TECHNICAL REPORT

Evaluation of the EDA Regional Innovation Strategies Program 2014 to 2017: Seed Fund Support and i6 Challenge Program

FOURTH economy

Published July 2019

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Executive Summary

Overview

In an increasingly global economy, regions are tasked with thinking more about their competitiveness, innovation capacity, and performance. The development and acceleration of innovation activities requires committed investment in both human capital—to generate new ideas—and infrastructure like R&D parks and incubators that enable technology transfer and the creation of new products. Incentivizing such innovation is vital to ensure a region's productivity can sustain long-term growth.

The Office of Innovation and Entrepreneurship (OIE), housed within the U.S. Economic Development Administration (EDA), operates two primary initiatives that focus on scaling innovation and supporting high-growth entrepreneurship. These competitive initiatives operate under the Regional Innovation Strategies (RIS) Program, a national grant program dedicated to increasing regions' capacity to translate innovation into jobs. The two opportunities, the i6 Challenge and the Seed Fund Support Program, are available to a variety of organizations that assist innovators and entrepreneurs. This evaluation report covers the Seed Fund Support (SFS) Program and the i6 Challenge projects awarded between 2014–2017.

The SFS Program provides grants for operational assistance to support the creation, launch, or expansion of equity-based, cluster-focused seed funds that invest in startups with a potential for high growth. The outcomes of the program include supporting innovation-based high growth entrepreneurship and startup acceleration and increasing the availability of regional risk capital for early-stage companies.

The i6 Challenge is designed to increase entrepreneurship that uses innovations, ideas, intellectual property (IP), and applied research to develop technology and make it market-ready, resulting in new businesses, accelerated paths to new markets, and new jobs. The i6 Challenge provides resources for a wide range of programs and services that support innovation-based, high-growth entrepreneurship and startup acceleration.

Purpose of Evaluation

This evaluation report examines the overall function of the RIS Program, examining how well the component programs (SFS and i6) work together. Additionally, it asseses the individual programs and their specific goals and metrics. Both programs are designed to advance high-growth entrepreneurship and scale innovation, but they provide different tools to serve different needs.

This evaluation analyzes the RIS Program's effectiveness and economic impacts to determine the following three objectives:

1. whether the Program is achieving its goals;
2. how the Program may be improved; and
3. whether the Program should be continued or terminated.

Fourth Economy Consulting was selected through a competitive open solicitation process to conduct the evaluation. Fourth Economy's team of consultants worked closely with U.S. EDA staff to verify the data and the operations of the RIS Program. Fourth Economy has direct experience in both the practice of innovation-based economic development as well as the research and evaluation of these programs. The team has directly led a variety of economic development initiatives and has produced a number of state and federal evaluations, including the Kansas Bioscience Authority, the Pennsylvania Keystone Innovation Zone, and the Small Business Administration Export Assistance Centers.

Summary of Findings

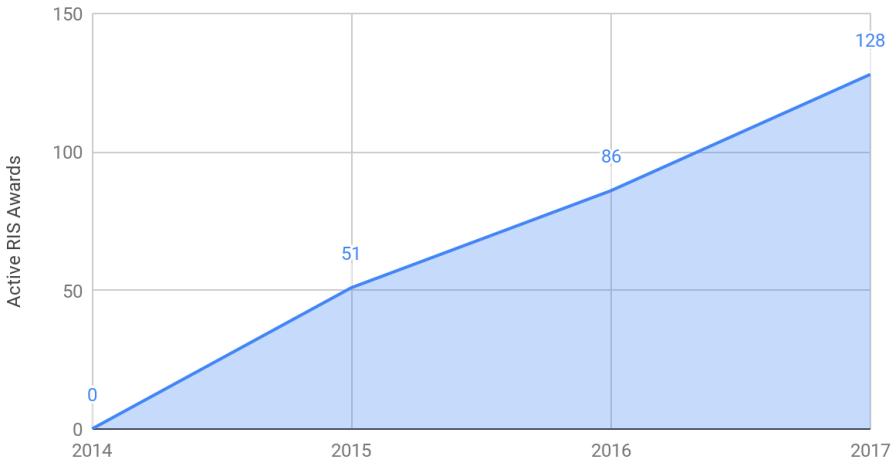
Overall RIS Program Findings

The RIS Program is highly competitive and the program is able to support only a portion of the overall demand. Requests greatly exceed the amount available. The budget for the RIS program grew by 173 percent from 2014 to 2017 and applications increased by 125 percent. The percent of awarded requests rose from 14 percent in 2014 to 20 percent in 2017. (See page 17: Strong Demand Makes RIS Highly Competitive.)

This volume of demand strains staff and team resources. Since each grant is a multi-year project, by 2017 the RIS portfolio grew to 128 active RIS projects for both SFS and the i6 Challenge. While some projects will be completed, any new round of projects could raise the portfolio total even higher. The program is supported by the EDA's Office of Innovation and Entrepreneurship (OIE). At the time that Fourth Economy conducted the program evaluation, OIE was comprised of five staff members, with two of those positions vacant. This left three people (but only two full-time equivalents) managing the program. Regional EDA staff members do provide grant management for projects in their territory, but the support of the RIS Program is not their primary responsibility. See page 15 for more staffing details. Additional staff capacity with appropriate experience in innovation and entrepreneurship will be needed if this volume of activity increases. A caseload of 42 to 64 projects distributed across the United States is too high

of a burden to adequately review progress reports and provide assistance to the grantees. (See page 16: RIS Applications and Grants Awarded.)

Figure 1: Active RIS Awards, 2014 to 2017



The National Science Foundation's (NSF) Established Program to Stimulate Competitive Research (EPSCoR) sets aside funding and establishes partnerships with government, higher education and industry in order to improve a state's research infrastructure and R&D capacity. EPSCoR distributes resources to the "have-not" states and provides a mechanism for broadening the geographic base and reach of innovation capacity in the United States.

> *A jurisdiction is eligible to participate in the NSF EPSCoR Research Infrastructure Improvement Grant Program (RII) if their most recent 3-year level of NSF research support is equal to or less than 0.75% of the total NSF Research and Related Activities (R&RA) budget.*[1]

While the RIS Program is highly competitive, it is serving a continuum of innovation environments. It is supporting states with an established innovation economy, as well as states that are still developing their research base and innovation economy. States that qualify for the EPSCoR program have low levels of research support, so EPSCoR reflects whether a state has a strong research base for its innovation system. Based on the awards to date, there is no bias towards non-EPSCoR states. The RIS Program has awarded grants to 17 percent of the applications from EPSCoR states compared to 16 percent of the applications from non-EPSCoR states. Entrepreneurship is a high-risk, high-reward enterprise; therefore, it is important that the program supports qualified applications. A competitive process is necessary to ensure high

[1] See https://www.nsf.gov/od/oia/programs/epscor/Eligibility_Tables/FY2018_Eligibility.pdf

quality programs that can effectively grow the innovation ecosystem and develop entrepreneurship. Applicants from EPSCoR states or regions with fewer resources and assets may need more assistance in the development of these programs and applications, which may require leveraging additional staff capacity or the ability to leverage the capacity of experienced peer organizations in other states. However, awarding grants solely on the basis of need or lowering the threshold for qualifying for a grant is not advisable. (See page 19: RIS Awards in EPSCoR and non-EPSCoR States.)

Summary of SFS Findings

After four years of activity, the following findings are sufficiently robust to provide clear evidence of the impact of the program to inform program recommendations.

- **Rapid Expansion -** In just three years of operation, the SFS program's seed fund activity has grown rapidly, reaching impact levels comparable to and serving as complements to other early stage investors. (See page 37: Seed Fund Activity Overview.)

- **Growing Underserved Markets -** The SFS Program has already achieved a significant market share in several states, especially states with fewer than 500 firms having received venture capital. (See page 38: What is the market share of the SFS Grantees?)

- **Leveling the Field -** The SFS program has provided more grants to EPSCoR states, expanding access to risk capital in areas where it is not currently available. (See page 42: How has the SFS program helped Rural and Urban Areas? Also see page 45: Do regional conditions determine the impact performance?)

- **Meeting Capital Needs -** The SFS grantees are providing capital in amounts sufficient to meet the needs of most entrepreneurs. SFS grantees reported capital investments in their clients that ranged from $20,000 to $450,000 (with an overall average of $62,755), which is sufficient for the startup capital needs of more than half of the firms in business for less than three years. (See page 40: How does the SFS program perform in providing the level of capital needed?)

- **Efficient Job Creator -** The 2014 and 2015 cohorts of the SFS program have supported job creation at a cost per job that is comparable to EDA's Revolving Loan Fund program. (See below for the cost per job metrics, and in more detail on page 40: Performance of the SFS Grant Cohorts.)
    - EDA Revolving Loan Fund = one job for every $24,915 in leveraged funds.
    - 2014 SFS Cohort = one job for every $26,753 in leveraged funds.
    - 2015 SFS Cohort = one job for every $29,661 in leveraged funds.

Several of the findings from this evaluation will require further investigation as additional data on the impacts of these projects becomes available. The evidence available at this time is not solid enough to justify making program changes on its basis, but these findings may have implications for strategies that can enhance the impact of the SFS program for different regions.

- In states with low access to risk capital, SFS grantees were more active in making investments than those in states with high access to risk capital. These grantees may be seeding activity to grow the entrepreneurial pipeline.

- Grantees in states with low access to risk capital generated fewer companies. This may reflect a more conservative approach to company creation or the need to spend more time and effort to build an entrepreneurial culture. They also provided smaller average investments, which may reflect lower business costs or a strategic decision to give entrepreneurs some capital to prove themselves.

- Regional conditions alone do not explain the success or level of impact of the grantees, but there is insufficient data to attribute differences in success to other factors such as the capacity of the organization or the operational strategy of the program.

Summary of i6 Challenge Findings

- **Expanding Innovation Infrastructure -** The i6 program has supported an expansion of the innovation infrastructure in the United States. Overall, 36 states have received at least one i6 grant since 2014, with 42 total states supported by the RIS Program. (See page 16: RIS Applications and Grants Awarded.)

- **Maturing Programs -** The i6 Challenge portfolio has matured over time, from the programs piloted in early 2014-15 to more established programs in later cohort years. (See page 55: Performance of the i6 Grant Cohorts.)

- **Efficient Job Creator -** The job creation of the i6 grantees has been very cost effective; the 2015 cohort created one job for every $3,062 spent. The cost increases to $7,832 dollars per job for programs operating for fewer years. This suggests that *performance may increase* over time, or that programs created by *established organizations* may be able to perform at a higher level, unless they are targeting an underserved region or population, or focusing their effort on an emerging technology sector. (See page 55: Performance of the i6 Grant Cohorts.)

- **Diverse Regions -** i6 grantees are generating impacts regardless of the innovation level of the state and its degree of urbanization. However, the most rural states also tend to have lower innovation levels and may require more time and support to build the ecosystem and become self-sustaining. (See page 60: Performance of i6 Challenge by State Conditions.)

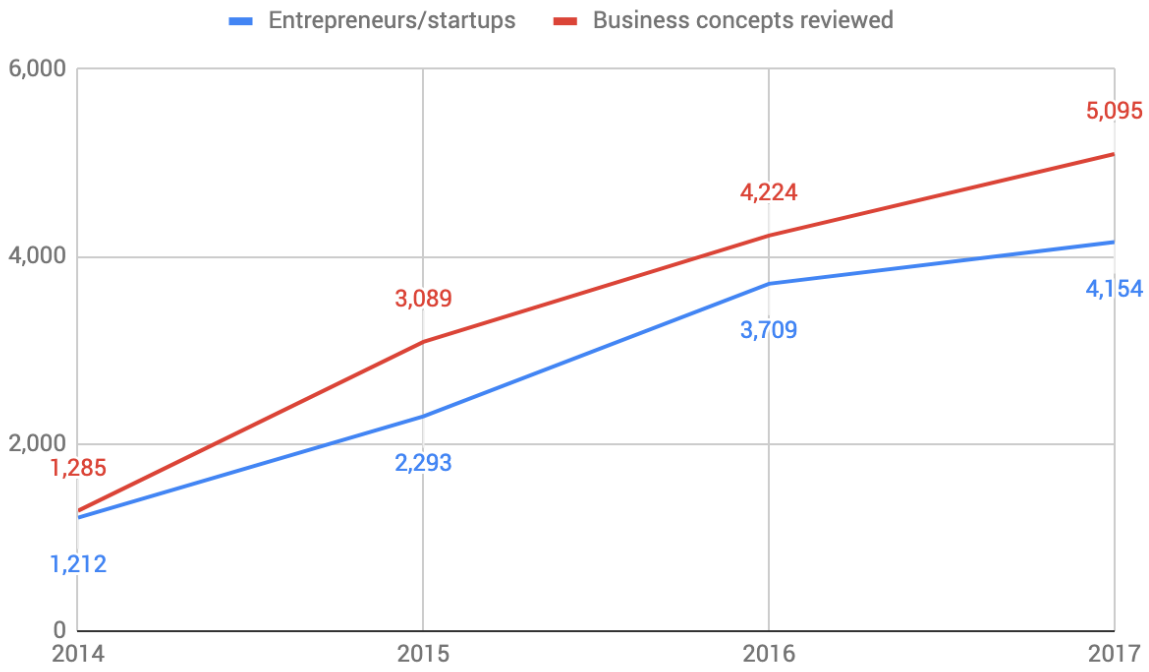
- **Flexible Approaches -** i6 Grantees have employed a wide variety of strategies to achieve diverse goals. There is no "one-size-fits-all" approach. Efforts that are open, or not technology- or sector-specific, may be better suited to regions that need to increase entrepreneurship, whereas programs that define a specific sector or technology niche may work better where the primary need is to diversify or build on a specific competitive advantage. (See page 61: How does the technology focus of Grantees impact performance?)

The following findings indicate levels of success and impacts across individual i6 cohorts. Since there are many variables that can influence cohort impact, these trends are not concrete and may change over time. A more detailed look at these findings is in the full report.

- **Growing Impacts -** After four years of activity, the 2014 projects have generated significant impacts. Within the next two years, as projects mature and the awards increase from 17 per year to 27, the overall program impacts should significantly increase as well. (See page 51: Overview of the i6 Challenge.)

- **Building the Entrepreneurial Pipeline -** The i6 Challenge has supported a rapid increase in the number of entrepreneurs and startups that receive support services from the grantees. By the end of 2017, the i6 Challenge grantees worked with 4,154 total entrepreneurs and startups and reviewed 5,095 business concepts. (See page 54: To what degree has the i6 Challenge expanded the nation's innovation infrastructure?)

Figure 2: i6 Grantees Support a Growing Number of Entrepreneurs



Recommendations for the RIS Program

This evaluation provides an analysis of the RIS Program's effectiveness and economic impacts to determine the following three objectives:

1. whether the Program is achieving its goals;
2. how the Program may be improved; and
3. whether the Program should be continued or terminated.

Achieving Goals

Seeding Innovation Investment - The RIS Program serves a critical role as the first investor (or angel investor) of the innovation ecosystem that seeds organizations and activities that can then attract sustaining support from local sources. Together the SFS Program and the i6 Challenge programs are expanding the infrastructure for innovation and entrepreneurship across the United States.

Increasing Access to Risk Capital - The RIS Program is demonstrating promising results in increasing access to risk capital. There is a need in the United States to expand access to risk

capital and level the entrepreneurial playing field. Only 11 out of 1,000 firms younger than two years old have access to risk capital. Without risk capital, businesses will only be started by those with personal wealth and resources. The SFS program has enabled local partners to raise $91 million in local risk capital available for investment, and those partners have deployed nearly $19 million of this local risk capital. The SFS program has achieved a significant market share in several underserved states.

Advancing Entrepreneurship - The RIS Program is rising to the challenge of advancing entrepreneurship and providing national validation that builds support to sustain these efforts. Rates of business creation by state range from a low of seven percent to a high of 13 percent, validating the need to promote entrepreneurship across the United States. Innovation and entrepreneurship require the development of a supporting ecosystem, which is not accomplished rapidly. The most well-known cases of the development of entrepreneurial hubs (Silicon Valley, Research Triangle, San Diego) took decades to become fully established and internationally competitive regions.[2] The organizations and collaborations behind those partnerships required stable, multi-year financial support. The i6 Challenge grantees have supported 4,154 entrepreneurs and startups in 36 states. From 2014 to 2017, the i6 Challenge also provided a maximum of $500,000[3] grant over three years with an average match from state and local sources of nearly $713,000. Though these critical catalytic resources are not sufficient to ensure self-sufficiency, they do provide enough to advance bolder visions and plans and to identify what works in a region.

Program Improvements

Maintain Flexibility - Flexibility is a hallmark of the RIS Program. It is critical that applicants have the ability to tailor the program to meet regional needs and priorities. The RIS Program recognizes that there is no single path to a prosperous future, so it allows participants to develop an approach best suited to their needs and capacities.

Simplify the Metrics - The flexibility of the program, however, has created a complex system of performance metrics that are not tracked consistently. The RIS Program can be improved by simplifying and streamlining data collection and tracking. A panel of willing and experienced grantees should be convened to identify the core metrics that must be tracked as well as a limited number of models and options that applicants can employ based on their staff capacity and resources. To reflect the flexibility of the program, applicants should have the option to track and report supplemental metrics in addition to the required core metrics. This could help

[2] Wessner 2013 and Tornatsky et. al. 2002.

[3] The cap has been raised to $750,000 for the 2018 grants.

resource-constrained applicants limit the effort spent on tracking impacts. Grantees around the country would benefit from learning from their peers about the level of effort and costs associated with different methods of tracking and monitoring.

Scale Staff Resources to the Portfolio - Staff support for the RIS Program must be scaled to the active portfolio. There were 128 active projects supported by three staff members, two of whom spent fifty percent of their time on the RIS Program, which equated to two full-time equivalents. Regional EDA staff members provide grant management for projects in their territory, but support of the RIS Program is not their primary responsibility. Given that these projects are dispersed around the country, this caseload of 42 to 64 projects each is not optimal. A caseload of 15-20 projects is ideal, so that staff can better monitor progress reports and provide support to the projects in the RIS portfolio. The OIE staff should be a resource for the grantees, but they need enough staff capacity to support the active project portfolio. An ideal system would integrate staff who have regional expertise with staff whose expertise is related to the specific program goals of:

- Innovation
- Entrepreneurship
- Regional Connectivity
- Bringing Innovation to Market

Provide a Pre-Application Review - Entrepreneurship is a high-risk endeavor, so awarding grants to unprepared applicants is not likely to result in success for the entrepreneurs in the region. The RIS Program must remain a competitive program, with a high threshold for admittance, but there needs to be a mechanism for supporting and improving applications from regions that have a higher level of need and fewer resources. In 2014, the RIS Program provided grants for feasibility studies for Seed Funds, but this has not been a specific element of the program. As a competitive program, the RIS Program is not suited to supporting feasibility studies or planning grants. This kind of support is available through other programs at the EDA and should not be duplicated within RIS. There can be better integration between the RIS Program and the Local Technical Assistance program and the Planning programs, managed out of the regional offices.

Creating a simplified referral or feeder system to these programs would enable RIS applicants to access feasibility, planning or other support to develop more competitive applications. Adjusting the application process to include a 3–5-page pre-application or project overview would reduce the burden on applicants who are not ready to submit a competitive application and it would reduce the burden on OIE staff in reviewing unqualified proposals. Aligning this pre-application with other EDA programs for technical assistance and planning would enable these regions to reduce the time spent on unsuccessful applications and increase time spent identifying expert

resources, filling gaps in the regional ecosystem, and sharpening the innovation strategy for the region.

Program Continuation

Continue to Catalyze - The RIS Program has generated initial successes and promising early returns but economic transformation does not happen quickly. The RIS Program remains early in its evolution and it **should be continued** as a vital catalyst for supporting state and regional innovation.

> Without this funding, we could not have launched the program. While many *talk entrepreneurship*, few *fund it*.
>
> *(RIS Participant)*

Amplify Capacity and Credibility - In the program's few years of operation, it has provided critical funding that would otherwise have been impossible for participants to raise and access. When surveyed, participants in the RIS Program noted that the benefits also extend beyond funding, with many expressing that participating has *increased the visibility and credibility of their projects and initiatives*; added much *needed capacity to extend their reach more regionally*; strengthened the recruitment of advisors, additional partners, and, in some cases, investors; and even served as a catalyst to launch other programs.

Leveraging and Leveling - The variation in state and local business cycles can make it challenging to sustain regional programs during difficult budget years. The federal investment represented by the RIS Program *directly stabilizes the funding* for these programs and provides an incentive for state and local sources to sustain funding. The resources provided by the RIS *are critical to leveling the playing field* so that the benefits of entrepreneurship and innovation are shared broadly, not just with a select few.

Building National Innovation Infrastructure - The RIS Program provides the only mechanism for developing a national support infrastructure for the innovation economy. Entrepreneurship and innovation remain hallmarks of American economic success. Even at this preliminary stage, the program is generating impacts in a cost-effective manner. The benefits of these investments are likely to generate a greater return over time, as more regions build their innovation ecosystems and grow new generations of entrepreneurs.

Regional Innovation Strategies (RIS) Overview

Background

In today's fast-paced, knowledge-based economy, transformative advancements in technology are changing the way regions evaluate and define economic performance. Technology—and the innovation it enables—has become central to the development of regional economies and their ability to adapt to economic changes over time, address social and environmental challenges, and sustain economic growth and competitiveness.

One important pillar within the innovation ecosystem is small business development and entrepreneurship, which is a significant driver of economic growth. A significant amount of this growth and impact is driven by a small portion of disruptive, high-growth firms. As regions develop their innovation ecosystem, the number and quality of high-growth firms will increase. Furthermore, a healthy climate for innovation and entrepreneurship provides a range of benefits for the economy, from the creation of new goods and services that enhance the quality of life for companies and individuals, to creating jobs, increasing wealth and income, and providing new opportunities for growth during economic transitions.

In order to compete, it is critical for regions to have the capacity and necessary infrastructure to encourage the presence and activity of entrepreneurship and innovation. The combination of research and development networks that help generate new ideas and knowledge; mechanisms to turn those ideas into marketable commercial products; varying sources of risk capital; and a talented and highly-skilled workforce are the critical components that enable entrepreneurship driven by technology and innovation. These assets take the form of programs and policies to support such growth. Regional and state-wide efforts include investments in accelerators, incubators and other regional or industry-specific ecosystem initiatives; expanding University R&D programs and public/private industry collaborations; increasing the availability of co-working spaces, makerspace settings, and shared collaborative labs and resources; making available proof of concept, seed and venture funds; and providing training, mentoring and education programs. All of these assets working together as one integrated innovation ecosystem allows businesses to start and scale for greater economic impact.

Staffing of the EDA's Office of Innovation and Entrepreneurship

The RIS program is managed through EDA's Office of Innovation and Entrepreneurship (OIE). At the time that Fourth Economy conducted the program evaluation, OIE was comprised of five staff members, with two of those positions vacant. This left three people (but only two full-time

equivalents) managing the program. This level of transition is not unexpected in a small office, where one vacancy leads to 20 percent or more loss in program support. In addition, staff and senior leaders have competing duties with other programs and activities that divide the time and attention they can dedicate to program management and operations. This makes it challenging to support the grantees and provide the level of assistance that would increase their effectiveness.

RIS Applications and Grants Awarded

The RIS Program supports two primary initiatives: the i6 Challenge (i6) supports regional projects for innovation and entrepreneurship, and the Seed Fund Support (SFS) Program provides operational support for regional projects to organize or operate equity investment networks that provide seed funding or enhance the operations and availability of private funding. The differences between these initiatives require that they be evaluated separately. There are states and regions that have both i6 and SFS projects; therefore, some aspects of the evaluation will consider the potential interaction effects of these programs.

Table 1: RIS Applications and Awards by Year

	2014	2015	2016	2017	Total
i6 Awards	17	17	27	27	88
i6 Applications	131	124	176	157	588
SFS Awards	9	8	8	15	40
SFS Applications	48	49	62	60	219
All RIS Awards	26	25	35	42	128
All RIS Applications	179	173	238	217	807
Overall Award Rate	15%	14%	15%	19%	16%

Strong Demand Makes RIS Highly Competitive

The level of interest in the RIS Program has been growing since the reorganization of the program in 2014. Overall, the RIS Program has awarded grants to 16 percent of applicants. The RIS budget grew by 173 percent between 2014–2017 while requests only increased by 125 percent, so the percent of awarded requests rose from 14 percent in 2014 to 20 percent in 2017. Applications for the RIS Program are highly competitive and the program is able to support only a portion of the overall demand.

Figure 3: Program Demand, RIS Projects Awarded and Not Awarded

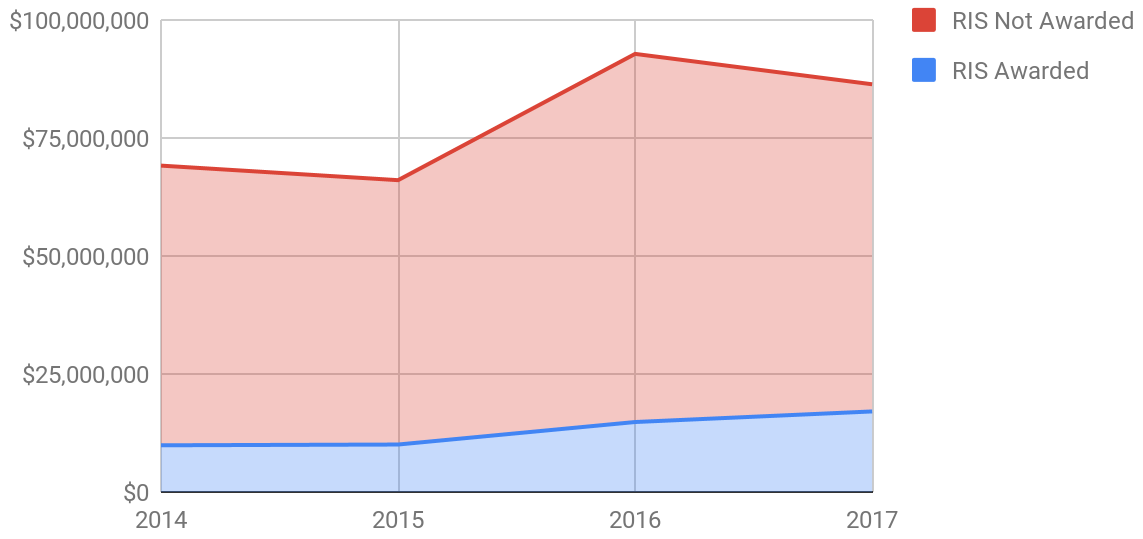


Table 2: Percent of RIS Requests Awarded

All RIS	RIS Awarded	RIS Not Awarded	RIS Total Requested	Percent Awarded
2014	$9,887,150	$59,245,267	$69,132,417	14%
2015	$10,048,290	$55,998,689	$66,046,978	15%
2016	$14,815,159	$77,983,456	$92,798,615	16%
2017	$17,058,991	$69,302,136	$86,361,127	20%
Total	$51,809,590	$262,529,548	$314,339,137	16%

The SFS program is the smaller of the two programs under the RIS Program. It has received fewer applications and requests for support. The budget for the SFS program more than doubled between 2014 and 2017, which raised the share of awarded requests from 18 percent to 25 percent.

Table 3: Percent of SFS Requests Awarded

SFS	SFS Awarded	SFS Not Awarded	Total Requested	Percent Awarded
2014	$1,916,881	$8,722,301	$10,639,182	18%
2015	$1,998,181	$9,927,696	$11,925,877	17%
2016	$1,895,460	$11,757,208	$13,652,668	14%
2017	$4,174,300	$12,612,606	$16,786,906	25%
Total	$9,984,822	$43,019,811	$53,004,633	19%

The i6 Challenge has awarded four times the amount of the SFS program. The budget requests for the i6 Challenge are five times the requests for the SFS program, making this program even more competitive.

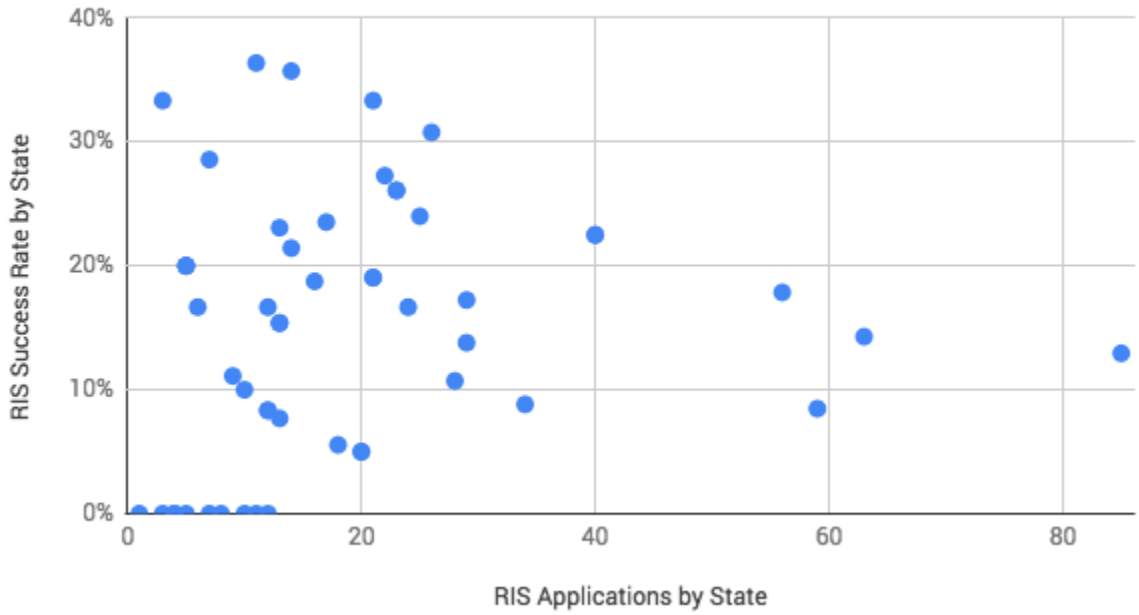
Table 4: Percent of i6 Challenge Requests Awarded

i6	i6 Awarded	i6 Not Awarded	Total Requested	Percent Awarded
2014	$7,970,269	$50,522,966	$58,493,235	14%
2015	$8,050,108	$46,070,993	$54,121,101	15%
2016	$12,815,625	$66,226,248	$79,041,873	16%
2017	$13,215,306	$56,689,530	$69,904,836	19%
Total	$42,051,308	$219,509,737	$261,561,045	16%

The applications can come from a variety of eligible entities operating independently or in a consortium. States and regions that submit more applications tend to have a lower success rate for awards. Given the competitiveness of the program, and the difficulty of assembling the application, applicants could be better served by a process that will help them focus and improve the quality of their application. A pre-application process with a 3–5-page project overview would give applicants an opportunity to get feedback on how to improve their proposals; additionally, it would be a chance to inform applicants about other programs with additional resources to help them further refine and enhance their strategy. The application process is difficult and time

consuming and a pre-application would help applicants determine whether they are ready to submit or if they need to refine their approach. The RIS Program has received an average of more than 200 applications each year. The pre-application process could also help to reduce the number of full applications that have to be reviewed, which would free staff time and resources.

Figure 4: RIS Applications and Success Rates by State (Dots Represent Activity by State)



RIS Awards in EPSCoR and non-EPSCoR States

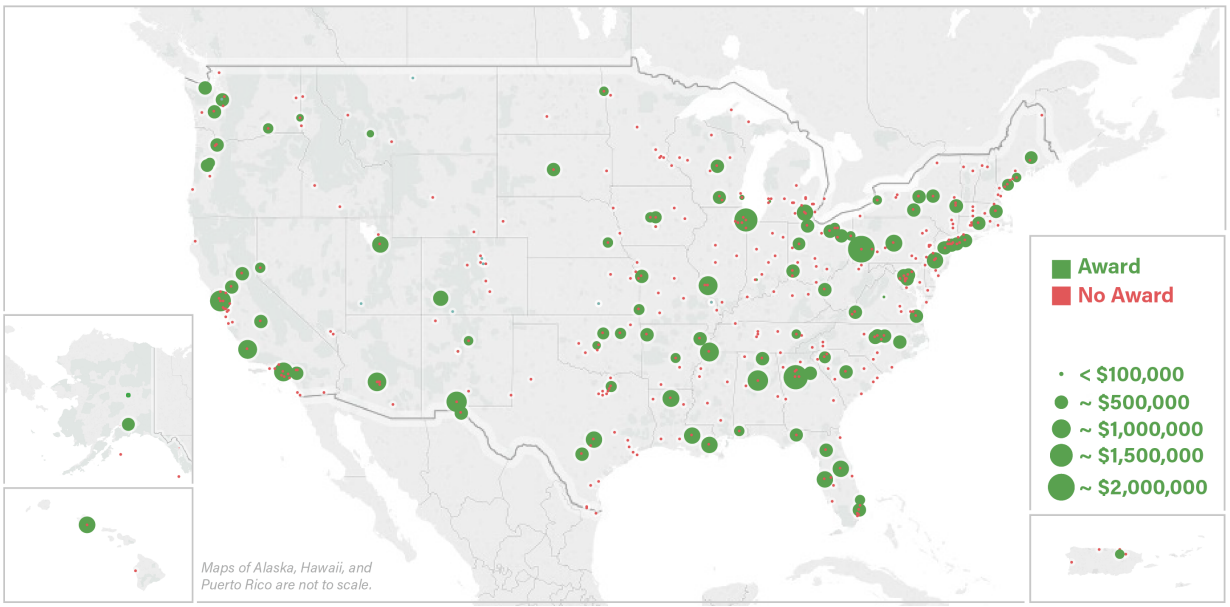
The overall RIS Program has made 47 awards to EPSCoR states compared to 115 awards to non-EPSCoR states. However, the non-EPSCoR states submitted more applications. The overall success rate for EPSCoR states was 17 percent compared to 16 percent for non-EPSCoR states. EPSCoR states with low innovation levels have submitted fewer applications and may need more strategic program development assistance to develop competitive applications. However this may be difficult to accomplish with the limited staff resources available (see page 13: Scale Staff Resources to the Portfolio.)

Table 5: RIS Awards to EPSCoR States

	Non-EPSCoR	EPSCoR
RIS Awarded	115	47
Total RIS Applicants	723	279
Award Rate	16%	17%

Figure 5: Map of RIS Grantees and Unsuccessful Applicants

The map shows the locations of awards (sized by amount) and unsuccessful applicants (in red).



The projects funded through the RIS Program between 2014 and 2017 have been broadly distributed across the United States, providing a variety of programs and services to promote access to risk capital, innovation, entrepreneurship, regional economic development, and commercialization of research.

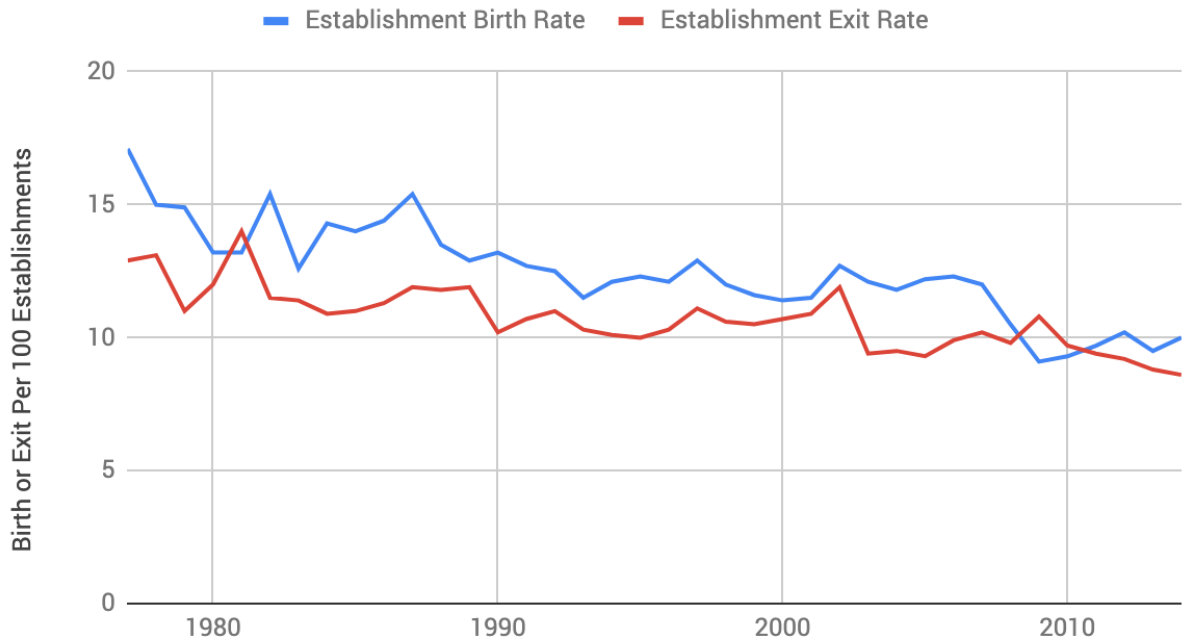
Baseline Trends

The RIS Program aims to support the growth and expansion of innovative and entrepreneurial firms by funding regional programs that assist high-growth businesses. Evaluations of the RIS Program's performance must consider the overall business climate in the United States. The following section reviews the trends and conditions affecting these programs' operation and assesses the factors that may influence the impacts and outcomes that the RIS Program seeks to achieve.

What is the trend for business formation in the United States?

The overall rate of establishment births has fallen steadily since the data began to be tracked in 1977. There were about 17 establishment births for every 100 establishments in 1977, and that number has fallen to 10 per 100 (in 2014). There has been a slight increase in the establishment birth rate since 2009.

Figure 6: U.S. Establishment Birth and Exit Rates, 1977 to 2014



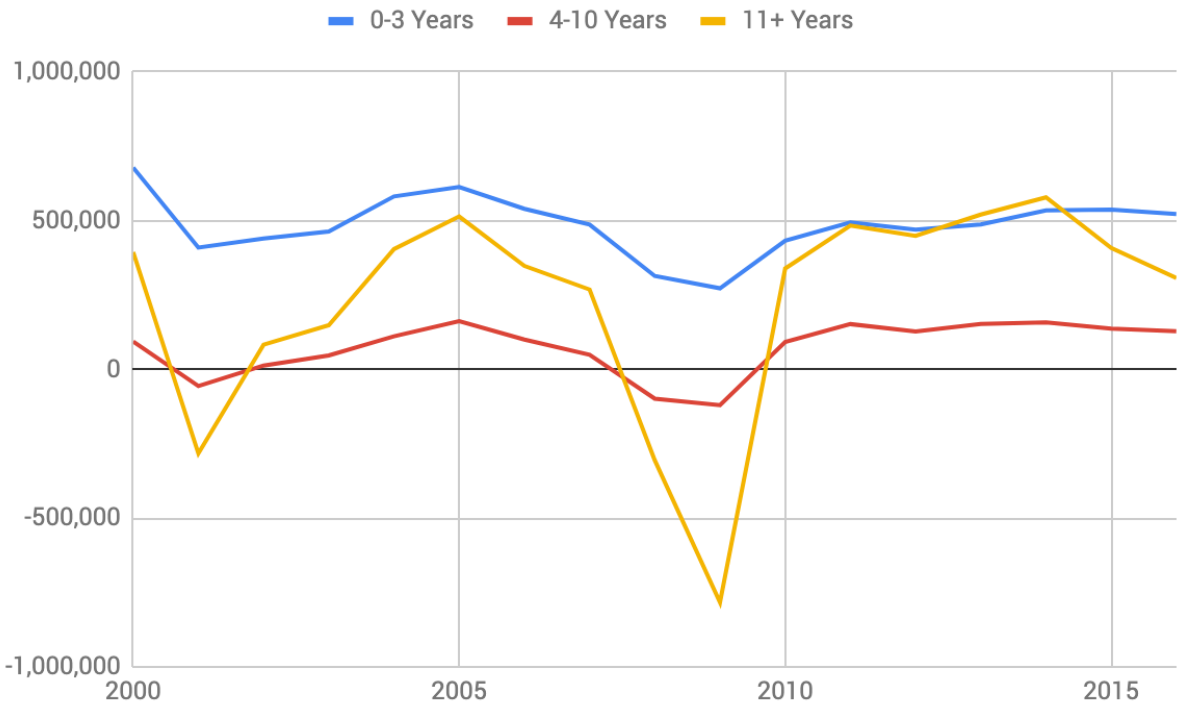
Source: U.S. Census Bureau, Business Dynamics Statistics (BDS)

This data is at the establishment level, so it includes large firms that are opening and closing locations. However, data on firm birth and exit for firms with 1–4 employees follows this trend, with the number of small firm births declining from 20 per 100 in 1977 to 15 per 100 in 2014. In future evaluations, as more data on firm birth rates becomes available, it will be critical to consider how this long-term trend may impact these regions and programs.

What do startups contribute to the economy?

Counteracting the long-term decline in the startup rate is critical for promoting healthy regional economies. There is debate about the role of startups and small firms in the economy, but there is substantial data to document the role of startups for creating and bringing to market new products and services, as well as their role in job creation.

Figure 7: U.S. Annual Net Job Creation by Firm Age (2000-2016)



Source: Quarterly Workforce Indicators

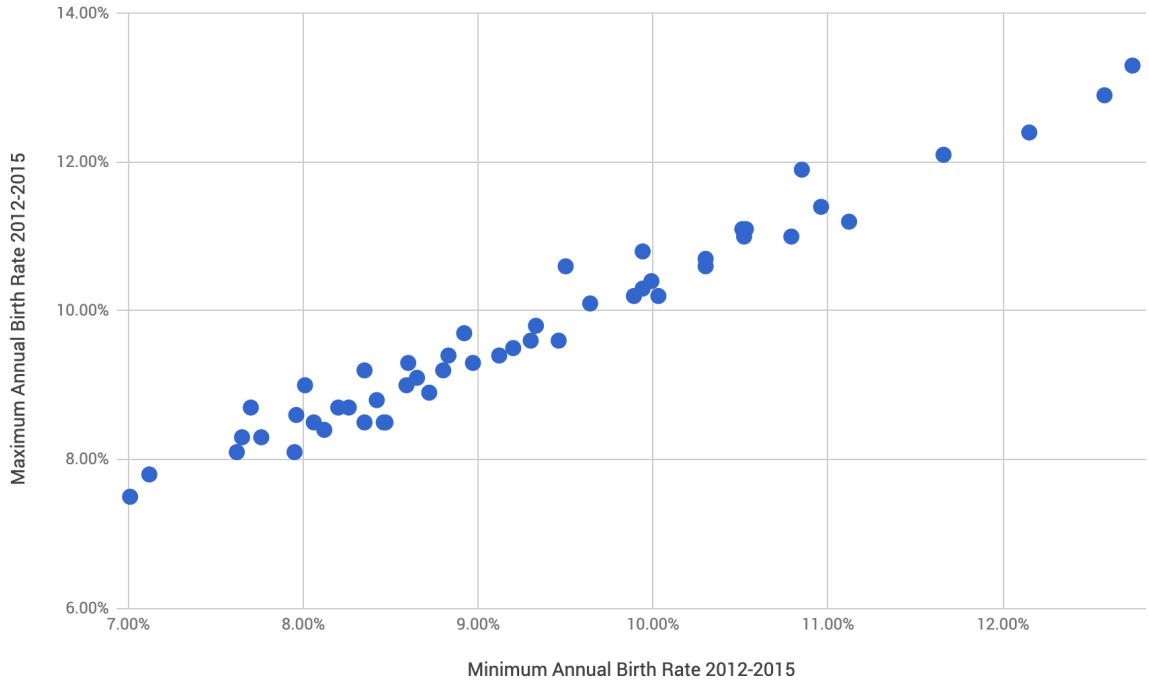
Startups are not a panacea for growth. There is a distinct "up or out" pattern of startup creation whereby many firms fail, but the ones that survive grow rapidly. On average, startup firms (age 0-3 years) have provided nearly 487,000 net jobs each year from 2000 to 2016. Startup job creation decreased during the economic decline in 2009, but still provided a positive net job creation of more than 272,000 jobs from 2000 to 2016, while older, established firms (aged 11 or more years) generated a net loss of more than 783,000 jobs. Firms aged four to ten years also declined by more than 120,000 jobs. Startups provide counter-cyclical employment growth—they grow when other firms shed jobs—and thereby provide a vital mechanism for stabilizing job creation.

How do startup rates vary in the United States?

The establishment birth rate varies significantly by state. The states with the lowest startup rates generate seven new firms per 100, compared to 13 per 100 for the most dynamic startup states. This difference of six firms has a cumulative effect. For the even the smallest state, this difference means the creation of 2,200 new firms per year instead of 1,200 new firms—a

difference of 1,000 per year. Expanding the startup pipeline enhances the climate and potential for generating high-growth businesses.

Figure 8: Mininum and Maximum Establishment Birth Rates by State, 2012-2015 (Dots Represent Activity by State)



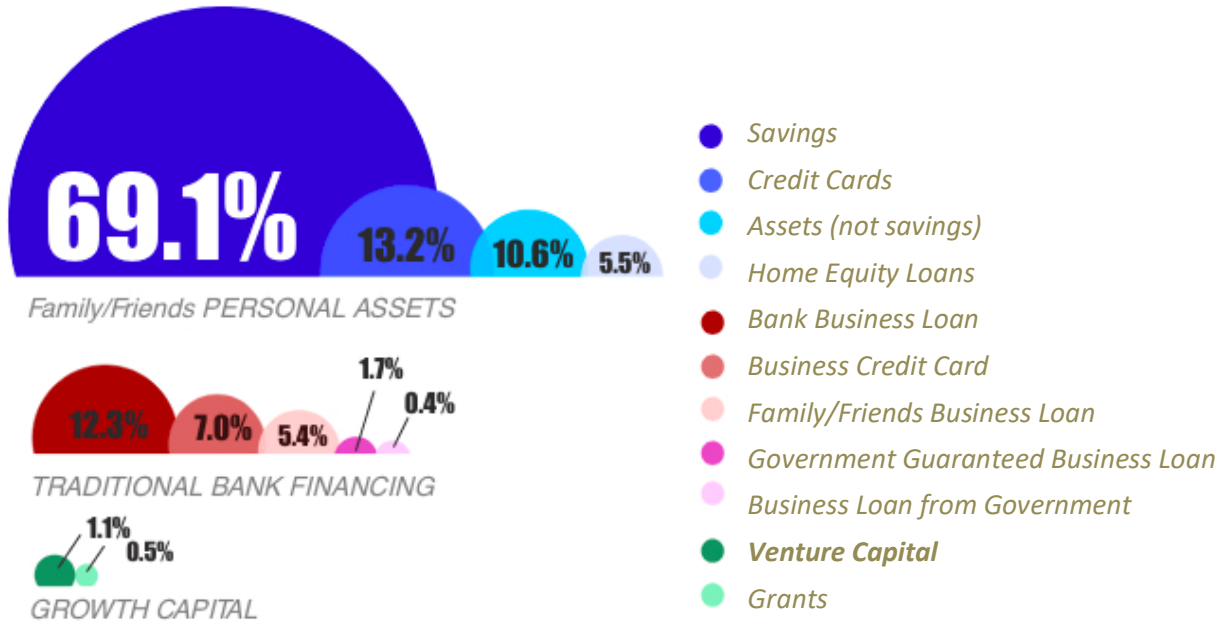
Source: U.S. Census Bureau, Business Dynamics Statistics (BDS)

Startup rates within a state are essentially stable in the short run. Data from the U.S. Census Bureau, Business Dynamics Statistics (BDS) concerning annual establishment births by state from 2012 to 2015 show that the difference between the highest and lowest annual rate of establishment births averages less than 0.5 percent. The state with the largest variation from 2012 to 2015 amounted to a difference of only one percent between the highest and lowest annual rates. Given the short-term stability of startup rates, these differences are likely to persist absent some intervention to enhance the infrastructure and support system for entrepreneurs.

Where do firms get their capital?

The personal assets of the owner and the owner's family are the most common sources of business financing, but relying solely on these sources limits entrepreneurship to the wealthy. Since we do not know which opportunities will create value, it is important to increase the pool of risk capital beyond the small amount that the market provides, which can create opportunities for those without family resources.

Figure 9: Sources of Capital for Startups (Less Than 2 years Old)



Source: Adapted from the 2014 Annual Survey of Entrepreneurs

Table 6: Use of Personal Assets to Start a Business

Source of Funding: Personal Assets	All firms	Less than 2 years old
Personal/family savings of owner(s)	63.9%	69.1%
Personal credit card(s) carrying balances	10.3%	13.2%
Personal/family assets other than savings of owner(s)	9.8%	10.6%
Personal/family home equity loan	7.3%	5.5%

Source: Annual Survey of Entrepreneurs, 2014

A small percentage of firms have access to resources beyond their personal assets. For startups less than two years old, only 12 percent are able to access traditional bank financing and seven percent establish a credit account for their business. Five out of 100 firms are able to get a loan or investment from family or friends. State and local governments operate a number of business loan programs, but these are often out of reach for startup businesses whose only collateral is intellectual property. As a result, 17 out of 1,000 firms under two years old access a government guaranteed business loan and only four out of 1,000 businesses are able to access a direct government loan. This leaves a lot of businesses out of the capital markets.

Table 7: Use of Traditional Debt Capital to Start a Business

Source of Funding: Traditional Debt Capital	All firms	Less than 2 years old
Business loan from a bank or financial institution	17.9%	12.3%
Business credit card(s) carrying balances	5.3%	7.0%
Business loan/investment from family/friends	5.0%	5.4%
Government-guaranteed business loan from a financial institution	1.9%	1.7%
Business loan from federal, state, or local government	0.4%	0.4%

Source: Annual Survey of Entrepreneurs, 2014

Personal assets and debt are not the ideal path to building a high-growth business. Most firms do not have access to traditional financing provided by banks—especially startups where the only collateral is intellectual property. This creates an environment in which only the wealthy have the ability to start a business. Very few firms are able to access traditional bank financing, even loans that are guaranteed by federal, state or local governments. High-growth businesses require access to investment capital, but only 11 out of 1,000 firms are able to tap into these resources.

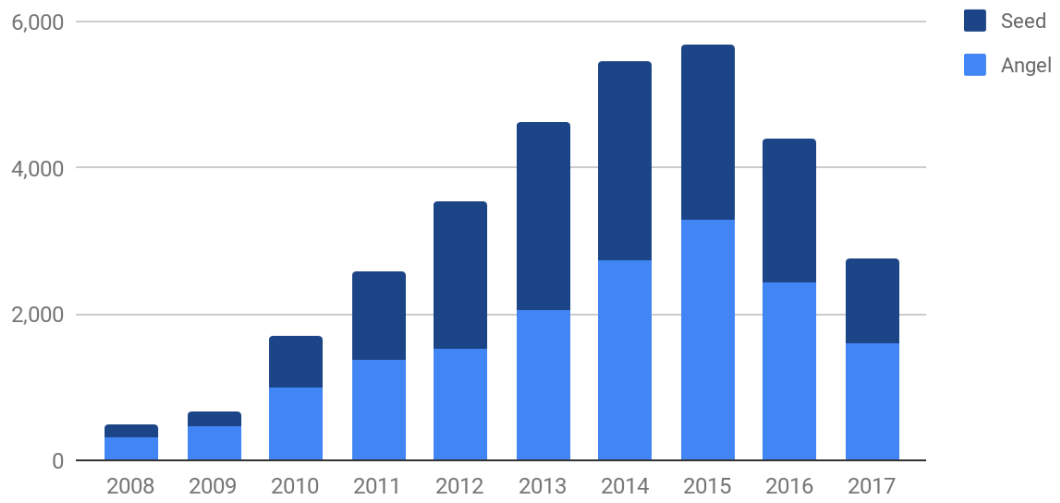
Table 8: Use of Growth Capital to Start a Business

Source of Funding: Growth Capital	All firms	Less than 2 years old
Investment from venture capital	**0.6%**	**1.1%**
Grants	0.3%	0.5%

Source: Annual Survey of Entrepreneurs, 2014

The number of deals provided by seed and angel investors (funders who support the earliest-stage startup companies) has been shrinking since 2015. Angel and seed investors funded an average of 3,190 deals annually over the last decade. Furthermore, risk capital is unevenly distributed across the United States. In 2017, three states (CA, NY, MA) accounted for 75 percent of all risk capital investment in the U.S. The availability of growth capital in the U.S. is highly constrained and unevenly distributed.

Figure 10: U.S. Angel and Seed Rounds by Year

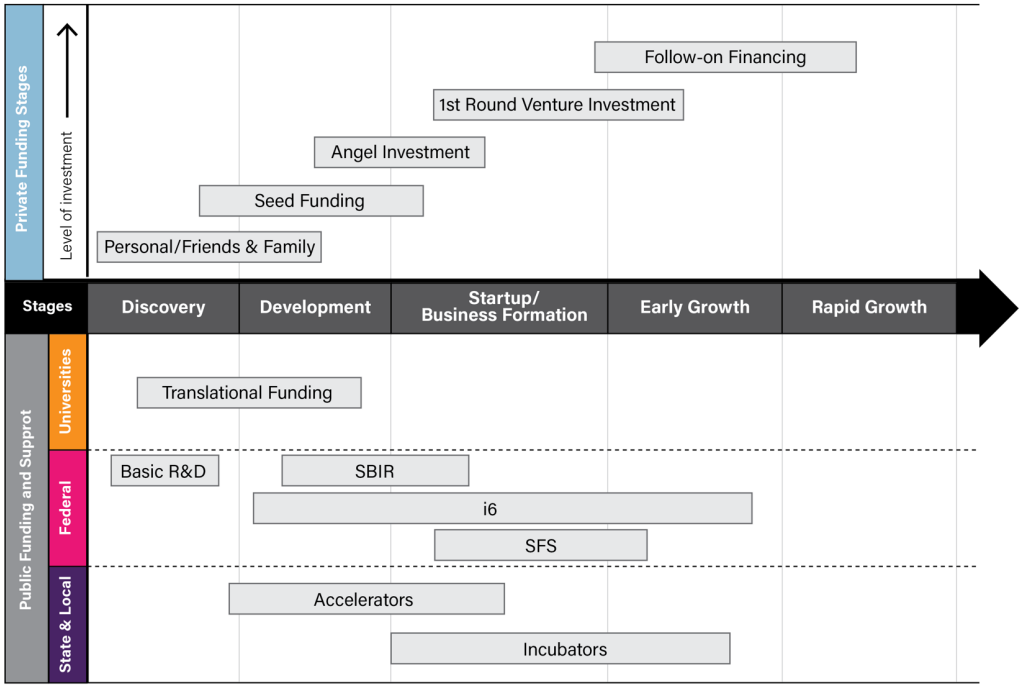


Source: PitchBook NVCA Q3 2017 Venture Monitor

What is the role of risk capital?

Many small businesses start small and stay small. They are often called "lifestyle businesses" that provide jobs and create wealth, but their growth is limited. Risk capital supports high-growth entrepreneurs and innovations that have the potential to disrupt existing markets. It is, by definition, a high risk, high reward investment. Access to risk capital is vital for the startup economy. Risk capital is a form of equity capital. Unlike loans or debt capital, investors receive equity shares or stock in the company. Investments made in early stage and startup firms are recouped as the market value of the company grows and other investors provide additional growth financing. The following graphic illustrates the stages of development of this high-growth, disruptive segment as well as the pools of capital, including the RIS Program, that are available.

Figure 11: Funding and Support through the Business Start-up Cycle



Source: Fourth Economy

What is the baseline for access to risk capital?

The Census Bureau and the Kauffman Foundation partnered to conduct the Annual Survey of Entrepreneurs (ASE), with the first survey covering 2014. These surveys provide a nationwide baseline for entrepreneurship and venture investment. If this survey continues it could also provide benchmarks for performance evaluation of entrepreneurial support programs. As a baseline, the ASE can assess whether the RIS Program is expanding access to capital and if it is providing sufficient levels of capital.

Table 9: States with the Lowest Rate of Venture Funding

States	Firms with Venture Funding	Total reporting	Percent Venture Funded
Alaska	28	10,711	0.3%
Arkansas	110	34,928	0.3%
West Virginia	60	18,654	0.3%
Illinois	725	175,852	0.4%
Nebraska	137	32,375	0.4%

Source: Census Annual Survey of Entrepreneurs, 2014

The 2014 ASE found that 25,950 firms out of 4,035,832 in the United States reported receiving venture investment. That equates to an average of 6.4 firms out of 1,000 (0.6%) with venture investment. For firms less than two years old that number rises to 11 firms out of 1,000 (1.1%) that have venture investment. The states with the least access to venture investment have only three per 1,000 (0.3%) with venture funding. Many, but not all, of the states with least access to venture investment are also small.

Evaluation Framework

Our evaluation of the RIS Program included a review of prior assessments of complementary support programs for innovation and entrepreneurship; the findings of this review influenced the design of our approach. In 2014, the University of North Carolina at Chapel Hill and SRI International conducted an assessment of the Jobs and Innovation Accelerator Challenge and the i6 Challenge program for 2010 and 2011 that relied primarily on survey results because few impacts were available at the time. Chhabra et al. (2018) conducted an evaluation of the research and science stimulus provided under the American Recovery and Reinvestment Act (ARRA) that employed a more sophisticated statistical approach that was not possible with the data available at this time. Paglia and Robinson (2017) reviewed the performance of the SBA's Small Business Investment Company (SBIC) Program, which provided $80.5 billion in capital for 172,800 financings from 1958 through December 2015. Their analysis is based on 1995–2014 SBIC data for 11,681 funded firms.

> *On average, one new job was created for every US$14,458 of funding invested through the SBIC Program, while an average of one job was created or sustained for every US$4,525 invested. Restricting the analysis to only those firms financed through active licensees, the authors found that one new job was created for every US$16,340 invested, and one job was created or sustained for every US$4,603 of SBIC funding.*
> *(Paglia and Robinson 2017, page 2)*

Brown and Earle (2012) conducted an econometric panel study of job creation by the SBA 7a and 504 loan programs. Using rigorous matching methods, the authors linked all SBA loans from 1953 to 2009 to universal data on all employers in the U.S. economy from 1976 to 2010. Their efforts resulted in a sample of more than 200,000 firms based on nearly 1.4 million loans made the by SBA.

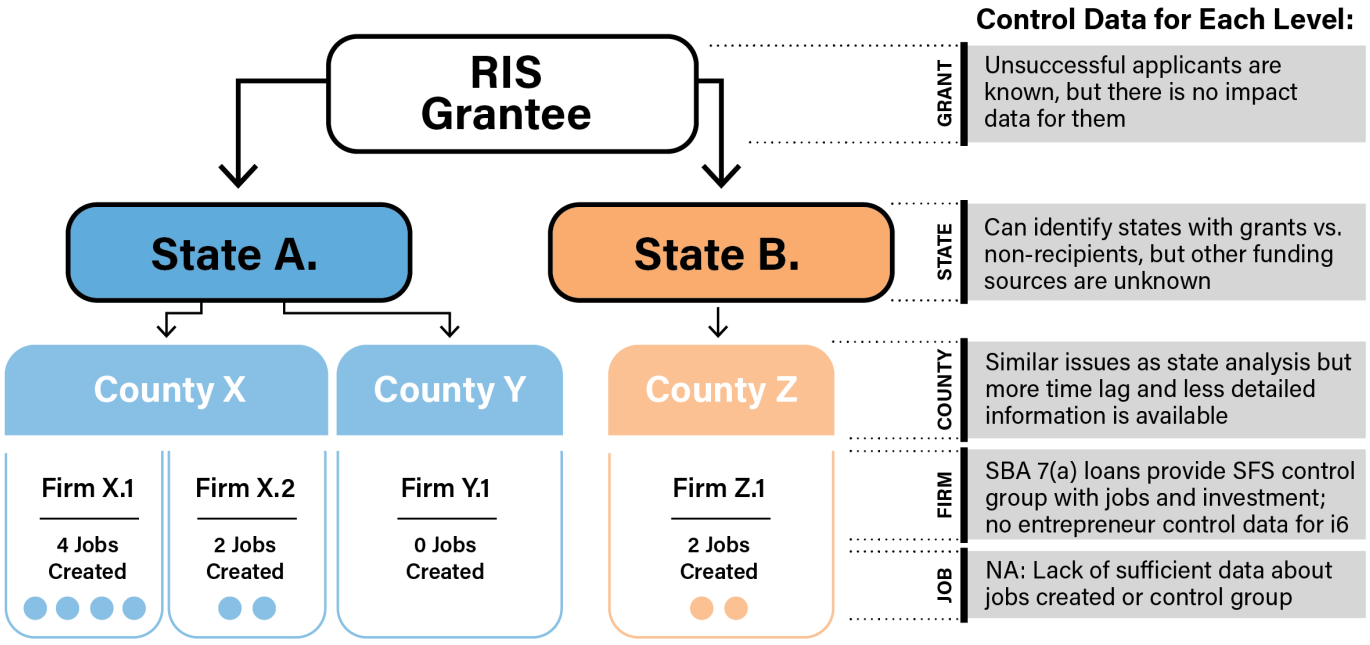
The RIS Program, operating since 2014, has worked with a mix of firms and individual entrepreneurs but the volume of activity between 2014 and 2017 does not yield a sample of subjects robust enough for the more sophisticated analyses in some of these studies. Many of

the services provided through the RIS Program were delivered to entrepreneurs, and no independent source data on entrepreneurs who are in the process of creating a business exists that would enable a comparison using more rigorous methods and estimates.

Data Challenges

There are several levels at which this analysis could be conducted if the availability and quality of data would support it. These possibilities are outlined below for both the SFS Program and the i6 Challenge to help define what might be possible in the future as the sample of projects and recipients grows and as the pool of outcome data provides a sufficient trend to determine if impacts can be attributed to program effects and not random variations or other influences. The ability to conduct this analysis also depends on the grantees ability to provide client-level detail that is not anonymized. More discussion of these challenges and how they may be addressed is provided in the section Data and Metrics Conclusions on page 64.

Figure 12: Levels of Analysis and Control Groups



If there are no additional project extensions, the 2014 and 2015 cohorts will be complete by the second quarter of 2019. There are 34 i6 projects in those cohorts and seventeen SFS projects. Given the time lags in reporting and data collection, by 2023 it will be possible to have 3 years of

post-project trend data for evaluation that would provide more control for random or cyclical variations in the data.

The factors and considerations that influenced the evaluation include the following:

- Internal Organizational Factors
  - Variation in grantee activities
  - Variation in grantee target regions
  - Size, maturity and capacity of grantees
- Internal Regional Factors
  - Variety and lack of consistent industry targets and definitions
  - Variation in initial regional conditions
  - Size and sophistication of the businesses and populations they serve
- External Factors
  - Local, national, and international economic conditions
  - Industry and technology trends
- Measurement Factors
  - Consistent benchmarks for outputs (e.g., What factors define a good job or high wage? How much regional variation should be considered?)
  - Uncertain time from intervention to outcome

Based on the data limitations at this time, this evaluation relies on the program metrics collected by the grantees and vetted by the OIE staff and the consulting team. The detailed client data could not be reliably matched at the firm level because many grantees submitted anonymized impact data for the firms assisted, which made it impossible to exclude those firms from a control sample. At the county or regional levels, the anonymized firm data prevented impacts from being associated to specific counties. Furthermore, general data on county conditions was not recent enough to provide adequate time trends. The analysis therefore relies most heavily on state-level conditions for examining program outcomes. Additional detail about the data sources is provided in Appendix 1: Data Sources on page 67.

Innovation and Regional Growth - The Theory

The program logic model for the RIS Program is grounded in a theory about innovation and entrepreneurship's role in regional growth. The RIS Program was designed using an emerging model of economic development that reflects the role that innovation and entrepreneurship play on a regional level and how those regional dynamics shape our national economic trajectory. A

definition of this new model and the role of government is detailed in "Economic Development: A Definition and Model for Investment," and briefly summarized below.[4]

In a resource-based economy the location and abundance of natural resources define the prospect of development. However, technology shifted the boundaries of opportunity by increasing development in peripheral locations. Furthermore, technology shifted the fundamental equation of development so that the capacity to create and transfer knowledge became the defining capacity in a knowledge-based economy (Feldman & Francis 2003). Whereas the location of natural resources occurs over millennia and is determined by human intervention, education and the creation of knowledge are entirely human capacities that can be developed over generations.

Education alone is insufficient for regional development. Technological progress and innovation do not occur in a vacuum but are embedded in the social and economic relations of people, firms and regions. Innovation can alter the required inputs or the production process to change the cost equations of production. Innovation can also create new market demand. In these ways, innovation is central to the development of regional economies and their ability to adapt to economic changes over time. Technological progress and innovation are no longer thought to be the result of individual acts of invention—they are now understood to be the accumulation of a series of creative ideas, innovations and new productive capabilities (Storper and Walker 1989, Aydalot 1986, Johnson 2010). Innovation is a collaborative, social enterprise that is not confined to individual persons or even individual firms. It is an interactive process of exchange and transformation that flows through decentralized networks of collaborators in public and private institutions (Stephan 2012). These networks may be coordinated by government programs (NASA, DoD, SBIR) or consortia (SEMATECH, World Wide Web Consortium).

Fostering these networks is not a process of picking winners, but of developing a support structure that fuels innovation and seeds a strong entrepreneurial sector. Innovation is inherently a process of discovery and development, while entrepreneurship is about risk-taking and forming opportunities into business ventures. Dynamic clusters provide the conditions for both innovation and entrepreneurship to interact.

> ***We never know which new opportunities will yield a high return and which projects or companies will fail. The best way to hedge society's bets is building the capacity of***

[4] Feldman, M.P, T. Hadjimichael, T. Kemeny, and L. Lanahan, (2016), "The Logic of economic development: a definition and model for investment." Environment and Planning C: Government and Policy. 34: 5-21. Also available from https://www.eda.gov/files/tools/research-reports/investment-definition-model.pdf.

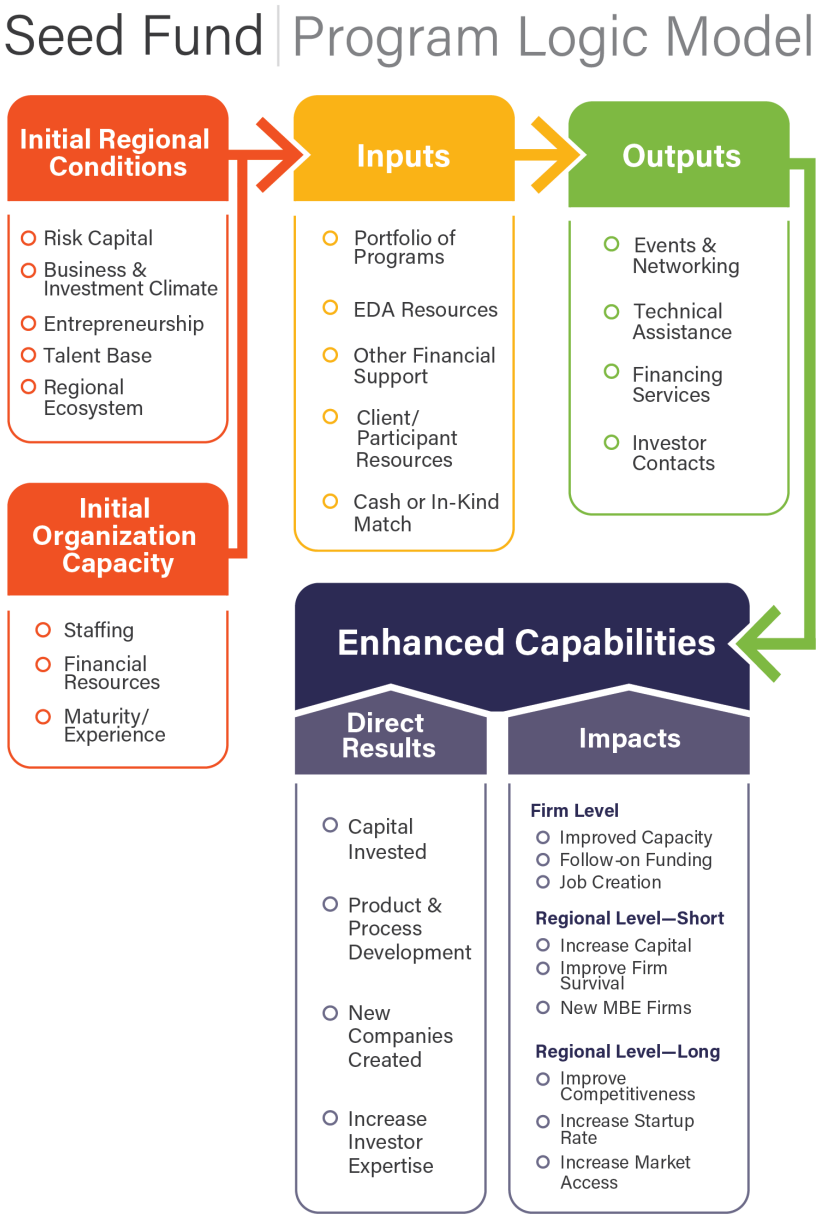
individuals to fully and creatively participate in economic and social life, and to incentivize companies to more fully realize their capability to add to the economy. (Feldman et al 2016)

If innovation systems and capacity are as fundamental as other forms of economic infrastructure, then it is important to add depth and variety to our "innovation ecosystem," both in terms of geographic distribution and the types of firms and entrepreneurs that are supported. Entrepreneurship is a "learning by doing" process, so each entrepreneurial firm is a training ground for another generation of entrepreneurs. In this sense, it becomes a self-replicating engine of growth. The support of regional innovation networks is akin to the programs to develop highways or provide electrification—all can produce broad benefits.

SFS Program Evaluation

A program logic model serves as a starting point for program evaluation. As a new program, the SFS program did not have an existing logic model. The project team created the following logic model specific to the SFS Program as an initial step in the evaluation.[5]

Figure 13: Seed Fund Program Logic Model



[5] The EDA has updated its logic model (see https://www.eda.gov/files/performance/EDA-New-Evaluation-System.pdf) so the logic models for the RIS Program are more specific versions of the EDA logic model.

Overview of the SFS Program

The Seed Fund Support (SFS) Program has provided 40 awards for programs in 27 states. In FY 2014 only, the SFS program provided support for feasibility studies to explore the creation of seed funds, as well funding to start new seed funds or expand the operations of existing seed funds, or in some cases the entire range of activities. The SFS Program does not directly capitalize the local seed funds or invest in clients. The SFS Program funds the operations and support activities, such as organizing and managing angel networks, conducting outreach, or providing matchmaking and education for investors and entrepreneurs. The local seed funds are created by a variety of organizations including universities, independent nonprofits, and investor consortiums. The local seed funds all define a market area for their investments although the exact size can vary greatly. Some of the local funds target specific technology or investment niches, while others will entertain potential deals from a range of industries that complement their regional innovation clusters.

Figure 14: Map of SFS Grantees and Unsuccessful Applicants

The map shows the locations of awards (sized by amount) and unsuccessful applicants (in red).

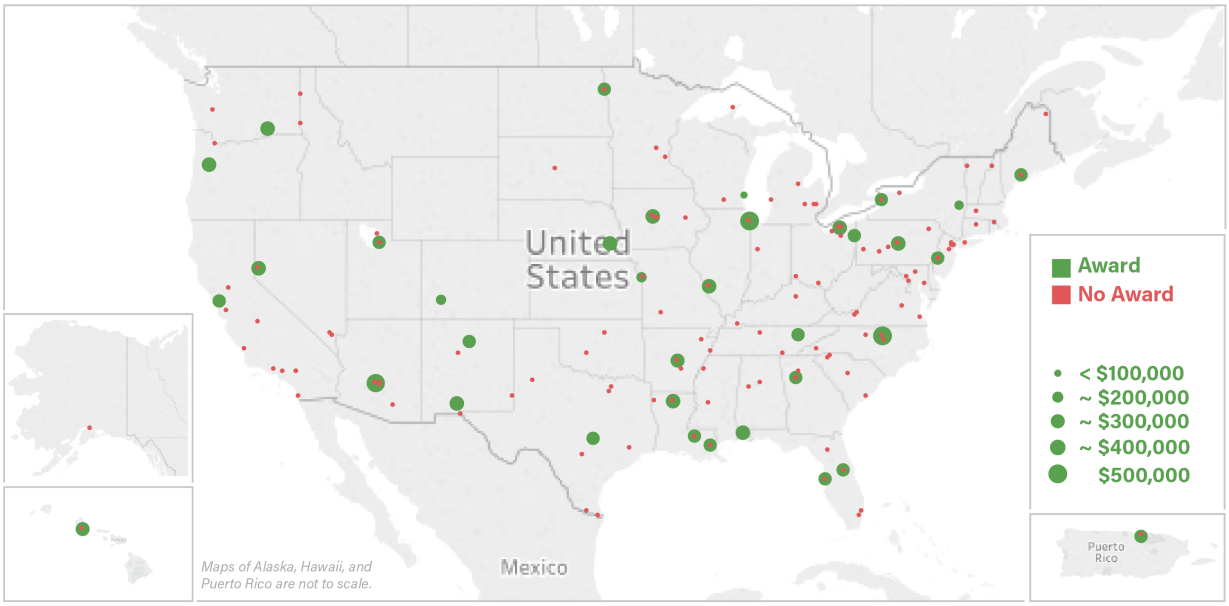


Figure 15: Summary Statistics of the Seed Fund Support Program 2014 through March 31, 2018

SFS Timeline for Impact

In measuring impacts of projects funded by the SFS Program, the maturity and type of organization are major influencers. As indicated in the table below, established organizations

have an advantage in generating impact results sooner than both new organizations and new programs in established organizations. For new organizations, impact results won't be seen until about the fourth year after the initial award.

Table 10: SFS Timeline for Impact

New or Established Organization	1 year after award	2 years after award	3 years after award	4 years after award
Established Organization	*Fund First Projects*	***First Impact Results***		
New Program / Established Organization	*Launch*	*Fund First Projects*	***First Impact Results***	
New Organization	*Develop*	*Launch*	*Fund First Projects*	***First Impact Results***

SFS Evaluation Detailed Findings

The SFS program aims to increase the availability of and access to regional risk capital for early-stage companies. For some regions, especially those that are transitioning from traditional industries, the focus is on connecting, educating, and equipping high-net-worth individuals to become angel investors so they can effectively deploy the sources of capital that exist within regions. More effective deployment of local capital will increase their capacity to attract external capital as well.

SFS grants provide funding for technical assistance, operational costs, marketing, and outreach related to the planning, formation, launch, or expansion of cluster-based seed capital funds that invest capital in innovation-based startups with a potential for high growth. These funds must be equity-based (e.g., revolving loan funds do not qualify).

Given the operating span of the Seed Fund Support (SFS) program, there is insufficient data to examine the impact of these grants; some of the earliest projects did not complete the grant period until September 30, 2018. As noted in the Timeline to Impact, it can take two to four years for a program to generate initial impact results. The 2014 cohort is now at the point where the activities funded through the SFS are generating impacts. The SFS grantees have reported their activities and impacts and this evaluation provides some analysis of these results, but at this time, these impacts are not reflected in sources of independent regional data due to the time lags

in those data sources. SFS projects that were awarded in 2014 began operations in the second quarter of 2015, so they did not generate significant impacts until 2016 or 2017, which at best provides one or two years of "post-treatment" data for a maximum of ten grantees. This doesn't provide enough of a sample to rigorously evaluate the outcomes. However, there are critical evaluation questions that can be answered at this time:

- How much do regional factors -- the business and investment climate in the state or region -- influence the success of the program? Do prior or existing conditions explain the performance of the grantees?
- Is the SFS program more effective in regions with available risk capital, or in regions that need to develop capital or improve access to capital?
- Does the SFS program provide sufficient resources for success?

Seed Fund Activity Overview

In its three years of operation, the Seed Fund Support (SFS) program has leveraged a significant amount of seed fund activity. The program serves as a complement to other early stage investors such as the Angel Capital Association (ACA). The ACA is a membership group of the earliest-stage investors. Provided in the comparison chart below, their seed fund activity in 2017 provides a good benchmark of how rapidly the SFS program has expanded since its inception. The SFS program complements these angel investors and helps to expand their reach.

Table 11: Comparing RIS SFS and Angel Capital Association

RIS Seed Fund Support	**Angel Capital Association - 2017**
233 investments	432 investment rounds in 393 companies
31 active SFS projects invested $18.9 million (out of $91.5 million raised) in 29 states	26 Angel Groups invested $102 million in 36 states
100 percent of the investments were less than $1 million	59 percent of the investment rounds were less than $1 million
Median investment per grantee of $882,500; Median investment per recipient of $50,000	Median investment per Angel Group of $202,000
100 percent of the deals were syndicated	73 percent of the deals were syndicated

The SFS program has developed a network of 840 investors, 489 of which have participated in an investment round. An average of 14 investors participated in each investment round. Each SFS network enables these investors to syndicate their deals, which reduces the risk to each individual investor, and enables them to assess more firms than they could individually. This helps to expand and develop the expertise of the investors. The recipient firms benefit from a broader network of more knowledgeable and savvy investors that can help them access later rounds of funding.

What is the market share of the SFS Grantees?

The SFS program does not provide capital directly to entrepreneurs but supports the operations of the local programs that provide access to sources of risk capital. Some local programs directly operate seed and venture funds that make targeted investments into startups and entrepreneurs. Based on the reported investments and location of the investment recipients supported by the SFS grantees, these grantees have achieved a market share of greater than one percent in nine states. In six of the states with fewer than 500 firms with venture capital, the SFS grantees attained a market share of more than two percent. As the SFS program matures, it creates the capacity to significantly expand access to venture capital in underserved areas. The state level data in the ASE survey includes firms of any age in the state, not just early stage firms. If data were available at the state level for early stage firms with venture investment, then the market share for early stage and startup firms would be even higher.

Table 12: States where SFS grantee investments account for 1% or more of all firms with VC

States	Total Invested	Companies Receiving Investment	Average Investment	All Firms with VC in States	SFS Grantee Market Share
AR	$282,322	15	$20,166	110	13.6%
AL	$1,000,000	17	$58,824	340	5.0%
MO	$214,262	13	$16,482	404	3.2%
AZ	$1,283,500	13	$98,731	468	2.8%
LA	$260,000	7	$37,143	265	2.6%
MN	$615,000	11	$55,909	483	2.3%
NY	$1,055,000	25	$42,200	1,768	1.4%
ND	$25,000	1	$25,000	89	1.1%
FL	$575,000	16	$35,938	1,543	1.0%

Source: SFS grantee reports and Annual Survey of Entrepreneurs, 2014.

Table 13: States where SFS grantee investments account for less than 1% of all firms with VC

States	Total Invested	Companies Receiving Investment	Average Investment	All Firms with VC in States	SFS Grantee Market Share
NE	$250,000	1	$250,000	137	0.7%
KS	$50,000	1	$50,000	228	0.4%
IA	$50,000	1	$50,000	357	0.3%
IL	$100,000	2	$50,000	725	0.3%
CA	$1,229,000	9	$136,556	3,702	0.2%
WA	$100,000	1	$100,000	698	0.1%
TX	$900,000	3	$450,000	2,240	0.1%
MI	$70,000	1	$70,000	794	0.1%
PR	$125,000	5	$25,000	NA	NA

Source: SFS grantee reports and Annual Survey of Entrepreneurs, 2014. NA: Puerto Rico is not in the ASE survey therefore a value is not available.

Using the national average in the United States of 6.4 firms receiving venture investment, the SFS program has been active in *eight states with above-average* venture investment (Table 14) and *nine states with below-average* levels of venture investment (Table 15).

Table 14: Eight States with above-average VC investment and SFS grantee investments

State	Firms with VC out of 1,000
TX	8.4
CA	7.8
IA	7.5
AL	7.1
AZ	6.8
WA	6.8
MI	6.5
NY	6.5

Source: Annual Survey of Entrepreneurs, 2014.

Table 15: Nine states with below-average VC investment and SFS grantee investments

State	Firms with VC out of 1,000
ND	5.7
FL	5.6
MN	5.5
KS	5.4
MO	5.2
LA	5.0
NE	4.2
IL	4.1
AR	3.1

Source: Annual Survey of Entrepreneurs, 2014.

State-level data provides a crude measure of access to venture capital as many of these programs are operating within sub-state regions with different levels of access to venture capital. Data on these sub-state regions does not provide a sufficient time frame to measure the level of

access to risk capital. Furthermore, many of the investments reported by the grantees are anonymized and do not indicate the company name or a detailed location, which limits the analysis at the sub-state level.

How does the SFS program perform in providing the level of capital needed?

Where the location and individual investments were reported, the SFS grantees provided capital that ranged from $20,000 to $450,000, with an overall average of $62,755. Some grantees are providing smaller grants of less than $1,000 to support businesses in their planning and due diligence. Based on the ASE data, the level of capital support offered by the SFS program is sufficient startup capital for 48 percent of all firms. Additionally, the capital support is sufficient for more than half of the firms in who have been in business less than 3 years and whose startup capital needs range from $10,000 to less than $1 million (shaded in green below).

Table 16: Amount of Capital to Start or Acquire a Business

Amount Required	All firms	Firms with less than 2 years in business	Firms with 2 to 3 years in business
Less than $5,000	15%	18%	16%
$5,000 to $9,999	8%	9%	9%
$10,000 to $24,999	12%	14%	13%
$25,000 to $49,999	9%	10%	11%
$50,000 to $99,999	10%	10%	11%
$100,000 to $249,999	10%	10%	11%
$250,000 to $999,999	7%	7%	7%
$1,000,000 to $2,999,999	1%	2%	2%
$3,000,000 or more	1%	1%	1%
Do not know	18%	11%	12%
Not applicable	9%	9%	9%
Percent of total reporting	72%	65%	66%

Source: Annual Survey of Entrepreneurs, 2014

Performance of the SFS Grant Cohorts

The 2014 and 2015 grants have had more time to invest funds and generate impact. The 2014 cohort included three projects out of nine total projects that only conducted feasibility studies:

- Greater Phoenix Economic Council, Greater Phoenix Seed Fund Feasibility Study

- Albany Medical College, Biomedical Acceleration & Commercialization Center at Albany Medical College (BACC) SEED Fund
- Regional Development Corporation, Venture Acceleration Fund Enhancement Project, New Mexico

Excluding the feasibility studies from the analysis, the results by year indicate that programs need at least three years of operation to reach their maximum effectiveness. In terms of the direct federal spending, the 2014 and 2015 cohorts are costing less than $5,000 per job created, plus an average of about $6,000 in matching funds. The early investments in operational activities for the 2014 and 2015 cohorts have resulted in a ramp-up of job creation. Over time, the 2016 and 2017 cohorts are expected to follow this trend.

Table 17: Spending and Investment to Support One Job

Dollars per Job	2014	2015	2016	2017	Average All Years
Federal Dollars per Job	$4,737	$4,842	$13,539	$19,783	$9,008
Match Dollars per Job	$5,833	$6,310	$14,787	$24,296	$10,963
Invested Capital per Job	$16,183	$18,509	$34,750	$8,989	$18,141
Total Leveraged Dollars per Job	$26,753	$29,661	$63,076	$53,068	$38,112

Note: Averages will not sum.

Federal and match spending on operational activities in the early years for raising funds, organizing investors and conducting outreach to entrepreneurs does not generate an immediate return on jobs or other impacts. However, in later years those returns begin to accelerate. The 2016 cohort has begun the transition from startup operations and made some initial investments that should generate jobs in future years. The relatively high amount of investment per job created ($34,750) reflects the time it takes from initial investment to generating economic returns. The 2017 cohort, by comparison, has a lower amount of investment per job created, but that reflects the fact that this cohort has less than a year of operating activity and has not yet invested as much capital as the 2016 cohort.

The Total Leveraged Dollars Per Job for both the 2014 and 2015 cohorts are comparable to the EDA's Leveraged Cost Per Dollar from the Revolving Loan Fund program, where $16.5 billion in leveraged financing has created or retained 662,000 jobs, for a cost per job of just under $25,000.[6] In terms of the creation of new companies and jobs, the 2014 cohort has generated the most companies per grantee, but the 2015 cohort has generated more jobs per grantee and per company created. The 2017 cohort has had relatively strong job creation considering the limited time of operations.

Table 18: Average Impacts per SFS Grantee

Companies & Jobs	2014	2015	2016	2017	Average All Years
Companies per Grantee	6.7	5.4	4.1	1.9	4.1
Jobs per Grantee	39.9	45.8	17.5	14.1	26.7
Jobs per Company	5.9	8.4	4.2	7.3	6.6

Note: Averages will not sum.

How has the SFS program helped Rural and Urban Areas?

If the SFS program is to increase the access to capital in regions where it is not present, then it is important that it serve a variety of communities. Access to risk capital is typically lower in rural areas. Each state was classified based on the percent of the population living in rural areas, to create four classes for analysis. Existing classifications have nine to twelve categories, which is not useful when comparing only fifty states.

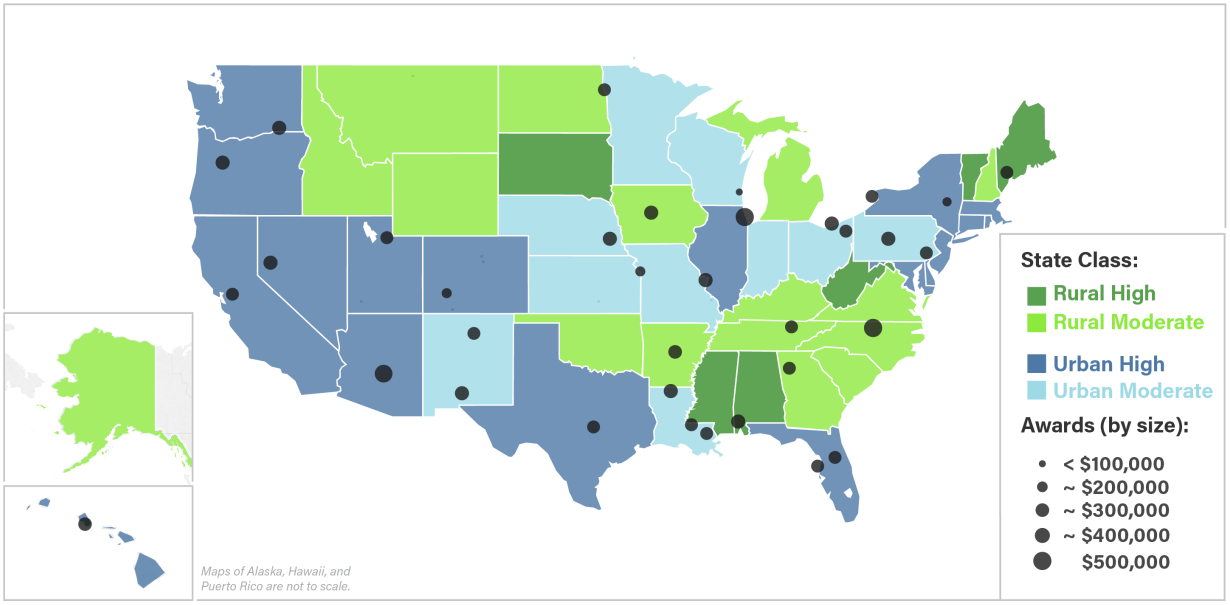
Table 19: Urban and Rural Classification

Urban or Rural Class	Percent of Population in Rural Areas
Rural High	50% or more
Rural Moderate	30% to 49%
Urban Moderate	20% to 29%
Urban High	Less than 20%

[6] https://www.eda.gov/pdf/about/EDA-Performance.pdf

Figure 16: Map of Urban and Rural Classes

The map shows all 50 states by rural and urban class. SFS grantees are shown with dots.



For each state, we calculated the average Milken Risk Capital Index (RCI) from 2010 to 2016 to determine if SFS awards went to states with greater access to risk capital. Given that the earliest awards were made in 2014 and just ended their grant activity in 2017, there is no post-award trend to examine. For each state that received an award, the average RCI for the years before that award were included. For states with no award, the average includes all four years of the RCI. States were also classified based on their participation in the SFS program. The status of these states with SFS support include the following: a "Grantee" has at least one active SFS award and a "Grantee, no active investments" represents a state with an SFS award that has not yet made its first investments as of July 2018. Finally, the "target" status includes those states that received an SFS investment from a program operating in a different state. Among the states with no activity, there are states that did not apply (No Application) and those that did apply but have not yet received an award (No Award).

Table 20: Did Availability of Risk Capital Influence SFS Awards?

Urban and Rural States and the Risk Capital Index (RCI)			
Urban-Rural Code	***Status***	***States***	***Average RCI***
Rural High	Grantee	3	39.1
	No Application	1	35.9
	No Award	2	51.1
Rural High Total		6	42.1
Rural Moderate	Grantee	3	40.8
	Grantee, no active investments	3	58.1
	No Application	2	29.5
	No Award	7	46.0
	Target	1	54.1
Rural Moderate Total		16	46.0
Urban Moderate	Grantee	4	50.9
	Grantee, no active investments	3	52.0
	Rejected	2	51.6
	Target	1	62.1
Urban Moderate Total		10	52.3
Urban High	Grantee	7	65.7
	Grantee, no active investments	5	54.3
	No Application	1	55.7
	No Award	5	66.8
Urban High Total		18	62.0
Total		**50**	**52.7**

Within the most rural states, the grant recipients had a lower average RCI, indicating less access to risk capital than the states that applied but did not receive an award. However, the state with

the least access to risk capital did not apply. For the moderately rural states, the grant recipients that have made active investments had less access to risk capital relative to the states that were rejected. Several states with grants that have not made active investments have relatively higher risk capital scores (58.1), as well as states that were the target of investment from an out-of-state SFS program. Again, the states with the lowest RCI scores did not apply. Overall, the program is not demonstrating a preference in awarding grants only to the states with the best risk capital environment, but there does appear to be a self-screening effect where the rural states with the lowest access to risk capital did not apply.

For the most urban states, the RCI for the grantee status is nearly the same but lower than the states that applied unsuccessfully (65.7 for grantees vs. 66.8 for rejected). For the most urban states, only one state did not apply, and it has an average RCI higher than those states that have grants but no active investments. There were no moderately urban states that did not apply. Amongst the moderately urban states that were rejected for an award, they had an average RCI comparable to, but slightly higher than, the grantee states. For the urban state there is no demonstrated preference to award grants based on the risk capital environment and no self-screening effect for lower risk capital areas.

Do regional conditions determine the impact performance?

It is also possible to examine whether the access to risk capital in the state influences the impact performance. The Milken RCI for states provides an independent assessment of the access to risk capital in each state.

Table 21: SFS Summary Statistics by Access to Risk Capital

High/Low Access to Risk Capital

	Average Investment per Grantee	Average New Companies per Grantee	Average Investment in Each Company	Total Grantees
Projects in High-RCI States	5.7	4.6	$102,799	28
Projects in Low-RCI States	6.7	2.5	$34,558	11
All Projects	6.0	4.1	$81,126	39

Note: Low RCI = Average Milken Risk Capital Score < 50 for 2014, 2016. Averages will not sum.

States with an average RCI below 50 for 2014 and 2016 were classified as Low-RCI and the states with an average RCI of 50 or more were classified as High-RCI states. There is not

sufficent trend data to determine whether the impacts can be attributed to the SFS program, because it takes at least 3 years for the programs to generate impacts. However, it does provide some insight into whether existing regional conditions pre-determine or heavily influence the generation of impacts.

The grantees in Low-RCI states were more active in making investments, but they generated fewer companies. Programs in the High-RCI states may be more selective than the programs in the Low-RCI states, where there is a need to "seed the ground" in building an entrepreneurial culture. In a Low-RCI state, the early investments made by the grantees give entrepreneurs a chance to fail fast. Entrepreneurship is a learning by doing activity, therefore these investments create the proving ground for current and future generations of entrepreneurs in a community. The grantees in Low-RCI states are providing, on average, significantly less investment, which may reflect a lower cost environment, or simply a strategy of providing only enough capital for the entrepreneurs to prove themselves.

Table 22: Job Creation by Access to Risk Capital

High/Low Access to Risk Capital

	Grantees	Jobs per Grantee
Projects in High-RCI States	28	27.5
Project in Low-RCI States	11	24.7
All Projects	39	26.7

Note: Averages will not sum.

Access to risk capital does not substantially influence the jobs created by the grantees, which suggests that a strong organization can overcome regional, or at least state, conditions. Regional innovation programs are rarely an overnight success. Even in states with a strong risk capital climate, there is a long timeline from starting a program to generating significant impacts. All of the programs are generating intermediate impacts, such as providing mentoring services and technical assistance, or raising investment capital. Significant impacts like launching new companies and creating jobs take more time. In states with high access to risk capital, 46 percent of the grants have not attained outcomes related to launching new companies and 43 percent have not attained job creation goals. States with more difficult conditions require even more time to build infrastructure, to identify and connect investors and to educate entrepreneurs and ultimately generate impact. In the states with low access to risk capital, 64 percent of the

grants have not attained outcomes for new companies and 55 percent have not yet attained job impact outcomes. Many of these grants have been operating for fewer than three years, and it is not yet clear how much more time might be required in a low-risk capital climate.

Table 23: Outcome Attainment by Access to Risk Capital

	Projected Outcomes Not Attained	
Projects in High- or Low-RCI States	**New Companies**	**Jobs Created**
Projects in High-RCI States	46%	43%
Projects in Low-RCI States	64%	55%

The Established Program to Stimulate Competitive Research (EPSCoR) sets aside funding and establishes partnerships with government, higher education and industry in order to improve a state's research infrastructure and R&D capacity. EPSCoR distributes resources to the "have-not" states and provides a mechanism for broadening the geographic base and reach of innovation capacity in the United States. EPSCoR involves five major federal research agencies:

1. Department of Energy (DOE)
2. National Aeronautics and Space Administration (NASA)
3. National Institutes of Health (NIH)
4. National Science Foundation (NSF)
5. U.S. Department of Agriculture (USDA)

Eligibility is defined by the 3-year level of research funding. The NSF defines the funding level as follows:

> *A jurisdiction is eligible to participate in the NSF EPSCoR Research Infrastructure Improvement Grant Program (RII) if their most recent 3-year level of NSF research support is equal to or less than 0.75% of the total NSF Research and Related Activities (R&RA) budget.*[7]

Examining the performance of EPSCoR states versus non-EPSCoR states provides additional insight into the ability of the SFS program to broaden the base of the innovation economy and support states and regions that start with fewer advantages. The SFS program has provided 24 grants to Non-EPSCoR states and 15 grants to EPSCoR states.

[7] See https://www.nsf.gov/od/oia/programs/epscor/Eligibility_Tables/FY2018_Eligibility.pdf

Table 24: Activity Level of SFS Projects in EPSCoR States and Non-EPSCoR States

Indicator	Non-EPSCoR States	EPSCoR States		
		All	High Access to Risk Capital	Low Access to Risk Capital
Grants	24	15	5	10
Average investments made	5.8	7.5	6.2	8.2
Average number of new Limited Partnerships (LPs)	31	6.8	10.4	4.8

The non-EPSCoR states were slightly more exclusive or restrictive in the investments they made with an average of 5.8 investments per grantee compared to 7.5 investments for the EPSCoR states. The difference was driven by the EPSCoR states with less access to risk capital, which made more investments to seed activity in their states. The non-EPSCoR states were able to tap a rich pool of investors and average 31 new limited partners in their funds compared to 6.8 limited partners in the EPSCoR states. The EPSCoR states with more access to risk capital only average 10.4 limited partners, one third of the level of the non-EPSCoR states but still twice the level of the EPSCoR states with less access to risk capital.

The programs in non-EPSCoR states generated new companies at a rate comparable to the EPSCoR states overall. The EPSCoR states with more access to risk capital generated companies at a higher rate than non-EPSCoR states. The EPSCoR states with less access to risk capital generated fewer new companies. These differences may reflect the depth of the investment pool and the selectivity of the investors and grantees. The non-EPSCoR states were likely to have a deeper investment pool so they could be more selective or focused. The EPSCoR states with more risk capital may be taking a more aggressive approach in deploying their available risk capital to seed more entrepreneurial activity. The EPSCoR states with less risk capital need to both build the pool of investment capital and develop investment-grade deals.

Table 25: Outcomes of SFS Projects in EPSCoR States and Non-EPSCoR States

Indicator	Non EPSCoR States	EPSCoR States		
		All	High Access to Risk Capital	Low Access to Risk Capital
Average number of new companies	4.5	4.2	6.2	3.1
Average number of jobs	23.8	35.3	44.4	30.2

On average, the non-EPSCoR states were more conservative in the job creation generated by their activities. The EPSCoR states are generating more aggressive job creation from their investment. This could reflect the lower cost of doing business, or a more aggressive growth posture where these companies perceive a need to be larger or grow faster to stave off competition from resource-rich areas, especially in the EPSCoR states that have more risk capital.

End of the Detailed SFS Evaluation Findings

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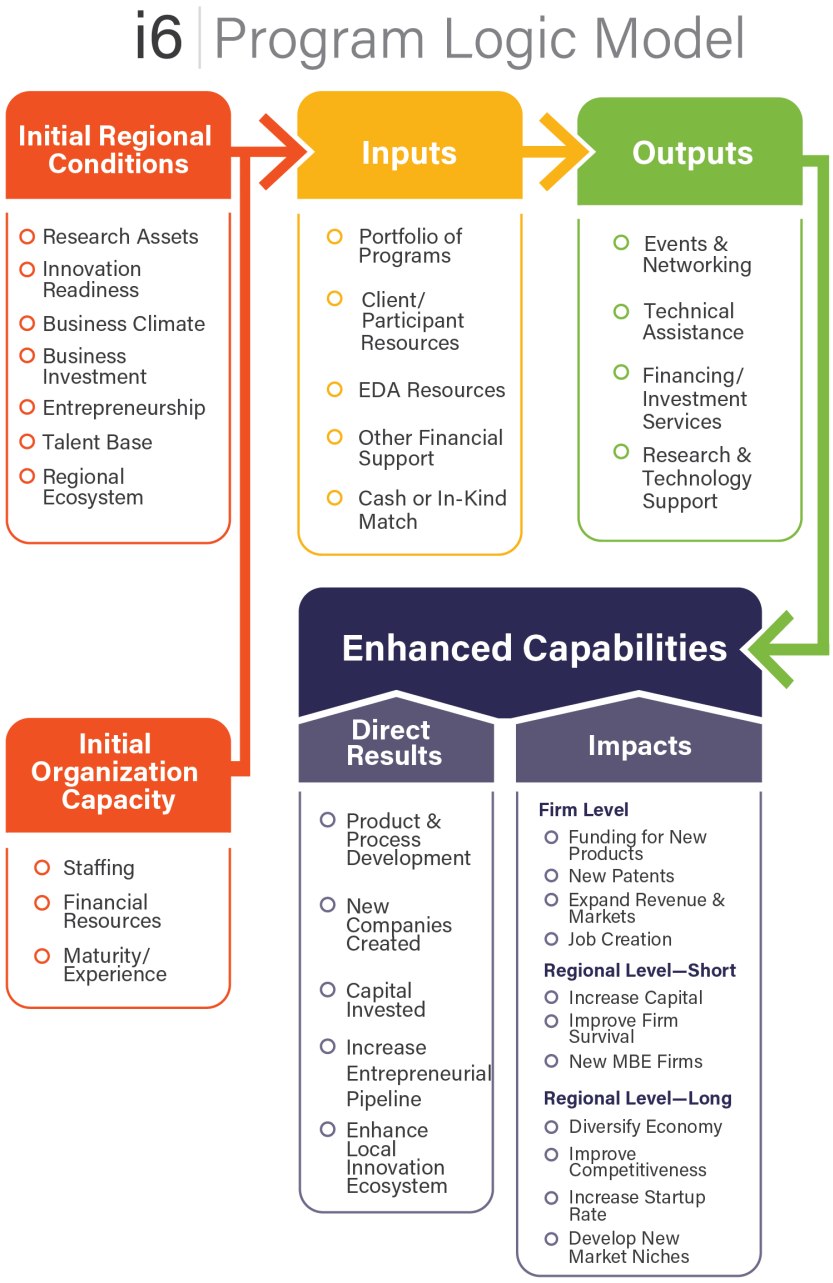
i6 Challenge Evaluation

The i6 Challenge program logic model serves as a basic starting point for evaluation. The project team reviewed a variety of evaluations for complementary programs as well as the goals and results of the i6 Challenge in order to develop the program logic model below.

Figure 17



The model above considers the organizational capacity of i6 Challenge grantees, the variety of regional conditions, as well as the variety of inputs. Finally, it specifies a range of direct results and impacts—such as the growth of the entrepreneurial pipeline and the enhancement of local innovation ecosystems—as key direct, short-term results of the program's activities and categorizes regional impacts of the program in both short and long-term intervals.

Overview of the i6 Challenge

The i6 Challenge is designed to build regional capacity to translate ideas into inventions and generate products, services, companies, and jobs. It provides funding to invest in the development, creation and/or expansion of a variety of proof-of-concept programs and services that support innovation-based, high-growth entrepreneurship, startup acceleration, and technology commercialization. These programs and services include startup incubators, accelerators and applied research efforts and services that provide technical assistance, market evaluation, business planning, mentorship, and more. The program was launched to advance innovation-led economic development that catalyzes vibrancy, economic growth, and innovative economies across the country.

From 2014– 2017, the projects awarded through the i6 program have achieved a broad distribution across the United States, providing a variety of programs and services to promote access to risk capital, innovation, entrepreneurship, regional economic development, and the conversion of research into new products, services, and businesses. Even more than the SFS program, the i6 Challenge grantees vary significantly in the focus of their programs. Some of the grantees took a balanced approach and distributed their efforts across four primary activity areas: inovation, entrepreneurship, regional connectivity, and commercialization. Other grantees emphasized only one or two activities, typically commercialization or innovation (see table below). This variation is an important element of the program because it provides flexibility for grantees to respond to the specific needs of their region; however, it makes the task of assessing their performance much more difficult.

Table 26: Range of i6 Challenge Activities

Range of Activity Focus	Minimum	Maximum
Innovation	10%	50%
Entrepreneurship	10%	40%
Regional Connectivity	0%	35%
Commercialization	0%	60%

The i6 Challenge has supported 88 projects in 36 states, while there are fifteen others that have no i6 projects. Rhode Island has not yet applied for an i6 Challenge.

Figure 18: Map of the i6 Challenge Grantees and Unsuccessful Applicants

The map shows the locations of awards (sized by amount) and unsuccessful applicants (in red).

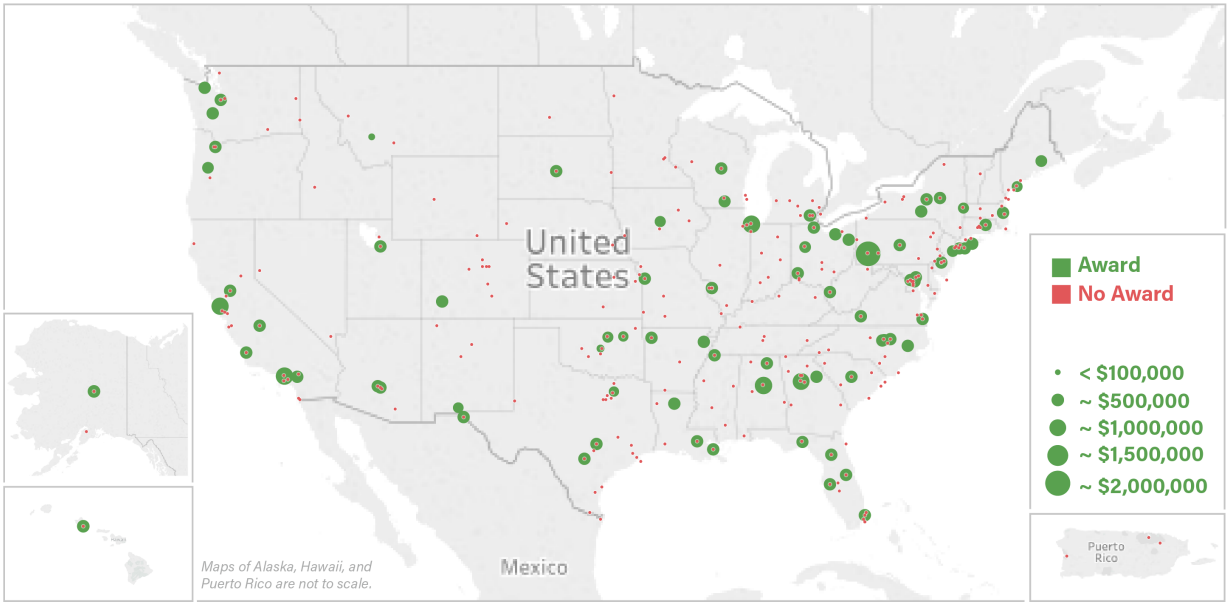
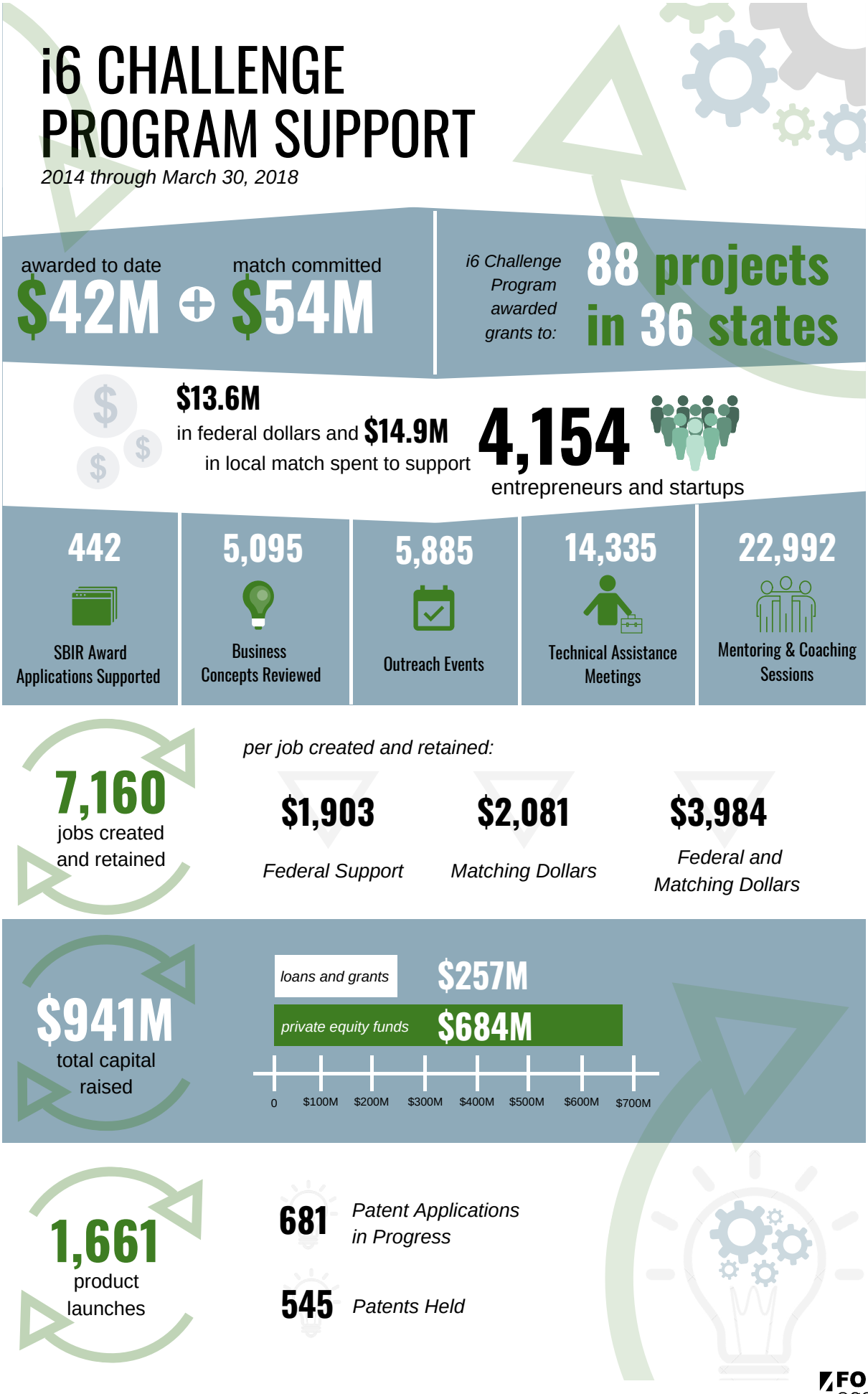


Figure 19: Summary Statistics of the i6 Program 2014 through March 30, 2018



i6 Challenge Timeline for Impact

In measuring impacts of projects supported by the i6 Challenge, the maturity and type of organization are major influences. As indicated in the table below, established organizations have an advantage because they generate impact results earlier than both new organizations and new programs in established organizations. For new organizations, impact results won't be seen until about four years after the initial award.

Table 27: i6 Timeline for Impact

New or Established Organization	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Established Organization	*Deliver Services*	***First Impact Results***		
New Program / Established Organization	*Launch*	*Deliver Services*	***First Impact Results***	
New Organization	*Develop*	*Launch*	*Deliver Services*	***First Impact Results***

i6 Challenge Detailed Findings

To what degree has the i6 Challenge expanded the nation's innovation infrastructure?

According to the 2014 Annual Survey of Entrepreneurs, a total of 25,950 U.S. firms of any age had private risk capital investment at some point in their development. For startups (firms that have been in operation less than 3 years), there were only 7,845 active firms in 2014 with private risk capital investment, including 3,427 that were less than 2 years old. There is no data on how many firms have unsuccessfully pursued risk capital. The i6 Challenge has supported a total of 4,154 entrepreneurs and startups since 2014. There is no simple calculation to establish the market share of the i6 Challenge, but *the volume of activity suggests a significant expansion of the innovation infrastructure in regions across the U.S.*

Overall, 36 states have received at least one i6 Challenge grant since 2014. Rates of entrepreneurship do not vary significantly over time and there are substantial differences between states that are not likely to be equalized without intervention. Therefore, supporting this innovation infrastructure encourages the dispersion of entrepreneurship to more communities that can then enjoy the long-term benefits that innovation and entrepreneurship can bring.

Performance of the i6 Grant Cohorts

It takes time for these programs to become fully operational and begin generating impacts. As a cohort, the 2014 projects have generated the greatest impacts on most measures, but they have had four years of activity. Starting with the 2016 cohort, the number of new grantees increased from 17 per year to 27 per year. Given the larger number of projects, the impacts from the i6 Challenge grantees in 2016 and 2017 should increase significantly in the next two years.

Table 28: Summary of i6 Challenge Total Outcomes by Year

Total Impacts	2014	2015	2016	2017	All Years
Grantee	17	17	27	27	88
Match spent	$7,904,231	$4,249,621	$2,725,900	$19,327	$14,899,079
Disbursed	$6,222,948	$4,170,228	$2,842,552	$386,985	$13,622,713
Entrepreneurs/ startups	1,212	1,081	1,416	445	4,154
Jobs created or retained	2,838	2,750	711	862	7,161
Capital from loans/grants	$138,605,839	$46,549,372	$55,894,820	$15,790,907	$256,840,938
Investment capital raised	$277,769,609	$121,128,468	$202,407,851	$82,928,175	$684,234,103

Controlling for the number of grantees and the amount of time they have been operating provides some insight into how the overall i6 Challenge portfolio is maturing over time. Many of the early grants in 2014 and 2015 involved pilot programs. Furthermore, many of the grantees were applying for a new program and did not have a depth of prior projects from which to derive lessons. As the program has matured, new applicants were able to learn from the experiences and practices of the early cohorts and develop better programs. The expectation is that this experience should help to make later cohorts more effective. Considering their length of operations, the average metrics for the 2015 and 2016 grantee cohorts demonstrate some progress and an increase in the effectiveness of the i6 Challenge portfolio. The number of entrepreneurs and startups participating has increased since the 2014 cohort. The 2015 cohort is on pace to outperform the 2014 cohort in jobs, but it is below the pace for raising investment

capital. The 2016 cohort has been more successful on investment capital, but it is lagging on job creation. The 2017 cohort is very difficult to assess as it includes several more established programs that were able to leverage an existing base of activity, but the start date for these grantees was October 2017 or later.

Table 29: Average Outcomes Generated by i6 Challenge Grantees per Year of Operation

By Years and Grantee	2014	2015	2016	2017
Match spent	$116,239	$83,326	$50,480	$716
Disbursed	$91,514	$81,769	$52,640	$14,333
Entrepreneurs/startups participating	18	21	26	16
Jobs created or retained	42	54	13	32
Capital from loans/grants	$2,038,321	$912,733	$1,035,089	$584,848
Investment capital raised	$4,084,847	$2,375,068	$3,748,294	$3,071,414

Note: A number of the grantees for 2017 began their awards in the fourth quarter of 2017 so they have had very limited operations.

The cost-per-job metric also controls for the number of grantees and the length of their operations because it considers how many direct and matching dollars have been expended by the program. From this perspective, the 2015 cohort is generating job impacts more efficiently than the 2014 cohort. The 2016 cohort has not yet generated significant job impacts so the cost per job is higher; it should decrease as job creation grows in future years and the cohort begins to deploy the investment capital raised in the initial years of operation. The 2017 cohort is too early in their activity to develop even preliminary conclusions about their cost effectiveness.

Table 30: Spending to Support One Job by i6 Challenge Grantees

Total Impacts	2014	2015	2016	Average
i6 Match Dollars per Job	$2,786	$1,546	$3,834	$2,081
i6 Awards Disbursed per Job	$2,193	$1,517	$3,998	$1,903
Total i6 Spending per Job	$4,979	$3,062	$7,832	$3,983

How has the i6 program helped Rural or Urban Areas?

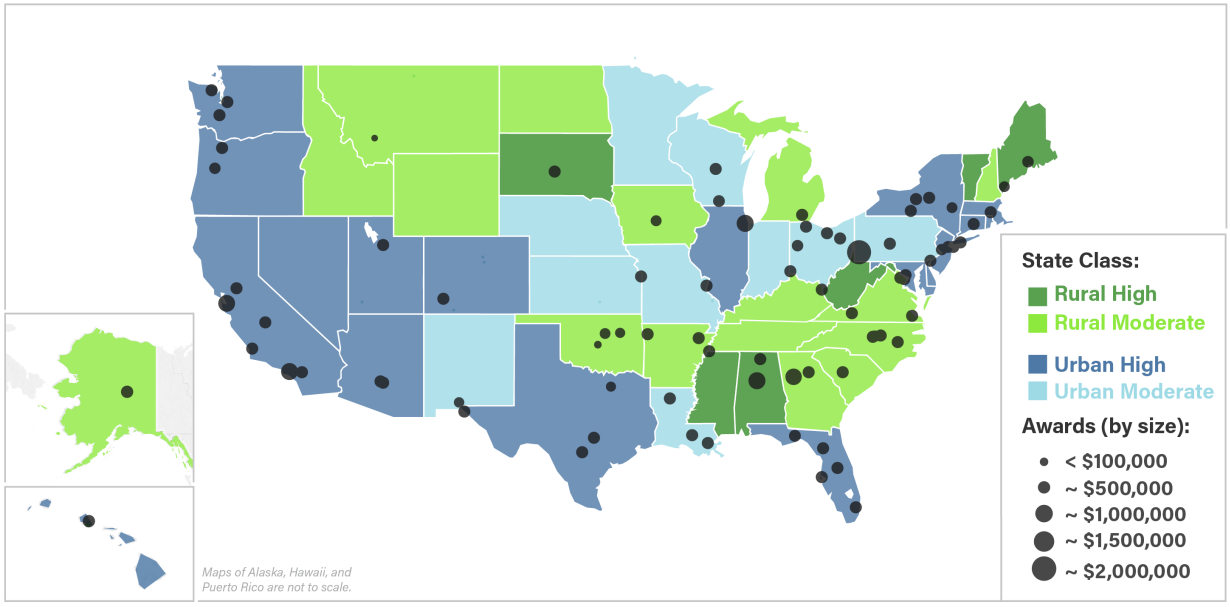
If the i6 Challenge is to assist the growth and expansion of the innovation economy, then it must promote the development of entrepreneurship in a variety of communities. Each state was classified based on the percent of the population living in rural areas, to create four classes for analysis.

Table 31: Urban and Rural Classification

State Urban or Rural Class	Percent of Population in Rural Areas
Rural High	50% or more
Rural Moderate	30% to 49%
Urban Moderate	20% to 29%
Urban High	Less than 20%

Figure 20: Map of Urban and Rural Classes

The map shows all 50 states by rural and urban class. i6 grantees are shown with dots.



There is a performance difference between the i6 Challenge grantees in the moderately urban and the most urban states, but that gap is not as great as the gap between the urban and rural states. The clients of the seven grantees operating in the most rural states generated lower metrics across the board, had fewer new products, patents and jobs, and raised an average of $235,086 in total investment capital. The grantees also provided technical assistance to fewer clients. These grantees are working with a smaller pool of potential clients spread over a larger area, which creates unique challenges to delivering services. The grantees operating in the moderately rural states also have lower metrics on technical assistance; this could also be attributed to the smaller pool of clients and greater distances, but the grantees in these states are competitive with their peers in the introduction of new products and the rate of job creation. They have raised significantly more investment capital than the grantees in the most rural states

but less than 70 percent of the capital raised in the more urban states. The programs operating in more rural regions are likely to need more time and support to overcome their unique challenges.

Table 32: Comparison of i6 Grantees in Urban and Rural States

Rural or Urban States	Rural High	Rural Moderate	Urban Moderate	Urban High	Total
Count of Grantees	7	20	19	42	88
	Rural High	**Rural Moderate**	**Urban Moderate**	**Urban High**	**Average**
Technical Assistance Projects per Grantee	30	40	194	253	173
Client New Products per Grantee	7	33	23	14	20
Patents Held by Clients per Grantee	1	5	12	14	10
Client Jobs per Grantee	56	82	70	98	85
Average Client Investment Capital per Grantee	$235,086	$6,443,200	$9,624,385	$9,512,139	$8,049,813

Note: Averages will not sum.

Do regional conditions determine the impact performance?

There is insufficient trend data on the outcomes to really examine pre- and post-treatment effects for the i6 Challenge given that it takes at least 3 years for the programs to generate impacts. However, we can examine, to a degree, which existing regional conditions influence the impact performance. The rural and urban classification does not fully account for some of the differences between states. Many of the moderately rural states have large state universities that can be significant assets for conducting research and developing new technology. The EPSCoR program classifies states according to the level of research funding they receive, which reflects the research capacity in the state that can support the innovation ecosystem.

The i6 Challenge has provided grants to 20 programs in EPSCoR states and 68 programs in non-EPSCoR states. The grantees in the EPSCoR states have been more successful, on average, at creating jobs—with an average of 109 jobs per grantee compared to 78 in the non-EPSCoR states. The job creation may reflect lower operating costs in the EPSCoR states, but there is not

a statistically significant effect between the job creation levels and various proxies for operating costs. It is especially difficult to control for nuanced factors, such as whether the lower costs for labor, for example, reflect differences in the experience and expertise level of that talent.

Table 33: i6 Challenge Grantee Outcomes in EPSCoR and Non-EPSCoR States

	Non-EPSCoR	EPSCoR	Total
Number of Grantees	68	20	88
	Non-EPSCoR	**EPSCoR**	**Average**
Client Jobs per Grantee	78	109	85
Technical Assistance Projects per Grantee	173	171	173
Investor Meetings per Grantee	51	45	50
Client New Products per Grantee	10	51	20
Average Client Investment Capital per Grantee	$8,457,672	$6,724,272	$8,049,813

Note: Averages will not sum.

> ***Proximity to capital is expensive.*** *States with the most access to local capital ($2.5+ million per venture-backed startup) also have higher costs of labor and housing relative to the national average. States with slightly less capital per startup (around $1 million per venture-backed startup) have costs closer to the mean, while regions with low values of local venture capital also have the lowest costs.*
>
> Source: PitchBook - VC Ecosystems
> Analysis of key indicators of US VC ecosystem development (June 2018)

Many programs, especially in the EPSCoR states, are filling gaps in the innovation ecosystem; in some cases, they may be the only supporting organization in the region. In regions with a more established innovation ecosystem, serial entrepreneurs would have more direct access to private investors without the services of an intermediary. Anecdotes from the narrative progress reports and feedback from the survey of grantees suggests this dynamic may be a factor, but there is no independent data to verify it.

The grantees in the EPSCoR states have introduced new products at a higher rate, but this includes several programs that are supporting innovation in low-tech industries where the development effort of a new product may be lower. While data is reported on clients assisted, the

specific nature of the new products developed has not been reported, so it is not possible to develop a more sophisticated assessment of the new products brought to market.

Investment capital flows to regions that provide high returns. The grantees in EPSCoR states have not raised as much investment capital, which may limit their ability to generate high impact businesses in the long run. These grantees and their clients will need to do more with less capital in order to generate the kinds of returns that will attract more investment capital in the future.

Performance of i6 Challenge by State Conditions

With 88 total grantees, it is difficult to segment the data for analysis and retain a sufficient number of cases to identify a pattern. Similar to the EPSCoR designation, states were classified as High Innovation Readiness Level (HighIRL) and Low Innovation Readiness Level (LowIRL) based on the Milken Index scores for Risk Capital and Technology for 2010-2012. Further segmenting the grantees by the level of urbanization of the state helps to reveal whether i6 Challenge investments are effective under different regional conditions.

Table 34: Outcomes by Grantee State Conditions

Average per Grantee	New Products	Patents	Investment Capital Raised	Jobs Created or Retained
High IRL	**9**	**11**	**$7,346,180**	**73**
Rural Moderate	5	4	$7,150,627	77
Urban Moderate	14	4	$2,994,886	52
Urban High	10	14	$8,299,550	77
Low IRL	**35**	**10**	**$9,105,262**	**104**
Rural High	7	1	$235,086	56
Rural Moderate	59	5	$5,735,773	88
Urban Moderate	30	18	$13,843,157	82
Urban High	40	16	$16,383,477	220
Average	**20**	**10**	**$8,049,813**	**85**

Note: Low IRL = Average Milken R&D and Tech Score < 50 for 2010, 2012. Averages will not sum.

Overall grantees in the LowIRL states have been more effective than the grantees in HighIRL states on several metrics. Grantees in the most urban states have accounted for a significant level of those impacts, but they are also outperforming the most urban areas in the HighIRL states. Furthermore, the grantees in moderately rural and moderately urban LowIRL states are outperforming their peers in the High IRL states. It is not clear if these results will hold up over time, but with the data available to date, we can conclude that *initial conditions are not destiny*.

Regions that are more rural, or which start at a lower level of innovation readiness can catch up with focused investment and intervention.

How does the technology focus of Grantees impact performance?

Grantees were able to tailor the industry focus of their activities based on their assessment of regional needs and growth drivers. Slightly more of the grantees defined a broad focus, so the services would be available to firms or entrepreneurs within any innovation cluster in the region. Other programs decided to serve very specific technology or industry niches within their regional innovation clusters (see table below).

Table 35: Sample of Technology, Industry and Sectors Targeted by i6 Challenge Grantees

Niche or Technology Focused	Industry or Sector Focused
Agriculture Tech	Aerospace
Air Force Research Laboratory (AFRL) Technology Transfer Organization	Bioscience or Biotechnology
Augmented and Virtual Reality	Energy, Water, Agriculture
Clean Energy	Forest Products
Digital Innovation	Government
Fashion and Fashion Technology	Hardware
Health Information Technology	Healthcare
High Strain Rate Metal Forming	Information Technology
Mass Timber Products	IT and Life Sciences
MedTech	Life Sciences
Microgrid Technologies	Manufacturing and Bioscience
Residual Materials	Manufacturing/Hardware
Thermal and Environmental Controls Systems	Mixed Use: Manufacturing (Small/Medium Businesses)
Water Technology	Software/IT

There are too many industries targeted by the grantees to enable a valid comparison of impacts or performance related to industry. There is some value in comparing the performance of programs based on whether they targeted their efforts or took a more open approach to support their regional innovation cluster. 43 grantees were classified under an open approach that served individuals, entrepreneurs, and firms regardless of their industry or technology focus. The

remaining 45 grantees specified an industry or technology focus and were classified as focused. The differences cited in the analysis should not be interpreted as favoring one approach over the other, but as a guide to help future i6 applicants align their strategy with the goals and needs of their region.

Overall the "open" projects served more clients. This is to be expected, since they did not apply any screening that would reduce the potential pool of clients. While the open projects reviewed more business concepts on average, the focused projects reviewed only nine fewer, a difference that is not statistically significant and is likely to reflect the screening activity of the focused projects. The focused projects served an average of 22 clients compared to 76 clients for the open projects, which reinforces the selective nature of their focus. There is no difference in the level of technical assistance provided to the clients. The open projects provided more technical assistance overall, but given the larger volume of clients, they provided an average of 3.5 technical assistance projects per client compared to 3.6 per client for the focused projects.

Table 36: Grantee Activities for Focused or Open Projects

	Focused	Open	Total
Count of Grantees	45	43	88
Activities per Grantee	**Focused**	**Open**	**Average**
Business Concepts Reviewed per Grantee	63	72	67
Participants (Entrepreneurs, startups, etc.) per Grantee	22	76	49
Technical Assistance Projects per Grantee	80	267	173
Technical Assistance Projects per Participant	3.6	3.5	3.5

Note: Averages will not sum.

In terms of outcomes, the focused projects generated nearly as many investor meetings as the open projects (see Table 37). Their ability to provide a focused pool of clients overcomes the limited pool of investors that share that focus. The focused projects generated significantly fewer new products, but many of these focused projects are operating in niches with an established regulatory regime, such as biotechnology, that can slow the pace of innovation. In addition, several of the niches involve emerging technologies that require more development. From a strategic perspective, regions seeking a substantial increase in new product development should consider an open versus a focused approach.

The projects with an open approach generated higher job numbers than their counterparts with a more focused approach. While the difference in job numbers is statistically significant, there are several caveats. The open projects include a wider variety of businesses, so the effort and investment required to create jobs is not equivalent to the effort to generate jobs in Microgrid Technologies or Augmented Reality, for example. From a strategic perspective, the practical application of these findings is that *regions that have a need to create a larger number of jobs more quickly should consider the open approach. Regions that are seeking to diversify their economy, or which are positioned to be industry leaders in an emerging technology, should consider the focused approach* with the understanding that more time, effort, and patience are required to see the benefits of this approach.

Table 37: Grantee Outcomes for Focused or Open Projects

Average Outcomes per Grantee	Focused	Open	Average
Investor Meetings per Grantee	44	56	50
New Products per Grantee	6	34	20
Total Jobs Supported per Grantee	34	134	40
Total Client Investment Capital Raised per Participant	$297,042	$125,388	$164,282
Total Client Investment Capital Raised per Grantee	$ 6,534,918	$ 9,529,478	$ 8,049,813

Note: Averages will not sum.

The clients in focused projects attracted an average of $6.5 million in investment capital compared to $9.5 million for the clients in open projects. This gap of $3 million is important from a practical sense, but it is not a statistically significant difference. The focused projects are almost as successful at raising mid-sized and larger pools of funds. The open projects had more outliers with very large and very small funds. From the perspective of the practitioner, what is important is that the focused projects were able to raise an average of more than $297,000 per participant compared to $125,000 for the open projects. The significance of this hinges on the definition of participant versus a client, but for the grantees that provided detailed client information, the count of participants conforms with the active clients. Some programs include a larger number of participants who may have received limited services. If the focused projects do indeed require more effort and capital investment, they have been successful in raising capital in large amounts to support their clients. The ability to develop a pipeline of activity within a niche or a sector creates more depth of opportunity, attracting investors and providing benefits to entrepreneurs.

Data and Metrics Conclusions

In the course of this evaluation, the data collected by the grantees and reported to the EDA was reviewed for its utility in assessing program performance. All of the data collected requires a burden of effort shared by the individuals and companies receiving services, the grantees providing the services, and ultimately the EDA staff who review the reports and aggregate the results. Some indicators that could be very useful may, in practice, require more effort than they are worth. The following section discusses the conclusions related to data reported to the RIS Program and how that data collection may be improved and streamlined.

The earliest RIS projects have been operating since April 1, 2015 and completed their grant period as of March 31, 2017. As a result, very few projects and regions can be considered to have completed the full course of "treatment" in the RIS Program. Given the time lag in collecting client data, and the even longer time lag in collecting state and regional data, there is at best one year of post-intervention data with which to assess a small number of projects. This makes it very difficult to assess whether, at this time, the RIS Program is increasing access to risk capital and increasing the level of entrepreneurship in the communities it serves. It is clear, however, that the RIS Program has generated impacts in communities with a high degree of need and that these impacts are not simply the result of the RIS Program supporting a selected group of high-performing regions. At least three more years of data will be needed before impacts at the level of the regional economy can be adequately assessed.

This evaluation has relied on state-level data to assess regional conditions. State-level data oversimplifies or ignores some of the variation between regions within a state, but this data is available more frequently and with less non-disclosure. The time lags and variability in the data collection for county- and metropolitan-level data severely limits the time trend that could be analyzed. State-level data was also favored because it is not possible to fully attribute the impacts of the i6 grantees to specific counties or metropolitan regions. Each grantee provided a definition of their service territory based on counties; however, these service areas do not necessarily align with metropolitan areas.

Furthermore, although many grantees provided client-level data their collection process was not standardized and what they provided was often incomplete. Grantees differed in the level and types of information they reported, with some information held anonymous. Often this included address information that would be needed to attribute impacts to specific counties or metropolitan areas. Company names or other critical data was often kept confidential or coded, so much of the client-level data could not be validated independently. As a result, it is not possible to aggregate client data across different grantees.

There are limited options for improving the quality of the client data that would not create an undue burden on the grantees or their client firms. Grantees could be required to provide an Employer Identification Number (EIN) for each client, which would limit what information they have to collect, but this would not work well for capturing entrepreneurs and others who have not yet incorporated a business.

An additional challenge is that while some clients may receive a significant level of services, other clients may have only attended a training session or event. These clients may not be willing to provide their information and submit to annual tracking requests. Entrepreneurs and client businesses have an obligation to keep some of their operating information confidential, and they may refuse to respond to frequent information requests. If company names, locations or EINs are too burdensome, then some additional data needs to be collected to enable future evaluations.

The RIS Program would be better served by collecting fewer metrics with more specificity. The RIS Program also needs more clarity in the definitions and standards for different indicators. Grantees interpreted and reported indicators very differently, and the current staffing level doesn't support more one-on-one management and engagement with the grantees that would improve the data. A number of indicators were particularly problematic.

- Sales data. The data on prior business sales and change in businesses sales was interpreted very differently from one grantee to another, especially in how they treated startups versus existing firms and whether they distinguished sales attributed to the services received from sales for specific projects or the total sales of the firm. Clients are very sensitive about releasing this data and it is unlikely that grantees can get the information they need to correct these issues. This indicator should be discontinued.
- The number of new products introduced was also highly problematic because it does not distinguish between the complexity of the products being offered. This indicator should be discontinued unless grantees are able to suggest an appropriate quality control.
- Jobs. The jobs data mixes jobs created and retained into a generic total of jobs supported. For some grantees this may include the existing employees of established firms. The jobs indicator needs to be redefined. For example, the job creation data often does not include the total employment at the firm or specify whether the jobs created are full-time, part-time, or 1099 contract workers. At a minimum the grantees should be collecting total employment at intake, then the total employment at one and three years after an engagement, and finally the number of full-time-equivalent jobs attributed to the services received. Collecting information on total payroll or average wages would be

informative regarding the quality of the jobs created, but the client firms are likely to resist providing this information.

- Investor Meetings. This indicator should include a definition or distinction between a one-on-one meeting with at least a specified duration, versus a networking event where the participants may only be introduced to investors very briefly.
- Participants. The indicators on startups and entrepreneurs participating in the program needs to have a definition that clarifies some level of service for a program participant, such as at least one hour of dedicated staff time. Some grantees include potential clients that may only be on mailing list or who simply attended an introductory event or workshop.

Imposing standards and definitions on the grantees could be very difficult and burdensome. Reviewing the grantee reports, it is very clear that through trial and error many have learned a lot of lessons about what metrics to track and how best to track them. Getting direct input from a panel of grantees would be a valuable way to identify the key lessons they have learned and would provide models or practice guidelines for new applicants. Several grantees have developed or adopted tracking systems that would save future applicants from duplicative effort.

There is an innovative solution to the performance tracking problem that could be explored. This would require a partnership with at least the U.S. Census Bureau and the Bureau of Labor Statistics. If grantees collected only the EINs of their clients, the EINs could be provided to the U.S. Census Bureau or a research center with appropriate access to match with their establishment-level records in the longitudinal business research database (LRBD) to compare the performance of the RIS portfolio firms around job creation and job quality. The U.S. Census Bureau has protocols for keeping the results confidential and it would save significant reporting effort for both the grantees and the clients. This would free the grantees to focus their data collection efforts on metrics that are not available from other sources such as tracking their outreach and entrepreneurial development efforts.

The Economic Development Administration (EDA) and SRI International have partnered to develop a performance measurement and program evaluation system that captures the economic impacts of public investments, including EDA's, through local and regional economic development capacity-building.[8] The recommendations included in this evaluation are largely consistent with the new performance measurement and program evaluation system.

[8] See https://www.eda.gov/files/performance/EDA-New-Evaluation-System.pdf.

Appendix 1: Data Sources

The bi-annual progress reports and metrics submitted by the grantees provided a significant level of detail about the activities and impacts of the grantees. In addition to the quantitative summary metrics, these reports included client-level detail that was anonymized in many cases but sufficient to assess how each program was measuring their achievements. The EDA also provided additional administrative reports on applications and the expenditures of the program.

In addition to the metrics and reports submitted by the project grantees, Fourth Economy solicited feedback from the grant recipients regarding their experience with the RIS Program and the qualitative impacts their participation had on their organization and their region. Twenty of the Seed Fund Support recipients and 51 of the i6 Challenge recipients provided feedback on the barriers they faced during their involvement with the program, the elements of the program that were most helpful, and how it could be improved. This input helped to formulate the recommendations for the termination, or continuation and improvement, of the program.

The National Science Foundation State Profiles provided an overview of the research and innovation level in each state from 2011 to 2017. The Milken Index provided an overall measure of the innovation climate in each state, as well as sub-indices for the access to risk capital and innovation system, from 2012 to 2016.

Data on establishment births by state and county from 2012 to 2015 provided useful baselines for overall business startup rates. This data is provided by the U.S. Census Bureau from the Business Dynamics Statistics.

The U.S. Census Bureau's Annual Survey of Entrepreneurs for 2014 provided data on the sources and amounts of capital used by businesses in the United States. This relatively new data source provides a more comprehensive look at the financing of firms at all stages of development. See more here: https://www.census.gov/programs-surveys/ase/about.html.

Data on Angel Investment was sourced from the Angel Capital Association 2017 report that provided summary statistics on angel investment and investors. Additional data on angel and seed capital, as well as other early stage venture investment, was sourced from PitchBook and NVCA's Q3 2017 Venture Monitor. Regional data on startup financing based on PitchBook's data was sourced from the July 31, 2018, report "America's Rising Startup Communities" from the Center for American Entrepreneurship http://startupsusa.org/americas-rising-startup-communities/) .

Appendix 2: RIS Applicants and Grants by State

Activity for Program Years 2014–2017.

The number of applications and awards for each program by state are presented in the tables below. They are organized by EPSCoR status and whether the overall success rate in the state was higher or lower than the national average of 16 percent.

EPSCoR - Higher Success	i6		i6 Total	SFS		SFS Total	Total	
State/ Region	Not Awarded	Awarded	i6 Total Applicants	Not Awarded	Awarded	SFS Total Applicants	Total RIS Applicants	Success Rate
MT	2	1	3	0	0	0	3	33%
NM	11	5	16	3	2	5	21	33%
LA	10	5	15	8	3	11	26	31%
HI	2	1	3	3	1	4	7	29%
MO	13	5	18	4	1	5	23	26%
AR	7	2	9	3	1	4	13	23%
ME	8	2	10	3	1	4	14	21%
AK	3	1	4	1	0	1	5	20%
ND	3	0	3	1	1	2	5	20%
SD	3	1	4	1	0	1	5	20%
OK	11	3	14	2	0	2	16	19%
AL	18	3	21	6	2	8	29	17%
WV	5	1	6	0	0	0	6	17%
EPSCoR - Higher Success Subtotal	96	30	126	35	12	47	173	24%

Non-EPSCoR - Higher Success	i6		i6 Total	SFS		SFS Total	Total	
State/ Region	Not Awarded	Awarded	i6 Total Applicants	Not Awarded	Awarded	SFS Total Applicants	Total RIS Applicants	Success Rate
IA	5	3	8	2	1	3	11	36%
OR	8	4	12	1	1	2	14	36%
GA	13	5	18	3	1	4	22	27%
NC	13	4	17	4	2	6	23	26%
WA	17	5	22	2	1	3	25	24%
MA	12	4	16	1	0	1	17	24%
FL	24	7	31	7	2	9	40	23%
OH	23	7	30	8	2	10	40	23%
VA	12	4	16	5	0	5	21	19%
WI	16	3	19	1	1	2	21	19%
PA	37	8	45	9	2	11	56	18%
AZ	16	2	18	4	2	6	24	17%
CO	10	1	11	0	1	1	12	17%
Non-EPSCoR - Higher Success Subtotal	206	57	263	47	16	63	326	22%

EPSCoR - Lower Success	i6		i6 Total	SFS		SFS Total	Total	
State/ Region	Not Awarded	Awarded	i6 Total Applicants	Not Awarded	Awarded	SFS Total Applicants	Total RIS Applicants	Success Rate
NE	8	0	8	0	1	1	9	11%
PR	8	0	8	1	1	2	10	10%
KS	11	0	11	0	1	1	12	8%
NV	6	0	6	5	1	6	12	8%
SC	13	1	14	6	0	6	20	5%
DE	3	0	3	0	0	0	3	0%
ID	2	0	2	3	0	3	5	0%
KY	8	0	8	3	0	3	11	0%
MS	6	0	6	2	0	2	8	0%
NH	5	0	5	2	0	2	7	0%
RI	0	0	0	1	0	1	1	0%
VT	2	0	2	2	0	2	4	0%
WY	4	0	4	0	0	0	4	0%
EPSCoR - Lower Success Subtotal	76	1	77	25	4	29	106	5%

Non-EPSCoR - Lower Success	i6		i6 Total	SFS		SFS Total	Total	
State/ Region	Not Awarded	Awarded	i6 Total Applicants	Not Awarded	Awarded	SFS Total Applicants	Total RIS Applicants	Success Rate
TN	8	1	9	3	1	4	13	15%
UT	7	1	8	4	1	5	13	15%
NY	47	7	54	7	2	9	63	14%
IL	21	2	23	4	2	6	29	14%
CA	59	10	69	15	1	16	85	13%
MD	19	3	22	6	0	6	28	11%
MI	24	3	27	7	0	7	34	9%
TX	42	4	46	12	1	13	59	8%
CT	9	1	10	3	0	3	13	8%
NJ	12	1	13	5	0	5	18	6%
IN	18	1	19	1	0	1	20	5%
DC	9	0	9	3	0	3	12	0%
MN	8	0	8	2	0	2	10	0%
Non-EPSCoR - Lower Success Subtotal	283	34	317	72	8	80	397	11%

Appendix 3: Case Summaries of SFS Grantees

The SFS Program has supported a very diverse array of projects and organizations. The following case summaries illustrate the variety and differences within the current portfolio of projects. These projects highlight the flexibility of the SFS Program and the variety of ways in which different organizations have adapted the program to fit the needs and conditions of their region. The following cases were selected to illustrate the approaches taken by organizations under different state and regional conditions (see matrix below).

Year	Lead Organization	EPSCoR	Technology Focus	Other Factors
2014	University of North Dakota (ND)	EPSCoR	Open	Multiple funds, emerging region
2015	Coastal Enterprises, Inc. (ME)	EPSCoR	Natural Resources	Focus on rural job creation; SFS and i6 awards to different organizations
2017	Innovation Depot (AL)	EPSCoR	Open	Focus on Tech Pipeline
2015	BioAccel (AZ)	Non-EPSCoR	BioTech	Multiple funds, SFS and i6 awards
2017	BioGenerator (MO)	Non-EPSCoR	BioTech	Long-term integrated strategy

University of North Dakota Center for Innovation Foundation

Setting a High Bar Ensures Results

North Dakota is a rural state with a small population and a traditional dependence on the industries of agriculture and energy. Entrepreneurs in the state have suffered due to a lack of capital, a problem that the University of North Dakota Center for Innovation Foundation sought to remedy through investment into two venture capital funds.

The University of North Dakota Center for Innovation Foundation was awarded a Seed Fund Support grant by EDA to assist the foundation in starting up two new funds. One metric of this funding was to close at least one new angel fund with at least $5 million in commitments to invest. Due to a few different factors, neither fund achieved this, but each fund successfully raised money and had significant investment metrics, as well as achieving many of the other goals set out in the project. The amount of capital raised totalled $2.4 million, including just under $1.5 million during the grant period.

The two funds are very different. In 2012, Harvest Fund Partners, LLC was organized by the Dakota Venture Group, the nation's first student-run private equity fund out of the University of North Dakota. Harvest Fund was designed to be the first for-profit venture capital fund managed by students. Dakota Venture Group set a target fund size of $2 million, and throughout the course of the project they raised 70% of their seed capital ($1.4 million) from 25 investors. The fund closed on August 31, 2015.

The 701 Fund was started in 2015 as a private fund and it set $5 million as a target investment. This fund raised a total of $960,000 from 20 limited partners. Though the fund did not reach its goal, with nearly $1 million in holdings it can invest in 15-20 companies throughout the region at a targeted investment level of around $50,000.

Two factors influenced the lack of matching investment: a period of economic downturn in North Dakota's top two economies, agriculture and energy, and the revision of a tax credit aimed at angel investors. According to progress reports from the grantee, the unforeseen drop-off in economic activity resulted in many potential investors hesitating to commit to angel investing. Another factor was the revision of the Angel Investment Tax Credit. North Dakota had been offering investors a 45 percent state income tax credit, which was reduced to a 25 percent tax credit in 2017.

By many other metrics, the funds were successful. The funds screened over 500 companies to determine investment readiness; 68 of those companies went through the due diligence process, and many of those companies received technical assistance or coaching that allowed them to access funding from other sources. Together, the funds made 16 investments in 15 companies and supported 115 jobs. The most prominent industries of investment were bioscience, software, and medical devices.

Because there had been a dearth of angel investment in North Dakota, there was also a need to educate high-net-worth individuals about the risks and benefits of angel investing. Program staff created presentations and other materials and disseminated them to potential investors and entrepreneurs. Additionally, during the project period, three workshops were held at the Center for Innovation about how to evaluate startup opportunities, an initiative that reached 25 potential investors.

Furthermore, the funds were successful in establishing partnerships with other funding entities including Bank of North Dakota and the City of Grand Forks, who launched a convertible loan pilot program called Start-Up Grand Forks.

As of 2014, North Dakota only had 89 companies with venture investment, according to the Annual Survey of Entrepreneurs. This program has resulted in a significant expansion of risk capital in the state. The original expectations may have been too ambitious, but it is also possible that the project would not have achieved the results that it did if it had not aimed as high. Changes in tax policy and the economic climate may have depressed or delayed the results, but this program has demonstrated success despite adversity.

Coastal Enterprises, Inc.

Investing in Rural Innovation and Development

From the beginning, Coastal Enterprises, Inc. (CEI)—a Maine-based, private non-profit Community Development Corporation and Community Development Finance Institution—knew that starting a seed fund for investments in food, farm, fisheries, and bio-based businesses would require striking a balance. They also needed to address the capital gaps in rural areas. The fund's purpose is broader than the usual venture fund. This is a social venture fund that provides needed capital for rural businesses and creates jobs for rural economies, generates a return for investors, adds value to Maine-grown products, and leverages powerful market-level change in the food system and other natural resource–based economies. The fund would need to be profitable for investors while maintaining its mission—a challenge for a fund focused on small rural businesses. Through extensive evaluation and testing on CEI's part, the fund has found a sweet spot, collecting investors and making investments that are likely to provide returns.

The SFS grant focused on the feasibility, proof of concept and development of a mission-driven, natural-resource-based fund for rural development. While the fund would be new, CEI began in 1977, and in its over 40-year history it has made a significant impact on the Maine economy, having been responsible for $1.32 billion in investments. Due to this experience, the staff understood the challenges and opportunities of undertaking the creation of a Natural Resource Business Seed Capital Fund and, from the beginning, planned to conduct market research to ensure the fund was a good fit for both investors and businesses. They conducted a survey and worked with stakeholders and potential fund clients to define and quantify the target client market profile and their equity needs, and then developed a Target Client Profile in partnership with the Maine Center for Business and Economic Research. Additionally, they developed a series of case studies that reviewed different equity models that might be used for the fund. With this research in place, CEI launched a pilot program with a smaller, more discrete group of funders and investors to test their model before taking it public.

The pilot fund was successful, making $865,000 worth of investments in seven early-stage companies, and creating and retaining 156 jobs. The goal of investment for this fund was $1 million, and at the close of the program the fund had raised 89% of that target. Furthermore, it proved that CEI's mission-driven model to create quality jobs, environmentally sustainable businesses, and shared prosperity—while strengthening priority industries in the natural resource sectors—also could create viable investment returns.

In addition to funding natural-resource businesses in rural areas, CEI has created a means of supporting the businesses and continuing the mission of the fund. They built a menu of statewide business technical assistance options to support fund clients, which leverages existing

resources to help businesses expand and develop future strategies. They have also developed a curriculum on using equity and are offering training to potential clients in the natural resources sector. Taking the lessons from this first seed fund, CEI is also implementing a fundraising strategy for the next iteration of the seed fund, while continuing to cultivate a pipeline of potential investors.

Impactful investing that works for both the investor and the business requires extra effort on the part of the fund administrator. CEI brought their experience, research, and connections into the creation of the Natural Resource Business Seed Capital Fund to benefit all parties while improving the future of rural Maine.

Velocity Fund at Innovation Depot

Strategic Startup Investments Create a Tech Pipeline

In Alabama, the state's only accelerator program is delivering results by launching successful companies supported by a seed fund. Velocity is an accelerator in Birmingham, AL, which was funded through a Seed Fund Support Grant. It is a program of Innovation Depot, a 14,000 square foot center that functions as a one-stop shop for entrepreneurs that offers incubation, co-working, and immersive educational space. Because all these services are clustered under one roof, the environment is a supportive place to launch from, and a great landing ground for companies exiting the accelerator.

Velocity's first successful cohort of entrepreneurs went through their 13-week program in 2017. In 2018, they recruited a second round of entrepreneurs, this time with support from the EDA. The group of seven startups were chosen from a wide pool of applicants, with most from Birmingham, but others from Chicago, Atlanta, and Nashville. Each company received $50,000, as well as mentoring, training, and the chance to show their idea to investors during Demo Day, an event that functions as a graduation celebration and a pitch competition.

In addition to the programming offered to cohort members, Velocity and Innovation Depot held several networking and educational events in the community to raise awareness of the program and startups in general.

Unlike other funds profiled, the fund that is administered through Velocity is not for profit and is focused on economic development. It has been successful in raising funds through partnerships with private investors. The $50,000 that is invested in each startup comes from the Velocity Fund, which is supported by Alabama Power, BBVA Compass, Blue Cross Blue Shield, Protective Life, UAB, the Community Foundation of Greater Birmingham, HealthSouth, Brasfield & Gorrie, McWane, and Altec.[9] Regions Bank is also a supporter, and directly sponsored Demo Day 2018. In addition to the funding that companies receive upon entry into the program, the Velocity Fund also makes investments, funding 17 companies in 2018.

The Velocity Fund exceeded all metrics set in their programmatic scope. Their goal for raising seed capital was $2,500,000, and they exceeded that, raising $2,875,000. They set out to find 10

[9] Tyler Patchen, "Velocity Accelerator 2018 cohort selected," *Birmingham Business Journal*, December 20, 2017. Available from https://www.bizjournals.com/birmingham/news/2017/12/19/velocity-accelerator-2018-cohort-selected.html

contributors and ended up with 15. They planned to screen 100 investments, but instead screened 220. The accelerator also surpassed their goal number of investments of 10, instead funding 17. These investments support 70 jobs, a jump from their projected jobs number of 52.

The goal of the Velocity Fund is to create a consistent pipeline of high-growth, investable technology startup companies in the Birmingham region. With the support of investors, and with the advantages of being located in the Innovation Depot, Velocity has created an environment where small companies can grow and thrive.

BioAccel

Building an investment climate takes time

BioAccel is an independent non-profit founded in 2009 to promote economic development by funding early-stage ventures and providing support to accelerate the development and translation of bioscience technology and devices. BioAccel also aims to diversify the economy of Arizona and improve the delivery of healthcare. BioAccel has helped to launch 17 bioscience firms and invested $3.7 million in proof-of-concept projects.[10] BioAccel received a 2014 i6 Challenge award that overlapped with a 2015 SFS award, which enabled BioAccel to develop its entrepreneurial mentoring and training programs.

With the SFS award, BioAccel developed and launched three seed funds: BioAccelerator Fund I (BAF-I) to support BioAccel portfolio companies; BioAccelerator Fund II (BAF-II) to expand the portfolio in the Southwest region; and the Arizona Founders Fund (AFF), which is focused on early stage software, IT, cybersecurity, and mobility companies. BioAccel determined that these funds were needed to connect qualifying companies to Angel investments, as well as to serve as a lead investor for angel investments. The funds also complement BioAccel's existing support programs for startups.

BioAccel develops and de-risks its portfolio through a number of programs, such as the graduates of the Southwest Proof of Concept Center, the feeder program supported by the i6 Challenge; the clients of BioVenture Services, a subsidiary that provides technology transfer and commercialization support; and several award competitions such as the New Venture Program Awardees, BioInspire Awardees (BioAccel's Medical Technology Incubator), and BioAccel's Solutions Challenge winners.

The BAF-I raised nearly $1.3 million, short of its goal of $2.4 million. However, these funds were aggressively deployed. Funds from the BAF-I have been invested into fourteen companies, including four companies that pre-date the grant period. The remaining funds are being held for follow-on funding or exceptional investment opportunities. The companies supported by BAF-I have created 96 high-quality jobs, and the portfolio includes several potential home-run firms that would help the BAF-I to generate significant returns for investors and the state. BAF-II was still in the early development and fundraising stage at the time of the final report.

[10] BioAccel, History. Accessed from http://bioaccel.org/history on 10/01/2018.

The AFF raised $1.7 million, also short of its goal of $5 million. These funds were also aggressively deployed, with $900,000 provided to six firms that created 87 jobs. The AFF expects to generate additional capital through syndication of its deals, with a potential of a nearly tenfold increase in investment. Establishing an early track record of success with these initial investments will help to attract that capital.

BioAccel found that the effort to build their funds from individual contributions took longer than expected. Building these relationships proved to be time-consuming, despite several promising partnerships and strategies. The lack of a developed investor ecosystem that would facilitate networking and matchmaking limited opportunities to engage with investors. As a state, Arizona ranks near the middle in access to risk capital. However, the gap between Arizona and nearby California is significant. California exerts a gravitational attraction on regional investment because of their established ecosystem and track record of high returns. Arizona may benefit from that proximity, but it creates challenges as well.

BioGenerator

The value of momentum

BioGenerator is the investment arm of BioSTL, which had an i6 Challenge grant in 2014. BioGenerator received a Seed Fund Support grant in 2017 to build on the momentum of BioSTL's work since 2014. While the SFS grant has only been active a short time, there has been a continuity of activity from the i6 Challenge work to the SFS scope. BioGenerator provides a good example of how the accumulation of effort, through sustained funding and follow-on activities, can create a significant impact. This also means that the success of BioGenerator must also consider the prior work of BioSTL under the i6 Challenge, as the activities of these programs are highly integrated.

The roots of BioSTL go back to 2001, when leaders in St. Louis established the Coalition for Plant and Life Sciences to stimulate the entrepreneurial infrastructure for "bioscience innovation and to capture regionally the economic benefit of our world-class medical and plant science."[11] The coalition was re-branded as BioSTL in 2011. BioGenerator was formed in 2003 to focus on the creation of new companies.

The initial i6 Challenge grant awarded in 2014 enabled BioSTL to create the St. Louis Bioscience Regional Proof of Concept Center (POCC). At the time of this award, BioSTL and the St. Louis region were more than a decade into the development of their bioscience ecosystem. The POCC targeted the intersection of the region's strengths in big data, genomics, and plant science. With the i6 Challenge grant, BioSTL was able to focus BioGenerator to support early-stage founders through the technology development process.

By the end of their project period, BioSTL had reviewed 250 business concepts and worked with 49 clients. These clients had created only 38 jobs, which reflects the slow progression from startup through technology development to job creation, and the fact that a number of clients were not yet creating jobs. BioSTL clients were very successful in raising investment capital, with more than $50 million raised by the end of the initial i6 Challenge grant. BioGenerator inherited this pipeline of activity for the launch of their SFS project.

[11] BioSTL, History. Accessed from http://www.biostl.org/about/history/ on 09/27/18.

Appendix 4: i6 Case Summaries

The i6 Challenge has supported a very diverse array of projects and organizations. The following case summaries illustrate the variety and differences within the current portfolio of projects. These projects highlight the flexibility of the i6 Challenge and the variety of ways in which different organizations have adapted the program to fit the needs and conditions of their region. The following cases were selected to illustrate the approaches taken by different organization types, under different state and regional conditions, and whether their activity focused on any specific technology or type of business (see matrix below).

Year	Lead Organization	Type	EPSCoR	Region	Tech Focus
2014	Louisiana Tech University	University	Yes	Rural Region	Any
2014	The University of North Carolina at Chapel Hill	University	No	Statewide	Any
2016	Mohawk Valley Community College (NY)	Community College	No	Rural Region	AFRL
2014	New Orleans BioInnovation Center Inc.	Nonprofit	Yes	Statewide	Bio
2015	BioHealth Innovation, Inc. (MD)	Nonprofit	No	Statewide	Bio
2015	Maine Center for Enterprise Development	Nonprofit	Yes	Rural, Statewide	Any

Louisiana Tech University: I-20 Makers Network

Integrated effort to build the ecosystem

The i6 Challenge grant that started in 2014 built on prior work from earlier EDA grants dating to 2011. The 2014 grant focused on the I-20 Corridor Maker Space but they provided services from integrated programs funded by earlier grants. Louisiana Tech developed this integrated, linked model as an explicit component of their application.

The grant focused on expanding the capabilities and facilities of the maker space within the Louisiana Tech Thingery. The expansion of the maker space from 1,300 SF to 4,000 SF was combined with the development of programming and training and with the integration of the maker network into the regional ecosystem of programs.

This project had a track record and base activity on which to leverage its work. Within the first 12 months it was providing direct support to 28 entrepreneurial "maker teams" in various stages of new product design and prototyping.

While this project has had sustained local and federal support, it has taken time to overcome cultural barriers, raise the expectation of the participants, increase their willingness to try new things, and follow through from conception to finish. They have a very intensive program of technical assistance with an average of nearly 22 technical assistance meetings per client. 126 new products were launched by client companies, but the nature of the products developed by the maker clients varies greatly and many clients launched multiple products.

Clients by Founding Date:	
Before 2011	10%
2011-2014	18%
After 2015	30%
Pre-Venture	42%

This effort was not technology focused and it included assistance and services for established companies as well as startups and entrepreneurs. It is difficult to disentangle the integrated service network, but businesses supported by the project that were founded after 2015 had raised nearly $1.9 million in capital. Less than a third of the clients in the network pre-date the 2014 i6 Challenge, but the pre-venture clients do not have a founding date and so it is difficult to classify where they are in their development.

The University of North Carolina at Chapel Hill, Technology Commercialization Carolina (TCC)

Intensive services expanding statewide

The 2014 i6 Challenge for UNC established a center to serve entrepreneurs statewide through the development of their businesses, products, and services. The 2014 i6 Challenge leveraged the Concierge Service for Entrepreneurs, a program of the Kenan Institute that had been serving university inventors since 2012.

TCC provides inventors and innovators with commercialization and entrepreneurship training, early-stage venture launch support, and funding. The program resulted in 26 new product launches in a variety of sectors such as professional services, healthcare, and e-commerce.

Demand for some services decreased during the life of the project, which the project team attributed to a backlog of demand in the early years that was resolved through their efforts and through the expansion of capacity across the state as partners and peers began to respond to local needs. Furthermore, initial clients developed their skills and expertise and did not need as much assistance in later years. This effect of learning by doing reduces the direct impacts of the project, but the increase in skills and capacity in the region will increase the indirect or leveraged impacts in the long run.

This effort was not technology focused and included assistance and services for established companies, as well as startups and entrepreneurs throughout the state in urban and rural communities. This program averaged 3 technical assistance meetings per client, but the nature of the technical assistance they provide (financial projections, marketing strategies, business plan development, inventory control, supply chain logistics, and human resources policies) requires significant effort outside of client meetings.

Mohawk Valley Community College, Mohawk Valley Upstate Innovation Accelerator

Community college anchoring an entrepreneurial hub

The Mohawk Valley Community College (MVCC) thINCubator represents an early stage initiative that did not spin out of earlier efforts or an established center or program working in this rural community. They are, however, providing follow-on support to the finalists of the GENIUS NY competition, which is a year-long business accelerator that focuses on Unmanned Systems, Data-to-Decision Applications, and Internet of Things (IoT).

The i6 Challenge grant enabled MVCC's thINCubator to expand its services to include technology transfer, offering coding, marketing, and licensing bootcamps to entrepreneurs who are focusing on licensing IP as well as employees at organizations such as the Air Force Research Lab (AFRL). They faced some early barriers, such as a federal hiring freeze that delayed the development of the partnership agreement with AFRL.

The initial efforts focused on building partnerships and more effective collaboration between the stakeholders and support organizations. AFRL is the primary research asset, but they also have teams licensing technology from Syracuse University. Several licensing opportunities at AFRL are better opportunities for more established firms, but it is not clear whether those licensing opportunities will translate into regional development opportunities. One of the challenges noted by the project team is that companies had problems finding developers and tech talent within the region. This lack of talent could be a significant barrier.

To date, the project has worked with 22 clients and provided 334 technical assistance meetings for an average of 15 meetings per client. Given the early stage of this grant activity and the focus on licensing intellectual property from AFRL, no projects have launched nor has job creation occured. While this project is technically an accelerator, it is also doing fundamental work to establish an innovation ecosystem around the AFRL and other regional technology assets.

New Orleans BioInnovation Center Inc. (NOBIC)

Learning while doing - the value of the strategic pivot

Based in New Orleans, NOBIC aims to stimulate bioscience entrepreneurship statewide. Client companies may be based in the incubator facility or elsewhere in Louisiana. NOBIC operates a business incubator with lab and office facilities, business consulting assistance, and educational programming. NOBIC also runs the New Orleans BioFund, which provides debt and equity bridge funding for startups unable to access other sources of capital.

NOBIC has been operating since 2004, so it was able to build on an established track record and leverage the i6 Challenge to increase its level of activity and raise more awareness of NOBIC and the bioscience cluster in Louisiana. As an established program, NOBIC was able to generate quick early returns, working with 42 clients who reported the creation of 104 jobs, and raised approximately $15.2M in capital. The i6 Challenge project enabled NOBIC to expand and accelerate their services.

Even an established program can encounter detours and delays. Part of NOBIC's i6 Challenge grants included the recruitment of mentors who would be deployed to assist entrepreneurs. NOBIC anticipated some challenges in recruiting mentors, but ultimately recruitment was not the challenge. NOBIC initially established a structured process for entrepreneurs to sign up for scheduled mentor sessions. After two years, NOBIC determined that this model was not serving the needs of entrepreneurs and it pivoted towards a peer mentoring model with more flexibility. This is important in two respects: 1) NOBIC management identified a problem and adapted to fix it, and 2) the i6 program afforded them the flexibility to respond to what they learned.

Overall, in its final progress report NOBIC noted that it had "worked with over 100 different clients who have reported creating 161 FTE jobs, filed 145 patents, raised $59.6M in funding, and had over $41M in sales to date."[12] NOBIC was able to reach a significant number of firms, but the job creation for bioscience activity is not comparable to other sectors because bioscience firms are slow to develop new products and create jobs. Bioscience firms work in a heavily regulated industry where the product development cycle can extend for five to ten years beyond basic research. NOBIC has generated significant results in patents, funding, and sales. New Orleans and Louisiana are not an established center for biosciences, but the development of the mentor and investor networks will pay dividends in the long run.

[12] i6 April 2018 Performance Progress Report Final, Submitted by NOBIC, for the period October 1, 2017 – March 31, 2018.

BioHealth Innovation, Inc. (BHI)

Sustainability challenges in a high-innovation region

BioHealth Innovation's (BHI) Venture Commercialization Model is focused on harvesting technologies and intellectual property related to therapeutics, medical devices, and health technologies (including information technologies). BHI is able to leverage world-class research institutions such as The Johns Hopkins University, the University System of Maryland, the National Institutes of Health, and other federal laboratories. Maryland also has a vibrant entrepreneurial community that takes advantage of its location in the densely populated East Coast metropolitan corridor. The Maryland-Virginia-DC Metro area is also ranked as a top hub for life science research. In addition to the universities and federal labs, Maryland has a track record of investment in innovation. State efforts were formalized with the creation of the Maryland Technology Development Corporation (TEDCO) in 1998.

While BHI was only founded in 2012, it has been able to leverage a very experienced array of talent for its board and staff. For example, the President and CEO, Rich Bendis, is a serial innovation entrepreneur dating back to the Kansas Technology Enterprise Corporation in 1987. While still a relatively young organization, BHI has been able to leverage its staff expertise, state infrastructure, and location advantages to rapidly scale up activity.

It may be tempting to assume that an organization like BHI, with its many advantages, would face few challenges. In one sense, BHI is a victim of its own success. BHI, like several other innovation programs, encourages their staff to leave for staff roles at the client companies that they mentored. This is an intentional revolving door policy that seeks to develop talent and seed it where it can do the most good. While this model can benefit the region and the client companies, it makes it challenging for BHI to maintain experienced staff who can manage programs, especially when there is a spike in the transition volume.

BHI has been very aggressive in its outreach effort, with a large number of events and workshops. During the grant period, this outreach resulted in 354 business concepts that BHI reviewed and 78 clients served. This is a substantial volume of activity for a program addressing a specific sector such as biotech. BHI provided an intensive level of technical assistance including 343 investor meetings that helped clients to raise nearly $68 million in investment capital. BHI clients created 625 jobs, or approximately 8 jobs per company, during the grant period, reflecting both the high-quality resources provided by BHI as well as the strong innovation climate in Maryland.

Maine Center for Enterprise Development (MCED)

Sustainability challenges in a resource-constrained region

The Maine Center for Enterprise Development (AKA Maine Center for Entrepreneurs) has evolved from its roots in 1997 as an incubator on the campus of the Southern Maine Community College. The i6 Challenge expanded the Top Gun Rural Accelerator Network, a virtual incubator program launched in 2009 that provides training, mentoring, and the development of community connections to accelerate entrepreneurial development. Top Gun uses a network of professional experts to validate the business models of entrepreneurs and to develop their fundraising pitch. It is an intensive four-month program with a competitive application process that accepts 6-12 entrepreneurs per class in three to four locations around the state.

The application process does not screen for specific technologies or entrepreneurs. It is open to any who apply and qualify. While there was no specific recruitment or selection effort, the program has served a high percentage of women entrepreneurs. Later in the grant period, Top Gun did focus one class on aquaculture through a partnership with the Gulf of Maine Research Institute (GMRI) and the Maine Aquaculture Innovation Center (MAIC); however, this class finished the program in May of 2018, which is too early to assess those outcomes.

While Top Gun had been operating since 2009, and MCED was an established organization, they faced some challenges due to their longevity. The planned retirement of the Executive Director occurred within the first year of the grant. Planned transitions are less disruptive than unplanned transitions, but they are still a distraction and an additional burden on operations. Overall, the organization handled the transition very smoothly, and there was no drop off in project activity during the grant period.

A larger challenge has been the stability of state support. While MCED is an independent nonprofit with a long history, it has also received annual support from the State of Maine to provide its services. Maine typically provided an average of approximately $60,000 per year, but during the grant period the state proposed to slash that amount to $33,000.

Given the selective nature of this program, there were 91 clients served during the grant period. Access to risk capital is a challenge in Maine and the clients served through the Top Gun programs raised $1.2 million. The clients created 369 jobs, an average of 4 jobs per client, and one job for every $1,873 (well below the average of one job for every $3,000 for programs operating more than two years). This program is a great example of what can be accomplished in a resource-constrained environment.

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