Regional Entrepreneurial Assessment Project:

Final Briefing Report

Region 1: Southwest Virginia

December 2018

TECONOMY PARTNERS LLC

Table of Contents

Overview

The purpose of this briefing report is to provide a high-level baseline assessment of entrepreneurial development and identification of potential priority actions in GO Virginia Region 1 – Southwest Virginia.

TEConomy Partners, LLC was engaged by the GO Virginia Statewide Board to provide each GO Virginia region an independent and objective assessment of its entrepreneurial development position, to facilitate a situational assessment of the region's entrepreneurial ecosystem, and to help identify with local leaders priority actions to help strengthen the ecosystem.

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Setting the Context: Importance of Entrepreneurial Development for Regional Growth

- In 2017, there were 750 surviving traded sector startups formed since 2007 in Region 1
- 5,445 jobs in 2017 were found in these 750 surviving startups
- By comparison, over the 2007-2017 period, total traded sector industry employment declined by 9,161 jobs in Region 1.
- So without entrepreneurial growth, Region 1 would have had even steeper declines in its traded sector industry employment

Project Work Plan

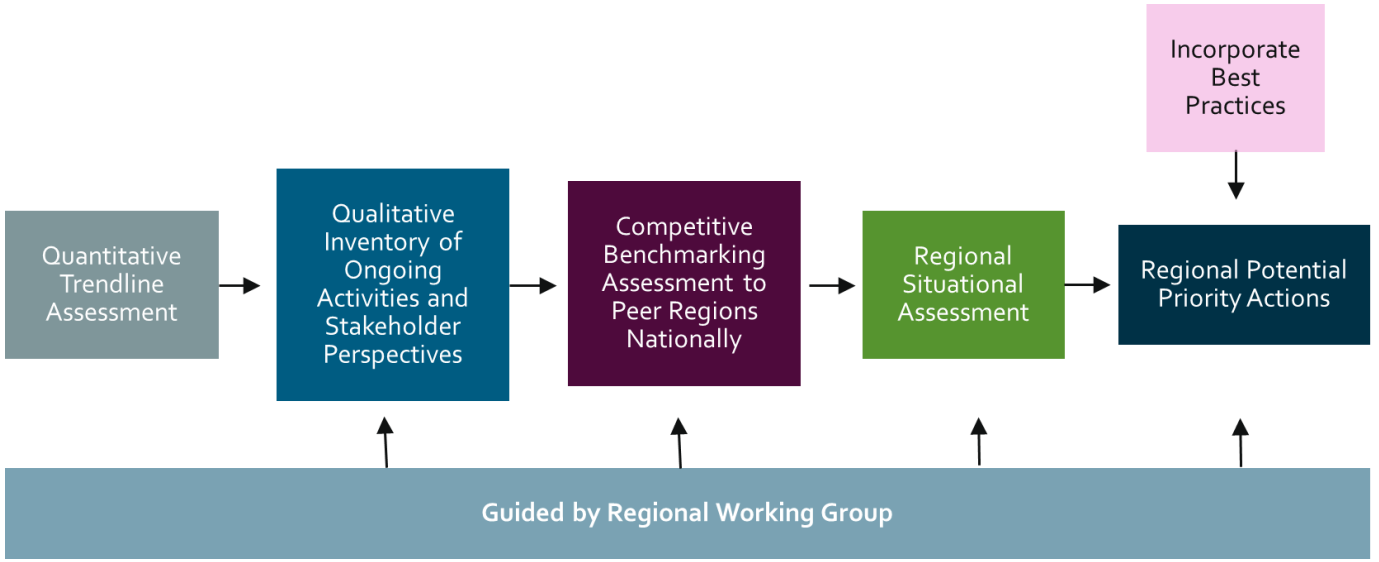
The work plan for preparing this Region 1 entrepreneurial development assessment involved examining:

- Recent data trends in entrepreneurial development
- Ongoing entrepreneurial activities and stakeholder perspectives
- Competitive position to peer regions nationally

These analyses were then utilized to develop a situational assessment of gaps and weaknesses to address and strengths and opportunities to build upon.

Based on the situational assessment and informed by best practices nationally, a set of potential priority actions has been identified for further development by GO Virginia Region 1 to catalyze the development of a robust innovation ecosystem.

Overview of Work Plan for GO Virginia's project:



See Appendix A for listing of Working Group members from Region 1

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Strategic Framework: Focus on Entrepreneurial Development Stages Across Traded Sector Industries

Stages of Entrepreneurial Development

Entrepreneurship is a process involving an interconnected set of development stages supported by public and private resources and services that generates successful new startup businesses to drive regional economic growth. If a region is underperforming in any stage of entrepreneurial development, then it will not realize its full potential in advanced industry development.

	Ideation	Commercial Viability	Market Entry	Growth & Scalability
Activities at Each Stage	Idea development/ invention, possibly involving lean startup approaches for identifying end users, market assessment and (if appropriate) IP creation	Customer discovery, new product development, proof-of-concept testing, prototype development, and validation/market testing	New firms that finalize commercial products, add key team members, execute business plans, marketing plans, manufacturing plans, develop supply-chains, and generate early revenues	Critical mass of firms that generate operating capital to expand markets, scale manufacturing, re-examine team member mix, generate new employment, and begin new product development through virtuous cycle supporting vibrant industry clusters
Type of Assistance to Entrepreneurs Needed	Guidance/coaching on gathering insights for business concept development	Domain specific market knowledge on differentiation, positioning, timing to complete and validate a full business model	Execution of business plans, investor outreach, product launch and business development for first customers	Building management team, positioning for IPO, entry into new markets and expanding market presence
Likely Sources of Risk Capital	Sweat equity; friends and family	Proof-of-concept; SBIR; accelerator angel investment, pre-seed	Angel investors; Formal VC investments including seed, Series A and Series B.	Later rounds of venture capital funding; mezzanine/SBIC; SBA (7)a loans

Focus on Entrepreneurial Development in Traded Sector Industries

Of particular importance to GO Virginia is focusing on those new start-ups in traded sector industry activities that serve customers and markets beyond their local communities, and as a result, can drive regional economic growth. It includes industries such as: manufacturing; professional, scientific and technical services; information technology; finance and insurance; transportation and warehousing; mining; agriculture and food processing; and tourism related industries

US Cluster Mapping Project describes the critical importance of a strong base of traded industry sectors :

"[Traded industry clusters] are free to choose their location of operation (unless the location of natural resources drives where they can be) and are highly concentrated in a few regions, tending to only appear in regions that afford specific competitive advantages.

Since traded clusters compete in cross-regional markets, they are exposed to competition from other regions…Traded clusters are the "engines" of regional economies; without strong traded clusters it is virtually impossible for a region to reach high levels of overall economic performance."

Assessment of Ideation in Region 1

Overall Assessment:

Region is enhancing ecosystem via well-organized efforts of Opportunity SWVA but demonstrates limited deal flow for new traded sector startups, lacks "critical mass" despite emerging activities and identified opportunities.

Strengths and Opportunities:

- High concentrations of startups (10-year cohort) in region's targeted industry clusters including Advanced Mfg., Ag & Food Processing, Energy/Natural Resource Products
- Patent growth – the region more than doubled its patents from 2014 to 2017, though from a small base (17 to 40)
- Positive in-migration of top talent, along with growth overall in the highly-educated working age population
- Emergence of regional Business Challenges energizing grassroots ideation though largely "lifestyle" companies in nature (non-traded sector)
- Opportunities raised regarding Cybersecurity; Drone tech; Coal by-products; Agriculture
- Major emphasis on, successes with tourism startups

Gaps and Weaknesses:

- Patent levels lag the state and comparable rural regions on a per capita basis
- Concerns regarding fundamental entrepreneurial acumen and culture in the region
- Lack of regional entrepreneurial "deal flow" or "critical mass" in traded sectors; activity largely in non-traded areas

Assessment of Commercial Viability in Region 1

Overall Assessment:

Region has a lack of value-added, domain-specific entrepreneurial services and resources to advance promising early-stage companies.

Strengths and Opportunities:

- Strength of efforts by SBDCs, VA Community Capital, Others for guidance/consulting; however, not domain-specific
- Access to SBA Microloans via People, Inc.

Gaps and Weaknesses:

- Lack of a regional accelerator program
- Insufficient entrepreneurial mentoring in the region
- Gap in/need for Angel investor funding
- Very few federal SBIR/STTR awards to small, innovative companies; lags the state on per capita basis, but comparable to other rural regions

Assessment of Market Entry in Region 1

Overall Assessment:

Region has assets to leverage but lacks venture and other key sources of risk capital as well as the serial entrepreneurs and mentors vital to this stage of company development.

Strengths and Opportunities:

- Employment in and growth from younger, traded sector firms – share comparable to state and ahead of other rural regions; young firms contributing to overall growth
- VCEDA Seed Capital Matching Fund making a significant difference (see sidebar)
- Several regional incubator assets: Abingdon, Pioneer Center, Richlands, Crossroads (Galax), The Nest at UVa-Wise (new)
- Strength and support of Opportunity SWVA and local/regional economic development organizations

Gaps and Weaknesses:

- Lack of serial entrepreneurs for mentoring/business assistance
- VC Investments – no regional investments/deal activity in recent years

VCEDA Seed Capital Matching Fund Assisting Early-Stage Companies

The Virginia Coalfield Economic Development Authority has implemented a Seed Capital Matching Fund in the last year and a half to support regional entrepreneurs. The funds, with a maximum award of $10,000 with a required match, are flexible to broadly cover business expenses, for example for equipment purchases or working capital.

To date, 36 small businesses have received a grant award and cumulatively employ approximately 300 in the SWVA region. While the majority are not in traded sector industries, in the latest round 3 companies with drone technologies received awards.

Assessment of Growth & Scalability in Region 1

Overall Assessment:

Entrepreneurship bolstering employment declines in most all major traded sectors; though concerns regarding follow-on funding, and broader challenges of population decline and workforce skills to significantly scale regional companies.

Strengths and Opportunities:

- Major industry clusters active in entrepreneurial development, especially emerging strengths (see sidebar)

Gaps and Weaknesses:

- SBA loan volume, value, and change are lagging state and comparable rural regions
- Working age population declines, especially young working age adults
- Lack of sources for follow-on funding a concern for scale-up

Contribution of Entrepreneurial Development to Traded Sector Industry Cluster Growth

Industry Cluster	Economic Development Position in Region	Contribution of Entrepreneurship
Agriculture & Food Processing	Emerging Strength	**Very Significant**
Business Services	Sizable/Weak Growth	**Very Significant**
Energy, Natural Resources, & Finished Products	Specialized/Declining	**Very Significant**
Engineering, R&D, Testing & Technical Services	Declining	**Very Significant**
Financial & Insurance Services	Emerging Strength	**Very Significant**
Health Care Services	Sizable/Declining	**Very Significant**
Information Technology & Communications Services	Emerging Strength	**Significant**
Life Sciences	Declining	**Very Significant**
Manufacturing	Specialized/Declining	**Very Significant**
Ship Building, Aerospace, & Defense	Declining	**Minimal**
Transportation, Distribution and Logistics	Sizable/Declining	**Very Significant**

Potential Priority Actions Identified for Entrepreneurial Development in Region 1

- Promote and develop stronger ideation programming, resources targeting traded sector opportunities.
- Establish intensive accelerator programming and domain-specific resources to advance, scale promising early-stage startups.
- Address need for more startup risk capital for early-stage market entry by traded sector companies in the region.
- Concept of a “Regional Entrepreneurial Quarterback”.

Potential Priority Action: **Promote and develop stronger ideation programming, resources targeting traded sector opportunities.**

Rationale:

- Address limited deal flow/ideation for traded sectors in the region with opportunities identified in several existing, emerging tech areas, many of which represent broader state strengths with opportunities to align.
- Seize momentum of (and expand) regional business/pitch competitions, entrepreneurship programming and emphasis at UVa.-Wise, ecosystem work of Opportunity SWVA.

Possible Activities:

- **Seek collaborative opportunities with other VA regions/organizations via pilot projects in targeted technology/industry areas**, e.g. drone technologies, agriculture, Cybersecurity, coal by-products – all areas with broader state industry, research strengths.
- **Collaborate with Statewide SBDC's Innovation Commercialization Assistance Program and possibly other universities with NSF iCorps sites** (such as UVA) to support ideation programs in the region with targeted outreach to companies receiving SBIRs and broader base of technology-oriented potential entrepreneurs in the region – tap into networks of counselors found across NSF iCorps sites in Virginia.
- **Provide matching funds for business challenges** across the region to enhance participation, incent ideation in traded sector tech, market areas.
- **Establish a talent outreach program that supports experiential learning projects and entrepreneurial exploration with students** in relevant courses/degree programs through collaborations with faculty.
- **Encourage entrepreneurship by creating 1-stop website for entrepreneurs** to coordinate resources/assistance along with "success stories". Importance of highlighting successes within the region to promote entrepreneurship.

Illustrative Best Practice Examples:

- Charlotte: Ventureprise at UNC, Charlotte leverages its NSF i-Corps site to bring a customer discovery/mentorship program to non-university related, early-stage, innovation-driven startups in the region. Successful teams then able to tap micro-grant (up to $10k) or seed grant (up to $50k) from statewide NC IDEA program.
- Oklahoma: i2e Venture Assessment Program designed to help entrepreneurs investigate product/market fit of a new business concept through a five week program of workshops and individual feedback and direction with follow-on recommendations on next steps needed to advance business concept.
- Nashville: Vanderbilt Wond'ry Innovation Garage program pairs a corporate sponsor with teams of Vanderbilt students and faculty to tackle an issue or project identified by the company, with both undergrad and graduate students participating and committing to 5-10 hours per week.

Potential Priority Action: **Establish intensive accelerator programming and domain-specific resources to advance, scale promising early-stage startups.**

Rationale:

- Need for deeper value-added services, guidance, mentoring, fundamental business guidance to entrepreneurs with promising early-stage companies in advanced technologies and traded sectors.
- Clusters of regional strength and activity require domain-specific expertise lacking in the region (e.g. in agriculture, drone technologies, potentially cybersecurity).
- Need for additional resources and guidance on how to access, for example federal SBIR/STTR awards, SBA loans.

Possible Activities:

- **Create intensive accelerator programming**, perhaps at UVa-Wise aligned with new Nest facility and entrepreneurship programming, in a multi-week or phase "bootcamp" model, with a complementary pilot program with Entrepreneur(s)-in-Residence (EIRs) to assist in advisory roles and to link innovation to market opportunities.
- **Leverage regional presence of UVa.** to tap into broader expertise of i.Lab, Darden School of Business, related programming and resources.
- **Further examine, engage traded sector companies** that have received VA-CEDA Seed Capital Matching Funds, won pitch competitions for potential accelerator, value-added services.

Illustrative Best Practice Examples:

- Chattanooga, TN: Co.Starters 9 week lean startup program followed by Co.Lab Accelerator mentoring program for high-growth potential startups
- Raleigh-Durham: Blackstone Entrepreneurs Network North Carolina that provides expert venture coaching through a veteran group of EIRs

Potential Priority Action: **Address need for more startup risk capital for early-stage market entry by traded sector companies in the region**

Rationale:

- Modest levels of early-stage funding in the region are making a difference, with small tranches available to startups via the VA-CEDA Seed Matching Fund, VCC, and People, Inc. Microloans but these funds are limited and there is no VC invested in the region, very limited use of federal SBIR awards, and SBA Loans. Potential indigenous Angel Investors/Funds are largely on the sidelines.

Possible Activities:

- **Organize a formal angel investor network in the region.** Given lack of understanding of innovation-based businesses of high-net worth individuals consider creating an in-house capacity to conduct due diligence with support from GO Virginia.
- **Seek to form a regional or multi-region student seed fund** for investments in promising student ideation as UVa.-Wise and other institutions build out entrepreneurial ecosystem.
- **Address need for increased funding of statewide angel investment tax credit, which is actively used by Virginia angel groups**. There is a $5 million cap in available credits each year, after which credits are prorated, which makes its benefit level uncertain for investors.
- **Consider SBIR/STTR grant writing assistance and matching fund** to boost funding opportunities for small innovative companies and to advance traded sector activities.

Illustrative Best Practice Examples:

- Susquehanna, PA: Rural Business Innovation organization provides business technical assistance for accessing financing, along with a micro-loan startup grants, as well as a network of incubators near local colleges and universities (including Bucknell).
- Chattanooga, TN: Two seed funds are active in the region, Chattanooga Renaissance Fund and Lamp Post Group.
- Ohio Third Frontier: 34 pre-seed or seed funds established across regions of Ohio, capitalized at approximately $6-$7 million on average, with matching state investments.

Proposed GO Virginia Action: **Establish Regional Quarterbacks for Entrepreneurial Development in Each GO Virginia Region**

Specific Activities:

- Identify opportunities and needs for regional entrepreneurial development within traded sector industries
- Ensure an implementation capacity on priority actions
- Provide a "front door" in each region for entrepreneurs to receive coordinated services among service providers

Service Delivery Approach:

- Performance-based grants developed in consultation with each region to address priorities
- In each region, an advisory committee will be created to oversee the efforts of the regional quarterbacks
- Potential for multi-regional applications
- VRIC proposal articulates additional entrepreneurial activities that need to be coordinated with the regional GO Virginia efforts

Budget Rationale:

- Award $200k-$300k per region to fund a full-time professional to serve as the regional quarterback. Funding could yet be made available in FY 2019.
- The regional quarterback would be tasked with advancing a regional strategic plan and prioritizing strategic investments, with the input from regional entrepreneurial ecosystem stakeholders, under the auspices of the GO VA Regional Boards.
- Once a regional prioritization investment plan is developed, further funding would be available in FY 2020 and thereafter to fill the gaps identified, including funding for efforts such as: EIRs, incubators, accelerators, mentor networks, etc.

Comparable Best Practice Model: *Launch Tennessee*

- Supports a network of Entrepreneur Centers, located in six cities across the state that provide entrepreneurs access to a mix of support services, including: wayfinding for entrepreneurs, boot camps, mentorship, co-working space, and initial pre-seed grants.
- In 2016, Launch Tennessee made grants to its Entrepreneur Centers of $200,000 to $375,000 for each center. These centers serve a much smaller area than GO Virginia regions.

Appendix A: Listing of Working Group Members

Working Group: Region 1

- Jimmy Adkins, LENOWISSCO Planning District Commission
- Jim Baldwin, Cumberland Plateau Planning District Commission
- Andrew Barnes, Rally SWVA - UVa-Wise
- Joy Bhadury, Radford University
- McKenna Blevins, UVa-Wise
- Shannon Blevins, UVa-Wise
- Theresa Burriss, Radford University
- Steve Childers, Radford University
- Doug Jackson, Department of Housing and Community Development
- Becki Joyce, UVa-Wise
- Cathy Lowe, Virginia Highlands Small Business Incubator
- Emily Mayo, Friends of SWVA
- Dirk Moore, Emory & Henry College
- Stephen Mullins, Workforce Development Board
- Becky Nave, Virginia Tourism Corporation
- Sandy Radliff, Virginia Community Capital
- Josh Sawyers, UVa-Wise
- Tal Stanley, Emory & Henry College
- Cathy St. Clair, Go Virginia Region One
- Ida Walker, Friends of SWVA

Appendix B: Quantitative Trendlines on Entrepreneurial Development

Initial Analysis of Entrepreneurial Dynamics in Your Region's Traded Industry Sectors

Key Measures:

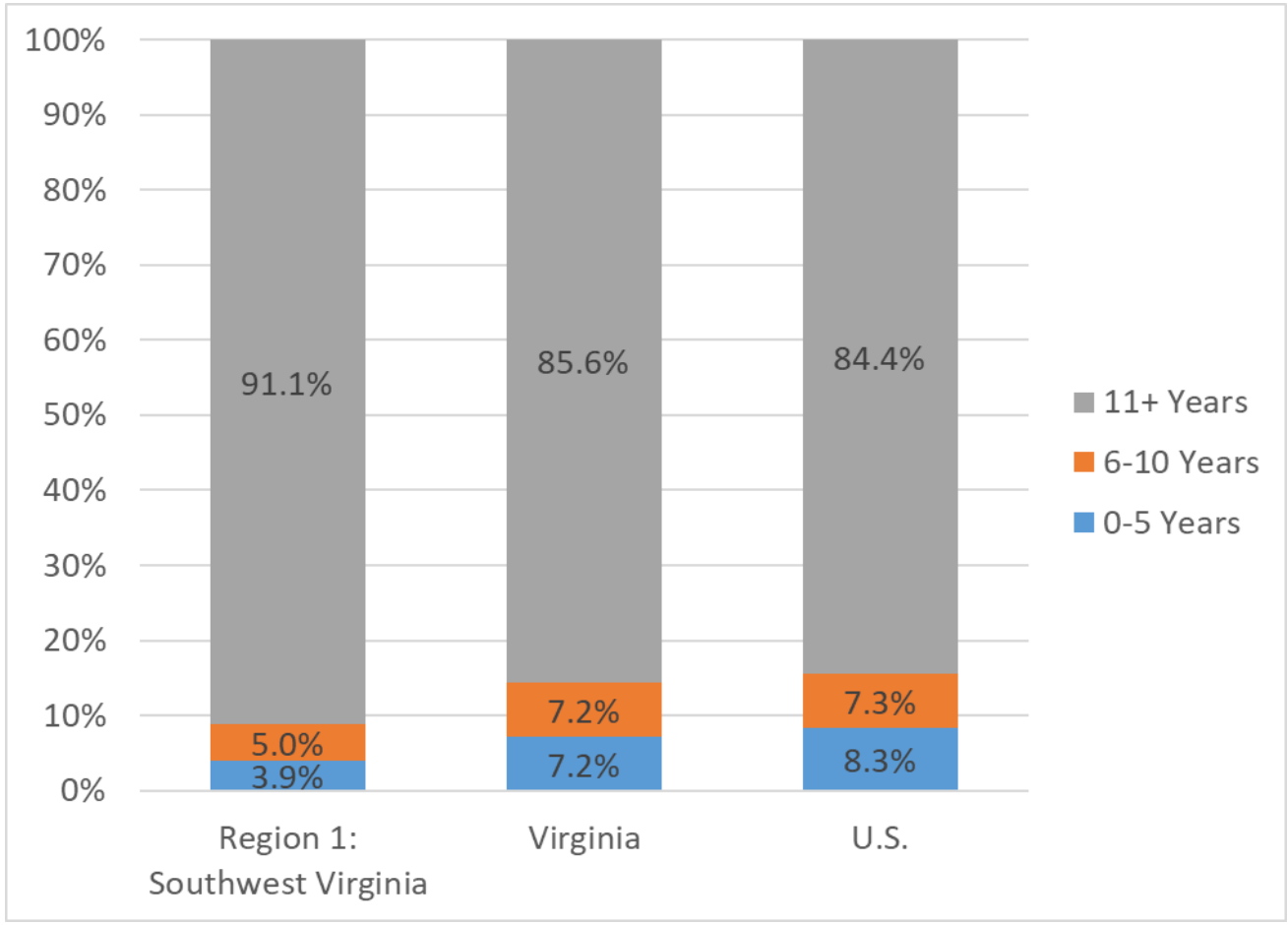
- Job distribution by age of firm
- Job creation by age of firm
- Business formation rates of start-ups
- Survival rates of startup companies
- Examining key elements of "net" employment growth
- The contribution of high-growth startups compared to all startups

Note on Data Sources:

- Two data sources used to provide a full depiction of entrepreneurial dynamics:
- ***The Quarterly Workforce Indicators (QWI) from U.S. Census*** is a new longitudinal database with detailed data related to the job creation and other characteristics of firms, including by age groupings.
  - ***Most Detailed Level of Geographic Coverage***: County
  - ***Coverage***: Covers over 95% of U.S. private sector jobs (does not cover ag jobs, self-employment)
  - ***Grouping of Employment by Age of Firms***: 0-1 Years; 2-3 Years; 4-5 Years; 6-10 Years; 11+ Years
  - ***Industry Coverage***: 2-digit industry, which can define at a high-level traded sector industries
  - But QWI does not provide intelligence at the firm level
  - All data is on a quarterly basis
- **The Business Dynamics Research Consortium (BDRC) database** is a time-series dataset that catalogues individual establishments by location, employment, sales, and industry from 1997 to 2017. The BDRC It is maintained by the University of Wisconsin
  - Coverage: It compiles multiple data sets to track performance and growth for more than 144 million individual businesses across the United States.
  - Provides extensive firm level data
  - Able to identify firm by address
  - Detailed industry coverage

Regional Employment Distribution by Age of Firm for Traded Sector Industries

- Majority of employment base is contained within older firms, mirroring wider state and national trends

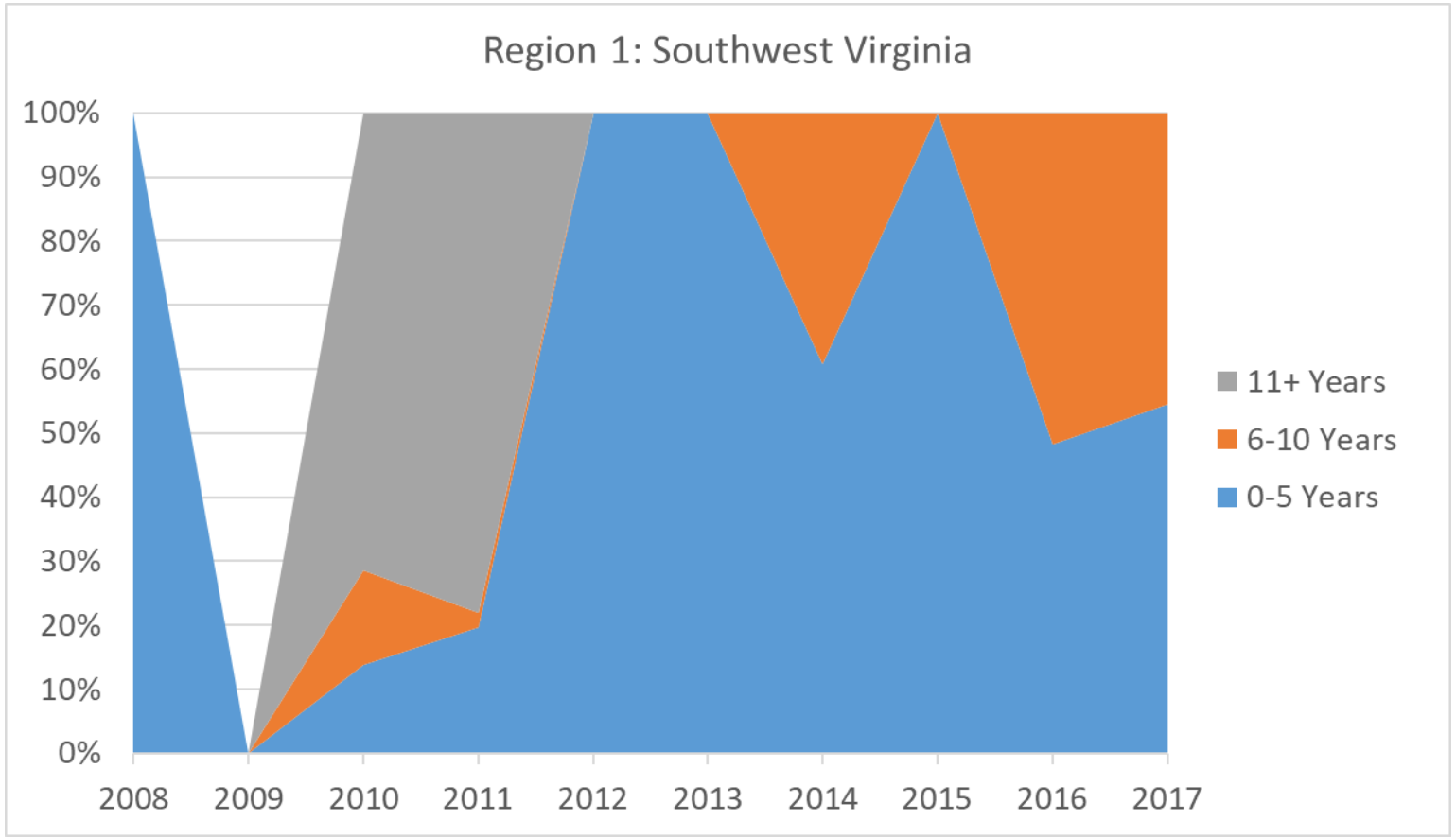


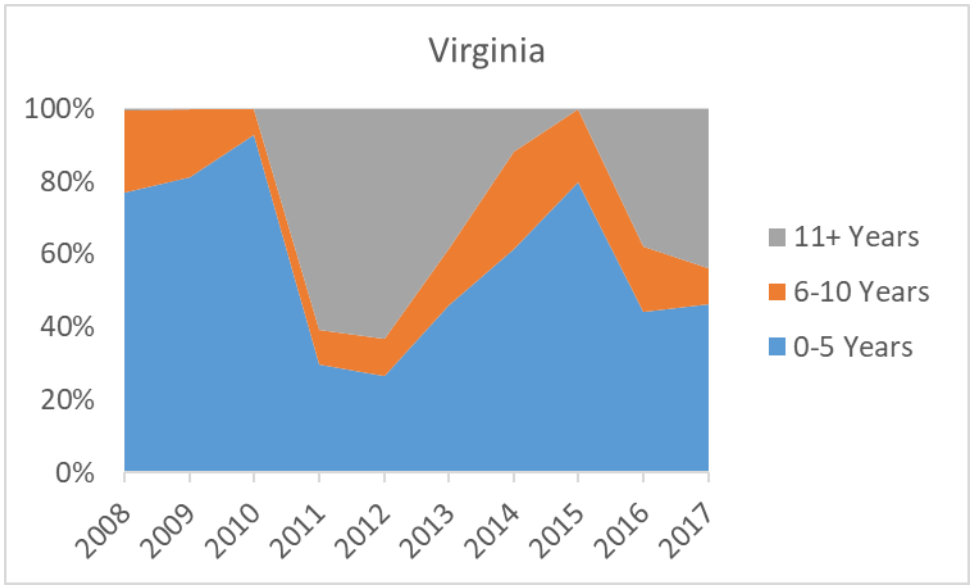
Traded Sector Employment Levels by Firm Age as a Percentage of Total Employment, Averaged 2008 Q1 through 2017 Q2

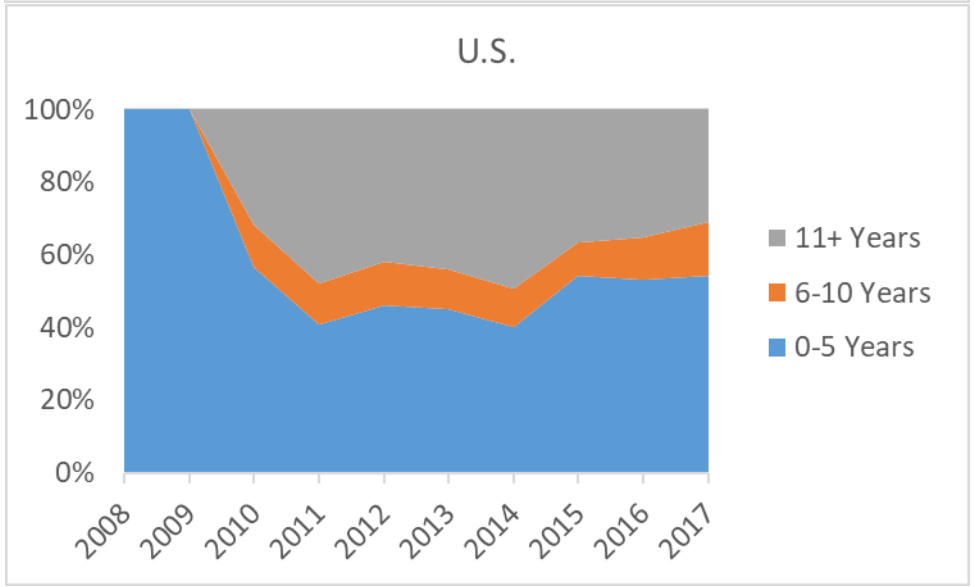
Source: U.S. Census Bureau Quarterly Workforce Indicators dataset.

Trends in Job Generation by Age of Firm for Traded Sector Industries

Traded Sector Net Job Change by Firm Age, 2008 Q1 through 2017 Q2



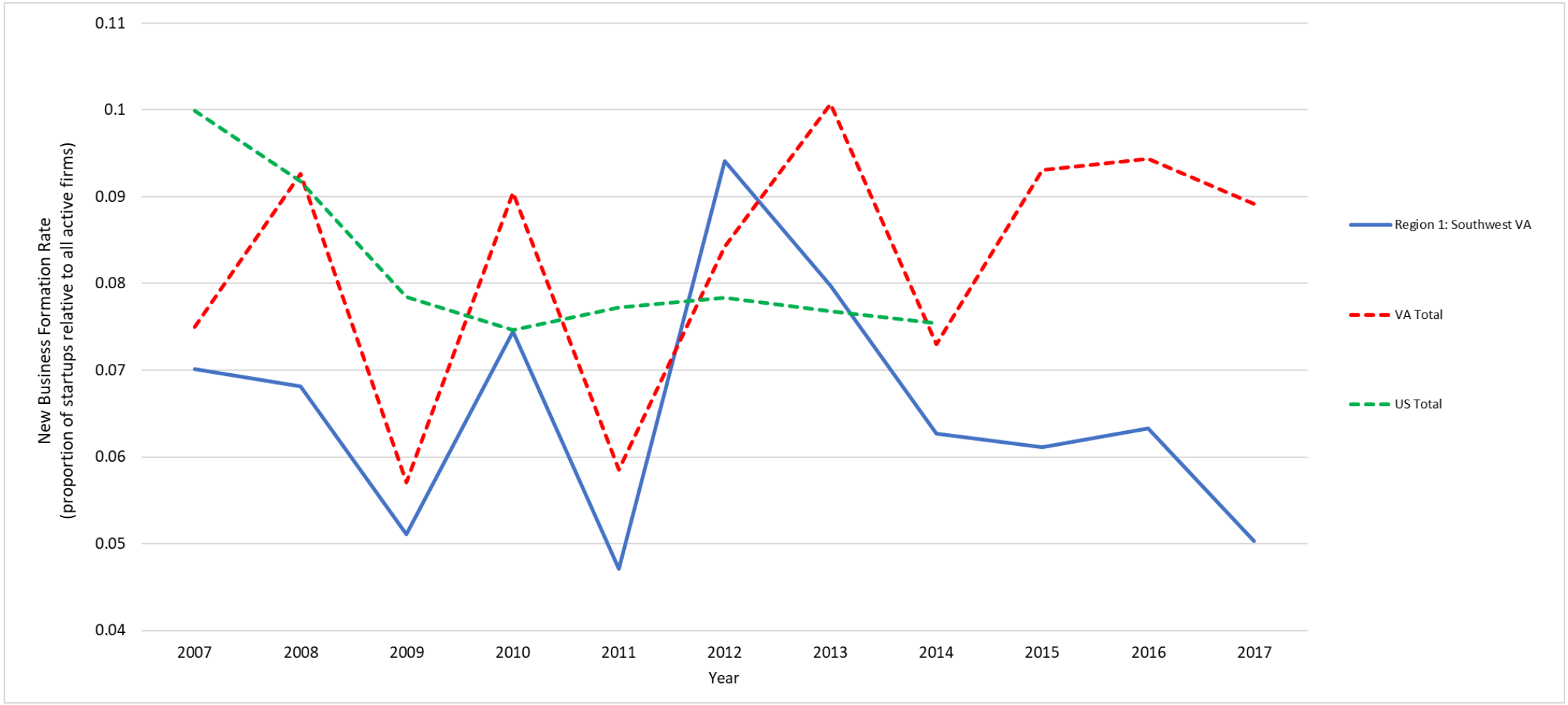




Source: U.S. Census Bureau Quarterly Workforce Indicators dataset.

Overall New Business Formation Rates for Region Based on BDRC Firm Level Data

- Trends in overall new business formation rates for region follow state until 2012, but then observe decline in activity



*US new business formation rates available to 2014 via US Longitudinal Business Database

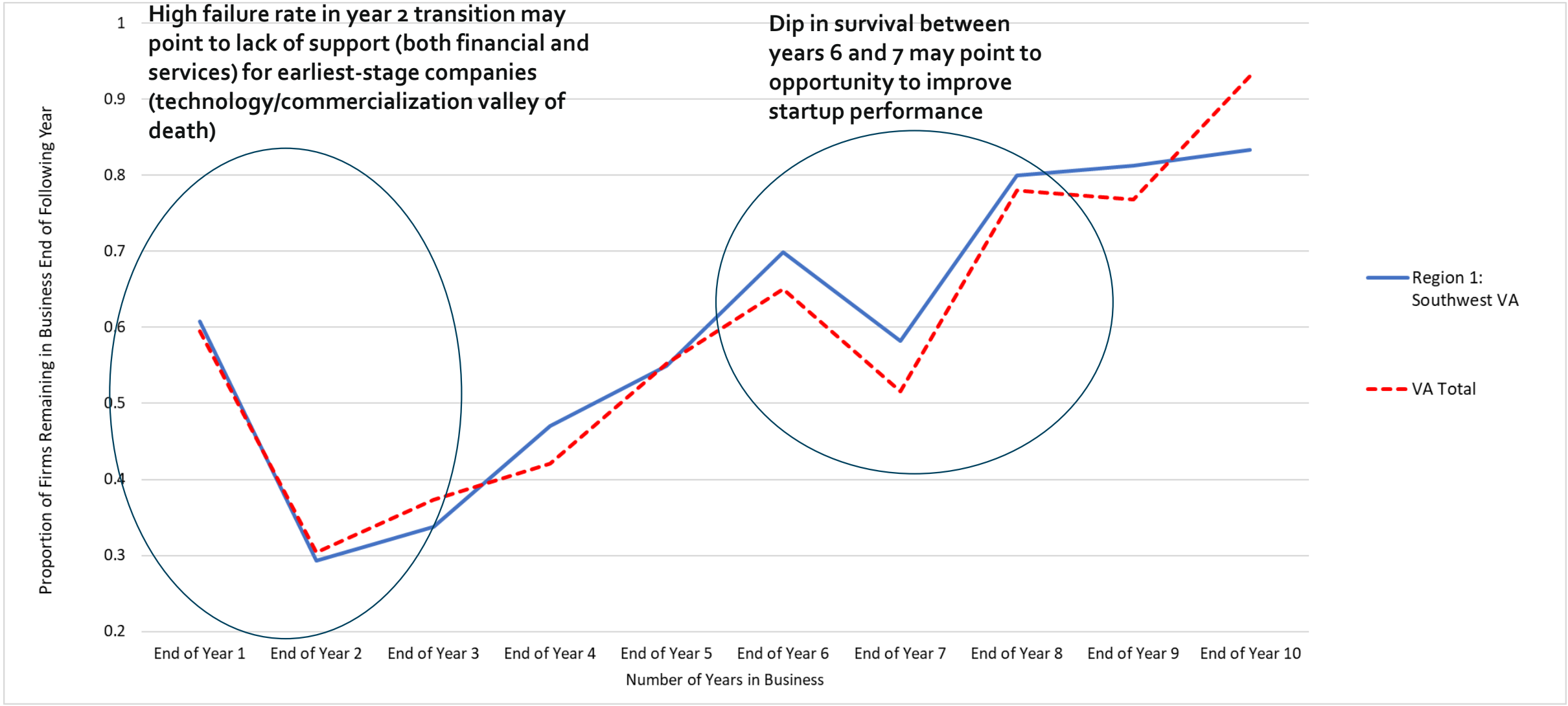
BDRC Profile of Startup Activity Trends in Region

Founding Year of Startup Cohort*	Number of Startups in Traded Sector Industries	Number of Startups Surviving by 2017	Start-up Employment Levels 2017
2007	174	57	936
2008	136	30	205
2009	99	39	323
2010	151	68	467
2011	75	32	164
2012	165	88	647
2013	161	72	583
2014	126	78	549
2015	125	94	648
2016	137	88	469
2017	104	104	454

*Composed of all new non-branch firms with first recorded employment activity in a given year

Year-over-Year Survival Rate Trends in Regional Traded Sector Startups

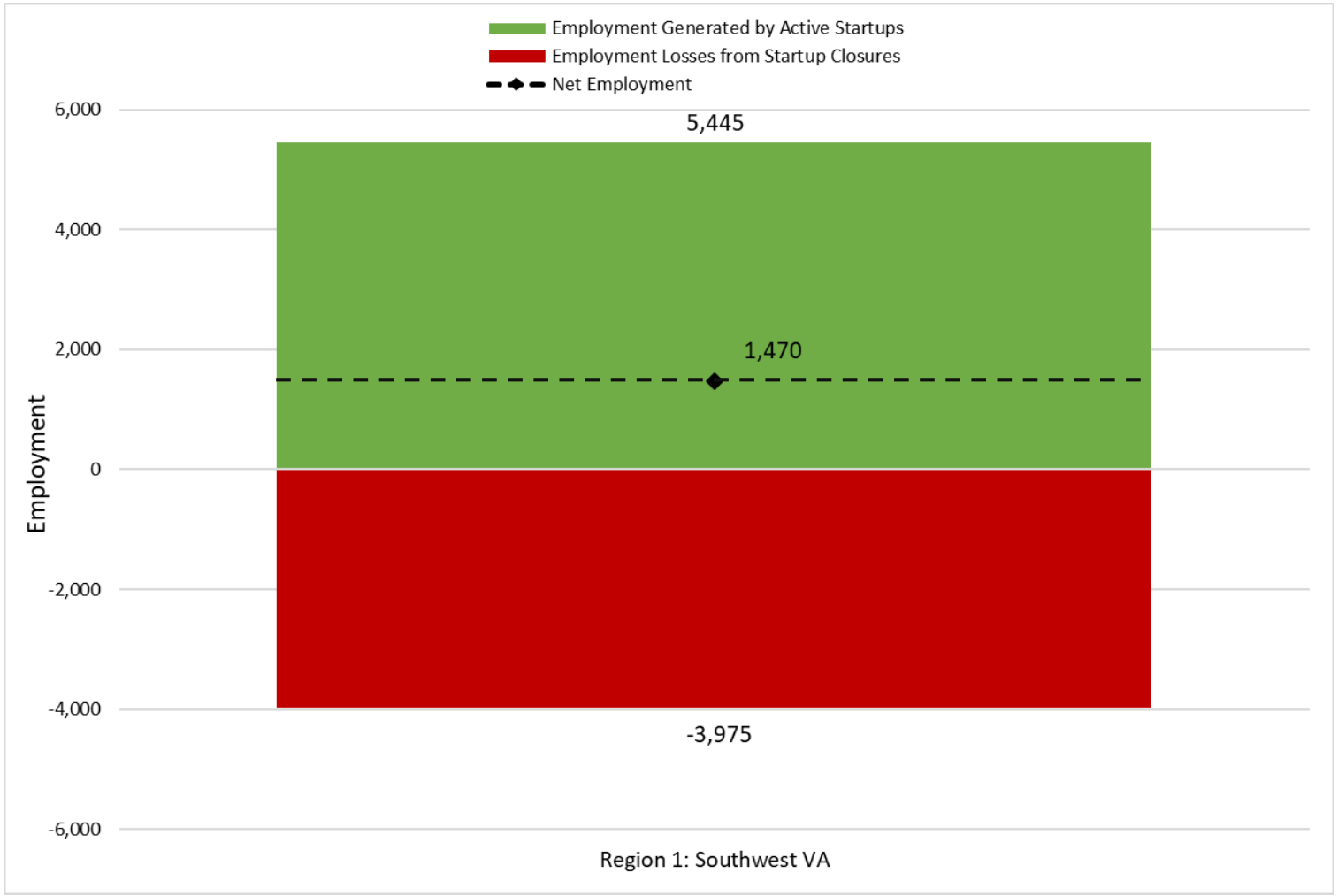
Cumulative 10-year startup cohort survival rates for region are 54.1% compared to a VA statewide rate 53.5%



*Startups defined as having firm age <10 years as of 2017

Net Employment Impacts Generated by Traded Sector Startup Firms in VA

- Significant churn within startups, though generally net employment gains from those surviving startup firms outpaces employment loss from failures across region



	Total Virginia Startups
Employment Generated by Active Startups	155,033
Employment Losses from Startup Closures	-98,732
Net Employment	56,301

*Indicates GO Virginia regions with research universities
**Startups defined as having firm age <10 years as of 2017

Profile of Traded Sector High Growth Startup* Activity in Region

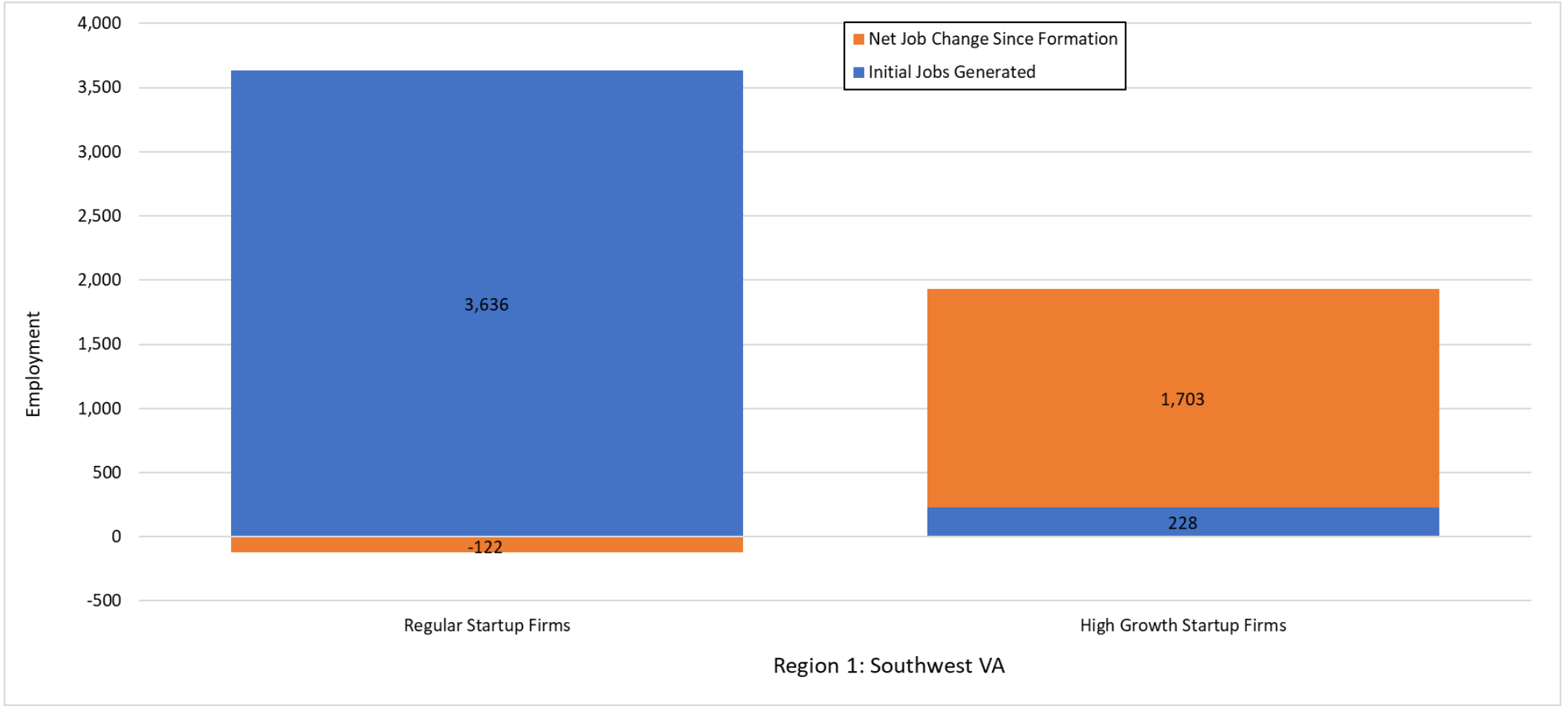
Founding Year of Startup Cohort**	Total Number of Startups in Traded Sector Industries	Number of High Growth Start-ups in Traded Sector Industries*	Number of High Growth Start-ups Surviving by 2017	Employment Levels of High Growth Start-ups, 2017
2007	174	19	7	645
2008	136	9	3	40
2009	99	6	3	99
2010	151	7	6	111
2011	75	4	3	48
2012	165	21	10	313
2013	161	17	6	247
2014	126	21	13	171
2015	125	27	22	257
2016	137	0	0	0
2017	104			

* High growth startups defined as >25% annualized employment growth over lifetime of business
** Composed of all new non-branch firms with first recorded employment activity in a given year

Employment Growth Impacts Generated by Current Traded Sector Startup Firms in Region

- Key to long term success is high growth startups – disproportionate share of lasting gains in employment observed from cohort of startups exhibiting high annualized growth rates

	Total VA Regular Startup Firms	Total VA High Growth Startup Firms
Initial Jobs Generated	104,889	9,058
Net Job Growth Since Formation	506	40,781



*Indicates GO Virginia regions with research universities

**Startups defined as having firm age <10 years as of 2017, high growth startups defined as >25% annualized employment growth over lifetime of business

Profile of Startup Activity Within Key Regional Industry Clusters

Target Industry Clusters:

- Advanced Mfg.
- Agriculture & Food Mfg.
- Information & Emerging Tech
- Energy & Minerals

Major Industry Cluster***	Number of Startups in Cluster	Number of Start-ups Surviving by 2017	Start-up Employment Levels, 2017	Start-ups Industry Cluster Employment Concentration Index*	Number of High Growth Start-ups in Cluster**
Agriculture & Food Processing	195	108	321	1.24	3
Business Services	755	434	1,595	0.75	28
Energy, Natural Resources, & Finished Products	236	109	1,897	6.37	32
Engineering, R&D, Testing & Technical Services	77	38	285	0.62	8
Financial & Insurance Services	144	78	230	0.49	1
Health Care Services	54	22	536	1.09	13
Information Technology & Communications Services	65	33	235	0.35	7
Life Sciences	54	24	123	0.67	3
Manufacturing	107	62	417	1.23	6
Ship Building, Aerospace, & Defense	0	0	0	0.00	0
Transportation, Distribution and Logistics	395	190	1,171	1.12	36

*Represents a measure of specialization in startup activity in certain industry clusters given overall state trends, >1.2 indicates highly specialized concentration of startup generation in industry area

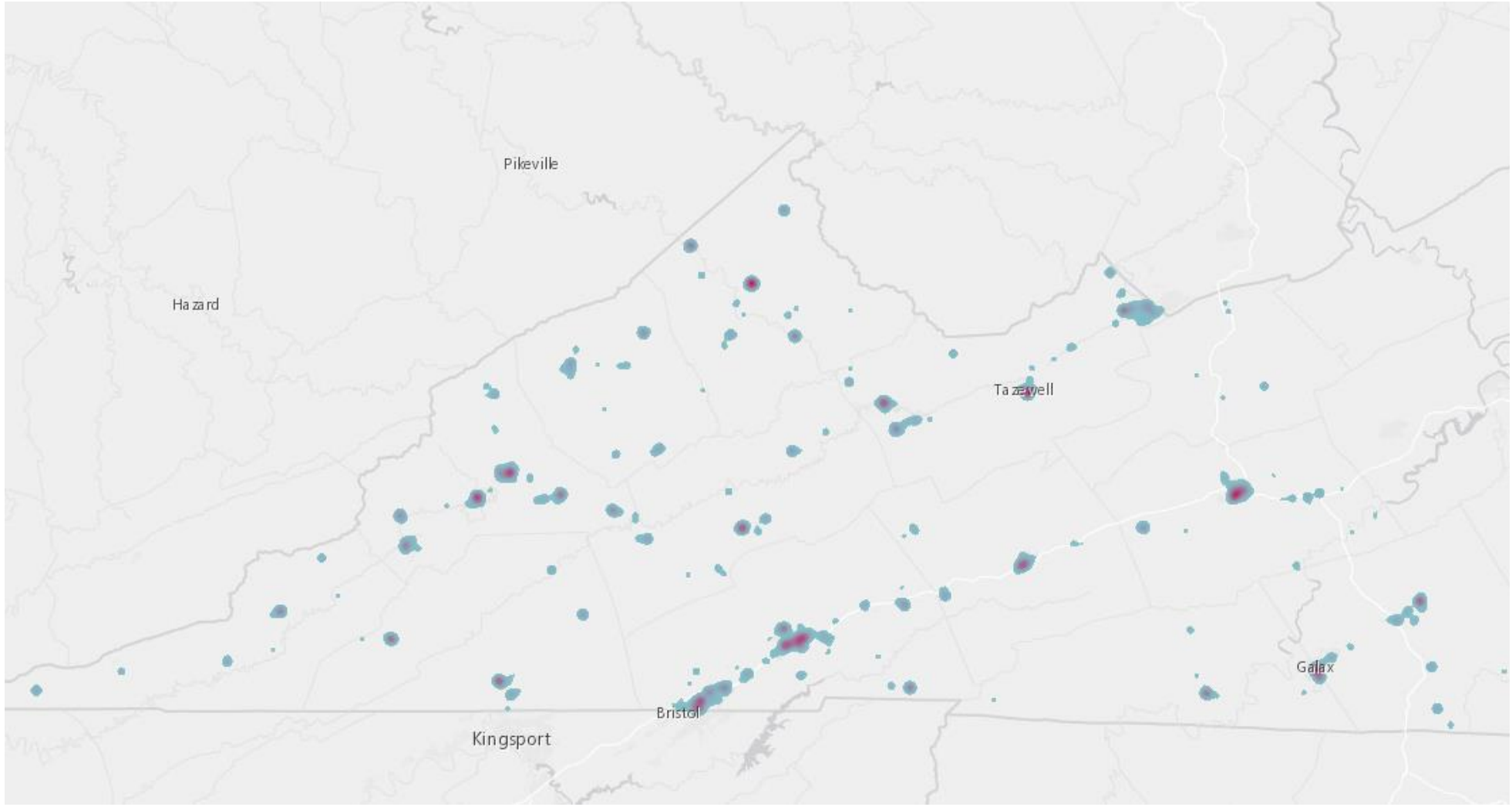
**Defined as >25% annualized employment growth over lifetime of business

***Note: some industry cluster definitions include a mix of traded and untraded industry sectors

Geographic Distribution of Traded Sector Startup Activity in Region

High Regional Startup Activity Levels

Low Regional Startup Activity Levels

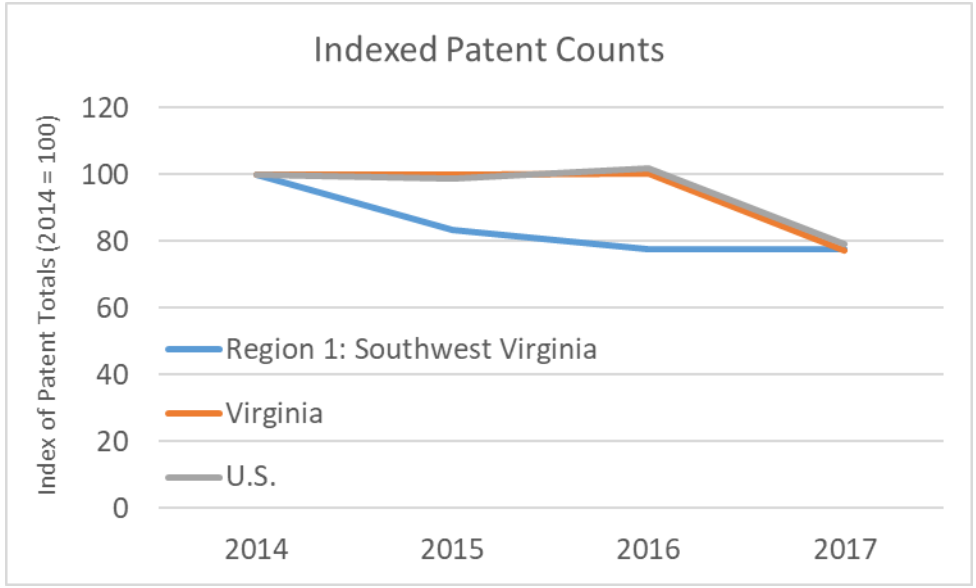


Initial Analysis of Broader Innovation Ecosystem Activity Innovation Ecosystem Activities

Key Measures:

- Patent Activity of Inventors Residing in Region
- Venture Capital
- Federal Small Business Innovation Research (SBIR) Awards
- Utilization of SBA Loans

Regional Patent Activity



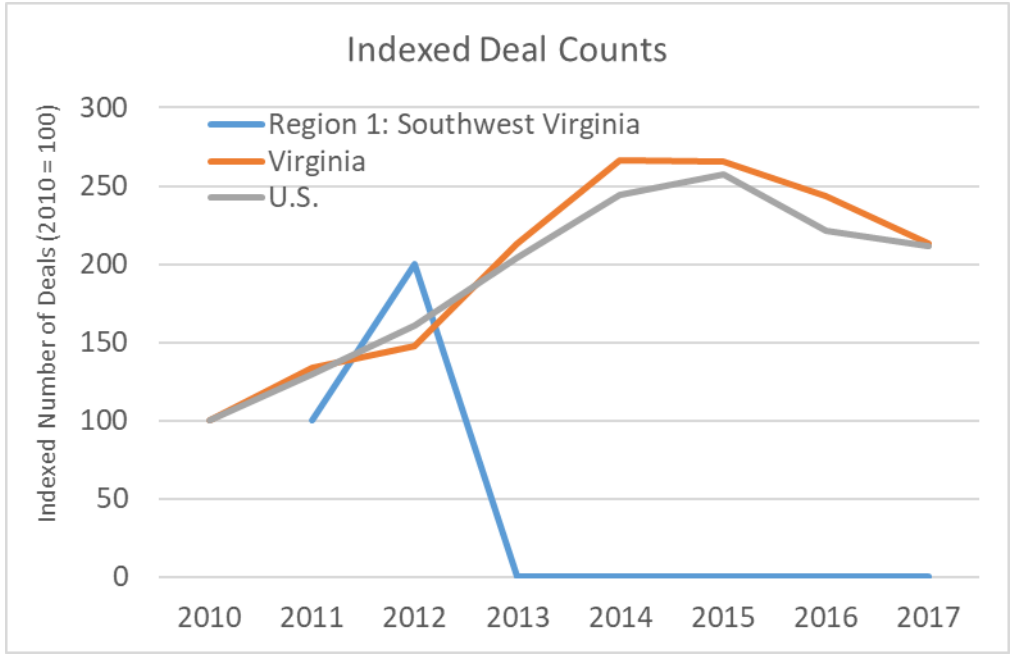
Total Patents, 2014-17

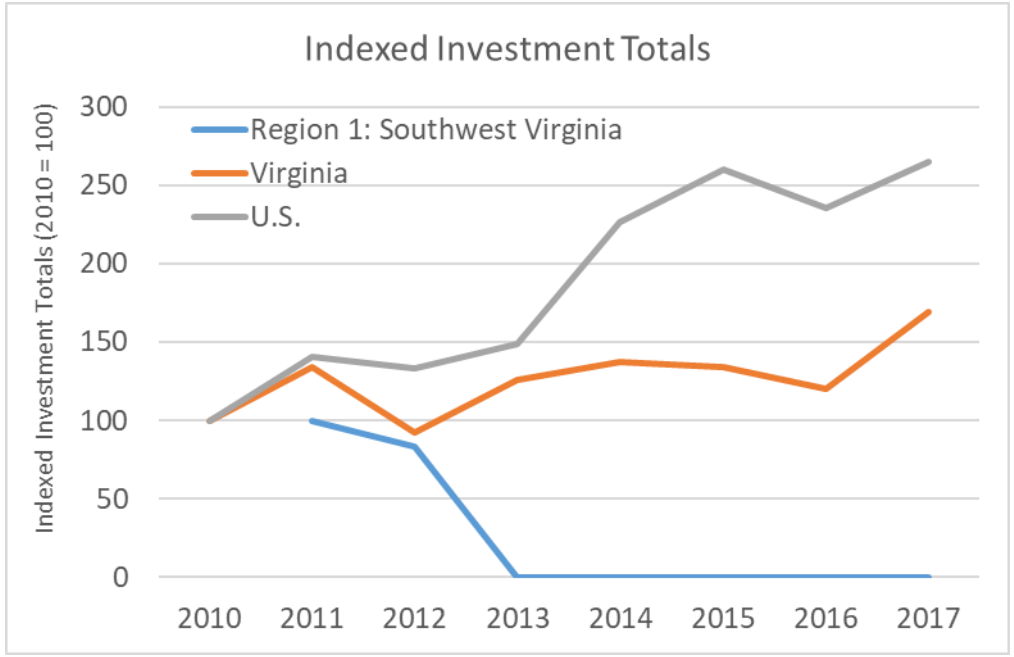
Region 1: Southwest Virginia	2014	2015	2016	2017	Total
Patent Counts	54	45	42	42	183

Technology Class Area	Patents with at least one inventor in Region, 2010-2017
Details of electric transformers or inductances	10
Details of mining machines for slitting or completely freeing minerals from the seam	8
Component parts, details, or accessories, of pumps or pumping systems specially adapted for elastic fluids	6
Apparatus or processes specially adapted for manufacturing or assembling magnets, inductances or transformers; Apparatus or processes specially adapted for manufacturing materials characterized by their magnetic properties	6

Source: U.S. Patent & Trademark Office data from Thomson Reuters Thomson Innovation patent analysis database.

Venture Capital





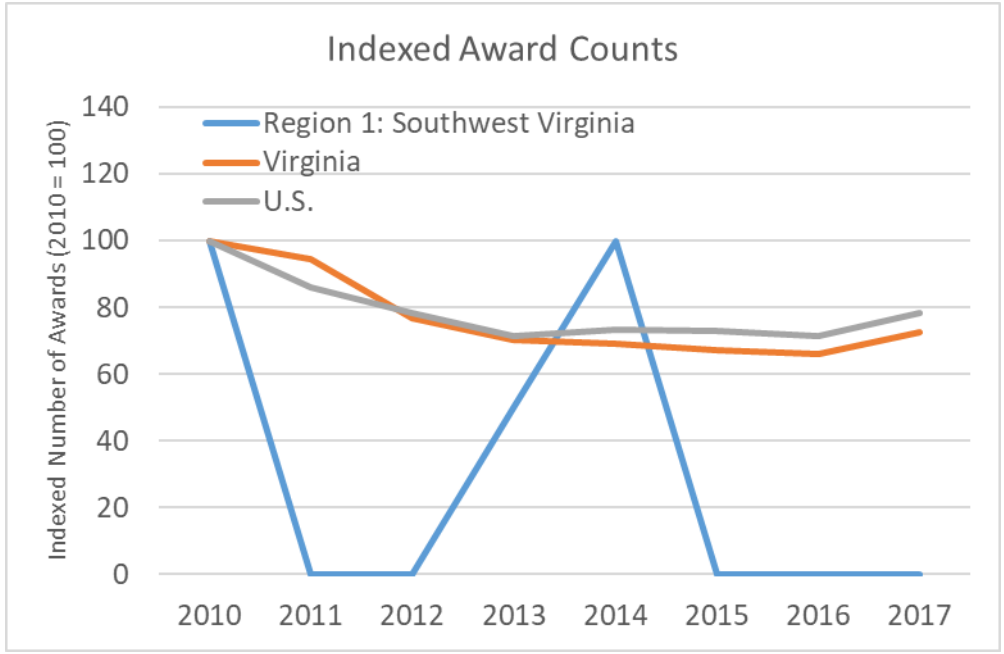
Region 1: Southwest Virginia	2010	2011	2012	2013	2014	2015	2016	2017	Total
Deal Counts		1	2						3
Investment Totals (Millions)		$0.2	$0.2						$0.4

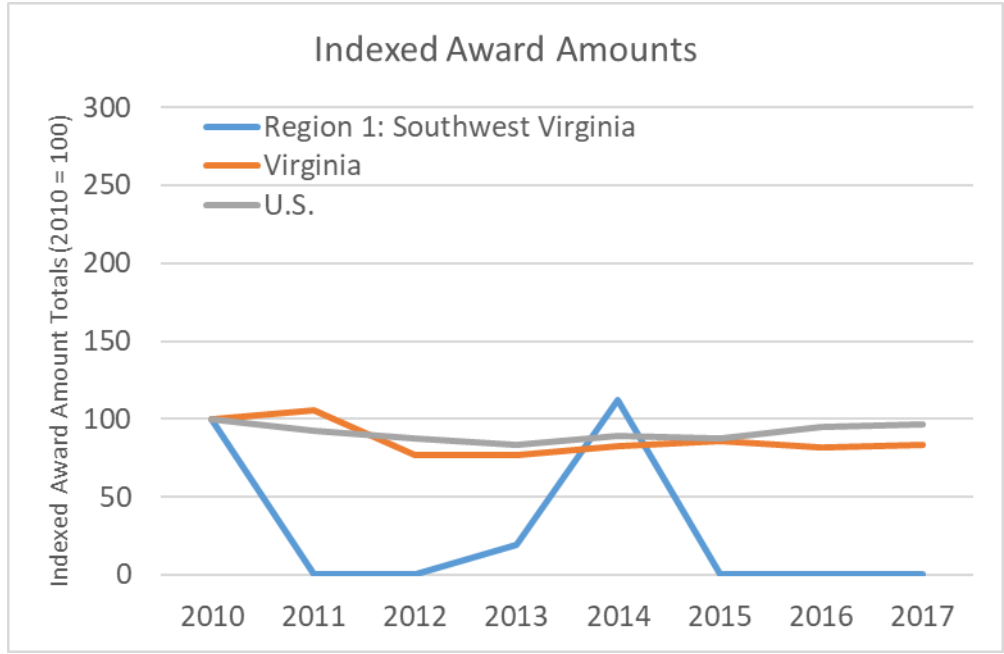
All Companies Receiving VC Investment, 2014-17

Company	Industry Cluster	Deal Count	Investment Total (Millions)
CavitroniX	Energy, Natural Resources, & Finished Products	1	$0.24
WireTough Cylinders	Manufacturing	1	$0.20
Superior Fabrication (Industrial Supplies and Parts)	Manufacturing	1	$0.00

Source: PitchBook Data, Inc.

SBIR/STTR Awards





Region 1: Southwest Virginia	2010	2011	2012	2013	2014	2015	2016	2017	Total
Award Counts	2			1	2				5
Award Amounts (Millions)	$0.49			$0.10	$0.55				$1.13

Source: www.SBIR.gov

Regional Use of SBA Loans

- **SBA 7(a) loans are the agency's primary program for financial assistance to small businesses**
  - Amounts: up to $5M
  - SBA guarantees: 75% to 85%
  - Qualification: for-profit business, SBA size standards, demonstrate good credit/mgmt./ability to repay
  - Use of Proceeds: Startup costs, buying land/buildings/equipment, new construction, working capital, seasonal lines of credit.
  - Benefits: Flexible, longer terms, lower down payments, no prepayment penalties

Region 1: SBA 7(a) Loans and Loan Amounts, Cumulative Totals 2010-18*

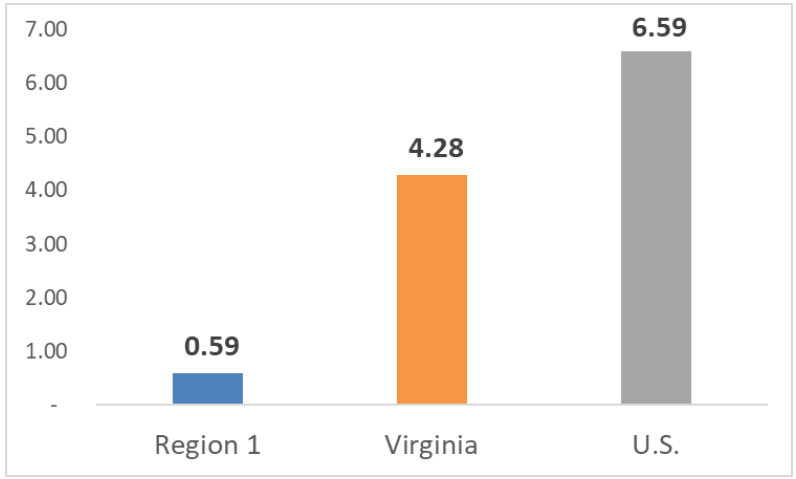
Industry	Co's Receiving Loans	Total No. of Loans	Total Loan Amounts ($)
Total, Traded Sectors	**21**	**28**	**$6,640,000**

Source: TEConomy analysis of SBA loan data reports.
*Data for 2018 are through Q2.

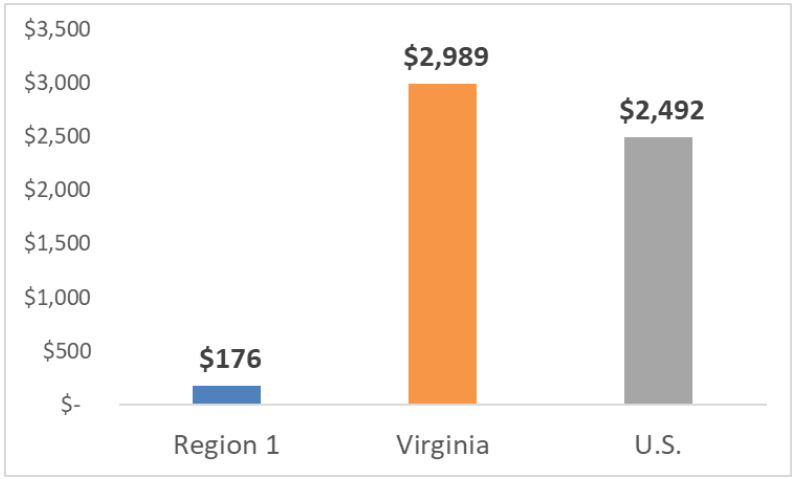
Regional Utilization of SBA Loans vs. State & U.S. Totals

- In 2017, regional companies accessing loan funding at lower rates relative to overall establishments compared with VA and US

SBA 7(a) Loan Counts, Traded Sector Companies Per 1,000 Establishments, 2017



SBA 7(a) Loan Amounts ($), Traded Sector Companies Per Establishment, 2017



Source: TEConomy analysis of SBA loan data reports.

Appendix C: Inventory and Stakeholder Discussions

Informing the "Situational Assessment"

Stakeholder Discussions and Inventory *

- Jonathan Belcher, Virginia Coalfield Economic Development Authority
- Tim Blankenbeckler, SBDC - MECC
- Shannon Blevins, UVa-Wise
- Margie Douglass, SBDC - SWCC
- Doug Jackson, Department of Housing and Community Development
- Carl Knoblock, Small Business Administration
- Sandy Ratliff, Virginia Community Capital
- Josh Sawyers, UVa-Wise
- Shane Simmons, People, Inc.
- Cindy Green Snider, Virginia Community Capital
- Cathy St. Clair, Go Virginia

* See handout for inventory profiles

Appendix D: Competitive Benchmarking

Benchmarking: ***Regions Selected and Comparative Measures***

- **Regions Selected**: TEConomy solicited and received input across the 9 GO Virginia regions on regions they benchmark themselves against, consider useful comparisons

- **Large Technology Hubs**
  - Raleigh/Durham, NC
  - Austin, TX
  - Charlotte, NC
- **Medium-sized regions with urban core and multiple mid-tier research institutions**
  - Birmingham, AL (UAB)
  - Chattanooga, TN – medium-sized, minimal university presence
  - Dayton, OH (Univ. of Dayton; Wright State Univ.)
  - Durham, NC (Duke)
  - Greenville, SC (Clemson Univ.)
  - Nashville, TN – medium-sized, major research university
  - Raleigh, NC (NC State)
- **Rural regions with major research institutions**
  - West Lafayette, IN (Purdue University)
  - Gainesville, FL (Univ. of Florida)
- **Rural region without major research institutions (near Interstate and mfg.-oriented)**
  - Greater Susquehanna, PA (MSA/Micro blend)
  - Cookeville, TN (Micro) – rural, minimal university presence
  - Jackson, TN (Micro) – rural, minimal university presence

*Regional geographies are Metropolitan Statistical Areas (MSAs) if not otherwise specified above.

- **Comparative Measures**: Organized across stages of entrepreneurial development

Ideation
- Highly educated population growth and in-migration
- New firm startup rate
- University R&D
- Patent Activity

Commercial Viability
- SBIR/STTR Activity
- University Technology Transfer & Commercialization

Market Entry
- Employment in Younger, Traded Sector Firms
- Venture Capital Activity

Growth & Scalability
- Presence of High Growth Companies
- Talent dynamics such as population growth of working age population, educational attainment and highly educated population growth and in-migrations
- SBA 7(a) loan activity

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Ideation

Ecosystem Element	Measure	GO VA Region 1	VA	U.S.	Benchmarking Groups: Median Value			
					Large Tech Hubs	Mid-sized Regions	Rural with Major Research Anchor	Rural with No Major Research Anchor
University R&D	University R&D Expenditures per Capita, 2016	-	$174	$222	$863	$370	$2,800	$62
	Percent Change in Total R&D Expenditures, 2010-16	-	22%	17%	16%	15%	13%	-25%
Patenting (Incls. Industry & University)	Invented Patents per 1,000 Population, 2017	**0.1**	0.3	0.5	2.1	0.4	1.4	0.2
	Percent Change in Total Invented Patents, 2014-17	**135%**	-33%	7%	16%	9%	20%	6%

Note:
- Large Tech Hubs: Raleigh/Durham, NC; Austin, TX; Charlotte, NC
- Mid-Sized Regions: Birmingham, AL; Chattanooga, TN; Dayton, OH; Durham, NC; Greenville, SC; Nashville, TN; Raleigh, NC
- Rural region with Major Research Anchor: West Lafayette, IN; Gainesville, FL
- Rural region without Major Research Anchor: Greater Susquehanna, PA; Cookeville, TN; Jackson, TN

Sources: TEConomy analysis of National Science Foundation, Higher Education R&D Survey and US Patent and Trademark Office data

Commercial Viability

Ecosystem Element	Measure	GO VA Region 1	VA	U.S.	Benchmarking Groups: Median Value			
					Large Tech Hubs	Mid-sized Regions	Rural with Major Research Anchor	Rural with No Major Research Anchor
SBIR/STTR Awards	SBIR, STTR Award Funding per Capita, Avg. 2014-17	**$0.40**	$15	$8	$17	$5	$30	$0.30
	SBIR, STTR % Pt. Change in Share of Award Funding, Avg. 2010-13 to 2014-17	**0.00**	-0.56	-	0.09	0.03	-0.04	0.00
	Number of Phase 1 Awards, 2010-2017	**3**	1,796	17,802	486	44	119	2
	Number of Phase 2 Awards, 2010-2017	**2**	935	10,002	235	33	49	0
University Technology Transfer & Commerciali-zation	Avg. Annual Univ. Start-ups, 2014-16	-	17	911	28	5	21	-
	Avg. Startups Formed per $10M Univ. Research, 2014-16	-	0.15	0.16	0.13	0.10	0.36	-
	Avg. Licenses/Options Executed per $10M Univ. Research, 2014-16	-	1.12	1.14	1.54	1.03	2.87	-

Sources: TEConomy analysis of SBIR.gov data and Association of University Technology Managers, Licensing Activity Survey

Market Entry

Ecosystem Element	Measure	GO VA Region 1	VA	U.S.	Benchmarking Groups: Median Value			
					Large Tech Hubs	Mid-sized Regions	Rural with Major Research Anchor	Rural with No Major Research Anchor
New Firm Startup Rate	Rate of New Firm Formation as a Percent of All Firms, 2014	-	7%	8%	9%	7%	7%	5%
	Percentage Pt. Change, 2010-14	-	0.3	0.2	0.0	-0.1	0.4	-1.0
Employment in Younger, Traded Sector Firms	Share of Employment in Traded Sector Firms Ages 0-5, 2017 Q2	**6%**	7%	8%	8%	6%	7%	3%
	Avg. Share of Employment Growth in Firms Ages 0-5, 2013-2017 Q2	**100% (Ages 6+ = Negative)**	52%	46%	36%	34%	42%	30%

Sources: TEConomy analysis of U.S. Census Bureau, Business Dynamics Statistics and U.S. Census Bureau, Quarterly Workforce Indicators data

Market Entry

Ecosystem Element	Measure	GO VA Region 1	VA	U.S.	Benchmarking Groups: Median Value			
					Large Tech Hubs	Mid-sized Regions	Rural with Major Research Anchor	Rural with No Major Research Anchor
Venture Capital Investments	VC Investments, 2014-17	-	$2.6 B	$308 B	$2.3 B	$127 M	$66 M	$0.2 M
	VC Investments per Capita, 2014-17	-	$315	$954	$1,221	$164	$255	$1
	Change in VC Investment, 2010-13 to 2014-17	**-100%**	24%	89%	42%	86%	-13%	2000%
	VC Deals, 2014-17	-	1,068	54,030	565	81	74	3
	VC Deals per 100,000 population, 2014-17	-	13	17	31	13	30	2
	Change in VC Deals, 2010-13 to 2014-17	**-100%**	67%	58%	67%	49%	135%	125%
	Share of VC Investments in Angel + Seed + Early Stages, 2014-17	-	51%	41%	36%	79%	65%	100%
	Angel + Share of VC Deals in Seed + Early Stages, 2014-17	-	81%	88%	85%	84%	91%	100%

Sources: TEConomy analysis of PitchBook data

Growth & Scalability

Ecosystem Element	Measure	GO VA Region 1	VA	U.S.	Benchmarking Groups: Median Value			
					Large Tech Hubs	Mid-sized Regions	Rural with Major Research Anchor	Rural with No Major Research Anchor
SBA 7(a) Loans	Avg. SBA 7(a) Loans, per 100,000 population, 2010-2017	**0.8**	2.9	4.7	3.6	2.7	3.0	2.0
	Change in SBA 7(a) Loans, 2010-2017	**0%**	11%	22%	55%	8%	113%	33%
	Avg. SBA 7(a) Loan Value, per Capita, 2010-2017	**$1**	$9	$17	$18	$12	$10	$20
	Change in SBA 7(a) Loan Value, 2010-2017	**329%**	214%	82%	149%	120%	693%	48%
Presence of High-Growth Companies	Number of Companies on the Inc. 5000 List of Fastest Growing US Companies, 2018	**2**	297	-	57	13	3	1
	Change in Companies in Inc. 5000, 2010-18	**-100%**	2%	-	15%	13%	83%	-50%

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Sources: TEConomy analysis of SBA.gov and Inc 5000 data

Cross-Cutting Ecosystem Element: Talent Dynamics

Ecosystem Element	Measure	GO VA Region 1	VA	U.S.	Benchmarking Groups: Median Value			
					Large Tech Hubs	Mid-sized Regions	Rural with Major Research Anchor	Rural with No Major Research Anchor
Growth in Working Age Population	Growth in Total Working Age Population, 25-64—2012-2017	**-6%**	1%	3%	9%	5%	2%	-2%
	Growth in Young Working Age Population, 25-34—2012-2017	**-3%**	3%	7%	11%	7%	6%	4%
Educational Attainment	Share of Population Ages 25-64 with a Bachelor's Degree or Higher, 2017	**12%**	28%	23%	31%	23%	21%	15%
	Growth in Highly Educated Workforce (BA+), (25-64, working age) — 2012-2017	**4%**	10%	12%	26%	17%	16%	6%
Highly Educated Migration	Net Migration of Highly Educated Workers (BA+), 2012-17	**904**	-14,000	154,411	45,424	2,279	-9,684	-1,402
	Foreign In-Migration (BA+), 2010-17	**366**	151,627	3,933,494	38,243	8,782	8,423	587

Sources: TEConomy analysis of U.S. Census Bureau, American Communities Survey

Competitive Benchmarking Assessment

	Ideation	Commercial Viability	Market Entry	Growth & Scalability
Overall Assessment	⟷	⟷	↑	↓
Measures Region is Performing Well In	• **Patent growth –** region more than doubled its patents though from a very small base (17 to 40) • **Positive in-migration of top talent, along with growth overall in highly educated working age population**		• **Employment in/Growth from Younger, Traded Sector Firms** – share comparable to state and ahead of other rural regions; young firms contributing to overall growth	
On Par Measures		• **SBIR Activity** – lags state but comparable to/slightly ahead of other rural regions		• **Presence of High-growth Companies – (2) comparable to other rural regions**
Measures Region is Lagging In	• **Patenting –** lags state and rural regions		• **VC Investments** – no investments/deal activity in recent years	• **SBA Loan Volume and Value and Change** • **Working age declines, especially young working age adults**

Appendix E: Benchmark Case Study Profiles

Benchmark Case Studies: Wide Number of Tools for Entrepreneurial Development

	Ideation	Commercial Viability	Market Entry	Growth & Scalability
Typical Entrepreneurial Assistance Service Tools				
Tool-Kit Components	• Lean startup bootcamps/pre-accelerator preparation • Mentoring by an EIR/venture advisor • Pitch/Business competitions • University entrepreneurship centers • University technology commercialization scouting	• Accelerators/venture development organizations/incubators • NSF iCorps • Mentoring by EIRs with understanding of specific markets and technologies • Incubator, co-working, maker-spaces	• Mentoring by EIR with serial startup experience • Second stage incubators, research parks, multi-tenant specialized lab facilities	• Growth services involving talent recruitment and development, networking in domain areas and business functions, export assistance • Mentoring by seasoned business executive who grew companies 20x
Typical Risk Capital Catalysts Tools				
Tool-Kit Components	• Commercialization/Technology Transfer Funds • Pitch competition micro-investments	• Proof-of-Concept Funds • SBIR/STTR Matching Grants • Accelerator and Pre-Seed Funding • Refundable R&D and Technology Investment Tax Credits	• Angel Matching/Due Diligence Funds • Angel Investment Tax Credits • Seed Matching Funds	• Fund of Fund Investments (multiple ways to generate funding)

Innovation and Entrepreneurial Development Ecosystem Components

Benchmark Communities				
Austin, TX	← IC² Institute – mentorship, networking, Austin Technology Incubator → UT Kelleher Entrepreneurial Center UT School of Engineering Innovation Center		← South by Southwest Conference & Festivals →	
Birmingham, AL	←Alabama Drug Discovery Alliance →	Velocity Accelerator	Innovation Depot	Focus on IT training: Covalence IT coding boot camp; Innovate Birmingham efforts in IT training for under-employed and unemployed young adults
Charlotte, NC	UNCC 49er Student Foundry Charlotte Venture Challenge	UNCC NSF i-Corps Site ←Network of accelerators (fintech, cleantech, NC Idea →	Packard Place	Innovate Charlotte regional assessments on needs
Chattanooga, TN	← CO.LAB – mentorship, networking, accelerators, connection to capital →	← CO.Starters →	← CO.LAB's Gig Tank, Consumer Goods Accelerators, etc. →	Crowd-sourced financing platforms, such as Kiva; Chattanooga Renaissance Fund (seed fund); and Lamp Post Group (early-stage VC)
Dayton, OH	Wright Brothers Institute (commercialization intermediary)	The Entrepreneurial Center accelerator program	The Entrepreneurial Center mentoring services Accelerant Seed Fund	
Gainesville, FL	UF Entrepreneurship & Innovation Center	← Sid Martin Biotech Incubator & Innovation Hub Incubator → Florida Angel Nexus	← Innovation Square → Florida Opportunity Fund	StartupGNV networking events

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Innovation and Entrepreneurial Development Ecosystem Components

Benchmark Communities

Greenville, SC		← NEXT program of Greenville Chamber – accelerator, mentoring, incubator and makerspace →		CU-International Center for Automotive Research
Nashville, TN	Vanderbilt Wondry	Vanderbilt NSF i-Corps ← Bunker Labs – Launch Lab, Veterans-in-Residence program, CEOs Circle →		
		← Nashville Entrepreneurial Center – mentoring, Pre-Flight, In-Flight, Music & Healthcare Accelerators →		
Raleigh-Durham, NC	← Active student bootcamps/pitch competitions/incubation →	NC State NSF i-Corps Site	← Research Triangle Park, Centennial Campus, HQ coworking, American Underground & Biolabs →	
		← Active university alumni angel networks at Duke, NC State & UNC →		
	NC State EIR to Scout for Technologies	PoC Funds at NC State, UNC & Duke	← NC Biotech Center →	
	← Duke collaboration with privately managed accelerator and incubators →		UNC Carolina Research Ventures $10 m "Seed" Fund	
Susquehanna, PA		← Rural Business Innovation network of incubators →		College student internship funding
		Micro-startup grants from Rural Business Innovation	← Keysone Innovation Zone Transferable Tax Credits for Young Firm Revenue Growth →	
West Lafayette, IN		← Purdue Research Park & Purdue Discovery Park District: Incubators, Multi-tenant facilities, Mixed-Use placemaking →		
		← Purdue Foundry with EIR mentors→		
		Trask Fund for applied research and PoC		
		Elevate Purdue Foundry "pre-seed" Fund	$12 m Foundry Investment "seed" Fund	
		Ag-Celerator "pre-seed" Fund		

Benchmark Case Study: Austin, TX

Regional Context:	• A major technology hub with one research anchor that until recently was not aggressive on tech transfer/startups and had no medical school • Chamber of Commerce drove progress where government was passive or lagged • Success at attracting semiconductor consortia in 1980s led to increasing ties to Silicon Valley and its investors • Unexpected success of Dell Computer in 1980s/1990s created local wealth and management talent, all used in startup formation
Key Tools:	• **IC2.** Institute started creating entrepreneurial momentum even in a period when university itself lagged • **Austin Technology Incubator.** Probably the most important outcome of IC2. Industry verticals aligned with Chamber targets. • **Dell Medical School.** Chamber succeeded in lobbying state for new med school at UT Austin, and Travis County matched with local tax levy • **Innovation District.** Next logical step after medical school is an integrated medical district, now under way • **SXSW.** Once a music festival, it deliberately broadened to add film and software/interactive, creating additional ties to coastal media & investors • **Kelleher Center at UT McCombs School.** Finally active in entrepreneurship, UT Austin now has a campus hub in the business school • **Cockrell School of Engineering Innovation Center** offers advice and training to faculty and staff, provides small startup grants, and hosts competitions, among other activities.
Successes:	• Chamber has adopted Innovate Austin initiative, and names annual 'A-list' of emerging, growth, and accelerator-stage ventures • Regional Council of Governments CEDS has unusually sophisticated section on entrepreneurship and growth acceleration, recognizing importance of both launch and expansion • ATI itself claims to have helped clients raise $890 million in capital, cumulatively, $200 million in 2016 alone to 19 companies • Across entire region, Chamber claims $869 million in capital to 123 deals in 2016
Challenges:	• Growing a full, research-oriented biomedical capacity has only just begun and remains a major challenge • Withering of semiconductor initiatives leaves status of J.J. Pickle Research Campus uncertain, isolated by expressway from main campus
Best Practice Lessons:	• Austin is the pre-eminent example of successfully mixing arts and technology into a single message on creative economy • SXSW has been as impactful as any high-tech initiative, and made Austin a platform for startups nationally, as well as exposing local startups to the national audience • There are few other mid-sized metros with such close ties to the centers of music and film (LA) and tech (NY and San Francisco)

Benchmark Case Study: Birmingham, AL

Regional Context:	• Mid-sized region with research anchors, including University of Alabama Birmingham ($500+ m annually) and Southern Research Institute (~$70 m annually in contract research funding). • Research anchor focus is strongly on life sciences. • Challenge of having to reinvent itself from being a steel-oriented economy (the "Pittsburgh of the South") to an innovation and knowledge hub.
Key Tools:	• **Applied and translational research focus**: Alabama Drug Discovery Alliance, a collaboration of SR and UAB, leverages significant drug discovery and development research and shared use facilities and moves new therapeutic leads through a structured process of assay development, high-throughput drug screening, lead identification and development, pre-clinical testing and early clinical trials. • **Innovation Depot**, a 140,000 sq. ft. incubator and co-location space, making it one of the largest in the nation. It offers range of space options, including wet lab. The Innovation Depot is far more than a technology incubator, but a home for a variety of entrepreneurial and talent initiatives in collaboration with community stakeholders. • **Velocity**, a relatively new accelerator housed at Innovation Depot, with ability to invest $50,000 in seed funding for each selected startup company. • **IT workforce development** – Multiple efforts in place at different levels for IT coding/software development bootcamps targeting undergraduates and under-employed/unemployed young adults. • **Networking activities**: Tech Birmingham programs include a monthly TechTuesday speaker series, member only networking socials, broader information sharing events, and Keep It Local to create opportunities for local companies to do more business together in IT products and services, among other efforts.
Successes:	• Innovation Depot reports 112 companies assisted with 1,064 jobs and $155 million in sales revenue. Largely tech-oriented companies, but some life sciences. • Establishing networks and connections with other communities to generate investor interest and entrepreneurial teams, including New York and Israel • Many of its graduates are now serving as tenants for a larger innovation district development in Birmingham • Alabama Drug Discovery Alliance in early 2018 had 19 drugs in the development pipeline, leveraging major drug discovery programs in emerging infectious diseases, cystic fibrosis and cancer, engaging major biopharmaceutical companies.
Challenges:	• Advancing broader access to capital across stages of investment • Generating life sciences startups from research anchors
Best Practice Lessons:	• Role of entrepreneurial anchor in creating focus and branding on innovation and entrepreneurship • Advancing a single umbrella for delivery of technology transfer, commercialization and entrepreneurial services • Embedding talent and workforce initiatives with innovation and entrepreneurial anchor activities

Benchmark Case Study: Charlotte, NC

Regional Context:	• Fast growing technology hub with smaller research anchors • Leveraging position in banking center to generate a rising entrepreneurial community.
Key Tools:	• **Innovate Charlotte (formerly Charlotte Regional Fund for Entrepreneurship)**: Established through the 2012 regional plan for "Prosperity for Greater Charlotte," and funded through the region's $2.5 billion community foundation. It was envisioned as a grant funding mechanism to support local non-profits to advance entrepreneurial culture, ecosystem connections, risk capital availability and technical skills. Over the years has taken a more pro-active approach in providing entrepreneurial assessments of the region, holding ideation workshops and recommending specific activities. • **Packard Place**: A redeveloped large auto showroom/building that has been transformed into an entrepreneurial hub housing multiple accelerators (see below) as well as offering fellowships to new startup founders and co-working space. • **Network of accelerators**: Includes one in clean energy (Joules Accelerator), fintech (QC FinTech), and tech (RevTech Labs and NC IDEA) • **Ventureprise**: UNC Charlotte's long-time affiliated incubator founded back in 1986. Long history of engaging entrepreneurial community, though in 2017 reconstituted with a stronger focus on student and faculty startups, with programs such as Ventureprise Launch NSF iCorps for university tech commercialization and 49er Foundry a student incubator. Also manages the NC IDEA offering a lean-startup program similar to its Ventureprise Launch for innovation-driven startups in the community.
Successes:	• Packard Place reports results for its aggregate community of accelerators, coworking spaces, fellows, etc. as generating from 2010-2017, 500 new jobs and $1 billion in venture capital raised. • Ventureprise reports over the 2008-2017 period supporting 46 new clients, with some notable successes such as CSi/Photograds, Verian Technologies, SecureEdge Networks and Saprex, which had successful exits or have moved into their own commercial facilities to accommodate substantial growth.
Challenges:	• Long time period to grow university research anchors to match fast growth of overall entrepreneurial activities and offer a deeper driver of innovation. • Not doing well in growing new research park anchors to complement emergence of technology hub, including slow growth of campuses with Charlotte Research Institute and David H. Murdock Research Institute.
Best Practice Lessons:	• Role of community foundation and community leaders in spurring entrepreneurial development.

Benchmark Case Study: Chattanooga, TN

Regional Context:	• Mid-sized region with limited research anchor.
Key Tools:	• Company Lab (or CO.LAB) is a non-profit accelerator and one-stop shop for local entrepreneurs founded in 2008. CO.LAB has developed a range of programs and services for both local growth and high-growth companies at different stages of development, including: Way Finding to screen and guide entrepreneurs to services, CO.STARTERS a 9-week program that teaches lean startup methods for business startup; CO.LAB Accelerator, a mentor-driven program for high-growth potential startups; GIG Tank, an accelerator focused on ultra-high bandwidth business applications; Consumer Goods Accelerator, an accelerator focused on outdoor recreation and food/beverage sector. • CO.LAB connects companies to capital, like the Chattanooga Renaissance Fund, and Lamp Post Group focused on seed investments. CO.LAB has also joined the Kiva, crowd-sourced financing platform. • In 2015 a new intermediary organization formed, the Enterprise Center, to more broadly leverage the City's high broadband infrastructure to create a place that develops and tests many applications for urban needs. • Chattanooga foundations and business leaders have historically invested in downtown revitalization efforts, including the riverfront development. CO.LAB spun out of downtown revitalization and visioning exercise supported by local family foundations. Other investments and assets include Chattanooga's gigabit network (10 gbps metro-wide fiber optic network), UTC, the regional university in close proximate to downtown, and the rebranded Innovation District involved mixed use developments.
Successes:	• Significant scale of activities by CO.LAB since its formation back in 2008, including 20+ cohorts and 700+ participants in CO.Starters, 83 companies graduated and $7M+ capital raised from CO.LAB Accelerator, 58 companies graduated and $29M+ capital raised for GIG Tank and 200 consultations a year from Way Finding.
Challenges:	• Lack of capital is viewed as a key constraint to high-growth companies
Best Practice Lessons:	• Demonstration of how to revitalize a community and its downtown through talent retention, placemaking, startup activity, and ecosystem building that supports both "local growth" and high-growth companies • Critical role of local foundations in catalyzing activities and combining placemaking, unique tech infrastructure development and entrepreneurial programming.

Benchmark Case Study: Dayton, OH

Regional Context:	• Mid-sized region anchored by major federal research lab, Air Force Research Labs at Wright Patterson Air Force Base, and University of Dayton with its research institute generating more than $100m in research activities highly aligned with ARL needs, plus Wright State University, with some research programs and an important talent driver for the region. • Challenge of moving beyond federal contract activity to drive new traded sector company growth.
Key Tools:	• **Wright Brothers Institute (WBI)**: A partnership intermediary to facilitate technology transfer from ARL, identify unmet technology needs, further commercialization through collaborative team efforts and engage small technology-based businesses to tap opportunities and partnerships. • **The Entrepreneur Center (TEC):** Serves as the delivery arm of entrepreneurial services supported by the Ohio Third Frontier and operates a traditional incubator with two sites in the region, which is now expanding into offering coworking space and an accelerator program. Also houses a site for WBI.
Successes:	• Wright Brothers Institute reports supporting over 100 innovation-based projects annually, with typically $3 million of commercialization activities and engaging over 1,000 small technology-oriented businesses. • While not among the top performing seed funds in Ohio, the Accelerant seed fund over 2007-2014 invested $17 million, creating 2,995 jobs and retaining 1,274 jobs. This performance though ranks last of the six privately-managed regional seed funds supported with matching funding from Ohio Third Frontier – and since 2013 has received no additional state matching funds.
Challenges:	• Creating more commercially focused technology-based companies.
Best Practice Lessons:	• While advancing industry partnerships with federal labs can be effective, it does not always translate into new commercially-focused technology businesses.

Benchmark Case Study: Gainesville, FL

Regional Context:	• Compact metro in North Central Florida surrounded by rural counties, distant from major population centers, dominated by U Florida, the land grant which also includes a medical school • Master planning is emphasizing infill between historic downtown and the university campus • Innovation & economic development one of six "pillars" of regional CEDS
Key Tools:	• **Sid Martin Biotech**. 40,000 s.f. Incubator created in 1990 with long and well recognized track record, off campus in Progress Corporate Park • **Florida Innovation Hub.** 100,000 s.f. dry incubator at downtown campus, anchoring: • **Innovation Square.** Major live/work innovation district project planned for blocks between campus and downtown Gainesville, 1 major multitenant building already open, both wet and dry space • **Entrepreneurship and Innovation Center.** On-campus hub for student entrepreneurship, including consultancy with real startups and 'hatchery' for student ventures • **Florida Opportunity Fund.** Venture fund established with state's allocation from Treasury SSBCI fund • **Florida Virtual Entrepreneur Center**. State-supported through Florida High Tech Corridor collaboration of the three major research universities. • **StartupGNV (formerly GAIN).** Not-for-profit organization encouraging local startups. • Additional lower-tech incubators including two at smaller institutions like Santa Fe College strongly supported by the Chamber and highlighted in regional strategies • Multiple commercial coworks, makerspaces, etc. • **Florida Angel NEXUS.** Statewide collaborative of regional angel groups and funds • Every county in the region (1ll 12 counties surrounding Alachua) qualify for planning support from the state Rural Economic Development Initiative
Successes:	• Sid Martin claims its companies have attracted cumulatively $500 million in capital ($1.7 billion in funding including revenue and acquisitions), with 80% still in operation 5 years after graduation, and 16 of all biotech companies in-state started there • UF licensing office claims to have started more than 160 companies (about half biomedical, but also technology)
Challenges:	• Relative isolation from state's major business/corporate centers – 70 miles to Jacksonville, 110 to Orlando, 130 to Tampa • Chamber recognizes need to take strategy to a higher level, including better connecting startup creation to targeted industry clusters, and reducing outward brain drain
Best Practice Lessons:	• Through patient nearly 30-year investment in Sid Martin Biotech, UF has moved beyond "Gatorade" to genuine standing in biotech world

Benchmark Case Study: Greenville, SC

Regional Context:	• Mid-sized region anchored by presence of university research anchors in the region and a growing academic hospital creating a new medical school in collaboration with local universities.

Key Tools:	• **New innovation center campuses outside of the main Clemson University campus with focus on specific technologies, including:**
	  • **Clemson University International Center for Automotive Research (CU-ICAR), Greenville:** Significant public-private partnership between growing automotive industry, Clemson University and the state to create a new R&D center of excellence in automotive technologies close to the industry cluster and about 45 minutes from the Clemson campus . Includes creation of a new graduate program in automotive technologies at the site that involves multi-disciplinary approach involving electronics, computing and advanced materials, supported by recruitment of eminent scholars. Home to company research centers, including BMW IT Research Center and Koyo Bearing R&D Center, plus offers a 60,000 sq ft Center for Emerging Technologies.
	  • **Clemson University Biomedical Engineering Innovation Campus, Greenville:** A 30,000 sq. ft. lab located within a facility at the Greenville Health System campus, which is a spearhead to advance collaborations with a new academic medical center development taking place.
	  • **Clemson University Innovation Campus and Technology Park, Anderson, SC:** Eight miles from the main Clemson campus. Home to university's Advanced Materials Research Lab, environmental labs and computing center; Duke Energy Innovation Center; and industry funded National Brick Research Center
	• **Rise of mix of accelerator, incubator and maker-spaces in Greenville region:** Led by the NEXT program of the Greenville Chamber, brings a strong focus on entrepreneurial and innovation-focused small businesses, with three different facilities, including one targeted for advanced manufacturing, mentoring programs, events and other ecosystem development efforts.

Successes:	• $250 million public-private partnerships in CU-ICAR has generated 770 jobs and another 720 jobs announced, plus major surrounding projects including 1,100-acre mixed use development with an expected population of 10,000, location of Hubbell Lighting Corporation headquarters, among other industry and health system investments. • NEXT Innovation Center reports assisting 102 companies, attracting $23 million in new capital in 2017 and 261 new jobs paying on average $69,443.
Challenges:	• Linking major public-private innovation center developments with entrepreneurial activity.
Best Practice Lessons:	• Creating new anchor research and innovation centers around industry clusters through university, industry and state partnerships

Benchmark Case Study: Nashville, TN

Regional Context:	• Mid-sized region anchored by a major research university, strong music scene and leading healthcare companies

Key Tools:	• The Nashville Entrepreneur Center a non-profit offering a range of fee-based services and memberships spanning coworking, networking, incubation and intensive mentoring/acceleration services:
	  • Co-Working space and Community access
	  • Pre-Flight program for entrepreneurs to advance business ideas
	  • In-Flight program for early-stage startups with up to three employees and $150,000 in revenue
	  • Accelerators focused on music industry and healthcare industry verticals that accept startups nationwide
	• Vanderbilt is an NSF i-Corps site and has graduated 17 teams; Vanderbilt's Wond'ry, the university innovation center, is aimed at developing an institutional innovation culture for faculty and students, and includes programs like Innovation Garage (industry-university collaboration on disruptive solutions), entrepreneurship courses, a makerspace, pitch events, and EIRs
	• Bunker Labs

Successes:	• Branding from major LaunchTN entrepreneurial event, 36/86, is helping to create buzz for Nashville's entrepreneurial community, which is not strong in VC funding, overall net employment from young companies nor university tech transfer, but is attracting significant net in-migration and is generating significant numbers of high growth companies.
Challenges:	• Very diffuse entrepreneurial community, with need to create stronger presence of innovation in the region, including more placemaking
Best Practice Lessons:	• Importance of having a one-stop entity for entrepreneurship

Benchmark Case Study: Raleigh-Durham, NC

Regional Context:	• Mid-sized region anchored by major research universities with strong focus on innovation programs and place-making.

Key Tools:	• **NCBiotech Center:** Long-standing, dedicated program to growing life sciences in the region and across the state, including advancing research excellence, investing directly in emerging companies, ensuring trained workforce and advancing networking and peer groups in life sciences.
	• **Major placemaking for technology with Research Triangle Park (RTP) and Centennial Campus at NC State**. RTP is one of the oldest and largest research parks in the U.S., but has been largely home to larger corporations, including a strong emphasis on biopharmaceutical. It is now reinventing itself with a new town center to offer more amenities and opportunities for emerging companies, plus single use facilities are being converted into multitenant facilities for start-ups and emerging companies, such as Alexandria Real Estate's new Agtech facility that used to be a Syngenta R&D facility.. Centennial Campus at NC State has been a leader on establishing innovation districts, leveraging the university as an anchor and creating close relationships between faculty, students and company tenants, while offering mixed use developments including housing.
	• **Role of universities in commercialization.**
	  ◦ NC State is a national leader, with over 20 startups annually, dedicated funding through its Chancellor's Innovation Fund for proof-of-concept, a full-time site for NSF i-Corps, an Executive in Residence program to scout for technologies at university research labs, bootcamps and business plan competitions, strong entrepreneurial programs within its colleges and strong alumni networking of its start-ups (Wolfpack Investor Network).
	  ◦ UNC in 2010 launched a stronger focus on commercialization and entrepreneurship, including commercialization training launched through an EDA i6 grant, on-campus incubators, a downtown coworking space, proof-of-concept funding (Kickstart Venture Services), alumni investor network (Carolina Angel Network) and a $10 million seed-stage investment fund created by the university's endowment known as Carolina Research Ventures Fund.
	  ◦ Duke University has also embraced entrepreneurship with fellowship program, startup challenge, an incubation fund and a prototyping facility for students, and in its technology transfer efforts participation in the Coulter program, active alumni angel network and partnerships with private sector incubators and accelerators (MedBlue incubator, Biomarker Factory and Center for Advanced Hindsight).
	• Non-university physical developments, including coworking and incubator spaces, such as HQ coworking with three facilities in Raleigh and American Underground and BioLabs in Durham

Successes:	• Raleigh Durham is a top region for venture investment in high-potential innovation-driven companies, with over $1 billion in venture funding to 173 companies, able to attract VC investment from East and West coasts, as well as having a strong base of SBIR backed companies.
Challenges:	• Linking major public-private innovation center developments with entrepreneurial activity.
Best Practice Lessons:	• University engagement in commercialization and innovation is key driver for the region. Builds on brand of being a major complex for university research and talent.

Benchmark Case Study: Susquehanna, PA

Regional Context:	• Rural region with no university research anchors, but presence of non-research oriented colleges and universities.

Key Tools:	• Presence of a Keystone Innovation Zone designation, one of 29 in the state, offering transferable tax-credits of up to $100,000 based on growth in revenues to young companies under 8 years old, operating in innovation-led sectors and located in designated areas near colleges and universities.
	• Rural Business Innovation serves as hub for entrepreneurship including:
	  • Network of incubators located near local colleges and universities
	  • Business technical assistance for accessing financing
	  • Micro-startup grants of up to $5,000
	  • Student internships of up to $2,000 per semester
	  • Coordinator of local KIZ involving outreach and engagement with local businesses

Successes:	• Diversified range of approximately 30 companies served across manufacturing, IT, and bio-health through incubators, internships, micro-loans and KIZ tax benefits • Eleven companies received KIZ benefits in 2017 generating nearly $1 million in new sales and receiving $444,000 in transferable tax credits.
Challenges:	• Sustaining a rural economy by having new and small businesses generate job opportunities
Best Practice Lessons:	• Demonstrates role that an entrepreneurial focused entity can have across a rural region partnering with local institutions • Shows that a targeted tax credit oriented towards young growing businesses in traded industry sectors can be effective in rural communities.

Benchmark Case Study: West Lafayette, IN

Regional Context:	• Rural region with major research anchor
Key Tools:	• Purdue's university driven research park developments. The Purdue Research Park, a 725-acre site on formerly university ag-related lands approximately 8.5 miles from main campus. Now home to 160 tenants. Home to a 105,000 sq. ft. university incubator and coworking space, which was developed with private contributions and bond funding from a state tax-increment financing program to create business incubators that offers $5 million in bonding per incubator. Discovery Park District, a 400-acre mixed-use development immediately west of the main campus. It is the location for many of the university's commercialization and entrepreneurial development initiatives housed in the Burton Morgan Center for Entrepreneurship. • Purdue's Foundry is an accelerator-type program to help Purdue-affiliated entrepreneurs create startups offering access to EIR mentors as well as an umbrella for a range of entrepreneurial and commercialization initiatives including: Trask Fund for applied research and proof-of-concept funding of university inventions; an NSF iCorp site; a range of venture financing assistance, including a $12 m Foundry Investment Fund, a pre-seed Elevate Purdue Foundry fund receiving state support, Purdue Startup Fund, Purdue Angels and pre-seed Ag-Celerator funding.
Successes:	Since the founding of the Purdue Foundry in 2013, there have been 165 startups created that generated more than $270 million in funding and 200-plus new jobs.
Challenges:	• Growing a broader and sustainable innovation ecosystem for the region that sees local startups stay rooted in the region as well as attract other growth-oriented companies.
Best Practice Lessons:	• A major research anchor can both attract existing industry operations to locate nearby as well as create the tools to generate new startups from research inventions, and faculty and student ideas.

Innovating Tomorrow's Economic Landscape

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