

MARCH 2019

THE ENTREPRENEURIAL ECOSYSTEM FOR AGBIOSCIENCES IN INDIANA

ECOSYSTEM ASSESSMENT

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EntreWorks Consulting works with communities, organizations, and civic leaders to design, implement, and promote innovative economic development strategies, policies, and programs.



Innovation Policyworks enables economic development officials at state, regional and local levels make better, data-driven decisions by providing expert research, analysis and recommendations. Our clients see innovation and entrepreneurship as critical elements of their economic development strategy, and are developing new programs or policies, and/or evaluating existing ones.

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Executive Summary

AgriNovus Indiana (AgriNovus) operates with a mission to serve as Indiana's champion for the agbiosciences, the industry where food, agriculture, science and technology converge. AgriNovus pursues its work to make Indiana the home to unparalleled agbioscience talent and innovation via strategies that promote the industry, build networks between industry, government and higher education, develop a strong local talent pool, and nurture future agbioscience-focused innovators and entrepreneurs.

As part of this final component—nurturing Indiana's agbioscience entrepreneurs—AgriNovus commissioned EntreWorks Consulting and Innovation PolicyWorks to undertake an in-depth analysis to understand the environment for innovation and entrepreneurship across Indiana—for those working in the agbiosciences and for Indiana-based innovators and entrepreneurs more generally. The assessment takes a deep dive into Indiana's entrepreneurial ecosystems, i.e., the regional networks of organizations, individuals, and cultural practices focused on helping local people start and grow new companies. We assess how well Indiana, and its key regions, are positioned to help support the start-up of new companies and their transformation into fast-growing businesses that create new jobs, new wealth and new innovations in the agbiosciences and beyond.

Our research is based on several core beliefs related to today's innovation-driven economy. First, entrepreneurial ventures are the key drivers of new job creation and new innovations. A small share of high-growth companies creates the vast majority of new jobs in the United States and nurturing entrepreneurial ventures can be a promising path to economic prosperity. Second, regions with robust ecosystems are most likely to succeed in these endeavors. A great entrepreneur can emerge anywhere, but they are more likely to start their business and to succeed in places with robust entrepreneurial ecosystems in place. Finally, we recognize that robust ecosystems cannot be conjured out of thin air. They develop in regions where many critical elements are already in place. This is especially true in technology-intensive industries such as the agbiosciences where essential building blocks, such as robust R&D capabilities, a strong talent base, and proximity to core customers, are already present in Indiana.

The Research Program

This research report assesses Indiana's entrepreneurial ecosystems through several lenses. It begins with an assessment of how Indiana and its regions perform in terms of supporting the core building blocks of an entrepreneurial ecosystem which include policies that support:

- Specialized Infrastructure and Facilities: Meeting the unique space needs of entrepreneurs
- Talent/Human Capital: Building a regional talent base
- Market Access: Helping entrepreneurs identify, access and succeed in new markets
- Community Culture: Honoring and embracing entrepreneurship
- Regulatory/Government Support: Cutting red tape and promoting flexibility
- Business Assistance: Providing easy access to technical assistance
- Capital: Providing diverse sources of capital to help firms start and grow

Every region's ecosystem is different, with its own competitive strengths and challenge areas. We assess how Indiana performs in each of these building block components, identify areas of strength and gaps where new focus may be needed.

An added assessment examines sector data on the innovation economy. This analysis, included in Appendix I, benchmarks Indiana's recent economic performance on a variety of metrics that track the following:

- Sources of Technology and Innovation – such as research and development spending;
- Entrepreneurs and Business Dynamics – tracking the start-up and growth of new companies; and
- Capital Investment – assessing the range of funding sources to support new and growing businesses.

These ecosystem assessments are accompanied by a mini-benchmarking exercise (see Appendix II) that assesses the state of ecosystem-building in six other regions: Des Moines, Iowa; the Research Triangle region of North Carolina; St. Louis, Missouri; Pittsburgh, Pennsylvania; the Kansas City region; and Denmark. These regions were selected for several reasons: they offered economic and demographic similarities to Indiana, and, in four of the cases, also supported large-scale economic development programs focused on the agbiosciences.

Findings: How does Indiana Perform?

These various approaches to understanding entrepreneurial ecosystems across Indiana generate numerous insights about the current state and future potential of agbioscience-focused entrepreneurship. The process of building and nurturing robust ecosystems is underway across Indiana, generating numerous areas of competitive advantage. Yet, these efforts remain a work in progress, and additional investments, especially in increasing Indiana's rate of new business start-up and development of high-growth ventures, will be needed.

The innovation and entrepreneurship data benchmarking (presented in Appendix I) suggests that Indiana benefits greatly from key anchor institutions, such as Purdue University and Indiana University, and major employers such as Corteva Agriscience, Elanco, Beck's Hybrids, Clabber Girl, Ag Alumni Seed, United Animal Health, among others. New innovations, technologies and products are being spawned from these and other institutions across Indiana, and the state hosts a strong base of technical and scientific talent focused on the agbiosciences. Purdue is an especially important driver of new innovations and ranks among the country's best universities for technology transfer and commercialization.

Like many states in the Midwest, Indiana performs less well on business dynamism measures. The state has a low level of entrepreneurial activity in all sectors, including agbiosciences. A relatively small number of firms are starting up, and even fewer are becoming fast-growth companies that generate significant new jobs and revenues. This slowed entrepreneurial pipeline also factors into Indiana's average levels of performance related to new capital for growth companies. A diverse set of capital sources is in place, but deal flow, especially for higher-value venture capital deals, remains limited. Nonetheless, most observers believe that strong Indiana-based agbioscience start-ups have access to deep pools of capital—if they can provide sufficiently promising investment opportunities.

Several factors help explain this performance. Time lags may play a role. Much of Indiana's ecosystem support work is fairly new, having been established over the past few years. Start-ups take time to gain traction, create jobs, and generate new wealth. If this is the case, the metrics should improve in coming years as new firms gain traction and new tools, such as the Next Level Fund, come into play.

The report's case study analyses reinforce this conclusion. In several of the studied locations, Des Moines, North Carolina, St. Louis and Kansas City specifically, programs to nurture agbioscience-focused ecosystems have been underway for some time. Community leaders have made major investments in infrastructure, talent development, and new programs that have resulted in vibrant science and technology-based local economies.

Indiana's Current Ecosystems: A Status Report

Our primary research directly examines ecosystem building efforts across Indiana and finds a strong base of support tools and infrastructure in place across the state. Many regions, especially in denser cities like Indianapolis and Fort Wayne, host multiple organizations that view entrepreneurial support as a core mission. This embrace of entrepreneurship engages a very diverse set of players, including key state agencies, like the Indiana Economic Development Corporation (IEDC) and the Indiana State Department of Agriculture (ISDA), which include entrepreneurship promotion and support as key parts of their current strategic plans. Statewide industry initiatives, like AgriNovus, TechPoint and BioCrossroads also embrace this mission. Finally, at the local level, powerful cross-sector and bipartisan support exists among elected officials, traditional economic development organizations, private industry, and a variety of community leaders.

Indiana has succeeded in developing a strong "entrepreneur-friendly" business environment. In most cases, someone with a decent business idea and passion about entrepreneurship can and should be able to access nearly all of the support tools and networks they need somewhere in Indiana. This is no guarantee that a business will succeed, but it is a reflection that resources and support for new and growing businesses are readily available in Indiana.

Within this generally strong set of resources, several potential challenge areas arise. Growth capital for technology-intensive sectors, like agbiosciences, can be difficult to access. Like many Midwestern states, Indiana is not a prime location for institutional venture capital investments. At the other end of the spectrum, the state has limited resources for microenterprises or new funding tools like crowdfunding.

Indiana and its regions must also invest to expand the pipeline for new entrepreneurs. More Indiana residents, especially younger people, need to view entrepreneurship as a viable career option and as a common pathway to successful careers and lives. Ongoing work to build an entrepreneurial culture should continue and be expanded.

Looking Forward

Beyond engaging new partners and new entrepreneurs, these efforts also need to focus on economic sectors, like the agbiosciences, where Indiana has strong and inherent competitive advantages. The recent emergence of new ecosystem resources coincides with the growth of an increasingly strong agbioscience sector in Indiana. Indiana has always been a global leader in production agriculture; today it is also a global leader in agbioscience innovation. In addition to

fostering innovations in a host of sectors, Indiana's agbioscience firms employ more than 75,000 people across the state.

Indiana's agbioscience sector is developing in the midst of a global revolution in the agricultural and food sectors. Rising food demand and other factors are fueling the search for new ways to produce, supply, distribute, and store food. Investors are flocking to this sector and making major plays to support innovative ventures. Yet industry experts concur that the agbioscience sector remains underinvested, and that large potential growth opportunities are on the horizon.

AgriNovus and various partners around the state can and should assume a prominent role in building a stronger entrepreneurial ecosystem, especially for those working in the agbiosciences, but more generally as well. A strong pipeline and a robust ecosystem for all entrepreneurs will also help ensure a rich ecosystem for start-ups and growth ventures in the agbiosciences. AgriNovus and its partners can help to build this stronger overall ecosystem via several steps that:

- Build the Pipeline of Agbioscience Entrepreneurs in Indiana
- Accelerate Agbioscience Entrepreneurs in Indiana
- Connect Agbioscience Entrepreneurs to existing ecosystem resources
- Develop new resources targeted to the unique needs of Agbioscience Entrepreneurs

Investments in these four areas will help deepen and strengthen entrepreneurial ecosystems across Indiana in several ways. They will expand the scale and scope of business activity by encouraging more people to "take the leap" and start a new venture. Networking programs will help build deeper connections across regions, across institutions via public-private partnerships, and across disciplines as farming and agriculture experts connect and collide with partners in information technology, life sciences, finance, and the like. Meanwhile, AgriNovus will connect agbioscience entrepreneurs into existing networks and programs already in place across Indiana and will design new focused programs to make Indiana into a nationally recognized destination for these entrepreneurs.

Introduction

Since 2012, venture capital investments in the agbiosciences have jumped by a whopping 80 percent, leading the Boston Consulting Group to predict a new “green revolution” based on “a wave of start-up activity in agricultural technology.”¹ The thriving industry of the agbiosciences operates where food, agriculture, science and technology converge. The agbiosciences encompass several industry sectors, including plant sciences, animal health and nutrition, human food and nutrition, and high-tech agriculture or agtech. They also include critical enabling technologies such as data-enabled agriculture, automation and robotics, supply chain and logistics related to food security, and biofuels and bio-based energy.

Global trends in agriculture also set the stage for the surge in start-up activity. Agricultural markets are under strain, as global population growth continues. So, farmers are under pressure to be more productive with the same or reduced resources. At the same time, consumer tastes are shifting, and there is increased concern not only for sustainability, but for food safety and security, quality and health. Evolving regulations, the impacts of climate change, and economic cycles continue to challenge farmers and agribusinesses alike.

The Midwest is an important player in the field, with a strong concentration of both public and private organizations focused on the potential for massive growth in agbioscience-related business and innovation opportunities. Agribusinesses, large public and private universities and catalysts for economic development (including government and non-profit organizations) all recognize the importance of this sector.

The Midwest is very competitive because of these organizations, as well as its well-established supply chains for agriculture. The Midwest, after all, is one of the most fertile crop production areas in the world, with unique advantages in transportation, processing, human capital and research and development. However, the region suffers from a lack of equity capital, and this, combined with the long sales cycles and a limited base of home-grown technology companies, makes the start-up's challenge even more difficult.

It is in this context that AgriNovus Indiana (AgriNovus) focuses on a core mission to make Indiana the home to unparalleled agbioscience talent and innovation. This mission involves numerous activities from publicizing Indiana's many unique industry-related assets, supporting talent development and building collaborations between industry, academia, and government. This work also entails the nurturing of new ideas and new entrepreneurial ventures that help ensure the continued vibrancy of the state agbioscience sector.²

¹ Boston Consulting Group. 2016. “Lessons from the Frontlines of the AgTech Revolution.”

² AgriNovus Indiana defines agbioscience to include all the technologies mentioned above, generally inputs to agriculture, technologies related to production, and technologies related to manufacturing and distribution of food.

Great entrepreneurs can and do emerge everywhere, but they are more likely to emerge—and succeed—in places that have robust entrepreneurial ecosystems in place. As the Kauffman Foundation has noted:

*Entrepreneurship doesn't happen in a vacuum. . . . We have to build the ecosystem that surrounds entrepreneurs. Ecosystems help entrepreneurs thrive at each step. Just as the complex biological system of soil, water, sunlight, flora and fauna in a rainforest allows individual plants to flourish, so the ecosystem for entrepreneurs is essential to their success. Healthy ecosystems allow talent, information, and resources to flow quickly to entrepreneurs as they need it.*³

This report assesses the state of entrepreneurial ecosystems in Indiana, with a specific focus on the agbioscience sector targeted by AgriNovus. Beginning with a review of how ecosystems work and why they matter, the report then turns to a review of the key building blocks for effective ecosystems. Following is an assessment of how Indiana performs in terms of supporting regional ecosystems and in spawning both start-ups and scale-ups, i.e., high-growth ventures that generate significant levels of new employment, revenues, and new business opportunities. This includes a deeper dive into an assessment of how well state and regional initiatives support and nurture entrepreneurs operating in agbioscience-related sectors. **Appendix I** contains data related to the entrepreneurial ecosystem, while **Appendix II** puts Indiana in context by reviewing the ecosystems in Des Moines, North Carolina's Research Triangle region, St. Louis, Pittsburgh, Kansas City and Denmark.

What is an Entrepreneurial Ecosystem?

As the earlier Kauffman Foundation quote suggests, the concept of the “ecosystem” is consciously adopted from biology to reflect the fact that certain environments are especially conducive to supporting new and growing companies. Most of the core programmatic elements of an ecosystem, such as easy access to capital, have been well understood for years. However, the concept of an ecosystem serves as a useful organizing framework that emphasizes the importance of systems and networks in fostering entrepreneurship. In this view, there is no one single cause or factor that leads to an entrepreneur's (or a region's) success. It is the connections and interdependencies of multiple factors that matter.

There are numerous definitions of entrepreneurial ecosystems. The Organization for Economic Cooperation and Development (OECD) defines ecosystems as:

a set of interconnected entrepreneurial actors (both potential and existing), entrepreneurial organizations (e.g., firms, venture capitalists, business angels, banks), institutions (universities, public sector agencies, financial bodies) and entrepreneurial processes (e.g., the business birth rate, numbers of high growth firms, levels of 'blockbuster entrepreneurship', number of serial entrepreneurs, degree of sell-out mentality within firms and levels of entrepreneurial ambition)

³ Kauffman Foundation, *Ecosystem Playbook*, June 2017, p. 20.

*which formally and informally coalesce to connect, mediate and govern the performance within the local entrepreneurial environment.*⁴

This definition captures the complexity of ecosystems and the multiple players that operate within robust and successful ecosystems.

Why do Ecosystems Matter?

Ecosystems matter because they are associated with a region's enhanced ability to improve both the quality and quantity of local entrepreneurial activity. Regions with strong entrepreneurial ecosystems tend to have higher start-up rates as well as more success in spawning larger numbers of high growth companies.

Ecosystems matter because entrepreneurs matter. Entrepreneurial ventures are the primary creators of new jobs in the U.S. economy, but not all entrepreneurs are created equal. Most small firms and start-ups fail or do not create many new jobs.⁵ However, a small portion of new firms do grow quickly, and this subset makes the most critical contributions to job growth. Together, new firms and high growth firms (defined as those growing employment by 25% per year) account for about 70% of U.S. firm-level job creation in a given year.⁶

New wealth creation and new jobs are the core contributions of robust ecosystems, but they bring other benefits as well. Ecosystems help regions spawn a larger number of entrepreneurs, which spurs more competition and innovation, which in turn creates new opportunities for new entrepreneurs, their employees and customers and their investors.⁷ In successful regions, they help to generate a virtuous economic cycle that spawns successive generations of high growth successful companies, entrepreneurs, and investors. Silicon Valley serves as the prototypical example of this process, but numerous other regions have benefited from the development of robust entrepreneurial ecosystems. Prominent examples include Seattle, Austin, and Boston, among others.

How do Ecosystems Relate to Specific Industries?

While regions typically specialize in certain industries or clusters, effective ecosystems nurture entrepreneurs in all industries, from diverse backgrounds, and at different stages of a business' life cycle. Effective ecosystems rarely "specialize" in only one industry or a few clusters. In these regions, entrepreneurs can easily garner assistance with common business challenges, like accessing capital, grooming talent or finding qualified attorneys and other specialized consultants.

⁴ Mason, C., and Brown, R. 2014. "Entrepreneurial Ecosystems and Growth Oriented Entrepreneurship," Background Paper prepared for a Workshop organized by the OECD Local Economic and Employment Development (LEED) Program and the Dutch Ministry of Economic Affairs, p. 5.

⁵ Haltiwanger, J., Jarmin, R.S., Kulick, R., and Miranda, J. 2016. "High-Growth Young Firms: Contribution to Job, Output, and Productivity Growth." National Bureau of Economic Research Working Paper. Available at: <http://www.nber.org/chapters/c13492.pdf>.

⁶ Decker, R., Haltiwanger, J., Jarmin, R., and Miranda, J. 2014. "The Role of Entrepreneurship in U.S. Job Creation and Economic Dynamism." *Journal of Economic Perspectives*. 28:3, pp. 3-24. Available at: http://econweb.umd.edu/~haltiwan/JEP_DHJM.pdf.

⁷ Auerswald, P.E. 2015. "Enabling Entrepreneurial Ecosystems," Kauffman Foundation Research Paper, p. 10.

These general supports may be further supplemented by specialized expertise in a given industry or technical competency. For example, Boston's ecosystem supports entrepreneurs of all types, but it is especially strong in nurturing life sciences companies. Similarly, Los Angeles is home to a specialized ecosystem around media, television and film.

Economic developers have long sought to nurture economic clusters, i.e., regional ecosystems of related industries, institutions, and those with specialized expertise. It is generally agreed that "industries located in regions with strong clusters experience higher growth in new business formation and start-up employment" and the existence of the cluster contributes to start-up survival.⁸ The economics of agglomeration – things like shared technologies, skills, infrastructure and demand – lowers the cost of starting a business, enhances the opportunities for innovation, and enables better access to a range of inputs and complementary products. Clusters may also actually strengthen innovation because of competition among firms in the same region. An innovative cluster is one where the ability to innovate provides long-term, sustainable advantage for its members.⁹

Cluster support strategies can further bolster ecosystems in many ways, primarily via the creation of new knowledge which can emerge along several pathways:

1. Research and development performed by incumbent firms, at their own facilities, by their employees;
2. Research and development performed at universities or other third-party institution(s) and brought into the cluster by technology transfer mechanisms; and
3. Knowledge spillovers between "agents" where the recipient acts to commercialize the knowledge faster than the source of the knowledge.¹⁰

These knowledge creation activities help spawn new entrepreneurs, who commercialize new ideas and intellectual property via new business ventures. Via this process, knowledge "spills over and contributes to regional innovation, cluster formation and economic development."¹¹

Simply generating new ideas and intellectual property is not sufficient. Successful commercialization and knowledge spillover are more likely to occur in locations with robust ecosystems, i.e., they possess core strengths and capacities in the factors discussed later in the assessment.

Are the Agbiosciences Different?

Every industry has its own unique circumstances and operating practices, and the agbioscience cluster is no different. The agbioscience sector tends to be more technologically intensive than many other industries, with companies and universities investing in R&D and employing a more highly-skilled workforce. Larger corporations assume a more prominent role in the industry, and

⁸ Delgado, M., Porter, M., and Stern, S. 2010. "Clusters and entrepreneurship." *Journal of Economic Geography*. 10(4): 495-518.

⁹ Porter, M. 1989. *The Competitive Advantage of Nations*. New York: Free Press.

¹⁰ Boschma, R. 2015. "Do spin-off dynamics or agglomeration externalities drive industry clustering? A reappraisal of Steven Klepper's work." *Industrial and Corporate Change*. 24: 859-873.

¹¹ Qian, H. 2018. "Knowledge-based regional economic development: a synthetic review of knowledge spillovers, entrepreneurship and entrepreneurial ecosystems." *Economic Development Quarterly*. 32(2): 163-176.

barriers to entry for new start-ups are higher than found in other sectors like information technology or retail.

In technology-intensive sectors like the agbiosciences, a strong knowledge and talent base, peer networks, and labor mobility across companies and institutions assume particular importance. In these cases, successful ecosystems not only generate new ideas and knowledge, but also nurture networks and connections that facilitate the flow and development of these new ideas into new products, services, and technologies. Building these connections and activating an entrepreneurial mindset are core missions for AgriNovus.

A Framework to Assess Indiana's Entrepreneurial Ecosystem

The research literature presents a compelling case for why ecosystems matter to regional or state economic performance. A similar consensus exists around the core components of effective ecosystems. While there are many different models and classification schemes for entrepreneurial ecosystems, these multiple approaches share many characteristics.¹² Researchers typically emphasize that successful entrepreneurial ecosystems are information-rich. Successful locations have a strong local base of knowledge, in the minds of entrepreneurs, service providers, educators and investors, about the business start-up and growth process. This knowledge is also accessed via networking, links to support organizations and technical assistance, or via connectors and network hubs that serve to link entrepreneurs to the information, tools and resources needed to support business growth.

Ecosystems typically emerge at the local or regional, as opposed to the state, level. While this report discusses Indiana's entrepreneurial ecosystem, the "state ecosystem" exists as a network of regional and local ecosystems. For example, a Fort Wayne entrepreneur operates her company and participates in networking events in Northeast Indiana but may find a mentor in South Bend or an attorney in Indianapolis. These kinds of regional linkages are already occurring in Indiana through organizations like Elevate Ventures and the Purdue Foundry's operations across the state.

Robust ecosystems do not simply emerge nor can they be created from scratch. They emerge organically and are rarely created through a "top down" approach. Many successful ecosystems can be traced back to unique local cultures, natural amenities, or distinctive historical experiences. For example, many successful ecosystems have emerged from unique historical circumstances. Hong Kong is a classic example, where its role as free trade port and unique relationship to mainland China helped spawn a strong business-friendly climate. In other cases, a single company or small group of firms can help spawn a flourishing of other entrepreneurial ventures. This pattern has been common in recent U.S. history. For example, many of Silicon Valley's leading firms, such as Apple and Intel, can be traced back to a group of employees who left Fairchild Semiconductors in the late

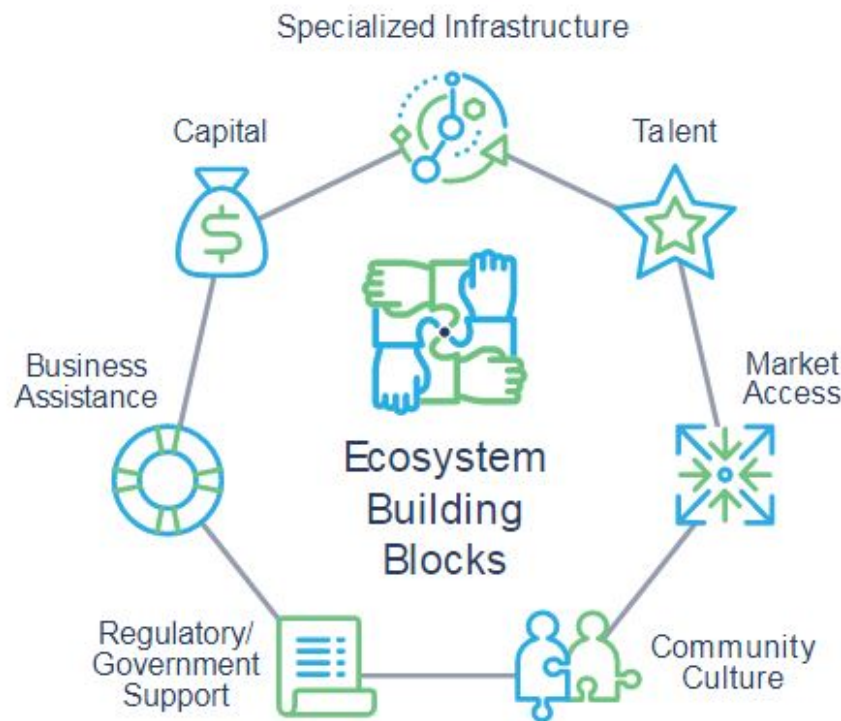
¹² See for example, Qian, H. 2018. "Knowledge-Based Regional Economic Development: A Synthetic Review of Knowledge Spillovers, Entrepreneurship, and Entrepreneurial Ecosystems." *Economic Development Quarterly*. 32:2.

1950s.¹³ Similar patterns of entrepreneurial spawning have been seen in San Diego, Kansas City, Boise and other regions.¹⁴

Beyond these important social context contributors, a number of core public policy factors do help shape entrepreneurial ecosystems. Researchers have highlighted several essential policy inputs/contributors that are closely associated with robust and effective regional ecosystems (Figure 1). They include policies that support:

- **Specialized Infrastructure and Facilities:** Meeting the unique space needs of entrepreneurs
- **Talent/Workforce/Human Capital:** Building a regional talent base
- **Market Access:** Helping entrepreneurs identify, access and succeed in new markets
- **Community Culture:** Honoring and embracing entrepreneurship
- **Regulatory/Government Support:** Cutting red tape and promoting flexibility
- **Business Assistance:** Providing easy access to technical assistance
- **Capital:** Providing diverse sources of capital to help firms start and grow

Figure 1: Public Policy Factors Contributing to a Robust Entrepreneurial Ecosystem



¹³ Kenney, M. 2000. *Understanding Silicon Valley: Evolution of an Entrepreneurial Region*. Stanford Business Press.

¹⁴ Mayer, H. 2011. *Entrepreneurship and Innovation in Second Tier Region*. Northampton, MA: Elgar; Walshok, M. and Shragge, A. 2014. *Invention and Reinvention: The Evolution of San Diego's Innovation Economy*. Stanford: Stanford University Press.

Specialized Infrastructure and Facilities

Most experts contend that soft or cultural factors are the essential components of effective ecosystems, but facilities and infrastructure can matter too. Entrepreneurs are like any other business in that they benefit from and want to work in regions that have strong infrastructure in the form of good transportation access across multiple modes, excellent water, sewer and power systems, and world class broadband access.

These types of physical assets are essential to business success but are not necessarily unique attributes of entrepreneurial ecosystems. However, some types of facilities are especially relevant for start-ups and new companies, including incubators, accelerators and coworking spaces.

Business Incubators

Business incubators often serve as key hubs in regional ecosystems. They are one of the first specialized approaches to supporting small businesses, and have long benefited from investments from federal, state, and local economic development agencies. Extensive research suggests that business incubation may help produce better business outcomes, such as higher firm survival rates and an increased likelihood that incubated firms will maintain local operations.¹⁵

Over time, many business incubators have altered their missions to now serve a wider diversity of companies, including more established firms. Many also focus less on ecosystem support and instead have a more general economic development mission. Meanwhile, some incubators' past service offerings, such as subsidized office space, are of less interest to new ventures that may operate with a limited physical footprint. This shift has been one factor driving the growth of business accelerator and coworking programs.

Indiana is home to a sizable number of business incubators, many of which have been operating for some time.¹⁶ Many of these operations are co-located on university campuses, such as [Purdue's Discovery Park](#), or in other research parks such as the incubator facility at Scott County's [Mid-America Science Park](#). Indiana is home to 23 certified technology parks, and most of these locations also include business incubation services as well.¹⁷ Other prominent incubation programs include the [Northeast Indiana Innovation Center \(NIIC\)](#) in Fort Wayne and Anderson's [Flagship Enterprise Center](#).

¹⁵ U.S. Economic Development Administration, *Incubating Success: Incubation Best Practices that Lead to Successful Ventures*, 2011. Available at:

http://edaincubatortool.org/pdf/Master%20Report_FINALDownloadPDF.pdf.

¹⁶ By some measures, Indiana may be under-served by business incubation facilities. The Milken Institute's 2016 *State Science and Technology Index* ranks Indiana as 45th among US states on its measure of the number of business incubation facilities per 10,000 business establishments. See

<http://statetechandscience.org/>

¹⁷ To view a listing of certified technology parks, visit <https://iedc.in.gov/programs/certified-technology-parks/home>

Skidmore Laboratory

Another critical resource for food-related entrepreneurs is the Skidmore Food Product Development Laboratory at Purdue which offers a state-of-the-art Pilot Laboratory. Operating as a model manufacturing area, it allows manufacturers to see how a process works before committing to full production. Wet chemistry, microbiology, and food product development laboratories are also available to solve related challenges. Capabilities include:

- Aseptic and thermal processing and packaging
- Equipment design and development
- Automated quality control/recipe management
- Process design
- Ultrasound applications/process improvement
- In-line Physical/Chemical Sensor evaluation
- Controlled/modified atmosphere, active and aseptic packaging
- Shelf-life studies and sensory evaluation

Because innovation in food is becoming an important part of agtech and the agbiosciences, commercial kitchens or kitchen incubators are important to consider. A 2016 survey identified as many as 200 commercial kitchens around the United States, including at least several operating in Indiana.¹⁸ The Indiana locations include:

- Indy's Kitchen (Indianapolis),
- Nana Clare's Kitchen (Valparaiso)
- Cook Spring Fort Wayne.
- Carmel's Kitchen (Carmel)
- One World Kitchen Share (Bloomington)
- Art House (Gary)

The typical kitchen incubator is designed to help start-up food entrepreneurs by providing access to large kitchens, cooking equipment, food storage, and perhaps some kind of loading and packaging support. Most users of these facilities run small food businesses or may operate catering or food service companies.

Business Accelerators

When it comes to accessing a full suite of business services, many regions around the world are embracing the concept of business acceleration.¹⁹ An accelerator is generally defined as a program that is provided over a brief period of time, e.g., 3 to 6 months, where companies compete to enter a

¹⁸ Econsult Solutions, *US Kitchen Incubators: An Industry Update*, March 2016.

https://econsultsolutions.com/wp-content/uploads/2016/03/U-S-Kitchen-Incubators-An-Industry-Update_Final.compressed.pdf.

¹⁹ Dempwolf, C.S., Auer, J., and D'Ippolito, M. 2014. "Innovation Accelerators: Defining Characteristics among Start-Up Assistance Organizations," Report prepared for US Small Business Administration Office of Advocacy;; Clarysse, B., Wright, M. and Van Hove, J. 2015. "A Look Inside Accelerators," NESTA (UK) Research Report.

cohort that is provided with extensive training, mentorship and support. Many accelerators include access to equity capital and/or financial awards at the conclusion of the program.

In addition to their work in spawning new companies, business accelerators are especially important because these programs typically view ecosystem development as part of their core missions. And, the regional spillover impact of accelerators appears to be positive. One recent study found that metropolitan statistical areas (MSAs) with accelerator programs tended to have higher levels of seed- and early-stage investing activity after programs have been put in place.²⁰ These impacts are not restricted to firms engaged in the programs; they also ripple out to early-stage firms more generally.

The Ag-Celerator™

Notable is the Purdue University-run Ag-Celerator™, a variant on the standard Purdue Foundry program dedicated to launching start-ups based on Purdue plant science innovations. The Ag-Celerator has a \$2 million fund associated with it that can award up to \$100,000 twice a year to the best companies in a cohort. The Ag-Celerator™ has awarded funds to six agbioscience start-ups as of mid-2018.

Several new accelerator programs are now up and running in Indiana. A number of these efforts tap into national programs or models. These include the new IEDC-supported gBETA Indy acceleration program, based on a partnership with gener8tor, a Wisconsin-based accelerator program. Other programs, such as Jeffersonville's Velocity accelerator or the Purdue Foundry, develop their own models and approaches.

Coworking

More recently, regions have sought to target other kinds of businesses and to support new ways of working. The past decade has seen a global boom in the development of new working spaces that have many names, such as makerspaces, hackerspaces or coworking facilities, and take many different forms.

Makerspaces and hackerspaces are targeted to providing specialized equipment, support and workspace for collaborative work. It is estimated that 400 such facilities operate in the United States, and the number of makerspaces worldwide has grown by 14 times since 2006.²¹ These spaces vary in nearly every way, and they can be located in schools, libraries, other public facilities or operated by private business or non-profits. They can range from simple hackerspaces where like-minded people can meet to do collaborative work to more elaborate makerspaces that also provide training and access to specialized equipment like 3D printers, computer design tools, and various machine tools. The more advanced makerspaces serve as digital factories. Makerspaces are important not only because they provide a place where ideas and new businesses can form, but they also seek to transform their communities. Some analysts refer to them as part of a new "civic infrastructure" which will help create local cultures that embrace innovation and creativity.

²⁰ Fehder, D.C. and Hochberg, Y.V. 2014. "Accelerators and the Regional Supply of Venture Capital Investment," Working Paper. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2518668

²¹ Lou, N. and Peek, K. 2016. "By the Numbers: The Rise of the Makerspace," *Popular Science*. The Maker Map (available at: <http://themakermap.com/>) provides an updated listing of sites across the United States.

Coworking spaces are the final component of the “new entrepreneurial infrastructure” and have experienced a growth boom of their own in recent years. Coworking spaces provide a work and meeting space for all kinds of independent workers. Many users of coworking space are freelancers, gig economy workers, or even telecommuters in traditional employment, but entrepreneurs also comprise a big share of coworking space users.

The size of the coworking market is disputed, but no one doubts that it is large and growing. The 2017 Global Coworking Census identified more than 14,000 coworking spaces around the world serving more than 1.74 million members.²² In 2005, the United States was home to one coworking space. Today, there are more than 3,200 of these locations around the country, with annual membership growth expected to average around 15% for the next several years.

Indiana has dozens of coworking spaces located throughout the state (Figure 2). Several of the coworking spaces are part of a network that includes Launch Fishers, Launch Terre Haute, and Launch Martinsville.

This emerging statewide network allows coworking space managers to share program ideas, tap into services and support available in other regions, and build closer connections between entrepreneurs in various regions. In addition, over 50 spaces offer an Indiana Coworking Passport that allows users to access multiple facilities across the state.²³

Beyond the Launch network, other notable coworking spaces include three in Lafayette and West Lafayette (Matchbox, Anvil and the Railyard), Fishtank in Columbus, Atrium (Fort Wayne), Innovation Pointe (Evansville), Dimension Mill (Bloomington), and Co:Lab (Muncie).

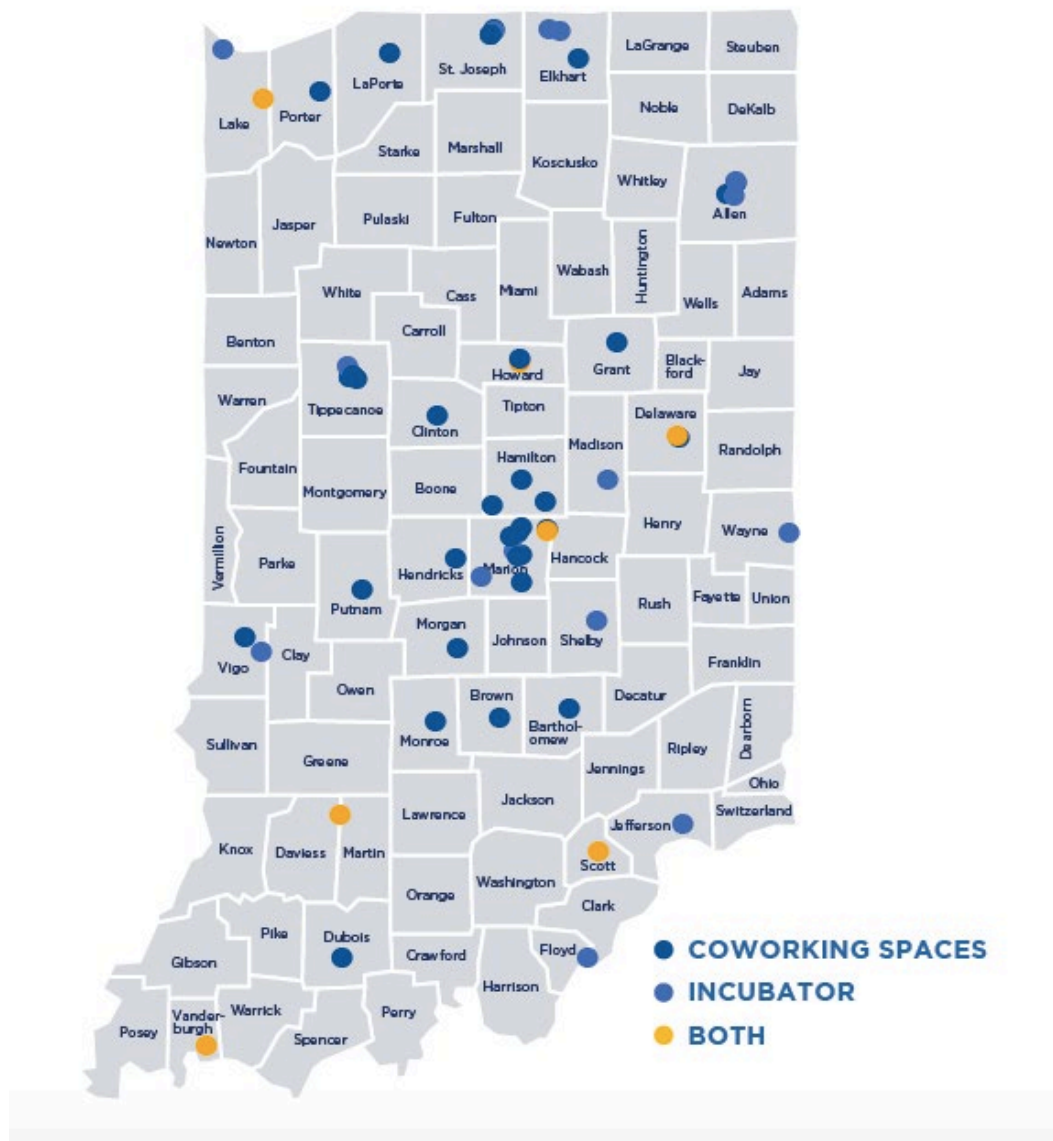
Regions across Indiana have a strong entrepreneurial infrastructure in place. Most regions have relatively easy access to business centers, incubators/accelerators, and coworking spaces. These facilities are open to entrepreneurs of all types, with only a few facilities offering specialized services to those working in the agbiosciences. The Northeast Indiana Innovation Center, for instance, offers both wet labs and a commercial kitchen, while other wet labs are available at incubators focused on the biosciences such as the Mid-America Science Park in Scottsburg or the Indiana Center for Biomedical Innovation.

The presence of these entrepreneurial hubs does not guarantee a thriving ecosystem. A building is just a building without passionate entrepreneurs who have good ideas and a network of support to help transform that idea into a successful business. Nonetheless, this strong network of entrepreneurial hubs is an area of competitive advantage for Indiana.

²² <https://gcuc.co/2018-global-coworking-forecast-30432-spaces-5-1-million-members-2022/>. See also: <http://www.deskmag.com/en/background-of-the-2018-global-coworking-survey-market-research>.

²³ For a complete list of spaces to offer the Passport: <http://www.indianacoworkingpassport.com/>

Figure 2: Coworking and Incubator Spaces Across Indiana - 2015



Source: Indiana Economic Development Corporation

Talent/Workforce/Human Capital

When it comes to sustaining strong ecosystems, few things matter more than access to talent. Without a deep base of skilled personnel, entrepreneurs will be challenged to develop fast growing ventures. This base of talent generally emerges from a culture that embraces learning, strong local educational systems and the local presence of major institutions, such as colleges, universities, or other large anchor institutions, such as sizeable corporations or research centers.

The talent base can also be nurtured via in-migration of new residents, attracted by business opportunities or other local amenities. Immigrants are an especially part of robust ecosystems, and

immigrant founders have played a critical role in a large share of America's most important technology companies. Overall, recent data suggests that immigrants account for around 25% of all new businesses created each year in the United States.²⁴ In some regions, they account for as much as 40% of new business creation.

These historical legacies are crucially important, and it is difficult to change the trajectory of a region that has not typically attracted outside talent or groomed its own home-grown talent. Indiana is less challenged on this front, as it home to high quality education systems from K-12 and beyond. The state's higher education institutions are widely recognized for their high quality.

In addition to supporting robust education programs, regional leaders can take other steps to develop a human capital base that supports business start-up and growth. This should include investments in workforce and education programs. This area is a key priority for AgriNovus in its work to enhance Indiana's agbioscience talent pipeline.²⁵ In addition, targeted efforts to enhance the local ecosystem should include the expansion of entrepreneurial education programs.

Effective entrepreneurship education programs can and should be made available to individuals from all backgrounds and from all age groups. Much education and training can and will be provided by traditional business service providers, such as the Small Business Development Center Network, which will be discussed further below. But education programs should also be offered in the formal education system and in related organizations that serve youth through adults.

Entrepreneurship education for youth is one of the most important facets of a robust regional ecosystem, especially in areas lacking a history of entrepreneurship. Changing long entrenched mindsets is difficult, and youth entrepreneurship offers one means to help start the culture shift process. In addition to increasing youth entrepreneurship rates, this training also provides other educational benefits for young people.²⁶

Youth entrepreneurship programs can take many forms, ranging from short summer camps or clubs to formal integration into the K-12 curriculum. Over the past decade, a growing number of states and local school districts have introduced formal guidelines for entrepreneurship education. At present, 42 states have adopted standards, guidelines or proficiencies for entrepreneurship education, and 18 states, including Indiana, require that entrepreneurship education courses be offered in high school.²⁷

Numerous other options exist to engage young people in learning about entrepreneurship, via groups like the YMCA/YWCA, National FFA, 4-H, Junior Achievement, the Boy Scouts, the Girl Scouts,

²⁴ Kerr, S.P. and Kerr, W.R. 2018. "Immigrant Entrepreneurship in America: Evidence from the Survey of Business Owners 2007 and 2012," National Bureau of Economic Research Working Paper No. 24494. Available at: <http://www.nber.org/papers/w24494.pdf>

²⁵ TEconomy Partners LLC. 2016. *Ensuring an Agbioscience Workforce for Indiana's Future*, Report prepared for AgriNovus Indiana.

²⁶ Aspen Institute Youth Entrepreneurship Strategy Group. 2008. "Youth Entrepreneurship in America: A Policymakers Action Guide."

²⁷ Junior Achievement USA. 2016. "The States of Entrepreneurship in America," JA Research Report. <https://triadja.org/wp-content/uploads/2016/07/The-States-of-Entrepreneurship-Education-in-America.pdf>

Chambers of Commerce and others that offer training or other tools to learn about business. Many of these groups already have a strong presence across Indiana. For example, Indiana 4-H sponsors an annual summer Entrepreneurship Academy for students in grades 9-12 with ideas for new businesses, and seven different Indiana communities sponsor an annual [“Lemonade Day”](#) where young people learn about business in the process of creating their own lemonade stand. Junior Achievement programs are found across the state, with major initiatives in both Northern Indiana and the Indianapolis region. Finally, the Indiana Department of Education offers a host of entrepreneurship learning opportunities via its [career and technical education programs](#), including active chapters of DECA (formerly Distributive Education Clubs of America), Business Professionals of America (BPA), and Future Business Leaders of America (FBLA).

In addition to these national or regional programs, communities across the state have also designed their own programs. The Innovate WithIN competition discussed later in this report is one excellent example. Another comes from Northeast Indiana where Goshen College has sponsored local high school business competitions where the winners receive scholarships to attend Goshen.²⁸ A number of other programs, such as the [South Bend Code School](#) (now operating in four Indiana locations), seek to combine entrepreneurship immersion with training in coding or other STEM-related disciplines.

Beyond high school, entrepreneurship education at community colleges and at four-year schools is booming. Over the past decade, the field has grown rapidly and programs and curricula have migrated from the business schools to other schools and academic disciplines. Indiana University has long housed one of the world’s most respected and highly ranked entrepreneurship programs at the Johnson Center for Entrepreneurship and Innovation, part of the Kelley School of Business. At the Indianapolis campus (Indiana University Purdue University Indianapolis – IUPUI), the Kelley School offers significant undergraduate and executive entrepreneurship programming, including a Master of Business Administration (MBA) in the Business of Medicine. Indiana University and Purdue University also have a joint degree program that combines a Kelley School MBA with a Master of Science (MS) degree in Agricultural Economics.

In addition to its research and education activities, the Johnson Center also manages operations of the Global Consortium of Entrepreneurship Centers, a worldwide network of university-based entrepreneurship centers. Like Indiana University, Ball State University’s programs have also been ranked among the top undergraduate entrepreneurship degree programs in the United States.

Ivy Tech Community College also operates extensive entrepreneurship programs at many of its campuses, offering majors in entrepreneurship along with certificates that accompany degrees in other fields such as culinary, nursing, or industry trades. Some campus programs can be quite extensive. For example, in Bloomington, the [Gayle and Bill Cook Center for Entrepreneurship](#) offers classes and training, while also managing the local SBDC network operations and the [Switchboard](#), a regional on-line guide to business resources.

²⁸ To learn more, visit <https://www.goshen.edu/news/2018/05/10/goshen-college-partners-indiana-counties-offer-scholarships-young-entrepreneurs/>

Nearly every college and university in Indiana now manages a robust entrepreneurship program that not only serves business majors, but students from across the university system. A study mandated by the Indiana General Assembly in 2011 and conducted by the Indiana Commission for Higher Education found that 88% of public institution campuses and 78% of private campuses offered entrepreneurship-related programming for students.²⁹

Students and faculty with interest in the agbiosciences can and do tap into this rich resource base, but they can also benefit from programs specifically tailored to agbioscience related industries and careers. Here again, Indiana offers a range of opportunities within agriculture, engineering and life sciences programs as well. Purdue has been especially active on this front with many of its programs centered at the [Burton D. Morgan Center for Entrepreneurship](#) and the [Discovery Park](#) complex of facilities. Within this cluster of activities, the Purdue [Foundry](#) has been especially important, supporting a host of programs including the Ag-Celerator effort referenced earlier in this report. Purdue's College of Agriculture also continues to garner numerous accolades and has regularly been recognized for its world's top-ranked agricultural and biological engineering program.

Purdue is not alone in providing excellent agriculture-focused education. Huntington University has created a new agricultural degree program at the [Haupt Institute for Agriculture Studies](#), and other schools across the state, such as Ivy Tech Community College, Ancilla College, Grace College, and Vincennes University, also offer agriculture curriculum and degrees. Other expanded educational programs are also under consideration. For example, the Indiana Council for Higher Education is currently assessing the feasibility of creating a new program focused on agriculture law.³⁰

New Careers in Food and Agribusiness Management

Indiana is home to one of the world's top business schools (Indiana University's Kelley School) and one of the world's top agricultural research and training schools in Purdue University. In an innovative educational partnership, the schools offer a joint MBA-MS degree in Food and Agribusiness Management. The program is designed to prepare students for careers in the agribusiness sector, and, with some minor refinement to course content and/or student projects, it could also become an important feeder of entrepreneurs and management talent into Indiana's agbiosciences start-up ecosystem. These updates could include the addition of entrepreneurship-focused course work or modules where students develop their own business ideas and plans.

Market Access

Robust ecosystems also benefit from various types of programs that seek to directly aid entrepreneurs in accessing new markets. This market identification and development work is

²⁹ Indiana Commission for Higher Education, Entrepreneurial Inventory, HEA 1006-2011, November 1, 2011. Available at: <https://www.in.gov/che/entrienv.htm>

³⁰ Indiana Commission for Higher Education, "Feasibility of an Agricultural Law Program offered by Indiana University Robert H. McKinney School of Law & Purdue University College of Agriculture," 2017. Available at: <https://secure.in.gov/che/files/Feasibility%20of%20an%20Agricultural%20Law%20Program%20-%20Response%20to%20SR%2033.pdf>

especially important in sector like the agbiosciences where company success depends on the ability to succeed in local, regional, national and global markets.

Market access programs help local firms think bigger and succeed in markets outside of the local region. Economic gardening programs are one well known example of such market access programs targeted to helping entrepreneurial ventures.³¹ This approach places heavy emphasis on providing new market intelligence to new and growing companies. Second stage ventures, firms with between 10-99 employees, are a special focus as these companies are deemed to have high growth potential. In Indiana, Elevate Ventures and the Purdue Center for Regional Development offer services similar to those found in economic gardening programs, and the [Lowe Foundation's](#) National Center for Economic Gardening is headquartered nearby in Cassopolis, Michigan.

Economic gardening programs provide market intelligence and other assistance to firms in a variety of sectors or seeking to access a wide array of new or growing markets. Other types of support programs offer more focused or specialized assistance. Examples include state and local export promotion programs, procurement assistance via the Procurement Technical Assistance Center (PTAC) network and other local partners, and targeted support for the development of specific sectors or industry clusters. The [Indiana Minority and Women's Business Division](#) is also available to help minority and women entrepreneurs access government contracting opportunities.

The range of market promotion programs in agriculture is quite impressive. Few other business clusters have such resources and capacities for new market intelligence and business development. Indiana has a strong infrastructure in place and plans to build on this foundation. The ISDA's latest strategic plan includes growing regional and international trade as a core objective.³² Indiana Governor Eric Holcomb and the IEDC also place international business attraction as a high priority for longer term job creation and investment. As an example, the Governor and IEDC partnered with AgriNovus in May 2018 on an agbioscience-focused trip to Israel, which fostered many promising business and research collaborations with Israel's own growing agtech start-up sector. Additional international missions and visits with a focus on agbiosciences are needed.

Export promotion programs can be especially important in helping firms achieve high growth. In Indiana, ISDA operates a large export promotion effort. ISDA rightly places great emphasis on agriculture-related exports, as Indiana presently ranks 7th among U.S. states for the value of its agricultural exports. At present, the agbiosciences are a tiny share of these exports, but the potential for growth is significant. The Indy Chamber has also embraced an aggressive export promotion plan, and provides [Go Global](#) market grants (of up to \$5,000) for firms to use for purposes such as trade show attendance or export market planning. This local effort does not identify agbiosciences as a targeted industry cluster, but grants are available to firms from all sectors with clear plans for export market development.

³¹ For background, see <http://edwardlowe.org/entrepreneurship-programs/economic-gardening/>

³² Indiana State Department of Agriculture, *Indiana Agriculture Strategic Plan 2027*, 2017, p. 6. Available at: <https://www.in.gov/isda/3547.htm>.

Community Culture

The role of culture in entrepreneurial ecosystems is essential, but also among the most complicated to understand and influence.³³ Researchers and entrepreneurs themselves regularly note that places with strong ecosystems “feel different” and offer a more conducive business environment.

Much of the current thinking about entrepreneurial cultures can be traced back to the 1980s when researchers began highlighting the role of informal networks and social ties in entrepreneurial success.³⁴ Subsequently, global cross-country comparisons, such as the Global Entrepreneurship Monitor (GEM), highlighted massive differences in national and regional entrepreneurship rates, which often occurred independently of other economic factors. Key cultural factors in this model include whether a society values entrepreneurship as a career choice, attitudes toward risk, and whether entrepreneurs have relatively high social status.

In general, the United States performs extremely well in various global rankings of cultural support for entrepreneurs. Yet, these strong showing masks large regional differences. Some regions can simply rely on past traditions and current business practices to sustain a strong entrepreneurial culture. Others need to actively invest in efforts to help spur interest and enthusiasm about the possibilities associated with local entrepreneurship.

Building an “entrepreneurial culture” is not a quick proposition; it requires years of work to change local attitudes and to introduce new generations to the benefits of entrepreneurship. A number of public education and outreach efforts can help further spread this message. Business plan and award competitions are especially popular, as they can typically occur with limited investments of both time and money. Business accelerators and other programs also help spread a message about the economic benefits generated by local entrepreneurs. Award programs that celebrate successful entrepreneurs and public information campaigns that highlight entrepreneurs are also low-cost methods for changing public perceptions about entrepreneurship as a career choice and source of local economic growth.

The state of Indiana is home to a diverse array of programs and initiatives that seek to promote a more entrepreneur-friendly business culture. A number of these efforts have been operating for some time. These include: the Venture Club of Indiana’s Innovation Showcase, Start-up Weekend, and awards programs sponsored by groups such as National Association of Women Business Owners, Ernst and Young, and the Indiana Small Business Development Center Network. Industry associations, business networks, and industry journals, such as TechPoint and the *Indianapolis Business Journal*, also sponsor awards that recognize the “best” in business. Finally, a small number of local governments, such as Grant County, have created their own award programs to honor new entrepreneurs and successful local companies.

³³ For background, see Bosma and Holvaert, 2017; Fritsch, M., and Wyrwich, M. “Persistence of Regional Entrepreneurship: Causes, Effects, and Directions for Future Research.” Jena Economic Research Papers 2017-003.

³⁴ Saxenian, A. 1994. *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*, Cambridge: Harvard University Press; Feld, B. 2012. *Startup Communities*. New York: John Wiley & Sons.

Beyond financial awards, business plan and pitch competitions offer the opportunity to not only recognize excellence but to teach potential entrepreneurs about the “ins and outs” of starting a new venture. For this reason, these competitions are common on college campuses across Indiana. In fact, nearly every Indiana higher education institution offers some opportunity where students, and sometimes employees, can test out new ideas via competitions and contests. A sampling can be found below:

- [I-69 Innovation Challenge](#): Open to student teams from Anderson, Ball State, Huntington, Grace College, Indiana Wesleyan, and Taylor Universities.
- Indiana University: Campus competitions include the [Clapp IDEA Competition](#) for student ventures and the BEST Competition for students in Software and Technology.
- Indiana State University: [Elevator Pitch Competition](#)
- IUPUI: The [JAGStart Elevator Pitch](#) contest is open to all students at IUPUI.
- Ivy Tech: Various campuses hold regular New Venture Competitions for student business teams.
- Notre Dame: The [McCloskey Business Plan Competition](#) is open to both business ideas and social ventures.
- Purdue University: Purdue’s [Burton D. Morgan Center](#) sponsors a business plan competition and the Schurz Innovation Challenge.
- Purdue Northwest: Sponsors the [Big Sell](#) competition.
- Rose-Hulman Institute of Technology: [SPARK Competition](#)
- Valparaiso University: Valpo Innovates

The success of these college level efforts has led to an expansion of the idea to other parts of the education spectrum as well. The new [Innovate Within](#) competition for high school students is rightly gaining a lot of attention and enthusiasm. Developed and sponsored by Ball State University and the IEDC, this contest is open to young innovators from across Indiana. In 2018, pitches came from across the state, with 86 applications from 65 different high schools.³⁵

In addition to new events like Innovate WithIN, Indiana is also home to a unique and strategic organization in [Centric](#), whose mission is to “connect, educate, and celebrate Indiana’s innovators.” Operating since 2009, Centric provides consulting and coaching services and sponsors the annual *Indiana Day of Innovation*, which generally celebrates innovation across the state, but also provides awards to local innovations in new products, services, and companies. The awards have ranged widely from honoring more traditional business innovations from large firms (such as Dow AgroScience’s stackable polyethylene terephthalate (PET) containers) and small firms (RDM’s shrimp farming systems) to less conventional innovations such as the Thunderbird roller coaster at Holiday World or the “Artrageous with Nate” video series.

At present, few of these diverse programs have an explicit agbioscience focus. One exception is the [AgBot Challenge](#), focused on agtech innovations, sponsored by Rockville, Indiana’s Gerrish Farms. In most cases, agbioscience-focused innovators tap into more general programs and competitions such as those cited above, or those sponsored by more traditional agriculture advocates such as the Indiana Farm Bureau’s Achievement Awards or the ISDA AgriVision Award.

³⁵ To learn more, visit <https://iedc.in.gov/news/details/2018/04/10/innovate-within>

The Innovation Showcase

The Innovation Showcase, sponsored by the Venture Club of Indiana since 2009, is likely one of the oldest and widest ranging of various business plan and pitch competitions operating across the state. It begins with a series of regional pitch competitions, running from April to August, where hundreds of entrepreneurs have the opportunity to pitch new business ideas to investors, fellow entrepreneurs, and others. The effort culminates in September at inX3, a week-long celebration of innovation and entrepreneurship across Indiana. The competition includes tracks for start-ups, university-based firms, and scaleup ventures. Firms benefit from exposure to investors and to the wider technology community and connections into powerful peer networks like TechPoint and others.

On their own, awards programs and business plan competitions cannot transform community attitudes toward risk and toward greater support for entrepreneurship as a career option. They must be supplemented by additional measures that take a more proactive approach to developing talent and educating local residents about the power of entrepreneurship. These efforts include specialized training programs, such as classes and accelerator programs. These types of initiatives are discussed in greater detail below in the sections on talent, access to business services, networks, and specialized infrastructure.

Regulatory/Government Support

Entrepreneur-friendly regulations are an essential component of any robust and start-up supportive community and are thus an important ecosystem building block as well. There is much overlap between entrepreneur-friendly regulations and business-friendly regulations, but there are important differences as well. For entrepreneurs, the most important regulations are those that affect business entry and growth. Is it easy to start a business? Is it easy to support that company's growth?

Indiana has traditionally benefited from its strong business friendly climate. The state ranks 8th nationally on both the 2017 State Business Tax Climate Index and the 2018 Small Business Policy Index.³⁶ These rankings focus on states and regions where taxes are low and regulatory burdens are limited. These factors matter more to established businesses. Meanwhile, high-growth entrepreneurs and lifestyle entrepreneurs often have different needs as they relate to public policy and regulation.³⁷ High growth entrepreneurs are most interested in locations with a rich base of talent and easy access to customers, suppliers, and partners. They may be less concerned about taxation levels and other regulatory concerns.

Regardless of their attitudes to government rules and regulations, all entrepreneurs have to deal with government agencies at some point in time. Successful regions make this process as painless as possible, and provide clarity, transparency and reliability to entrepreneurs. A number of strategies and approaches help create a more “entrepreneur-friendly” regulatory system. A first step involves providing one-stop access for permits, business licenses, and other necessary business paperwork.

³⁶ Walczak, J. , Drenkard, S., and Bishop-Henchman, J. 2016. *2017 State Business Tax Climate Index*. Tax Foundation. See <https://taxfoundation.org/2017-state-business-tax-climate-index/> and Keating, R. J. 2018. *Small Business Policy Index 2018*. Small Business and Entrepreneur Council. Available at: <http://sbecouncil.org/wp-content/uploads/2018/02/SBPI2018-SBECouncil.pdf>

³⁷ Endeavor Insight (2014). “What do the Best Entrepreneurs Want in a City?” Endeavor Insight Research Report.

Indiana's [INBIZ](#) website is one of the more effective “one-stop-shops” of this type, providing videos, how-to's, and other guides to help residents with the ins and outs of starting a business and dealing with various tax, registration, and licensing issues. [Open Counter Indy](#) uses tools developed by the software firm, Open Counter, which has developed partnerships with a number of city and county governments across the United States. The Open Counter Indy web platform allows users to quickly check zoning and land use codes for various types of business uses in Indianapolis, and to also identify the types of licenses and permits needed for certain business activities.

The creation of resource navigator tools is also commonly pursued, and Indiana is home to several excellent resource guides and websites. “*I don't know where to go for help*” may be the most common complaint made by entrepreneurs seeking assistance with regulatory issues, business planning or other needs. Resource navigators are designed to simplify the process and to ease the search for answers and support programs. IEDC, the Indiana Small Business Development Center (ISBDC) network, and other state agencies provide links to various support programs and technical assistance providers, but a statewide resource navigation site does not currently exist. INBIZ assists with regulatory compliance but does not link other sources of technical assistance. Several local and regional resource navigation sites are operating and can serve as an excellent resource for existing and prospective entrepreneurs. Examples include the Indianapolis Chamber's Indy Resource Navigator and the Northeast Indiana Innovation Center (NIIC) Navigator for new businesses in that region of the state. Other excellent support guides include the Business Ownership Initiative's guide to on-line courses, the Growth Alliance of Evansville's Start a Business Guide, and support tools provided by the ISBDC network.

Indiana is also a national leader in efforts to promote government transparency via regular reviews and oversight of rules and procedures to ensure that they remain business-friendly. The IEDC Regulatory Affairs division operates a business ombudsman service to help companies facing major regulatory hurdles or problems, and a similar support effort is housed at the Indy Chamber.³⁸ On the transparency front, Indiana regularly scores among best U.S. states for its commitment to sharing government data, receiving an A+ score in the latest assessment from the U.S. Public Interest Research Group.³⁹ This commitment to effective and transparent government and open data is beneficial for ensuring transparency and access to information, but it can also help potential entrepreneurs seeking information or tools for how best to serve government agency customers.

Business Assistance

Small business owners and budding entrepreneurs regularly complain that they don't know where to go to get help with their business challenges. With a robust ecosystem in place, these complaints are rare as entrepreneurs can easily find the technical assistance or support needed to address thorny business challenges.

The types of needed technical assistance can vary greatly and can run the gamut from the basics of business planning to sophisticated support with finance, market access, or technology development. Strong ecosystems are characterized by a deep local base of talent that can provide support for most

³⁸ To learn more, visit <http://www.indy.gov/eGov/City/DCE/small-business-services/Pages/Indy-Chamber.aspx>

³⁹ Surka, M. and Ridlington, E. 2016. *Following the Money 2016*, U.S. PIRG Education Fund Report. Available at: <https://uspirgedfund.org/sites/pirg/files/reports/USP%20FollowMoney16%20Report%20Apr16.pdf>.

issues facing new and growing businesses. Yet, even the most robust ecosystem will not be home to every kind of expert or resource person. The ability to connect to other regions or outside sources of expertise is also an important component of robust ecosystems.

Business assistance can and should be available from multiple sources. Traditional business support organizations are typically the first place where entrepreneurs seek outside help. These groups would include Chambers of Commerce, local economic development organizations, and programs specifically focused on small business support such as the U.S. Small Business Administration (SBA)-backed Small Business Development Center (SBDC) network and local chapters of SCORE (a resource partner of the SBA). More specialized efforts, such as those affiliated with the National Institute of Standards and Technology – Manufacturing Extension Partnership (NIST-MEP) or U.S. Department of Agriculture (USDA) Cooperative Extension programs, are also available nationwide.

In Indiana, the [Indiana Small Business Development Center](#) (ISBDC) network has ten regional offices and SCORE has 10 chapters. The Procurement Technical Assistance Center, a federally-funded program, has five locations in the state.

Additional business assistance programs are offered around the state, such as:

- [Northeast Indiana Innovation Center](#)
- [Indiana State University Business Engagement Center](#)
- [Patent Connect](#), operated by the Center for Intellectual Property Research at IU
- [Purdue Commercialization and Manufacturing Excellence Center](#)
- [Northern Indiana Lakes County Enterprise Center](#)
- [B-Start](#) in Bloomington, and
- [Rose-Hulman Ventures](#).

Elevate Ventures also provides critical business assistance and coaching services. While Elevate is typically viewed as a source of funding, the team also provides hands-on coaching and mentoring via its Elevate Advisors and statewide Entrepreneur-in-Residence (EIR) programs. These programs operate across Indiana and engage advisors with deep industry expertise, including one with extensive knowledge of the agbiosciences. The Purdue Foundry offers similar advisory services to entrepreneurs using its programs. In addition to its efforts at Discovery Park, the Foundry team is also supporting a regional acceleration and coaching program at [Purdue at Westgate](#). This effort is targeted to potential opportunities spinning out of the Naval Surface Warfare Center Crane Division.

These regional programs typically provide a diverse mix of support services to local business owners, ranging from help with developing initial ideas to business planning training to more customized services and financing as companies grow. Most of the local programs seek to operate like a “one stop shop” that can provide direct services or refer entrepreneurs to other partners.

The quality of support provided by these groups can vary greatly, but many of them provide highly effective and low-cost assistance to new and growing companies. However, these traditional forms of business assistance sometimes suffer from several shortcomings, many of which result from

limited budgets and staffing. First, they provide generalized support that may not always be customized for the unique needs of a local entrepreneur. Second, their services typically target start-ups and lifestyle businesses, and may not be appropriate for scale-up companies or technology-intensive firms such as those found in the agbiosciences. Finally, they may offer their services at times or via methods that are inappropriate or ineffective for some entrepreneurs. For example, many entrepreneurs prefer peer learning to formal training programs. Others lack the time or availability to access programs during the day, and instead prefer to access support on-line. Many entrepreneurs also prefer to tap into peer networks, as opposed to participating in more formal training programs.

These networks take many forms, and Indiana is home to a unique mix of these groups. Many of these networks can operate in a very informal manner. For example, six Indiana communities utilize the Kauffman Foundation's One Million Cups program where budding entrepreneurs and start-ups present business ideas to a group of peers at regular monthly or even weekly meet-up sessions. Similar networking events are also sponsored by groups such as Startup Grind, [Powderkeg](#), the Venture Club of Indiana, and Centric, Inc.

Several statewide initiatives have deep sector networks, such as TechPoint, Conexus and BioCrossroads, and like AgriNovus, provide an important venue for connections to be made. Finally, several networks engage target groups such as women entrepreneurs (e.g., the [National Association of Women Business Owners chapter in Indianapolis](#)) or the [Indy Black Chamber of Commerce](#).

In addition to trade associations or other nationally-backed networks, local entrepreneur networks are also growing in importance. These regional efforts serve as critical lifelines for local entrepreneurs, and can also be an important part of a region's economic development infrastructure. Many regional networks operate across Indiana. Examples include:

- Cass County Entrepreneurs
- Growth Alliance for Greater Evansville
- Start Fort Wayne
- Tech on Tap (Evansville).

In addition to networking with peers, entrepreneurs have a strong interest in finding mentors and coaches to support business growth. Mentors can be provided by traditional business service groups such as SCORE. Networks also play an important role in addressing this demand. Many national entrepreneur networks, like EO (the Entrepreneurs' Organization) and the Young Presidents' Organization (YPO), view mentoring as part of their core missions. In Indiana, mentoring is also provided through Entrepreneurs-In-Residence (EIRs) at the Purdue Foundry or Elevate Ventures.

Sparkling Entrepreneurship in Northeast Indiana

Northeast Indiana has recently witnessed a booming local interest in entrepreneurship. The Northeast Indiana Innovation Center has been in business since 1999, providing important services for local businesses. More recently, this pioneering work has helped spawn the creation of numerous new local champions, including Start Fort Wayne and others, who are working to build a thriving local ecosystem. In addition to building a stronger regional network, these efforts are encouraging several other local innovations. Examples include: the Cook Spring kitchen incubator, the Fort Founders Collaborative, the Atrium coworking space, and a local branch of the South Bend Code School.

Effective regional ecosystems provide businesses with a wide and deep base of entrepreneurial expertise. Some of this knowledge resides in economic development and business support organizations, but much of the expertise is found in private support providers, such as attorneys, accountants, and other consultants. The availability of specialized business services is a critical factor in successful ecosystems; a shortfall in such services is viewed as a major impediment by many entrepreneurs. In successful ecosystems, these firms understand the unique challenges facing entrepreneurs and tailor their services and pricing practices accordingly. For example, attorneys may provide reduced rates for start-up firms with the expectation that higher billing rates will follow as the firm grows. In Indiana, there are a number of groups offering services in return for equity, including management, such as [Little Engine Ventures](#), [Innovatemap](#), [SproutBox](#) and [DeveloperTown](#).

The development of specialized business support networks is especially important in technologically complex fields like the agbiosciences. Via this project and other work, AgriNovus is seeking to develop a strong “bench” of service providers—both public and private—that can offer specialized consulting, coaching and mentoring services tailored for the distinctive needs of agbioscience start-ups and emerging ventures. Agbioscience specializations could include patent attorneys with a deep understanding of plant and animal science patents and experts with a background in USDA regulatory regimes focused on gene editing and related technologies and the regulation of pesticides or animal health products.

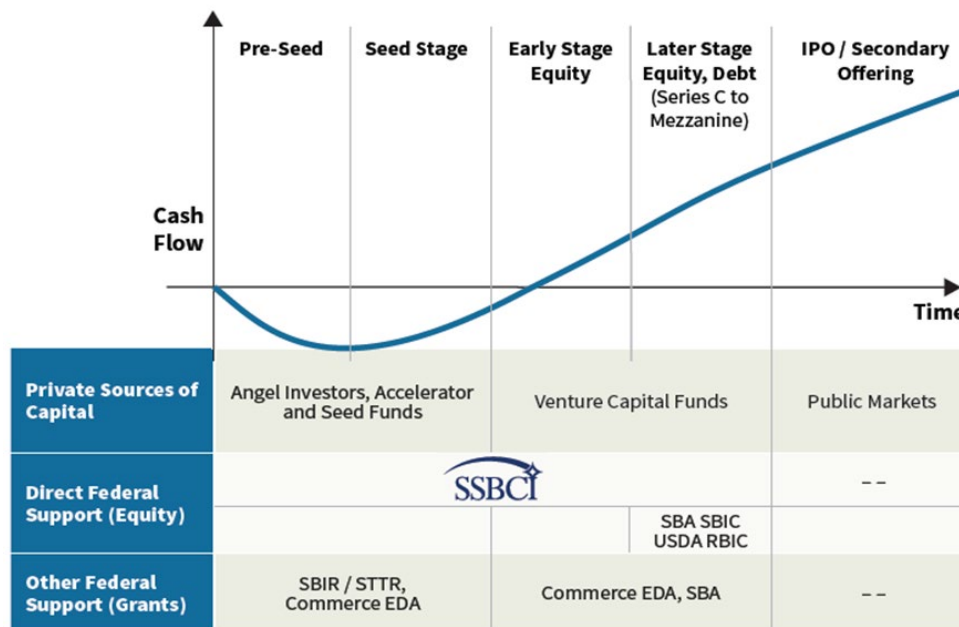
Capital

Casual observers typically consider access to capital as the most important component of an “entrepreneur-friendly” environment. Capital access is indeed a critical ecosystem building block, but other factors typically assume greater importance in successful ecosystems. Entrepreneur-friendly regions are home to diverse sources of capital, but they have the other building blocks as well. Other critical actors are those who provide the business or advisory services that help business owners and entrepreneurs effectively connect to and use capital for growth.

A diversity of funding sources and the connections between them are the critical factors for successful regional capital networks. Both debt and equity capital are needed. Suppliers of debt capital provide a range of financing from microlending to expansion and working capital to large scale project financing. Equity capital financing includes resources for product development to start-ups and seed capital to growth stage businesses and expansion/mezzanine capital. A few public sources of equity capital are available, but the bulk of equity financings come from private investors.

Figure 3 depicts equity sources of funding for a typical growing company. In early stages, these ventures may rely on angel investor or government-backed funding sources. As they grow, they may be able to tap investments from venture capitalists, private equity firms, or tap into other markets by eventually going public.

Figure 3. The Equity Capital Continuum for Growth Entrepreneurs



Source: Center for Regional Economic Competitiveness and Cromwell Schmisser

Equity investments, from angel capital to venture capital, are especially important for high-growth ventures that need large scale infusions of resources to fuel rapid expansion. Venture capital receives much attention in the press, yet most successful regions are home to a diversity of capital sources. They host venture capital investors, but they also attract and support a wide array of investors and investment vehicles. And, the causal relationships between capital and entrepreneurial regions are complex. Today, many researchers argue that, “venture capital lags rather than leads the emergence of entrepreneurial activity; it is not part of the initial environmental conditions.”⁴⁰

Firms receiving venture capital investments are typically well-established, seeking relatively large outside investments and in markets with significant upside growth potential. For example, in 2017, 36 Indiana-based firms received outside venture capital investments, with an average investment size of approximately \$3.7 million.⁴¹ Nearly all of these were in internet or health care related ventures.

⁴⁰ Mason, C. and Brown, R. 2014. “Entrepreneurial Ecosystems and Growth Oriented Entrepreneurship: Background paper prepared for the workshop organized by the OECD LEED Programme and the Dutch Ministry of Economic Affairs. p. 16.

⁴¹ Calculated from PWC Moneytree.

Most entrepreneurs, however, must look elsewhere for equity infusions, whether because they are earlier stage and not ready for venture capital, are not planning to grow fast enough to meet venture capital's investment profile, or because they are unwilling to share ownership with outside investors. In this case, they typically turn to friends and family or to angel investors. As noted elsewhere in this report, angel investors and organized angel groups are the primary equity source for companies around the United States. Angels across the country invest in roughly 64,000 ventures every year and typically invest smaller amounts in earlier stage deals. In 2016, the average deal size was around \$330,000, and 41% of deals were focused on the seed or start-up phase.⁴²

Most new businesses and small business use debt when they need outside resources to grow or to support daily operations. Since debt is generally collateralized, small businesses typically must have inventory or equipment or real estate to put up in order to get a loan. However, this also limits the applicability of debt as a source of capital to new or small businesses with intellectual property or research as their primary assets.

According to the most recent data from the Federal Reserve's Small Business Credit Survey, most start-ups (firms less than two years old) rely on personal funding and "bootstrapping" as their primary financing means.⁴³ About half (52%) of start-ups apply for outside financing, typically seeking loans or lines of credit valued at less than \$100,000. About 31% of these applications were approved in 2016.

More established small businesses operate in a similar fashion.⁴⁴ These companies are larger and have been in business for a longer period. Thus, they are more likely to seek external funding. They also rely primarily on loans or lines of credit, averaging between \$25,000 and \$250,000. Their applications also tend to be more successful. In 2016, 76% of small business credit applications received at least some financing. Forty percent of applicants received all requested funds.

Since most new ventures are seeking debt financing, a region's base of small business friendly banks and other sources of public finance can also play an important role in an ecosystem's health. These funding resources can be especially important in rural regions where businesses are much more likely to rely on small community banks or publicly-backed funding sources.⁴⁵ Given its strong production agriculture industry, Indiana is home to an enviable pool of banks and other private lenders with special expertise and interest in ag-related fields.

⁴² University of New Hampshire Center for Venture Research, Summary Angel Investing data for 2016 available at: https://paulcollege.unh.edu/sites/paulcollege.unh.edu/files/cvr-reports/2016AnalysisReportFinal_0.pdf.

⁴³ Federal Reserve Bank of New York, *Small Business Credit Survey: Report on Start-up Firms*, 2017. Available at: <https://www.newyorkfed.org/medialibrary/media/smallbusiness/2016/SBCS-Report-StartupFirms-2016.pdf>.

⁴⁴ Federal Reserve Bank of New York, *Small Business Credit Survey: Report on Employer Firms*, 2017. Available at: <https://www.newyorkfed.org/medialibrary/media/smallbusiness/2016/SBCS-Report-EmployerFirms-2016.pdf>.

⁴⁵ Federal Reserve Bank of Richmond, *Small Business Credit Survey: Report on Rural Employer Firms*, 2017. Available at: https://www.richmondfed.org/-/media/richmondfedorg/community_development/resource_centers/small_business/pdf/credit_survey/sbcs_report_rural_employer_firms_2016.pdf.

Despite the best efforts of successful investors like Steve Case and his “Rise of the Rest” fund, venture capital activity remains highly concentrated. Existing technology centers in California and Massachusetts capture the bulk of new investments from institutional venture capital investors, and few other regions attract significant dollars. The entire Midwest region saw only 92 deals worth a total of \$656 million in the first quarter of 2018, roughly 3% of total invested dollars.⁴⁶

Like its fellow Midwest states, Indiana is not a major center for venture capital investing, but it has developed a relatively robust capital ecosystem for start-ups and early stage companies. State and local leaders have supported a number of initiatives to make it easier for new and growing firms to access needed funds. These efforts include tax credits, such as the Venture Capital Investment Tax Credit which provides a 20 percent or \$1,000,000 credit for investments in Qualified Indiana Businesses (including those that are commercializing research and development or introducing new products). Other incentive programs provide credits for new job creation—the Economic Development for a Growing Economy (EDGE) credit—or for investing in new R&D. Training dollars are also available via the state’s Skills Enhancement Fund.

Several state-backed investments funds are also in place. At the pre-seed stage, [Elevate Ventures](#) administers a Small Business Innovation Research (SBIR) matching program for IEDC, granting a \$50,000 match (or 50 percent of the SBIR/Small Business Technology Transfer grant), with a lifetime maximum of \$150,000. In addition, with Purdue University, Elevate offers the Purdue Foundry Fund with “black” or “gold” investments of \$20,000 or \$50,000, respectively. Elevate also offers High Potential Start-up grants of \$5,000 to \$25,000 in some communities.

Many Indiana counties supplement these state-backed credits and funding streams by managing revolving loan funds (RLFs) that provide low-interest loans to small firms for new projects or for expansions. These funds are often capitalized with federal dollars from the U.S. Department of Agriculture (USDA) or other agencies, but other funding streams have been used as well. For example, the Floyd County RLF was created with funding from the [Horseshoe Foundation](#), the area’s primary community foundation.

Private capital resources for new ventures are also expanding. Presently, seed-stage investments are available in Indiana from angel seed funds such as:

- [VisionTech](#)
- [Indiana Angel Network Fund](#)
- [X-Cap Angels](#)
- [Irish Angels](#) (for Notre Dame-affiliated companies)
- [Purdue Angel Network \(P3\)](#)
- [Little Engine Ventures](#)

In addition, certain venture funds in Indiana make a significant number of investments. In addition to Elevate Ventures, High Alpha, Innovation Indiana Fund, BioCrossroads, Meridian Street Capital

⁴⁶ PriceWaterhouseCoopers 1Q18 Moneytree Report,
https://www.pwc.com/us/en/technology/assets/MoneyTree_Report_2018_Q1_FINAL.pdf

and Charmides Capital are active seed stage investors. Allos Ventures, Gravity Ventures, 4G Ventures and CHV Ventures, among others, also make early and late-stage investments.

Coming soon will be more later-stage funding available through the Next Level Fund. This \$250 million will be deployed through professionally managed funds over the next few years. Ouabache Investments, a private equity firm funded by the family who founded Weaver Popcorn, is also focused on investments in companies in the state with EBITDA of \$1 to \$4 million. The presence of equity funds in Indiana helps ensure more investments in local companies, but outside investors also make major investments in the state. Indiana-based entrepreneurs can tap into many venture funds based elsewhere in the Midwest, notably in Illinois (e.g., firms such as Cultivian Sandbox and Open Prairie Ventures), Michigan, as well as a few California-based funds who have co-invested with Elevate Ventures.

The Next Level Indiana Fund: A New Resource for Agbioscience Investments

In 2017, the Indiana Legislature made a significant commitment to state and regional ecosystems by authorizing creation of the Next Level Indiana Fund, a “fund of funds” designed to invest up to \$250 million in promising Indiana companies. The fund is managed by 50 South Capital Advisors, which will invest directly in Indiana companies and place the lion’s share of funds with other venture capital firms. Ultimately, the fund is designed to generate positive returns, while also infusing more equity capital into Indiana’s entrepreneurial ventures. The Fund kicked off operations in April 2018 and has already made two commitments by providing funds to Indianapolis’ High Alpha Capital and the Boulder-based Foundry Group.

In addition to the publicly backed sources cited above, debt capital is also broadly available with Cambridge Capital Management offering a variety of SBA-backed loans through the Indiana Community Business Credit Corp, and LYNX Capital offering similar services for minority-owned businesses. Halo Capital Group and 1st Source are also active.

New businesses in Indiana can tap into a growing array of alternative funding streams as well. Crowdfunding is an emerging source of new business finance, and Indiana’s securities laws allow entrepreneurs to access up to \$2 million via this approach. However, to date, few Indiana firms or communities have actively embraced crowdfunding. One prominent exception is [Localstake.com](https://www.localstake.com/), an Indianapolis-based crowdfunding site that has supported multiple companies and even enjoyed one major exit with the acquisition of the Scotty’s Brewhouse chain of brewpubs. The Indiana Housing and Community Development Authority and the Indiana University Foundation are also using crowdfunding tools to garner support for various civic and community projects.

Indiana also has a very limited range of resources for microenterprise or other sources of alternative community finance. Only a few microenterprise lenders and organizations, such as Anderson’s [Flagship Enterprise Center](#) and Community Action of Southern Indiana, operate in Indiana, and the state hosts only two certified community development financial institutions (CDFIs). This limited infrastructure may be one factor behind Indiana’s extremely low rate of microenterprise ownership.

In the most recent rankings from Prosperity Now, Indiana ranked #49 in the United States for the share of the labor force that owned a microenterprise.⁴⁷

While a diverse array of funding sources is available in Indiana, these investors have not yet made significant commitments to firms operating in the agbioscience sector. As described in Appendix I, investments in the agbiosciences in Indiana have been sparse to date, with the exception of several companies who have been awarded SBIR matching grants or have won investments from Purdue Ventures or the Purdue Ag-Celerator. The largest investments to date, over \$10 million to ClusterTruck and Spensa Technologies' acquisition by DTN, have not come through traditional venture investors.

What do the Data Show?

This ecosystem assessment is supplemented by a benchmarking review (presented in Appendix I) that measures Indiana's performance on a number of datapoints related to innovation and entrepreneurship. These measures track state and regional performance in three core areas: innovation inputs, such as research and development spending; business dynamics, which track the start-up and growth of new companies, and capital, which assesses the range of capital resources and the amount of funds invested in entrepreneurial ventures.

The data analysis suggests that Indiana's ranks in the middle of U.S. states on most key metrics, much like other states across the Midwest. When compared to all U.S. states, Indiana has a relatively low level of entrepreneurial activity. This finding also holds true for the agbiosciences and is likely associated with the structure of the industry overall, with the important role of large, multinational firms. These firms may be less likely to spin out start-up companies or acquire them, preferring instead to perform a significant amount of research and development in-house.

In addition, the state has a relatively low level of broad academic agricultural research and development, although Purdue University is the state's leader in this work and is aggressively and actively promoting start-ups based on its intellectual property. According to 2016 National Science Foundation data, Purdue ranked 37th among U.S. universities for total R&D expenditures, Indiana University ranked 45th, and Notre Dame ranked 104th against this measure.

However, the March 2018 acquisition of Spensa Technologies by DTN is a positive sign that may presage future success. Since its founding at the Purdue Research Park in 2009, Spensa raised \$4.5 million and was recognized as one of Forbes magazine's top 25 innovative agtech start-ups in 2017. However, Spensa still represents a unique success story that other Indiana-based firms have not yet been able to replicate. Spensa was also one of only six Indiana companies in the sector to win SBIR/STTR awards, a common source of early stage capital for science and technology-based firms. Other than Spensa, few Indiana firms in the sector appear to have gained venture or angel backing, or to have grown substantially enough to appear on the Inc. 5000 list of America's fastest growing companies.

⁴⁷ See the 2018 Prosperity Now Scorecard at: <http://scorecard.prosperitynow.org/data-by-location#state/in>

How does Indiana Compare to Other Places?

A second mini-benchmarking study (Appendix II) has been completed and assesses the state of ecosystem-building in six other regions: Des Moines, Iowa; the Research Triangle region of North Carolina; St. Louis, Missouri; Pittsburgh, Pennsylvania; Kansas City; and Denmark. These regions were selected for several reasons: they offered economic and demographic similarities to Indiana, and, in most cases, also supported large-scale economic development programs focused on the agbiosciences.

Several key lessons emerged from these case studies:

- **Research Excellence Matters, but So Does University Attitudes Towards Start-ups**
All of the studied regions are home to world-class research universities. Beyond excellent research capacity, the ability to engage with local entrepreneurial ecosystems matters greatly to regional prosperity. St. Louis has been most effective in terms of supporting a strong agbioscience-focused ecosystem, but strong outreach programs are also in place at Purdue and at North Carolina State University.
- **Large Agbioscience Corporations Have Limited Impact on Start-ups**
Like Indiana, all of these regions are home to major corporations, which, to date, have played a limited role in local start-up development. Firms are opening up, especially in their roles as investors. But, finding ways to better engage corporate partners can help to jump-start ecosystem developments.
- **Physical Hubs Matter**
All of the case study locations are home to what would be called “entrepreneurial hubs,” i.e., locations where key partners are headquartered and where entrepreneurs regularly participate in meetings, networking events, and other programs. These hubs are most consequential when located in business or population centers, such as St. Louis’ Cortex Community and 39 North District. Purdue’s Discovery Park and Convergence project, Indianapolis’ 16 Tech development, and the Fort Wayne Electric Works project are designed to serve this type of innovation district function in Indiana.
- **Agbioscience Builds on Bioscience and IT Excellence**
It is probably not a coincidence that St. Louis and the Research Triangle have long-standing and strong clusters in both information technology and life sciences that underpin their agbioscience cluster and entrepreneurial ecosystem. The depth of workforce talent with technical and entrepreneurial experience is a key component of the ability for newer clusters to emerge.
- **A Robust Entrepreneurial Ecosystem in General Supports Agbioscience**
Places with strong ecosystems in general also support agbioscience entrepreneurship. A small number of agbioscience accelerator programs are in place in the studied regions, but the most important initiatives support entrepreneurs across a variety of industry sectors.
- **Both Top-Down and Bottom-Up Initiatives Required**
Ecosystem building is an “all hands on deck” exercise. No one organization can be in charge, and partners can (and should) include private firms, government agencies, educational

institutions and non-profits. Successful ecosystem building combines bottom-up innovation with strong top-down support from government, private industry, and support organizations like AgriNovus.

How is Indiana Doing? Assessment of Gaps and Strengths in its Entrepreneurial Ecosystem

This review of Indiana's entrepreneurial ecosystem assets clearly indicates that a strong base of support tools and infrastructure are in place across the state. Many regions, especially in denser cities like Indianapolis and Fort Wayne, host multiple organizations that view entrepreneurial support as a core mission. This embrace of entrepreneurship engages a very diverse set of players, including key state agencies, like IEDC and ISDA, that include entrepreneurship promotion and support as key parts of their current strategic plans. Statewide industry initiatives, like AgriNovus, TechPoint and BioCrossroads, also embrace this mission. Finally, at the local level, powerful cross-sector and bipartisan support exists among elected officials, traditional economic development organizations, private industry, and a variety of community leaders.

Given this public attention and focus, Indiana has succeeded in developing a strong "entrepreneur-friendly" business environment. In most cases, someone with a decent business idea and passion about entrepreneurship can and should be able to access nearly all the support tools and networks needed somewhere in Indiana. This is no guarantee that a business will succeed, but it is a reflection that resources and support for new and growing businesses are readily available in Indiana.

Indiana's Ecosystem Advantages

Indiana's entrepreneurial support resources are especially strong in several areas. Entrepreneurs regularly complain about limited access to capital, so it is unlikely that business owners will be fully satisfied with Indiana's current array of public and private investors. Nonetheless, the state does host a strong and diverse set of capital sources, including a number of active angel groups, numerous local and regional banks, and publicly backed sources like Elevate Ventures and the new Next Level Fund.

Within this generally strong set of resources, two potential challenge areas arise. Like many Midwestern states, Indiana is not a prime location for institutional venture capital investments. At the other end of the spectrum, the state has limited resources for microenterprises or new funding tools like crowdfunding. Several regions have recognized this gap and are acting to address these challenges. For example, in Northeast Indiana, Elevate Ventures has recently created the Farnsworth Fund which will provide small grants (up to \$1,000) to help budding entrepreneurs test the potential of new ideas.

Indiana's network of incubators, technology parks, and coworking spaces is also impressive, and ongoing efforts to link these sites across the state should continue. While the Launch Indiana effort is no longer operating, connecting entrepreneurial support organizations across Indiana makes sense. Many of these facilities, especially coworking spaces in the former Launch Indiana network, are also doing a good job of operating as local entrepreneur hubs as opposed to real estate projects that offer coworking space. Effective centers offer workshops, meetups, and access to services and

networks as well. Centers located at college and university campuses are also providing enhanced services and are actively working with the wider community, as opposed to working only with students and faculty.

Indiana's commitment to entrepreneur-friendly government also represents an important competitive advantage. Starting a business in Indiana is a simple process, and clear guidance and support is available. Entrepreneurs often face obstacles in finding needed resources and business services, but a significant number of resource guides and navigation tools are available. These tools cannot solve every problem for an entrepreneur, but they reduce friction in the search for assistance.

Ecosystem Challenge Areas

While Indiana is building a stronger infrastructure to support new and growing companies, these accomplishments are not yet reflected in data on statewide and regional start-up activity. Indiana does not rank highly on most national benchmarking assets of innovation and entrepreneurship, such as the Kauffman Foundation Index of Entrepreneurial Activity or the Milken Institute's State Science and Technology Index. Similarly, Indiana's larger cities typically rank on the lower end of benchmark assessments. The analysis in this report also notes that Indiana lags U.S. averages in areas such as new establishment growth and job creation by small firms.

Several factors could explain this performance. Time lags may play a role. Much of Indiana's ecosystem support work is fairly new, having been established over the past few years. Start-ups take time to gain traction, create jobs, and generate new wealth. If this is the case, improved performance may emerge in coming years as new firms gain traction and new tools, such as the Next Level Fund, come into play.

Experience suggests that other causes may be at work too. In particular, the pipeline for new entrepreneurs in Indiana could be expanded. More Indiana residents, especially younger people, need to view entrepreneurship as a viable career option and as a common pathway to successful careers and lives. Ongoing work to build an entrepreneurial culture should continue and be expanded. New efforts like the Innovate WithIN competition and the growing number of accelerator and coworking efforts are positive signs of a "buzz" around innovation and entrepreneurship. Continued support to keep the "buzz" alive is needed. In addition, this message needs to reach more Hoosiers—not just those in larger urban areas or working in technology sectors. All Hoosiers have the potential to be entrepreneurs and economic success will ultimately depend on engaging a wider swath of the population in these endeavors.

The Agbioscience Opportunity

Beyond engaging new partners and new entrepreneurs, these efforts also need to focus on economic sectors, like the agbiosciences, where Indiana has strong and inherent competitive advantages. The recent emergence of new ecosystem resources coincides with the growth of an increasingly strong agbioscience sector in Indiana. Indiana has always been a global leader in production agriculture; today it is also a global leader in agbiosciences innovation. In addition to fostering innovations in a host of sectors, Indiana's agbioscience firms employ more than 75,000 people across the state.

Indiana's agbioscience sector is developing in the midst of a global revolution in the agriculture and food sectors. Rising food demand and other factors are fueling the search for new ways to produce,

supply, distribute, and store food. Investors are flocking to this sector and making major plays to support innovative ventures. A 2016 Boston Consulting Group study estimated that major corporate players, such as Monsanto, Dow AgroSciences, and others, invested anywhere from \$20 to \$25 billion in their agribusiness activities.⁴⁸ According to Pitchbook, global venture capital investing in agtech is also growing, rising from \$185 million to \$877 million between 2014 and 2017.⁴⁹ While this figure may sound impressive, it represents an extremely small share—only 1.7%—of total venture capital investments. Industry experts concur that agtech is underinvested, and that large potential growth opportunities are on the horizon.

Several agbioscience sectors are considered to have the greatest potential for new innovations and as spurs to new economic growth. They include:

- Plant Science and Crop Production
- Animal Health and Nutrition
- Value-Added Human Food and Nutrition
- Agriculture Equipment Technologies and Systems (commonly referred to as agtech or high tech agriculture)

Indiana has impressive strengths and assets in all of these areas. In addition to the ecosystem assets identified in this report, Indiana also benefits from its strong heritage and experience with production agriculture. It is home to a large base of producers, major corporate players like Corteva Agriscience, Elanco and others, world-class universities and researchers, and a desirable location with robust infrastructure and easy access to major markets.

Most of the competitive advantages noted above have arisen over multiple decades and are based on Indiana's role as an important center for production agriculture. Moving forward, AgriNovus has the potential to link Indiana's traditional agriculture assets to its newly emerging entrepreneur-focused assets. To date, this connection has remained limited, but great potential exists.

Several nascent initiatives are starting to spread the word that "it's happening here," i.e., that Indiana is home to a unique and powerful combination of assets in the agbiosciences. Promising new initiatives include Purdue's Ag-Celerator program and its new Skidmore Food Development Lab. Meanwhile, across Indiana, the number of commercial kitchens is growing. Finally, AgriNovus is assuming a leadership role as an agbioscience sector advocate, sponsoring industry-focused research and well-publicized events that highlight new industry opportunities.

How can Indiana Improve its Performance?

AgriNovus and various partners around the state can and should assume a prominent role in building a stronger entrepreneurial ecosystem, especially for those working in the agbiosciences, but more generally as well. A strong pipeline and a robust ecosystem for all entrepreneurs will also help

⁴⁸ Boston Consulting Group. 2016, p. 5.

⁴⁹ Startup Genome Project. 2018. Global Start-up Ecosystem Report. Pp. 67-73. Available at: <https://startupgenome.com/reports/2018/GSER-2018-v1.1.pdf>.

ensure a rich ecosystem for start-ups and growth ventures in the agbiosciences. AgriNovus and its partners can help to build a stronger ecosystem via several deliberate approaches, including:

- Build the Pipeline of Agbioscience Entrepreneurs in Indiana
- Accelerate Agbioscience Entrepreneurs in Indiana
- Connect Agbioscience Entrepreneurs to existing ecosystem resources
- Develop new resources targeted to the unique needs of Agbioscience Entrepreneurs

The recommendations detailed below focus on the role of AgriNovus as an advocate for agbioscience entrepreneurship, as a support network for the sector's founders and managers, and as a champion and investor in new programs that help Indiana's agbioscience firms launch, grow, and prosper.

1. Build the Pipeline of Agbioscience Entrepreneurs in Indiana

As noted above, the development of an entrepreneur-friendly culture is an essential component of successful and robust ecosystems. In these regions, starting a business is a "normal thing," a common and desirable career path. Indiana can do a better job of encouraging Hoosiers—especially young people—to consider taking the entrepreneurial leap. And, AgriNovus can help by encouraging these new entrepreneurs to consider starting new ventures focused in the agbiosciences.

Successful entrepreneurs emerge from multiple locations, but several areas of focus offer great potential:

- a. AgriNovus should consider developing a statewide youth ag-entrepreneurship initiative in collaboration with organizations with existing networks. For instance, work with organizations such as National FFA and 4-H and build on existing partnerships, such as the new Blue Room, an innovation experience unveiled at the 2018 National FFA Convention and Expo in Indianapolis. This effort should include creation of new curriculum, award programs, and other support to encourage Indiana youth to consider entrepreneurship as an exciting and viable career option.

AgriNovus should also develop new programming that brings agbioscience-focused activities and curricula to Indiana's growing array of STEM, robotics, and other science-focused education and youth development programs. Potential programming might include hackathons or robotics competitions focused on key challenges facing Indiana's farming communities.

- b. AgriNovus should focus on an untapped talent asset in Indiana's agbioscience ecosystem: executives at major agbioscience corporations. Consider developing a new network for these executives to learn about trends in the industry, to create start-up teams, and to help identify new business development opportunities. Many of these talented managers, especially those nearing retirement or who might leave during reorganizations, have the skills and knowledge needed to become successful entrepreneurs. However, they may lack specialized start-up knowledge or linkages to partners and service providers.

2. Accelerate Agbioscience Entrepreneurs in Indiana

In addition to generating greater local interest in agbioscience-focused entrepreneurship, AgriNovus and its partners should also support efforts that help new ventures grow and prosper. Generally, this work involves linking new company founders into peer networks at various stages of the business lifecycle.

- a. At the ideation stage, AgriNovus should consider sponsoring a series of meetings such as the Kauffman Foundation's One Million Cups program around the state. Founders need help in developing ideas and in testing those ideas with potential customers. In the idea generation phase, nascent entrepreneurs would benefit from a sounding board via regular convenings of an agbioscience-focused forum. These efforts provide a "safe space" to test ideas and garner feedback.
- b. After founders move from ideas to real start-ups, they need support networks as well. AgriNovus should consider chartering its own statewide start-up network that could meet on a semi-regular basis and allow new company founders to share ideas and learn from peers. This effort would operate similarly to a "mastermind" group for agbioscience start-ups.
- c. Develop a focused accelerator program that provides coaching and other support to promising agbioscience start-ups. This new effort could be structured in several ways. It could be built onto existing platforms or programs, such as the existing Purdue Ag-Celerator program, or it could be created as a new stand-alone organization led and managed by AgriNovus. A final option would be to engage a third-party investor or support organization to develop and manage the program on behalf of AgriNovus and its partners. Regardless of structure, the programming must be available and accessible to agbioscience entrepreneurs from across the state.
- d. AgriNovus should lead an effort to build a network of entrepreneurs-in-residence and coaches/mentors with expertise in key agbioscience sectors. These mentors can further supplement the support available to Hoosier entrepreneurs via programs like Elevate Ventures, the Foundry, and SCORE. Sector-specific experience and expertise is critical to helping agbioscience entrepreneurs overcome challenges unique to agricultural markets, regulatory environment and technologies.

3. Connect Agbioscience Entrepreneurs to Existing Ecosystem Resources

These new companies will have greater prospects for success when and if they have easy access to Indiana's growing array of ecosystem support tools. AgriNovus and its partners can play an important role in connecting founders to these resources. In general, AgriNovus should position itself to serve as a "business concierge" for aspiring and new entrepreneurs and existing companies operating in the agbiosciences. In this role, AgriNovus serves as a network weaver to make it easier for agbioscience entrepreneurs to find and utilize the business development services already in place across Indiana.

Several areas of focus make sense. AgriNovus can use its industry connections to help Indiana agbioscience ventures gain access to new sources of capital and to new markets. Several actions could be implemented to facilitate these connections:

- a. Include a pitch-competition at the AgriNovus annual Innovation Summit that links Indiana companies to investors around the globe, and helps the companies identify new opportunities and network connections.
- b. Active marketing of “star” Indiana entrepreneurs to investors located outside of Indiana.
- c. Coaching and other support to help Indiana agbioscience entrepreneurs succeed in major national competitions such as Ernst & Young’s Entrepreneur of the Year Awards, the National Farm Bureau’s Rural Entrepreneurship Challenge, and the Inc. 5000 list.
- d. Partnering with the Governor’s Office and IEDC to support more agbioscience-focused trade missions, more local participation in trade shows, and to encourage greater foreign direct investment into Indiana’s new agbioscience-focused ventures.
- e. Linking entrepreneurs to core service and infrastructure available from partners like Purdue University and USDA. AgriNovus should identify and develop easy ways for entrepreneurs to access resources like laboratories, greenhouses, hives, test farms, farm and laboratory equipment, and perhaps consider sponsoring an innovation voucher program to help defray the costs of using these facilities and services. (See also 4(a)(ii) below).

4. Develop New Resources Targeted to the Unique Needs of Agbioscience Entrepreneurs

Many of the resources needed for company growth and start-ups are in place across Indiana, but a few gaps do exist, particularly in areas specifically related to the agbiosciences. In these areas, AgriNovus and its partners should consider developing new programs or capabilities. Potential focus areas include:

- a. **Market Intelligence:** The presence of customers—in the form of farmers and of large agbioscience focused corporations—is a huge competitive asset for Indiana and for Indiana’s entrepreneurs. Yet, it can be difficult for new companies to understand customer needs and market trends. AgriNovus can help on this front via several tactics, including:
 - i. Continue to publish research and data on the industry, including an annual report that benchmarks industry progress and achievements.
 - ii. Work with partners, such as the Indiana Farm Bureau, to create an Indiana Agbioscience Test Bed, a group of farmers who agree to meet on a semi-annual basis to discuss market needs and pressing challenges facing production agriculture in Indiana. In addition to providing a new peer network for farm-based entrepreneurs, these sessions could serve as a means to inform entrepreneurs about potential new market opportunities. This group might also serve as a test bed network to assess new products, technologies, and distribution channels.

- iii. Host work sessions designed to identify “innovation challenges” facing larger corporate players. These have been successfully used in multiple sectors and can be organized around a specific challenge raised by a major company or industry leader. Small firms or teams are then encouraged to develop and share potential solutions. They operate akin to a “hackathon,” and can be an excellent means to spur innovation and to link small firms into larger global supply chains.
- b. **Capital:** Several new capital sources, developed by AgriNovus and key partners, could provide critical assistance for early stage ventures in the agbioscience sectors.
 - i. Working with Purdue and Elevate Ventures, AgriNovus should consider creation of a new agriculture-focused SBIR Phase Zero program. This program would offer small seed grants, of up to \$5000 per entrepreneur, to help test the feasibility of new business ideas and concepts.
 - ii. Agbioscience entrepreneurs may also require access to pre-seed funding that helps them further develop their business ideas and new products, services and technologies. This fund could operate like the Elevate Ventures Purdue Foundry Fund (Black and Gold Funds) but would be available to any and all eligible agbioscience entrepreneurs operating in Indiana. Funding would be focused on early stage ventures with typical investments falling in the \$25,000 to \$75,000 range.
- c. **Advocacy:** AgriNovus should continue in its important mission to “amplify the agbioscience innovation story”. AgriNovus should be the knowledge source for data about the sector and about what’s happening with Indiana’s agbioscience entrepreneurs. This advocacy role should include several important events and activities, such as:
 - i. Entrepreneur-focused program as a core part of the AgriNovus Annual Agbioscience Innovation Summit and related events.
 - ii. Creation of an annual Agbioscience Entrepreneur of the Year Award, along with a Hall of Fame that honors the history and legacies of earlier entrepreneurs.
 - iii. Annual benchmarking report on the industry, along with a master list of new companies and new investments.
 - iv. Expanded efforts to market the Agbioscience opportunity in Indiana, with speakers from outside of Indiana to discuss emerging trends.

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