UNLOCKING IP:

Leveraging Indiana's R&D Assets to Boost Entrepreneurship

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Executive Summary

In recent years, Indiana's leaders have placed a renewed emphasis on encouraging innovation and Hoosier entrepreneurship. The Indiana Economic Development Corporation's (IEDC) "5E" strategy highlights entrepreneurship-focused investments, and regional partners are investing in initiatives such as Heartland BioWorks and the 16 Tech Innovation District in Indianapolis. Leading universities are also embracing innovation, via new and retooled programs such as Purdue Innovates, IU Ventures, Notre Dame's IDEA Center, and Ivy Tech's new Garatoni School of Entrepreneurship and Innovation. Large companies are also leading this charge, with recent major announcements of the One Health Innovation District (led by Elanco Animal Health and Purdue) and the Zimmer Biomet-backed Medtech Innovation Center in Warsaw. Meanwhile, initiatives like IEDC's Regional Economic Acceleration and Development Initiative (READI) program enable billions in investments aimed at helping Indiana communities attract talent and strengthen regional economies.

These investments are beginning to bear fruit, but continued work is needed. To further support these new efforts, leaders at the Central Indiana Corporate Partnership (CICP) and AgriNovus Indiana—CICP's branded initiative focused on growth of the state's agbioscience industry—began investigating how to leverage Indiana's existing R&D landscape and IP assets to further stimulate entrepreneurship and innovation across Indiana. This effort is well-timed, according to dozens of project interviews with innovation leaders statewide.

These informants shared a strong consensus view that Indiana must embrace a more active approach to supporting innovation and entrepreneurship. Pockets of innovation and world-class research capacity exist, but often in isolation from one another. Major Indiana-based corporations are advancing new innovations, and leading universities are increasing their investments in innovation and entrepreneurship, but the process of generating new startups and spinoff companies has been slower than hoped. Among other things, Indiana must develop new tools and approaches to make it easier to commercialize intellectual property and new technologies developed at universities, corporate research centers, and by emerging entrepreneurial ventures.

Now is the time to scale up on all fronts: to invest more in innovation and entrepreneurship, to become more ambitious in our expectations for companies and support programs, and to do a better job of promoting Indiana as an innovation hot spot to Hoosiers and to others around the world.

What can be done to improve startup support and successful growth of new innovation-based companies through technology commercialization? Our research focused on questions such as: how can entrepreneurs be activated to drive more commercialization of underutilized intellectual property held by Indiana's corporations? How can the capabilities within Indiana's university technology transfer offices (TTOs) be best leveraged to further stimulate entrepreneurship among faculty and outside innovators? How can these new ideas be converted into viable and profitable business opportunities?

Targeted strategies can help, but we also found that they must be nested within a more robust ecosystem that offers real and sustained partnership opportunities for research universities, major corporations, and new startup ventures. Indiana must invest in new capabilities related to innovation and entrepreneurship, while simultaneously creating new playing fields where key partners can more effectively engage and collaborate.

Indiana has a powerful combination of assets and stakeholders that are well positioned to enable a robust innovation ecosystem through commercialization of new technologies. But more needs to be done to bring key actors together, leveraging existing networks to improve outcomes through new or better programming. The most promising actions might start with innovation challenges in which companies enlist the help of startups and universities to address industry problems.

Innovation challenges should draw from leading innovation programs that, at their most basic level, seek to build common understanding: what major research or innovation challenges face a given industry? By highlighting common challenges, this work can spur collective action and provide market intelligence to companies and innovators who seek to "solve" these challenges. Beyond this signaling function, the initiatives enhance the visibility of and facilitate easier access to key assets, which might take the form of a strong talent base, existing IP assets, or critical infrastructure resources such as specialized labs and equipment. They can also identify program gaps and market failures, including where new investments or new ways of doing business are required to generate sustained success.

AgriNovus has had success with this approach through its HungerTech and Producer-Led Innovation Challenges, and this model could be scaled and expanded to focus on other key clusters such as life sciences, advanced manufacturing, and technology. Our research suggests that such problem-solving challenges could and should serve as a catalyzing force that spurs additional activities and investments in support of a broader innovation and entrepreneurship ecosystem. Focused efforts to bring together actors around shared challenges, opportunities, and shared interests facilitate additional programming to address innovation-related gaps faced by these constituencies.

As stakeholders align around additional gaps or opportunities, efforts to address them could lead to more formal organizational structures ranging from a regularly convened innovation taskforce or working group to new institutions, like Indiana Biosciences Research Institute (IBRI). Regardless of where such work leads, focusing on technology-based entrepreneurship tied to targeted industries will ensure effectiveness.

More will be required than challenge-related programming. Additional focused convenings aimed at connecting high-level university and corporate research and technology leaders in key industry segments will help, as will additional investments in new and existing entrepreneurial and innovation-related programming (e.g. accelerators, proof of concept funds, etc.). Ecosystems gaps and barriers should be continually identified and addressed, including funding gaps and barriers to industry-university engagements. New or strengthened programs to support academic researchers and entrepreneurs should

also be considered to enhance the market potential of work emanating from Indiana's top-tier research universities.

From universities to major corporate innovators to intermediaries and public sector investments, Indiana has many of the ingredients needed to leverage its R&D assets to boost entrepreneurship. Thought strategic and targeted initiatives, beginning with challenge-focused programming, Indiana can unlock its IP and solidify its place as a state where cutting-edge science and engineering solutions support ongoing economic growth through industries of the future.

Introduction: Project Background

Studies such as the Central Indiana Corporate Partnership-backed *Entrepreneurship in the Population Survey: Indiana* finds that Hoosiers are less likely to start businesses than their counterparts in other parts of the United States.[1] The Indiana Chamber of Commerce's most recent *Indiana Prosperity 2035 Report Card* presents similar results.[2] The state performs well on many measures, such as business climate, cost of living ,and the share of workers employed in knowledge-intensive industries. But Indiana also performs far below average on many measures related to innovation and entrepreneurship. These include levels of venture capital investment and the share of workers with STEM-related degrees. In both cases, Indiana ranks 40th in the nation. The Chamber's *Indiana Prosperity 2035* plan aptly summarizes the challenge, noting that "Indiana has a great sandbox, but not enough entrepreneurs willing and able to build new enterprises here."[3]

Indiana's lagging stats on entrepreneurship are in many ways puzzling. Echoing the Indiana Chamber's sentiments, the state has built a great sandbox. It routinely ranks as one of the top states in the nation in which to do business, including one of the best states in which to start a business.[4] It is home to the headquarters of numerous innovative companies (e.g., Corteva Agriscience, Cummins, Elanco Animal Health, Eli Lilly & Co.) and three top-tier research universities (Indiana University, Purdue University, and the University of Notre Dame). The state has also seen major advances in its capacity to support innovation and entrepreneurship with new and expanded programs to invest in startups and venture growth. Yet it feels like more can and should be done.

Seeking to identify how best to accelerate Indiana-based innovation, the Central Indiana Corporate Partnership (CICP) and AgriNovus Indiana—CICP's branded initiative focused on the state's agbioscience sector—engaged EntreWorks Consulting, an economic development consultancy, to assess Indiana's innovation ecosystems and how they compare in relation to innovation and entrepreneurship ecosystems around the United States and around the globe. Our initial research focused on the hypothesis that dormant intellectual property (IP) trapped within Indiana's leading companies and universities could, if unlocked, be leveraged to boost entrepreneurship. Efforts to explore this hypothesis examined unique innovation policy domains and strategies such as improving university technology transfer and commercialization, technology

1 For background, see https://www.cicpindiana.com/entrepreneurshipinthepopulationindiana/

2 Indiana Chamber of Commerce, *Indiana Prosperity 2035 Report Card*, December 2023. Available at: https://www.indianachamber.com/wp-content/uploads/2023/12/INProsperity2035_ReportCard23.pdf

3 Indiana Chamber of Commerce, *Indiana Prosperity 2035: A Vision for Economic Acceleration*. Available at: https://www.indianachamber.com/indiana-prosperity-2035/

4 Kelly Main, "Ranked: The Best States to Start a Business In 2024," *Forbes Advisor*. Available at: https://www.forbes.com/advisor/business/best-states-to-start-a-business/

and supplier scouting initiatives, and business acceleration programs.

This focused research identified many leading practices and promising ideas, but it also highlighted a need to rethink key innovation and business development processes. Discrete investments, in areas such as university tech transfer or new business finance, could generate positive change, but might not generate the deep impacts sought by Indiana's economic development leaders. Instead, focused program innovations should be seeking to catalyze a transformation of the state's existing innovation ecosystem by better connecting Indiana's higher education leaders, corporate leaders, entrepreneurs, and innovation champions in a shared mission of pioneering innovations that tackle big societal issues, such as curing diseases, sustainably feeding a growing world, and advancing new directions in production technologies.

Indiana is not alone in thinking bigger and thinking differently about how to support innovation and entrepreneurship. Across the globe, national, regional, and local governments are embracing new innovation policy models, which require larger investment levels, deeper science and engineering expertise, and partnerships that engage academia, corporate leaders, and the growing startup community. A new consensus is emerging that effective innovation programs must span the entire technology development lifecycle. It is not enough to simply generate new ideas and IP. Active support and investment to turn these good ideas into viable commercial opportunities represents the real difference maker between thriving innovation hotspots and less successful regions.

This report reviews how Indiana's existing ecosystems support innovation and entrepreneurship, with a particular focus on science and technology-driven innovations that typically rely on some form of intellectual property or specialized research expertise. We begin with a review of the state of play in Indiana, highlighting many promising new initiatives. This exciting transformation algins well with global trends as regions around the world are rethinking how best to promote science-based innovation and entrepreneurship. Many new initiatives are organized around the concept of hard tech, which refers to a group of industries where the role of science and engineering expertise assumes outsized importance in terms of developing new market opportunities (including the advanced manufacturing and life science-focused industries that drive Indiana). An embrace of this hard tech organizing concept also suggests that key ecosystem partners also embrace new ways of supporting innovation and entrepreneurship. These new strategies and program models are reviewed with a focus on experimentation and opportunity identification, business building and scaling, and ecosystem sustainability. We conclude with a series of recommendations on how key ecosystem partners in Indiana can collaborate more effectively to promote and support hard tech-focused innovations.

Current State of Play in Indiana: What's Happening in the Field?

Like much of the U.S., Indiana is enjoying a robust recovery from the sharp pandemic-era economic downturn of 2020. In recent years, the state has enjoyed modest job and population growth, and historically low unemployment levels. Growth rates have tracked closely to national benchmarks, and Indiana typically ranks among the most robust economies in the Midwest. Leading economic observers project that 2024 will see continued strength and prosperity.[5]

While Indiana's economic fundamentals remain strong, the state continues to underperform on various measures of innovation and entrepreneurship. However, as previously mentioned, many throughout the state are seeking to address this challenge. Improving the state's innovation performance is a core area of focus for CICP and its branded sector initiatives—AgriNovus Indiana, BioCrossroads, Conexus Indiana, and TechPoint—as well as numerous CICP partners and stakeholders. A reinvigoration of this focus now is well-timed as it is consistent with new thinking and new approaches to technology commercialization and development, which some observers refer to as the deep tech (or hard tech) revolution.

Indiana is home to many exemplary assets and programs that enable it to play a leading role in this revolution. Throughout the state there are programs that support tech development at the individual level (entrepreneur training) and institutional levels (university tech transfer offices). These initiatives seek to move ideas from "lab to market" via strategies such as business mentoring, market research, and funding to support business idea validation, prototyping, and other steps required to prepare a product or service for the commercial marketplace. Moreover, the state's industrial base includes many R&D-intensive industries and firms. A fact made clear with data from the most recent release of the National Science Foundation's (NSF) Business Enterprise R&D Survey, which finds that Indiana companies spent $9.5 billion on R&D in 2021.[6] The level of corporate investment in R&D ranks Indiana 14th among all states, pointing to an opportunity to perhaps better engage incumbent industries in the broader innovation and entrepreneurship ecosystem. Despite these many strengths the overarching capacity to link all this activity at the ecosystem level is just emerging.

Interviews with key stakeholders identified many common challenges as well as important assets to help anchor future innovation investments. Most of Indiana's largest research institutions are amidst redesigning and enhancing their existing technology transfer and commercialization activities. At present, these schools do manage comprehensive technology transfer offices (TTOs), whose efforts

5 Alex Brown, "Kelley Reports Optimistic Forecast for 2024," *Inside Indiana Business*, November 2, 2023.

6 National Center for Science and Engineering Statistics and Census Bureau, Business Enterprise Research and Development Survey, 2021. Available at https://ncses.nsf.gov/surveys/business-enterprise-research-development/2021#data

generate significant technology and business opportunities. According to the FY2022 Licensing Activity Survey from the Association of University Technology Managers (AUTM),[7] Purdue University supported nearly $764 million in research expenditures. Its TTO programs helped support 379 invention disclosures and 169 new patents along with nine new startup companies. Meanwhile, Notre Dame supported $278 million in research expenditures, along with 67 disclosures, 24 new patents, and seven new startups in FY 2022. A 2023 ranking of the top world universities for patenting includes both Purdue (#5) and Indiana University (#73) in the world's top 100 rankings.[8]

Despite all of this, leaders at all three major research universities agree that they can do a better job of supporting researchers and positively affecting local economies. These sentiments are driving ongoing reinvention efforts. For example, Indiana University's most recent strategic plan supports Innovate Indiana, a multi-pronged effort to better support innovation and entrepreneurship. Similarly, Notre Dame has also announced several new initiatives, including the 1842 Fund, a venture studio in partnership with High Alpha Innovation.

These university initiatives align with ongoing strategies led by the Indiana Economic Development Corporation (IEDC) and by economic development partners at the regional and local level. Statewide, IEDC is investing in a host of innovation-focused strategies, including significant new investments in Elevate Ventures, the second round of the Regional Economic Acceleration and Development Initiative (READI), and a new expanded program led by the Applied Research Institute (ARI) that provides matching funds for federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grantees. Elevate Ventures has assumed an important leadership role in this work, via its existing and newer investment programs and events such as the Rally Innovation Conference.

New initiatives embracing these approaches are also gaining traction with the help of federal funding. Heartland BioWorks has been designated as a federal Economic Development Administration (EDA)-backed Tech Hub and will support a host of new initiatives at the Indianapolis-based 16 Tech Innovation District and across the state. Indiana is also a key partner, along with Illinois and Michigan, in the new United States Department of Energy-backed Midwest Alliance for Clean Hydrogen which will include a major production facility in Northwest Indiana, and the newly designated Silicon Crossroads Microelectronics Hub serves as a core node in the national Microelectronics Commons R&D project.

Similar work is underway at the local and regional levels, often in partnership with state agencies or via support from READI and other funding programs. The new Plug and Play Warsaw Medtech program, which recently launched, is particularly

7 Association of University Technology Managers, *FY2022 Licensing Activity Survey*. Available at www.autm.net. Indiana University did not participate in the FY2022 Survey.

8 National Academy of Inventors, "Top 100 Worldwide Universities Granted US Utility Patents, 2023," Available at: https://academyofinventors.org/top-100-worldwide-universities/ The University of Notre Dame ranks in the Top 100 among US universities.

exciting. Thanks to support from Zimmer Biomet, Paragon Medical, IEDC, and the Northeast Indiana Partnership, the national Plug and Play Incubator network will bring its programs to support medtech innovations in the Warsaw area, a long-time hub for the orthopedic and medical device industry. Indianapolis' One Health Innovation District, a new partnership between Purdue and Elanco Animal Health, is also generating significant enthusiasm. Other innovation partnerships are also being seeded across the state. In addition to the new federally-backed tech hubs noted earlier, these efforts also include Purdue University Northwest's Steel Manufacturing Simulation and Visualization Consortium and the Battery Innovation Center located near Crane in Newberry.

These technology-focused programs are complemented by a host of newer programs devoted to engaging Hoosiers in learning about entrepreneurship and the basics of starting a business. Indiana has long hosted programs such as the Small Business Development Center (SBDC) network, but it has historically lacked a deep reservoir of entrepreneurship support programming across the state, especially in more rural regions. Today, these programs exist in almost every part of the state. In fact, IEDC's listing of various Indiana incubator and coworking programs includes at least 300 different such efforts.[9] These efforts are also supported by growing youth entrepreneurship programs, and by a host of new training programs for youth and adults. For example, Ivy Tech opened its new Garatoni School of Entrepreneurship and Innovation in 2021 and is currently introducing these programs to all its campus locations.

Corporate engagement in innovation ecosystems is also growing. In addition to the above listed examples in Warsaw and Indianapolis, Corteva Agriscience—the world's largest pure-play ag company—recently launched Corteva Catalyst. This new innovation platform focuses on partnerships in four industry verticals: genome editing; biologicals and natural products; technology platforms; and decision science.

These newer programs and investments generated optimism among our project interviewees, but they also described many missed opportunities and program gaps as well. Several common themes emerged from our extensive interviews and focus groups (see the appendix for a listing). A strong sense of optimism and positive energy permeated many our interviews. Many interviewees argued that Indiana was poised to make great leaps as newer investments and initiatives begin to generate impacts.

> *"Indiana is developing a long-term mindset around business development, but we need to be more self-aware of our need to improve."*

> *"We have great research institutions at universities and firms, but the real potential comes in putting the pieces together."*

While most interviewees were positive about current policy and program directions, they also noted that success in the innovation game will require different ways of doing business. For too long, Indiana entrepreneurs and innovators have shied away from embracing big ideas and big ambitions, and these

9 To learn more, visit https://www.iedc.in.gov/resources/organizations/entrepreneur

sentiments were reflected in interview comments such as these:

"We are doing better but have too many silos."

"Lots of Indiana firms innovate internally, but there is not much external collaboration and cross-pollination."

"Indiana still lacks a tangible ecosystem. It's hard for non-local entrepreneurs to get engaged."

"We need a more high-intensity approach to business development."

Moving forward, Indiana will need to think bigger and invest more resources if it seeks to become a globally recognized innovation hub. Small scale changes and program tweaks can help, but a new mindset is also needed. Fostering this type of cultural change takes time. Many of the recommendations discussed in this report are designed to encourage an entrepreneurial mindset among Hoosiers. They can be further supplemented by other efforts such as well-publicized events (the Rally Innovation Conference), prize and pitch competitions (Innovate WithIN), and youth entrepreneurship training such as that provided by many organizations (e.g., FFA, 4-H, Junior Achievement, and the South Bend-based RISE program). These efforts publicize the benefits of innovation and entrepreneurship, while encouraging Hoosiers to consider entrepreneurship as a viable career option.

Building an innovation-friendly culture can also contribute to talent development, which was identified by interviewees as the primary challenge facing innovation and entrepreneurship in Indiana. The need to build a stronger talent base was noted in nearly every interview and focus group, with regular comments such as these:

"We still lack a strong base of entrepreneurs who can take a technology license and start a firm based on it."

"It's been hard to create high potential businesses. Most firms from the community are lifestyle businesses."

"We still lack the culture and churn you see in places like Silicon Valley."

"We don't lack for discovery and invention in Indiana. . . but we lack talent to turn these ideas into commercial assets. (We need) a new mindset and orientation to do that."

Talent-related challenges rank near the top of concerns facing Indiana's community leaders, with reports such as the Indiana Chamber's 2022 Leaking Talent Pipeline report gaining much public attention.[10] These studies take a broad perspective, assessing education, quality of life and other factors that affect talent migration. When it comes to innovation and entrepreneurship, attracting talented workers matters, but it is also essential to develop new entrepreneurs and researchers with an interest and capacity to develop new business ventures. Building this talent base will require expanded training and business accelerator programs as well as efforts to retain and attract technology and business talent to Indiana. Existing ecosystem support programs can help here, but specialized programs, such as venture studios or focused accelerators for academic entrepreneurs,

10 Indiana Chamber of Commerce, *Indiana's Leaking Talent Pipeline*, 2022. Available at: https://www.indianachamber.com/wp-content/uploads/2022/08/LeakingTalentPipelineStudy2022-BOOKLET-BIZ.pdf

will also be needed. Indiana needs to focus on both the quantity and quality of its entrepreneurial ventures. Indiana needs more entrepreneurs **and** more world-class entrepreneurs.

Making it easier to start and grow businesses in Indiana can further support this mission of talent development. As one interviewee put it, Indiana needs "an easy button" for entrepreneurship. It is still too complicated for many Hoosiers to find the tools and resources needed to start and grow a business. This is true for local Main Street businesses, but it is especially true for entrepreneurs working in deep tech or hard tech sectors where the business development process is more complicated and the technical and engineering demands are more pronounced. Interviewees reflected these issues with comments such as:

> *"We need an infrastructure to help people with business issues and product development that helps to de-risk technologies."*

> We must *"rethink network value. We need to engage more people from outside of Indiana in our ecosystem."*

These quotes suggest that there is a growing consensus among leaders and partners in the state's innovation ecosystems. To date, Indiana has been slowly making progress, quietly innovating and making important foundational investments. But now is the time to scale up on all fronts: to invest more in innovation and entrepreneurship, to become more ambitious in our expectations for companies and support programs, and to do a better job of promoting Indiana as an innovation leader to Hoosiers and to others around the world.

New Thinking on IP Commercialization: The Emergence of Hard Tech Ecosystems

Indiana is not alone in its push to identify new approaches that simplify and accelerate technology commercialization and business development processes. In fact, across the United States and around the world, organizations are experimenting with new approaches to technology-based economic development. Many of these initiatives have been tied to recent Federal funding opportunities, such as those promoted by the CHIPS Act, the NSF's Regional Innovation Engines program, and the EDA's Tech Hubs program. Similar initiatives, such as the European Union's Smart Specialization Program, are also occurring overseas.

These new program models embrace new ways of doing business and represent a shift in how place-based economic development investments are made and managed.[11] Until quite recently, most technology or innovation-focused economic development programs invested directly in the development of research (by individuals or organizations) and in efforts to support the accelerated commercialization of products and services generated by such research. Typical programs using this model include TTOs operating at most major research universities, business incubation programs, and federal programs such as the SBIR or STTR programs.

Newer investments seek to broaden this focus to the ecosystem level, with an explicit emphasis on "rewiring" the regional ecosystem. As a recent National Bureau of Economic Research (NBER) analysis noted,

> In contrast to funding whose primary objective is the direct production of high-quality science and engineering research, a Regional Innovation Engine (RIE) is intended to "re-wire" innovation ecosystem connections so that the research being conducted in that location can be leveraged as a driver of high-impact regional innovation and entrepreneurship. Put another way, as a "research-enhancing" intervention, an RIE has the potential to increase the return on investment of more traditional Federal and state research investments, as well as private and philanthropic investments, within a given region.[12]

Embracing this new logic, consortia (or engines) seek to not only improve the quality and commercial attractiveness of local research investments, but also to increase the productivity and impact of the regional innovation ecosystem.

11 Jorge Guzman, Fiona Murray, Scott Stern and Heidi L. Williams, "Accelerating Innovation Ecosystems: The Promise and Challenges of Regional Innovation Engines," National Bureau of Economic Research Working Paper 31541, August 2023., and Mark Muro, Joseph Parilla, and Francesca Iofredda, "What the New Tech Hubs Designation means for Boosting Innovation across the US," Brookings Institution, October 23, 2023. Available at: https://www.brookings.edu/articles/what-the-new-tech-hubs-designations-mean-for-boosting-innovation-across-the-us/

12 Guzman et al, p. 13.

This embrace of regional innovation ecosystems is influenced by new conceptions of the innovation pipeline. Under the older constructs, the technology development process was viewed as a literal pipeline where individual researchers developed ideas, converted them into new products and services (often with support from university TTOs or private research labs), and in turn transformed those new technologies into (hopefully successful) business opportunities.

This simplified pipeline metaphor's utility has lessened in recent years as researchers and practitioners have recognized that the realities of technology development are more complex and that multiple development pathways exist. In response, a related set of new approaches is emerging around the concept of "hard tech." In many cases, others refer to these sectors as "deep tech" or "tough tech." Regardless of terminology, these terms typically refer to new ventures that share four key characteristics.[13]

- They are problem-driven, not technology-driven: They are designed from the outset to tackle grand challenges or major missions, such as supporting the UN Sustainable Development Goals.
- They rely heavily on world-class science and research. They seek to develop the "best solution" to a given challenge, and typically operate where various technologies converge.
- They are focused on developing physical products as opposed to software or digital technologies.
- They thrive within ecosystems where academia, research labs and business closely collaborate.

The concept of hard tech recognizes the growing complexity of the technological development and commercialization processes. Addressing big challenges requires sophisticated solutions, which often require specialized science and engineering expertise. It seems likely that science-based expertise will assume growing importance in future years. In fact, recent research shows that 30percent of patents granted by the US Patent and Trademark Office (USPTO) now cite at least one scientific paper. In the 1980s, only 7percent of such patents cited scientific research.[14] Moreover, patents with close links to scientific research are much more likely to be associated with high impact innovations.

As these characteristics suggest, hard tech does not refer to specific industry or company. Instead, it can be defined as "a subset of innovation-driven enterprises which are taking breakthrough technologies from lab to market and using them to address large-scale fundamental problems."[15] The hard tech label refers less to specific technologies, focusing more on how these venture approach market challenges. Most researchers suggest that this definition would include sectors such as AI, quantum computing, advanced

13 Boston Consulting Group and Hello Tomorrow, Deep Tech: *The Next Great Wave of Innovation*, 2021, p. 11.

14 Martin Greenacre, "Research Shows Science Increasingly Contributes to Innovation," Science|Business, July 4, 2024. Available at: https://sciencebusiness.net/news/basic-science/research-shows-science-increasingly-contributes-innovation

15 Jean-Francois Boubier, Anne-Douce Coulin, Constant Morez, Greg Emerson, Kaustubh Wagle, and Antoine Gourevitch, "An Investors Guide to Deep Tech," Boston Consulting Group, November 2023. Some observers also use the term "tough tech" to refer to these ventures. See https://engine.xyz/reports/engine-report-2021-2022

materials, and agtech. For most states and regions, this grouping includes prominent emerging industries that are a high priority for economic development investments.

Hard tech is gaining interest from investors and from policy makers around the world. The Boston Consulting Group, which uses the term "deep tech" rather than "hard tech, estimates ventures now account for around 20 percent of venture capital spending.[16] In addition, governments around the globe are expanding investments and programs to support hard (or deep) tech. For example, the European Commission's New Innovation Agenda places heavy emphasis on ecosystem support for deep tech ventures,[17] and similar initiatives are underway in Asia and Latin America. Europe is also home to a new and growing Deep Tech Alliance that connects accelerators and research parks in ten European countries. In the US, programs like Tech Hubs and Innovation Engines may not use this deep tech terminology but are managing programs like those found overseas.

Whether focused on hard tech or other areas, newer models embrace a messier and less linear process of innovation. Innovation is instead viewed as a "contact sport" where new ideas can emerge from multiple sources, including individual researchers, large corporations, research labs, and the like. Support programs focus on concrete outcomes such as new patents or business starts, but also seek to build out an innovation ecosystem that supports more and better ideas, better business outcomes, and stronger impacts in terms of productivity improvements and job and wealth creation.

16 See Boubier et al.

17 European Commission, *Leading the New Wave of Deep Tech Innovation*, 2023.

Emerging Innovation Programs and Priorities: What's New in the Field?

Developing a more robust and sustainable innovation ecosystem requires a comprehensive approach that embraces all components of the technology development lifecycle. Robust ecosystems provide support for a diverse array of entrepreneurs and innovators, while also offering support at all phases of the business development journey, from initial ideation through financing and subsequent business growth and expansion.

Researchers have identified several factors characterizing well-functioning innovation ecosystems that support the development and growth of new technology-based ventures.[18] First, ecosystem partners are aligned around shared missions with common goals and desired outcomes. Second, roles and responsibilities are clearly understood across the ecosystem, and ideally the system lacks major gaps in key functions and support services. Third, regular information-sharing and coordination efforts are underway, and the networks operate with an incentive structure tied to key outcomes and objectives.

While few ecosystems fully reflect all these attributes, a smoothly running ecosystem highlights core challenges and business opportunities that can be readily accessed and understood by aspiring entrepreneurs and existing businesses. When new business ideas are tested and developed, researchers and entrepreneurs know "where to go for what," and support organizations regularly coordinate the delivery of support tools and resources. Partners share their successes (and failures) while supporting the continued evolution and enhancement of the ecosystem over time.

Key activities and initiatives within this framework include the following:

- **EXPERIMENT: Developing Ideas and Identifying Technology Opportunities:** Focused on identifying and refining new ideas, technologies, and business opportunities. Examples of relevant programs include university technology transfer offices, patent databases, and R&D investments.
- **DEVELOP AND SCALE: Building Business Capabilities:** Targeted to refining initial ideas and linking them to business development opportunities at startups, existing businesses, or other organizations. Entrepreneur training, business finance programs, and workforce development programs support these missions.
- **ECOSYSTEM GOVERNANCE: Sustaining the Network:** Managing innovation networks and programs engaging multiple partners. Among other things, this function involves convening and connecting key partners, raising operational funds, and measuring performance impacts.

18 RAND Corporation, *Strengthening the Defense Innovation System*, Research Report, 2023, pp. 65-82.

Below, we highlight leading practices in each of these functional areas.

EXPERIMENT: Developing Ideas and Identifying Technology Opportunities

Technology commercialization begins with an idea, and potential sources of these ideas are unlimited. Well-functioning ecosystems support and promote idea generation in multiple ways. At the most basic level, they promote and nurture an innovation-friendly culture where local people are encouraged to seek out and test new ideas and to consider entrepreneurship as a career option. Via regular events, outreach, and training programs, business and research opportunities can be shared with researchers, businesses, and other stakeholders.

Developing a commercialization-friendly organizational culture is regularly cited as a leading practice for research institutions and regional ecosystems.[19] Key steps include providing clear guidance and support to researchers, developing promotion and recruitment policies that promote innovation, and offering training and education on how to move ideas from lab to market.

The nation's top research universities, including those in Indiana, support these actions through their technology and commercialization programs. When TTOs first became a common tool in higher education, programs focused primarily on developing formal mechanisms, such as licensing agreements and support for spinout companies, designed to move ideas from lab to market. Today, these tools are a necessary (but sometimes insufficient) means to support technology commercialization. Other often informal mechanisms for technology commercialization are also part of the policy and program mix. They may include more active marketing of university technologies, closer ties to investors and potential corporate partners, and partnerships to jointly support labs, talent development, or collaborative research projects. In addition, universities and research centers are also embracing incentives that encourage faculty to pursue commercialization opportunities.[20] Commonly used incentives include cash awards for patents or other commercialization milestones, fellowship programs, entrepreneurship support for researchers, and leave/promotion policies that support commercialization efforts.

Outreach efforts can be further supplemented by more focused technology scouting efforts. In many regions, business service providers, both public and private, manage technology scouting and supplier scouting programs designed to connect innovators to new ideas and potential business partners. Technology scouting programs can take many forms, but several

19 University of Michigan Economic Growth Institute, "Maximizing Innovation and Technology Commercialization of Federal Research Investments." March 2019, pp. 8-12; Lauren Gase and Rose Vieland, "Strengthening University-based systems to Support the Development of Intellectual Property (IP) Strategies: Insights from Faculty, Administrators, and Students," Venture Well, June 2020.

20 World Intellectual Property Association, *Incentives in Technology Transfer: A Guide to Encourage, Recognize and Reward Researchers and Professionals*, WIPO, 2024.

primary types have been identified.[21] Many programs, such as those operating within the U.S. Department of Defense, seek short term technology infusions to support existing missions or programs. Longer term programs seek to anticipate future needs (out five years and beyond) or to identify future "game changing" solutions or technologies. The nature of these technology scouting activities can range from opportunistic to very structured to align to a key agency mission.

Technology scouting can also build on existing assets and programs. For example, the TTOs at most major research universities support on-line technology or patent databases that can be searched for the newest ideas and technologies. Purdue, IU, and Notre Dame all maintain databases of available technologies and intellectual property developed by university researchers. These tools offer one path to help access outside experts and technologies that might have untapped or under-appreciated commercial prospects.

In addition to university commercialization offices, many technology and venture development organizations also host databases of available technologies and resources. For example, the AUTM Innovation Marketplace aggregates available technologies from f its member universities. The Federal Lab Consortium manages a similar tool, FLC Business, linking firms and researchers to federal lab business opportunities. The Montana-based TechLink Center serves this role for technologies developed by and for DoD or the Veterans Administration, with its affiliated MilTech Center supporting fielding and deployment efforts. Indiana-based universities and research centers, such as those at NSA Crane, are engaged with these efforts.

Related data tools support supply chain optimization or help to build connections between OEMs and potential suppliers and partners. For example, at the national level, the National Institute of Standards and Technology (NIST) – Manufacturing Extension Partnership (MEP) program supports a supplier scouting tool connecting subcontractors to Federal business opportunities and related tools are managed by state MEP affiliates, such as those used in Indiana and Michigan. Other states operate databases related to defense contracting; Maryland's Defense Network portal is a good example.

Beyond these tools, regions and states can also stimulate new ideas via the identification of grand challenges or target industries. Most, if not all, of the new regional innovation engine/ tech hub investments have supported programming targeted to grand challenges of this sort. For example, Tech Hubs now support sectors as varied as microfluidics for semiconductor manufacturing (in Oregon), precision fermentation (in Illinois), sustainable polymers (in Ohio), and gallium-nitride based semiconductor manufacturing (in Vermont).

Finally, direct investments in R&D are a long-proven tool for this work. Many successful technology development programs are driven by state directives that deploy significant investments toward major research challenges. At the federal level, these efforts are often referred to as

21 US National Aeronautics and Space Administration, Office of Technology, Policy, and Strategy, *Technology Scouting: Phase 1 Report*, September 22, 2023.

"moonshots," such as the National Cancer Institute's cancer moonshot program or the Food Shot Global initiative target to ag-related innovations.

State governments often invest in their own moonshot-like initiatives, and also support a host of other R&D and technology investments. In 2022, state governments collectively invested more than $2.6 billion on R&D activities.[22] Some of this money supported state government activities, but nearly three-fourths of state R&D funds support extramural research focused on big research and technology challenges. Many states devote these funds to business finance programs targeting high-growth or venture ready firms. Elevate Ventures' 21 Fund operates in this fashion, providing equity infusions of up to $4 million for promising ventures.

More ambitious state programs target "grand challenges' with major investments in infrastructure, research capacity, and business development. Prominent examples include the Texas Cancer Prevention and Research Institute (CPRIT) and the California Institute of Regenerative Medicine, which supports stem cell research. These programs can attract significant funding. The Texas CPRIT project is funded with up to $6 billion in state investments which will support a 20-year research program.

In addition to funding research institutes such as CPRIT, other states have opted to back a suite of programs targeted to specific sectors. For example, North Carolina expends significant resources to advance its life science industries. These investments include funding for the North Carolina Biotech Center (approximately $17 million in FY2023), the Golden Leaf Biomanufacturing Training Center (around $2.5 million), and a host of tax credits and other support initiatives.[23]

Massachusetts also invests robust resources in cutting-edge industry research, much of it funneled through the Massachusetts Technology Collaborative (MassTech). Among other things, MassTech supports numerous industry initiatives for sectors such as cybersecurity, digital health, biomanufacturing, and robotics. These efforts may be significantly expanded going forward, as Governor Maura Healey has recently proposed the Mass Leads Act, which would invest $2 billion (over 10 years) in support of a statewide climate tech and life sciences effort, and $100 million in an Advanced AI Hub.

DEVELOP AND SCALE: Building Business Capabilities

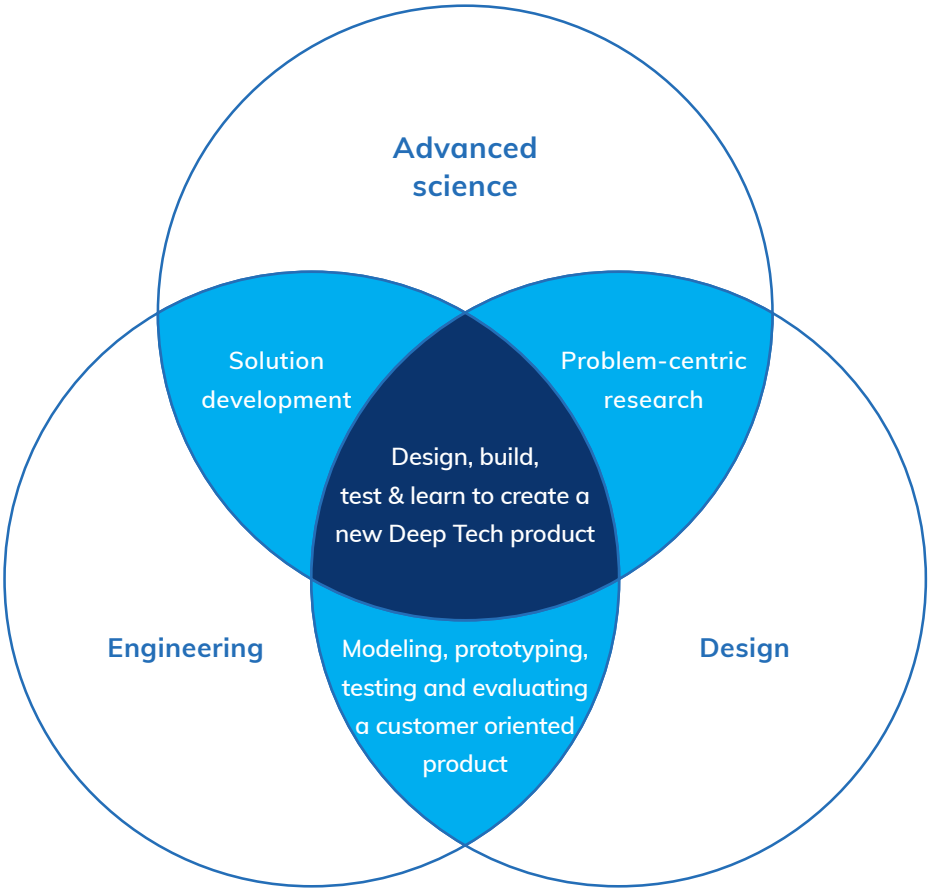
As research moves from the idea phase to the development phase, researchers and businesses need tailored support to develop and scale—i.e., to turn good ideas into viable business opportunities. All businesses face these decision points, but they can be especially challenging for technology intensive (or deep/hard tech) ventures where technological risks may be higher and the path to commercialization is both more complicated and riskier.

22 National Science Foundation, National Center for Science and Engineering Statistics, "State Government Expenditures for R&D Totaled $2.6 Billion in FY 2022," InfoBrief, November 27, 2023. Available at: https://ncses.nsf.gov/pubs/nsf24305

23 For background, see Teconomy Partners LLC, "Optimizing North Carolina's Innovation Ecosystem, 2022. Report prepared for NC Innovation.

These firms operate at a unique convergence of advanced science, engineering, and design (see Figure 1), which warrants a different approach to business building. At present, many entrepreneur and business support programs use tools and approaches first developed as part of the Lean Startup or Lean Enterprise movements.[24] This paradigm emerged out of the information technology revolution and is well suited to firms seeking to develop and scale digital, software, and information technology related ventures. The Lean Startup Loop, focused on the concepts of Build, Measure, Learn, forms the foundation for this model. Using this framework, entrepreneurs are encouraged to develop a minimal viable product (MVP) or technology, and then to push this MVP into the marketplace. Entrepreneurs capture feedback on market reception and use this learning to develop new iterations of the initial MVP.

FIGURE 1: KEY ELEMENTS OF DEEP TECH/HARD TECH VENTURES[25]



24 Eric Ries, The Lean Startup (Viking 2011),

25 Hello Tomorrow Asia Pacific, "The Deep Tech Difference: Best Practices for Building Deep Tech Ventures," August 23, 2021. Available at: https://www.hello-tomorrow-apac.org/post/the-deep-tech-difference-best-practices-for-building-successful-deep-tech-ventures

Many researchers contend that the Lean Startup Loop is less well suited to more technology intensive (or deep tech) ventures where technological challenges are more profound. They instead recommend adoption of a related framework, known as Design-Build-Test-Learn (DBTL).[26] Under the DBTL paradigm, the design phase assumes greater prominence, reflecting the higher capital and technology risks associated with the development of transformative ventures.

This shift requires different approaches to develop and scale new businesses. Because these firms pursue big challenges (and big potential markets), returns on investment can be significant. However, investments will take time. BCG has estimated that the time between investment rounds for deep tech firms may range from 25-40 percent longer than more traditional tech ventures.[27]

Ecosystem and business development initiatives will need to reflect these new realities. Close ties to universities, labs, and corporate research centers will be required, and knowledge of multiple technology fields will also be necessary. Public investments and programs will also need to embrace derisking. Potential derisking actions could include identifying core missions and problem areas, providing regulatory flexibility though regulatory sandboxes and other tools, and offering both R&D subsidies and procurement contracts to help address capital risk.

The complexities of hard tech innovation demand new approaches to IP development and commercialization. Even with the support of a university technology transfer office, few researchers and innovators will have the knowledge and capacity to go it alone in terms of developing new IP and turning those ideas into a profitable business venture. Moreover, much IP and new technology developed by university researchers remains at early phases of the technology readiness spectrum. Moving these ideas from the promising IP phase to success in the commercial marketplace takes time, resources, and significant business expertise.

The challenges of hard tech innovation suggest that ecosystem-driven solutions may work best, where researchers and innovators can tap into needed expertise and resources from academia, other entrepreneurs, corporate partners, investors, and business service providers. Developing these support networks represents one of the key challenges to successful IP commercialization and hard tech focused innovation.

Effective programs and ecosystems help researchers and entrepreneurs at all points of the business development cycle. Several areas are of special importance, including:

- Entrepreneur training and technical assistance,
- Capital programs,
- Connections,
- Infrastructure, and
- Talent.

26 BCG, "Deep Tech and the Great Wave of Innovation", p.9.

27 Boubier et al., p. 7.

Entrepreneur Training and Technical Assistance

All ecosystems contain programs and initiatives focused on training and upgrading the skills of entrepreneurs. In fact, these types of programs are among the most common small business and entrepreneurship programs found across the US and around the globe. Their focus, range, and diversity can vary greatly as programs may target certain demographic groups (youth, women, minority entrepreneurs), certain sectors (Main Street business, IT firms), and specific types of businesses (high growth vs. lifestyle).

R&D-driven ventures and entrepreneurs require unique models and engagements that recognize the unique challenges and opportunities facing these ventures.[28] New ways of building business, such as the DBTL approach, may be required. Capital needs are likely larger, due to higher levels of technology and regulatory risk as well as the potential for longer timelines to commercialization and other business milestones. These firms and entrepreneurs will always represent a tiny share of total businesses in each region, but their impacts in terms of jobs, wealth creation, and productivity improvements can be profound.

Many regions have developed more focused programming that recognizes the unique needs of technology-focused or deep tech entrepreneurs. They typically take the form of focused business acceleration programs that combine business coaching and mentoring, peer learning, access to specialized resources (e.g. lab space), and financing to support entrepreneurs during the acceleration program and beyond.

Some of the more well-known programs have spun out of universities or research labs or have been developed by venture investors. The Engine, based in Cambridge, Massachusetts offers a classic example. Spun out of MIT in 2016, the Engine targets "tough tech" companies and provides specialized training programs for faculty, graduate students, and other researchers from schools across the US. It also manages nearly 200,000 sf of lab, office, and industrial space, and its Engine Ventures arm invests in firms tackling challenges related to human health, climate, and advanced systems/infrastructure.

Georgia Tech's Center for MedTech Excellence offers another model with closer connections to a single university, and strong links to Atlanta's thriving innovation ecosystem. It operates as a partnership between Georgia Tech's Advanced Technology Center (an on-campus incubator), the Georgia MEP program, and the Georgia Center for MedTech Innovation, a non-profit Georgia Tech affiliate focused on the medtech development process. In New Mexico, the Lab-Embedded Entrepreneur Program (LEEP) builds on the state's strong base of Federal labs, and provides funding and business acceleration support to entrepreneurs who receive a two-year fellowship and access to the resources of the Los Alamos National Laboratory. Berkeley Lab's Cyclotron Road programs operate in the same manner, connecting innovators to resources at the Lawrence Berkeley National Laboratory.

28 Phil Budden, Fiona Murray, and Ogbogu Ukuku, "Differentiating Small Enterprises in the Innovation Economy," MIT Innovation Initiative Working Paper, January 2021.

Similar efforts are also underway in Indiana. For example, Purdue University's Digital Innovations in Agri-Food Systems Laboratory (DIAL) effort serves as a "venture studio" focused on nurturing new ventures operating at the converge of agtech and digital innovation. DIAL operates as a partnership between Purdue's Applied Research Institute and High Alpha, an Indianapolis-based venture studio focused digital innovations. DIAL also closely partners with AgriNovus on programs such as the Producer-Led Innovation Challenge. High Alpha is also partnering with the University of Notre Dame in a jointly-supported 1842 Fund to promote university commercialization efforts.

Capital

Connecting innovators to investors is a primary mission for most innovation-focused initiatives. As a result, many leading programs, such as the Engine, also manage investment pools or have close ties to venture investors and partners.

Many of the best-known state and regional programs manage a suite of capital programs that target firms at all points of the business development lifecycle. At the earliest stages, programs may support innovators with funding to participate in accelerator programs or small awards tied to pitch competitions or other activities. Many programs and universities offer "proof of concept" funds to help innovators refine early ideas and technologies. Examples include Mass Venture's Acorn Grants which provide up to $32,500 to assist researchers in demonstrating the viability of new technologies, and Purdue's Trask Innovation Fund, with funding (up to $50,000) available to Purdue-affiliated researchers seeking to commercialize new ideas. Many neighboring states, including Illinois, Ohio, and Michigan, also invest state dollars into their own proof of concept funds.

SBIR-STTR matching grants offer another means to support proof of concept work. At present, at least 22 states, including Indiana, support programs of this type.[29] These programs vary, but they typically provide additional matching funds to firms that have accessed federal SBIR funds. Ideally, the additional matching funds can be used to support additional business development activities or to even develop an initial SBIR application. Most grants remain relatively small, typically under $50,000 in value.

From a capital availability standpoint, these early development phases pose the biggest challenges to new innovators. Once they have traversed the so-called "valley of death," innovators typically seek to access funding from more traditional investors such as banks, angels, or venture investors. Most leading programs manage funds of this type or work with innovators to connect them to private funders. Elevate Ventures serves this broker/connector role in Indiana, and similar programs operate around the US. For example, Maryland's TEDCO is one of the US's most active venture investors, currently managing an investment portfolio of 442 companies.[30]

29 For an inventory of state programs, see https://www.sbir.gov/sites/default/files/SBIR-Table_StateMatchingPhase0_Sept2020.pdf

30 "TEDCO Generates $2.7 Billion in Economic Benefits for Maryland's Ecosystem in 2023," February 21, 2024. Available at: https://www.tedcomd.com/news-events/press-releases/2024/tedco-generates-27-billion-economic-benefits-marylands-ecosystem

The scale and diversity of these programs has grown in recent years thanks to the US Department of the Treasury's State Small Business Credit Initiative (SSBCI), which has been used by many states to support new venture or equity investment programs.[31] Indiana has deployed its SSBCI allocations to support the state's 21 Fund.

As firms move to later development stages, venture investors and private equity assume more importance as source of growth capital. Venture capital investment remains a highly concentrated industry, with limited investments outside of traditional VC centers such as the Bay Area and Boston. According to data from TechPoint, Indiana remains a relatively small player in VC markets, accounting for 1.2 percent of US VC deals in 2023.[32] Reflecting churn in the overall US VC market, Indiana saw 2023 increases in the number of VC deals, but also witnessed small drops in total dollars invested and average deal size. Health tech, agtech, and human resources-related tech account for the largest number and value of Indiana-based VC deals.

Connections

Building connections—to investors, partners, and customers—is one of the more important, but often underemphasized keys to the success of new and growing businesses. World-class programs emphasize their roles as convenors and connectors, and the best efforts have global reach and global reputations. Such connections become especially important for hard tech ventures where it may be especially challenging for a lone researcher or entrepreneur to build a scalable business venture.

Convening and connecting are essential functions for any ecosystem, but they are especially important in connecting large institutions, such as universities and major corporations to entrepreneurs and innovators. In these cases, intermediary organizations, such as university technology transfer offices, provide a "front door" and referral network to help people navigate the complex organizational of a university or research lab.

Other connecting activities address the needs of entrepreneurs and business partners for new technologies, new business opportunities and other types of support services. Many regions and programs manage supplier scouting networks that seek to help large firms find suppliers, often minority or disadvantaged firms, or assist smaller firms in identifying new contracting opportunities. The national NIST-MEP CONNEX marketplace offers a model of this type.[33] CONNEX maintains a database of more than 140,000 US-based manufacturers and suppliers, and offers a host of supply connection services. These connections and other technical assistance help new firms find their first customers, allowing them to gain traction and experience in new markets.

Connection tools also link firms and innovators to various business service

31 For background on state SSBCI programs, see https://home.treasury.gov/system/files/256/State-Small-Business-Credit-Initiative-SSBCI-Fact-Sheet.pdf

32 TechPoint, *2023 Indiana Tech Venture Report*, 2024. Available at: https://techpoint.org/wp-content/uploads/2024/02/2023-IN-Tech-Venture-Report-Final.pdf

33 CONNEX continues to roll out across the US and now supports MEP programs in 17 states. Other states and localities are also CONNEX partners. In Indiana, the Indiana Manufacturing Council serves as the current state CONNEX partner.

providers. Such tools regularly exist within local chambers of commerce and economic development organizations, but innovation-focused initiatives are also in place. For example, the North Carolina Biotech Center's BATON Referral Network links biotech innovators to a host of services, including accounting, legal, marketing and the like. Listed providers are vetted in advance and are expected to offer discounts or some level of pro-bono support to BATON referral customers. Launch Minnesota's Minnesota Exchange provides similar types of on-line connections for innovators across multiple industries.

These tools can also be deployed for capital connections as seen with the new ARPA-H Investor Catalyst Hub tool managed by the Venture Well network in support of the new Advanced Research Projects Agency for Health (ARPA-H) Health Innovation Network. The network operates via a hub and spoke model, with 179 spoke organizations operated in every state. In Indiana, the 16 Tech Community Corporation serves this role. The Investor Catalyst Hub is part of a suite of ARPA-H connection tools, along with a customer experience hub and a stakeholder and operations hub. This effort kicked off in late 2023, so detailed program results are still forthcoming.

Successful ecosystems also regularly host meetups and conferences of various types, which might be organized as business pitch competitions, business speed dating events, hackathons, innovation challenges, investor fairs and the like. A regular, and well curated, cadence of activities builds connections and helps to publicize wins, general ecosystem activities and new opportunities.

Within Indiana, the RALLY Innovation Conference may have the capacity to assume this type of critical role in moving the innovation ecosystem "to the next level." Pitched as the world's largest global cross-sector innovation conference, RALLY seeks to engage innovators in five key industry segments: ag and food, health, hard technology, sports tech, and software.

Infrastructure

Infrastructure can be a pain-point for many ecosystems as specialized space, such as wet labs or production facilities, may be difficult to access. As a result, many states and regions have created programs to build or assist in the financing of specialized and other facilities. In other cases, flex space is developed and can be accessed by multiple users.

These public infrastructure investments can often be quite sizable. For example, Illinois Governor J.B. Pritzker's recently proposed Quantum Hub plan (valued at $500 million) includes $100m for a new cryogenic facility and $200 million for a "quantum campus" in Chicago.[34]

Other states support shared lab space or manage facilities that can be used on a temporary or short-term basis. For example, Connecticut's CURE Innovation Commons provides coworking and lab space for biotech firms, and the Connecticut Center for Advanced Technology offers similar services for a host of manufacturing-related sectors. CCAT's Advanced Technology Centers offer

34 "Illinois Government includes $500m support package for Quantum Technologies in Budget Proposal, *Data Center Dynamics*, February 23, 2024. Available at: https://www.datacenterdynamics.com/en/news/illinois-governor-includes-500m-support-package-for-quantum-technologies-in-budget-proposal/

technical assistance and access to state-of-the-art equipment for sectors such as composites, additive manufacturing, and precision machining. In the Boston area, Lab Central offers access to lab space and other services at multiple locations, including labs with direct corporate (Bayer) and university (Harvard) connections. In North Carolina, the City of Wilson and RioT, an internet of things accelerator, are now partnering to build a Smart Agriculture Test Bed with a smart greenhouse and other resources where innovators can test new agtech-related products[35] The Indiana Bioscience Research Institute (IBRI) offers similar support and services, related to diabetes, health data, and pharmaceuticals development, at its facilities in the 16 Tech Innovation District.

Delaware is pioneering a new approach with its Graduated Lab Space Grants targeted to tech companies building new or expanded wet lab space. Funded at $10 million per year, the program will support up to a third of the buildout costs for developing specialized lab spaces. Maryland's Build our Future grants operate in a similar fashion, and will support wet labs and other technology infrastructure such as cyber ranges, prototype manufacturing centers, and secure compartmentalized information facilities (SCIFs) needed for classified government work.

Talent

Talent is the true driver of successful innovation ecosystems, with many of our leading technology hubs capitalizing on physical proximity or other connections to major universities and research centers. These historical connections and assets matter a great deal, but tailored strategies to develop, attract, and retain talent are also part of the policy and program mix for most innovation ecosystems.

Talent development typically refers to programs and activities that train people to work in certain industries or for certain organizations, i.e. workforce development. Nearly all of the EDA-backed Tech Hubs and NSF-backed Innovation Engines include major investments in workforce development tied to specific industry clusters or talent needs. For example, Indiana's Heartland BioWorks plans to create a BioWorks Training Institute, affiliated with Ivy Tech, to train historically disadvantaged students for careers in biomanufacturing.

Beyond supporting innovative workforce development programs, many ecosystem leaders also support initiatives that provide direct training to entrepreneurs and" innovators. In fact, most business accelerators can be viewed in part as training programs where new entrepreneurs learn the skills needed to build successful business. In some cases, this training focused on helping them learn the processes of innovation. Within the US, the NSF's I-Corps may be the best-known example of this approach. Started in 2012, the I-Corps program has trained more than 5,800 researchers around the US, and these project teams have started nearly 1,400 new companies.[36] Purdue Innovates currently serves as the Indiana coordinator for these programs.

Many universities and research organizations use the I-Corps curriculum

35 Drew C. Wilson, "Grant Funds Smart Ag Research Test Bed In Wilson, *The Wilson (NC) Times*, February 11, 2024. Available at: https://restorationnewsmedia.com/articles/wilsontimes/grant-funds-smartag-research-test-bed-in-wilson/

36 For background on NSF I-Corps, see https://new.nsf.gov/funding/initiatives/i-corps/impact-data

or related materials to help innovators learn about the process of business development. A host of other programs are even more closely targeted to the technology commercialization process. For example, the Activate Fellowship Program provides funding to early-stage researchers, and a mix of supports including training, mentoring, and access to funders. Since starting in 2015, Activate has funded 188 fellows who have started 147 science-based companies.[37] The program, run by a 501(c)(3) nonprofit organization spun out of the Lawrence Berkeley National Laboratory, is open to scientist from around the world, but also supports focused communities in Berkeley, Boston, Houston, and New York. Activate also manages the NSF's Entrepreneurial Fellowship program. The program generates nearly $15-$18 million in annual revenues, with funding generated from outside grants and donations along with key corporate and community partnerships.

The European Union is embracing all of these approaches in its new Deep Tech Talent Initiative first announced in 2022. This hugely ambitious program has engaged more than 3,200 partners across Europe with the goal of training more than 1 million people in deep tech innovation by the end of 2025.

ECOSYSTEM GOVERNANCE: Sustaining the Networks

No one is "in charge" of innovation in any given ecosystem, but stakeholder organizations play a critical role in any ecosystem's success and sustainability. Three factors must be addressed: 1) stakeholder engagement, 2) strategy, and 3) system.[38]

Effective stakeholder engagement is a core challenge. Ecosystems engage multiple, such as major universities, large corporations, startups, investors, and public sector agencies. All of these organizations have their own internal processes and practices and may have a limited track record with the types of outward-facing collaboration found in regional innovation ecosystems.

Engaging stakeholders must be a constant focus with any ecosystem. Information-sharing within and across organizations is essential. Innovators and researchers must be aware of ecosystem-related resources and opportunities and be incentivized to take advantage of them. These incentives can take multiple forms and may resemble some of the programs, such as business accelerators or mentoring, noted above. Ecosystem partners may offer incentives of their own, such as changes to academic promotion policies to emphasize commercialization activity as well as research achievements. Effective incentive structures will also help engage partner organizations, recognizing that key partners, such as large corporations or government agencies, may have differing rationales for engaging in the ecosystem.

Finally, robust ecosystems operate as systems. They are more than an aggregation of their member organizations. They share resources and they pursue common goals and missions. As such, a key ecosystem role involves the identification of core missions,

37 For background on Activate Fellowships, see https://www.activate.org/our-impact

38 Guzman et al., pp. 19-25.

and effective performance measurement to assess how the ecosystem and its partners are performing.

Effective ecosystem governance entails a complex set of activities and practices, which will likely include the following areas of focus: identifying and managing ecosystem partners, outreach and communications, securing funding, and impact/performance assessment.

Effective recruitment and management of ecosystem partners begins with creation and compelling mission (i.e., what is our shared purpose?) and a shared set of values. Every ecosystem will manage and engage partners in unique ways, but it is essential that the "rules of the road" are clear, transparent, and understood by all partners. Developing these common rules and practices is often easier said than done and will likely touch on difficult questions such as financial contributions, the use of common metrics, and whether decision-making is centralized or decentralized. They may involve codes of conduct for how partners engage with one another and with "customers" within the ecosystem and how assets and funding are shared.

Ecosystems cannot persist without some level of operational funding, requiring stakeholders to collaborate on shared funding models and shared applications for outside funding. Many of the new innovation hubs have been jump-started with Federal funds, but their long-term sustainability will depend on finding other funding streams.

Keeping partners engaged and raising outside funds requires close assessment of ecosystem activities, outputs, and outcomes. Effective ecosystems closely track performance, and actively share these results with partners, funders, and other stakeholders. These findings can then be used to refine and improve programs, identify new missions, and to attract new partners and funders. Ecosystems may use multiple tools for this function, including dashboards, annual reports, and other means to share progress with internal and external stakeholders.

Ecosystem governance also depends on effective outreach and communications. The suite of outreach tools may vary by region, but typically includes an active event schedule along with regular communications via email newsletters, social media, podcasts, and other means.

Most successful innovation ecosystems embrace these principles of effective ecosystem governance. With basic systems and structures in place, ecosystems can evolve, embracing new missions and learning from past investments and programs. Over time, ecosystems often come to look quite different from their original models and conceptions.

The evolution of St. Louis' life sciences and agbiosciences-related strategies reflects these patterns and offers useful guidance for Indiana-focused efforts such as the 16 Tech Innovation District.[39] The origins of this effort can be dated back to 1998 with creation of the Donald Danforth Plant Science Center. Over time, the Center's operations expanded, leading to the creation of BioSTL and the Cortex Innovation Community, one of the US's first innovation districts.[39]

39 Cheryl Baehr, "A Look at the St. Louis Innovation Ecosystem," *St. Louis Magazine*, February 16, 2024. Available at: https://www.stlmag.com/business/a-guide-to-the-st-louis-innovation-ecosystem/

Work Plan Deep Dives: Recommendations for Indiana

As mentioned earlier, this work sprung from a hypothesis that dormant IP trapped within Indiana's large and innovative companies and its top-tier research universities could be leveraged to spur innovation and entrepreneurship if it could somehow be "unlocked." As we explored this hypothesis and reviewed best practices in support of technology commercialization, our confidence in the veracity of our hypothesis grew. Unfortunately, so too did the feeling that there is no single mechanism through which dormant IP can be unlocked. Given this, we have structed recommendations around a sequence of activities aimed at building innovation networks that, over time, allow for technology commercialization to flourish.

As described below, our sequence of recommendations begins with a series of industry challenges that seek to bring together industry and university innovators to "solve" market problems. Building on momentum generated through these industry challenges, we then recommend linking challenge work to existing or new accelerators that support entrepreneurs in launching their ventures. In doing so, gaps in the innovation and entrepreneurial ecosystem will be discovered, including those related to capital and infrastructure. We recommend exploring opportunities to address a few known gaps now, including proof-of-concept funding as well as connections to contract manufacturing and lab space. We also recommend exploring opportunities to further cultivate home grown talent, including investigating a new fellowship program to encourage academic researchers to launch business and the creation of a tech commercialization network. Lastly, we recommend steps to sustain the innovation networks that emerge from all of the above work in hopes of creating a flywheel that solidifies Indiana's place as leader in innovation.

Identifying and Promoting Industry Challenges

At the outset, our proposed recommendations focus on reaching out to industry and research partners in identifying and publicizing key innovation challenges. Such efforts can build on AgriNovus' HungerTech and Producer Led Innovation Challenges. To date, AgriNovus has executed seven such challenge programs to-date (four Producer-Led Challenges and three HungerTech Challenges) through which 97 teams have participated (ranging from individual student entrepreneurs to venture backed companies). Thus far, all four of the Producer-Led Challenge winners have either received follow-on funding or been acquired, while two of the three HungerTech Challenge winners have been accepted to an accelerator program or received NSF grant funding post-program. AgriNovus and its colleagues throughout CICP should build on this success by engaging the broader organization's industry and academic stakeholder network. As with the AgriNovus challenges thus far, CICP and its branded initiatives should seek to better understand and publicize common industry pain points and areas of potential

transformation in order to operate additional challenge programming.

The challenge model offers a number of benefits. It can engage a more diverse array of innovators and unite program partners around common issues. Ideally, a well-run challenge also builds new collaborations that engage entrepreneurs, corporate partners, researchers, and economic development advocates as well. Challenge programs identify potential business opportunities of interest to project sponsors and funders, highlighting key pain points that can be "solved" by other innovators. As network partners seek to address the identified challenge, their search for solutions is likely to engage new partners, generate new ideas, or lead to repurposing or refocusing of older ideas in the form of existing IP or previously developed technologies. Challenges also help to widen innovation networks by engaging non-traditional partners who may bring new ideas and new energy. Over time, they can also help further support an innovation culture focused on creativity, discovery, and enterprise.

As with AgriNovus' challenges, future challenges should place initial emphasis on developing challenge opportunities tied to specific needs or gaps identified by corporate partners or research institutions. They may tackle huge challenges such as addressing climate change but are more likely to be focused on industry pain points. They may also be relevant to a single company or serve as cross-cutting challenges that affect entire industry sectors.

Subsequent planning and management of the challenge can be tailored to the needs and interests of the challenge's sponsors and designers. However, close alignment with the needs of business partners will help ensure that challenge participants and winners use the effort to develop new companies, products, or technologies. Focus areas may also be aligned with areas of expertise or competitive advantage for Indiana. Ideally, all of CICP's branded initiatives could lead or sponsor annual or semi-annual challenge programs targeted to each of their industries or sub-markets within their sectors.

Multiple performances metrics can be used to assess the impacts of work at this early problem definition phase of the business development process. These early phase metrics should focus on how the challenges engage existing and new partners, and whether they attract funding, and "buzz." For CICP and its branded initiatives, measures of business and university engagement will likely matter most. How many businesses and universities are engaged in this work, and are they actively supporting the process with resources, staff, and management focus. In addition, challenge leaders must also assess the attractiveness and stickiness of the identified challenges. Are they generating interest from many innovators and businesses? Are these businesses based in Indiana or elsewhere?

Linking Challenges to Business Acceleration Opportunities

Grand challenges bring excitement and focused attention to pressing business or societal problems. For this project, they intend to do more. They should be directly tied to business creation and acceleration opportunities. Recent corporate examples

include Diageo's current focus on new digital products ("Fusion by Diageo"), Johnson and Johnson's QuickFire Challenge addressing atopic dermatitis, or Corteva Catalyst's interest in genome editing.

These challenges are designed to directly engage entrepreneurs and innovators who develop business designed to address the designated market gaps and opportunities. These accelerator programs operate much like traditional accelerators but differ slightly due to their focus on a specific industry vertical or industry-wide challenge. Innovators or existing businesses come together in teams, and receive training, coaching, mentoring and a host of other support services. In some cases, innovators and their teams may utilize existing IP or tap into IP and technologies made available by universities or other research entities.

Accelerator programs can have big impacts, with recent research suggesting that startups participating in an accelerator program were more likely to remain in business or be acquired when compared to non-accelerated startups. Moreover, they typically raised anywhere from 50percent and 170percent more outside capital.[40]

As the initial innovation networks evolve, Indiana should consider creating a series of "Breakthrough Innovation Centers" tied to target sectors or grand challenges. In some cases, these efforts can build on existing or nascent initiatives, like IBRI, Heartland BioWorks and the One Health Innovation District. In emerging sectors, new centers or partnerships could be created. These centers would formalize the initial networks and provide a platform to implement many of the work plan ideas presented here. Ideally, they should be closely tied to challenges identified in partnership with corporate partners and include close collaboration with universities and other research partners.

Accelerator programming and focus areas will depend on specific industry targets, locations, program partners, and sponsors. Programming should reflect the unique circumstances of building hard tech companies, where R&D issues are more complex and where time to market may be slower. It should also place great emphasis on engagement with corporate partners, researchers, and other unique ecosystem assets. If academic researchers are a primary target, accelerator programming will need to focus on both the motivators and inhibitors that affect faculty as they seek to move ideas and IP from lab to market.

Creating these engagement and partnership opportunities will be a core mission for the Breakthrough Innovation Centers. This task can be further supported by new programs that engage a wide set of mentors and coaches to support innovators and teams participating in acceleration programs. Program coaches and mentors, as well as entrepreneurs-in-residence, will offer support, but additional expertise will be needed. To engage a larger and more diverse set of partners, Indiana's economic development leaders should create an affiliated network akin to the North Carolina Biotech Center's BATON Network or MassVX, the mentoring network linked to MassVentures. BATON and similar tools operate primarily as an on-line

40 Susan Cohen, Benjamin Hallen, and Christopher Bingham, "What Sets Successful Startup Accelerators Apart," *Harvard Business Review*, March 12, 2024.

clearinghouse of experts and resources. In contract, MassVX operates as a curated mentoring program where academic entrepreneurs are teamed with experienced business experts based on sector expertise or experience relevant to the entrepreneurs (e.g. accessing angel funding, entering overseas markets, etc.). For both models, active management and curation will be needed from an intermediary organization to ensure that the business matchmaking efforts succeed.

The impact of business acceleration can be tracked by the traditional suite of metric used for these programs. Typical measures include the number of companies supported, exits, revenue and job growth, and capital raised. If desired, performance can even be benchmarked vis-à-vis other accelerators or other universities via tools like SeedDB and the annual AUTM surveys.

Addressing Development Gaps

Businesses in the acceleration cohorts will receive extensive coaching and support to move their technologies and ideas from lab to market. Yet even the most successful ventures will face challenges along the way. Capital will prove to be the biggest issue, with many of the firms operating in the "valley of death" phase, where they are refining initial innovations but are not yet generating significant business revenue.

Indiana has a host of private and publicly backed finance tools for small businesses, but interviewees have suggested that it does lack a robust source of funding targeted to the proof-of-concept phase. In fact, a recent University of Michigan study found that 59 percent of TTO managers identified seed or proof of concept funding as the primary capital gap.[41] It may thus make sense to create new pools of funds to support innovators and companies in the proof-of-concept phase. Proof of concept funds now used across the US, with backing from universities, businesses, and government agencies, typically provide small grants (in the $25,000 to $50,000 range) to help innovators refine ideas, develop prototypes, begin product testing, and so on. They can be an essential lifeline for academic researchers or innovators using SBIR Phase 1 grants or other outside research funding.

Many states manage publicly funded proof of concept funds. Michigan manages one of the more extensive funding networks, which is anchored by the Michigan Translational Research and Commercialization Program.[42] First stated in 2012, it supports a statewide network of five university-housed innovation hubs, each of which targets specific technologies and industries such as agbiosciences, advanced transportation, and advanced materials. Innovators can receive up to $100,000 in state matching funds. These innovation hubs are based at individual universities, but each hub serves as an "aggregator" of business opportunities in a target sector. In addition to providing funding, the hubs also manage innovation challenges and publicize the availability of IP and technologies from Michigan-based universities, hospitals, and other research centers. Beginning in 2024, Michigan is now also funding a $5 million Michigan University Innovation Capital Fund and Consortium,

41 University of Michigan Economic Growth Institute, (2019), p.17.

42 Similar, albeit smaller, state proof of concept funds operates in Iowa, Kansas, Ohio, Oregon, and Virginia, among other states.

which engages Michigan's five largest research universities, to support investments in university-based startups.

Several proof-of-concept funds operate in Indiana. Startup South Bend manages a small program that provides up to $2,000 for area startups. Purdue's Trask Innovation Fund provides up to $50,000 to support Purdue-based research teams. ARI manages the state's SBIR/STTR matching program which is also used by many innovators in early business development phases. While not always defined as proof-of-concept funding, innovation voucher programs also support early-stage innovators. These voucher programs are growing in popularity, with Indiana also operating an ARI-led program provided up $50,000 per award.

CICP and/or one of its economic development partners should investigate the feasibility of creating a new proof-of-concept fund, or retargeting existing funds, to back innovators participating in business acceleration programs or other support initiatives. Funds should be linked to industry verticals or major program sponsors and designers, such as major corporate partners, universities, or reginal partners.

Access to capital is a primary challenge for growing ventures, but it is not the only one. As noted earlier, hard tech or deep tech companies also face unique and acute challenges in terms of accessing outside services, especially related to product launch and production, and in accessing lab space and other technical equipment and infrastructure.

Expanded innovation voucher programs could help innovators with these tasks, but more tailored solutions should also be considered. A number of new efforts could help connect innovators to contract development and manufacturing organizations (CDMOs) and contract manufacturing organizations who can more efficiently develop, test, and manufacture new products. Indiana's new Heartland BioWorks "BioLaunch Network" will provide this type of support, connecting startups to CDMOs or, where appropriate, to Purdue's new William D. Young Institute for Advanced Manufacturing of Pharmaceuticals (AMP). Similarly, on-line tools such as the CONNEX Marketplace can also help link to these resources, and also help to build supply chain connections for new firms and OEMs.

New infrastructure-related efforts should also be considered. BioCrossroads' statewide life sciences plan recommended a searchable inventory of laboratory space, available equipment, and related facilities across Indiana. This inventory can be used to assist startups in accessing needed space, and in identifying gaps in the marketplace. If significant gaps are identified, CICP should assess the feasibility of supporting new incentive programs focused on building new lab space and research facilities. Incentives could be part of new initiatives or could be developed via existing tools such as the READI program.

Tracking the impact of these investments will require a diverse mix of measures related to key business milestones, such as capital raised, sales and job growth, and the achievement of key technology milestones, such as patents or new products. In addition, industry surveys can be used to assess whether key pain points, such as limited access to lab space, are being effectively addressed.

Developing a Base of Home-Grown Deep Tech Talent

The successful rollout of these new strategies will depend on developing a deep home-grown base of innovators with the skills and desire to turn research ideas into new technologies and new companies. Indiana could benefit greatly from new investments that support the development of hard tech or deep tech talent. These focused investments should occur beside ongoing workforce development initiatives in Indiana, including those led by Ascend Indiana and other CICP partners.

Two types of talent-focused programs should be considered. As a first step, an early career support program that provides funding and coaching to academic researchers developing business startups should be considered. Related financial support should reinforce ongoing university initiatives, such as appropriate leave and tenure policies, that promote a culture that supports lab to market commercialization. These fellowship programs typically invest larger sums to support innovators. For example, the NSF Entrepreneur Corps provides funding of up to $350,000 per researcher, and the Mass Venture START Program, focused on SBIR grantees, provides grants in the range of $100,000 to $500,000. These larger sums provide an enhanced incentive for researchers who can focus intensively on the business startup process thanks to this outside backing. For this effort, performance measures will relate to the number of participants and their ability to successfully commercialize their research. The specific design of the fellowship effort will depend on program partners and funders. Ideally, programs should be associated with each of the state's key advanced industry sectors and strengthened through connections to major universities and/or innovation districts.

In addition to the fellowship programs, CICP or another economic development intermediary should support the creation of statewide technology commercialization network led by university technology transfer professionals that also engages other relevant partners, including corporate research executives. This network should operate like a community of practice, offering opportunities for peer learning, professional development, and other connections. By coming together, the network can also identify common challenges and serve as a convener of ecosystem partners. Examples of such networks include Michigan's Tech Transfer Talent Network and the Massachusetts Association of Tech Transfer Offices.

This proposed "Indiana Tech Commercialization Network" will provide the types of benefits typically found in trade associations or communities of practices, but if done right, it can do much more. Amplifying Indiana's technology commercialization capacity may be the primary impact. University TTOs can have the ability to tap into mentors, coaches, and industry experts from across the network as opposed to solely within their own institutions. At the same time, the network can provide needed services such as market assessments or licensing support, for smaller institutions that do not manage their own in-house TTOs.

Building a Statewide Network

Effective ecosystems depend on effective governance, ensuring that a diverse set of partners are engaged and that investments can be sustained over

time.[43] Thanks to its strong staff capacity, networks, and standing, CICP and its branded initiatives could be well suited to support this role in partnership with other leading ecosystem players.

Our proposed innovation networks are designed to jump start new discussions about Indiana's innovation ecosystems, but they have the potential to do more. If successful, they can serve as a platform for a host of new policy directions. The networks can also support a number of other functions. First, support will be needed to help manage and promote various statewide tools and resources, such as the inventory of lab space, and various mentor and referral networks. These tools will be customized for each industry focus area, with unique resources related to target industries and industry challenges.

Second, suggested networks, such the TTO network or the statewide mentor network, will also require active management and curation. Regional partners will also need to be engaged. These wider statewide networks will require some level of outside funding and network management, which may be provided by CICP or by other ecosystem partners around the state.

Finally, CICP should support a regular cadence of network and learning events that engage partners and stakeholders outside of the core industry networks. These events would include regular meetups, expert panels, and discussions focused on grand challenges or new industry missions. In addition, major high-profile events, like the RALLY Innovation Conference and the 2025 Global Entrepreneurship Congress, should be closely connected with these initiatives.

43 For a useful review, see Global Institute for Innovation Districts, "Why Governance Matters," GIID, 2023.

Concluding Thoughts

Data on innovation trends and interviews with leading experts yield an important and promising consensus. When it comes to innovation and entrepreneurship, Indiana seems to be on the verge of something big! For the first time in many years, key players and partners report that they all seem to be "rowing in the same direction."

These new directions build on existing assets. Indiana has always been home to world class innovators. It hosts some of America's leading firms in sectors such as manufacturing, pharma, and agbiosciences. It is home to some of the world's most respected universities, and it has always been recognized as a good place to do business.

These legacies persist today but are being amplified thanks to major new investments—from IEDC, major corporations, and private investors---in transforming Indiana's ecosystems for innovation and entrepreneurship. The early results are promising, as Indiana-based projects have successfully competed for and won major national grant competitions such as the EDA Tech Hub.

The recommendations presented in this report seek to build on these important foundations, and, most importantly, institutionalize the types of partnerships that produced successful efforts such as Heartland BioWorks. By building innovation-focused networks that persist over time and seek to address the most pressing industry challenges, these new programs and investments can further cement Indiana's growing role as a national and international hub for innovation.

These recommendations are designed to promote a host of benefits, including:

- Unlocking existing intellectual property and technology that can help solve industry or societal challenges.
- Creating regular opportunities for partnerships between university, corporate and startup-based innovators.
- Developing new organizations, such as an Indiana Tech Commercialization Network, to institutionalize these partnerships and engage new partners.
- Addressing gaps in Indiana's rapidly evolving innovation ecosystems, especially as they relate to supporting faculty researchers and providing larger capital infusions for hard/deep tech venture development.
- Supporting the growth of innovation districts such as 16 Tech and similar physical hubs across Indiana.
- Creating new innovations, jobs, and wealth that help all Indiana residents.

These recommendations require the embrace of an ecosystem-focused approach. No single organization can lead all efforts, and no single program or policy intervention will succeed in isolation. Instead, key ecosystem partners must continue to grow together toward the common goal of a more innovative and entrepreneurial Indiana.

Appendix: Interviewees and Focus Group Participants

- **Nida Ansari** (16 Tech Community Corporation)
- **Srikanth Balasubramaniam** (Cummins)
- **Adam Berry** (Indiana Chamber)
- **David Broecker** (Purdue University)
- **Juliana Casavan** (MatchBOX Studio)
- **Jose Correia de Simas** (Elanco)
- **V. Jo Davisson** (Purdue University/Amplified Sciences)
- **Christorpher "Toph" Day** (Elevate Ventures)
- **Stephen Farris** (General Motors)
- **Mitch Frazier** (AgriNovus Indiana)
- **Stephanie Frijia** (Northeast Indiana Regional Partnership)
- **Ting Gootee** (TechPoint)
- **Nick Hammond** (Indiana University)
- **Julie Heath** (Indiana University)
- **Ryan Henderson** (Conexus Indiana)
- **Taylor Hughes** (Indy Chamber)
- **Natasha Jensen-Matta** (IEDC)
- **Abhi Karve** (Purdue University)
- **Mark Kelley** (Indiana University / Apexian Pharmaceuticals)
- **Melina Kennedy** (CICP)
- **Pete Kollbaum** (Indiana University)
- **Andrew Kossack** (ARI)
- **Mitch Landess** (Conexus Indiana)
- **Lou Lenzi** (Indiana University)
- **Hui-Chen Lu** (Indiana University)
- **Marty Mechtenberg** (South Bend-Elkhart Regional Partnership)
- **Sharon Moe** (Indiana University)
- **Brendan Noll** (Plug and Play)
- **Brooke Pyne** (ARI)
- **Justin Renfrow** (Purdue University)
- **Kelley Rich** (University of Notre Dame)
- **Lakshmi Sastry-Dent** (Indiana University)
- **Darshan Shah** (CICP)
- **Nick Swisher** (Indiana University)
- **Jacob Schpok** (Elevate Ventures)
- **Julia van Kessel** (Indiana University)
- **David Watkins** (IEDC)
- **Jim Wispinski** (Corteva)
- **Vince Wong** (BioCrossroads)

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