

Nebraska State Legislature

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COMMITTEES

Education
Judiciary
Committee on Committees
Education Commission of the States

May 23, 2017

Speaker Jim Scheer
The Nebraska Legislature
Nebraska State Capitol
PO Box 94604
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Re: Biosciences Steering Committee Report

Background: The Biosciences Steering Committee was created with the enactment of LB 1093 (2016) and was charged with updating the BioScience Strategic Plan adopted in 2010.

Five Senators were appointed to the Committee:

Senator Adam Morfeld, District 46 -Chair
Senator John Kuehn, District 38, Vice Chair
Senator Heath Mello, District 5
Senator Jerry Johnson, District 23
Senator Paul Schumacher, District 22

The Committee contracted with BioNebraska who in turn subcontracted with SRI International who at the time was in the field doing similar work for the Department of Economic Development to write the updated report. The report is attached. Below is a summary of the steps the committee took,

The Committee met three times and heard invited testimony from representatives of Biotech industry doing business in Nebraska to get their input on changes needed on what needs to be done at a state level to grow their industry.

The following people and who they represent testified August 22-23, 2016

August 22, 2016
Rob Owen – Streck, Inc.
Kyle Nixon – Novozymes

Kenny Soejoto – American Labs

August 23, 2016

Dr. Tyler Martin – Great Plains Biotechnology

Steve Bray – Natureworks

Josh Johnson – Benchmark Bio Labs

Chris Riley – Archer Daniels Midland

Paul Woolard – Archer Daniels Midland

Brad Roth – NUTech Ventures

Michael Dixon – UneMed Corp

Courtney Dentlinger – Department of Economic Development

Phil Kozera – BioNebraska

The Committee heard testimony on a number of challenges the BioTech industry faces in growing their businesses in Nebraska. The number one issue identified was the lack of trained workers with experience/knowledge of working in a regulatory environment. Another concern heard was that the capital outlay for these businesses is quite high, the jobs pay very well, however, the number of jobs created do not meet a threshold allowing these businesses to qualify for tax credits through the Nebraska Advantage Act. Other concerns included lack of investment capital, lack of available wet lab space, lack of awareness that these jobs exist. Also noted is the median salary for a job in the biotech field is around \$68,000 per year, which is above the average salary in Nebraska by approximately \$20,000.

The Committee instructed BioNebraska to focus on the following issues when preparing the updated strategic plan.

1. Create Job Training opportunities for working in a regulatory environment;
2. Create a new tier for NE Advantage Act for BioTech Industry;
3. Establish a state Nebraska Biotechnology Venture Fund;
4. Create more opportunities for STEM training in K-12

The Committee met on December 8, 2016 to receive the final report from BioNebraska on the updated strategic plan. The Committee had a spirited discussion on next steps that need to be taken to address the concerns raised in the updated strategic plan. It was decided by consensus that a list of four recommendations would be included in the final report. The lone dissent came from Senator Paul Schumacher.

Recommendations:

1. Create job training opportunities for working in a regulatory environment;
2. Create a new tier in the Nebraska Advantage Act that favors the Biotech industry
3. Create more opportunities for STEM training in grades K-12 thus raising awareness that they well paying, highly technical jobs do exist in Nebraska.

4. Study the use of interest from state investment cash funds to create a Venture Capital Fund targeting the Biotech Industry.

Recommendations one, three and four are currently in progress or have been accomplished. The Legislature passed Senator Morfeld's LB 641 created the Bioscience Innovation Program which established a \$2 million fund for bio-tech startups. In regard to recommendations one and three, Senators Kuehn and Morfeld introduced LR 212, an interim study to Interim study to identify K-12 and postsecondary education resources to meet industry needs in preparing students for employment in careers requiring knowledge and skills in science, technology, engineering, and math with an emphasis on jobs in the biosciences sector.

Conclusion: The Biotechnology industry in Nebraska continues to grow at an exponential rate, creating highly compensated jobs that require technical expertise in working in a regulated environment. The industry is finding it difficult to find qualified workers for those jobs locally. In addition, the biosciences industry is also finding it challenging to attract critical capital investment in their businesses.

The State of Nebraska must invest in these businesses, create opportunities for more job training for both workers starting out and for retraining displaced workers; encouraging STEM education in K-12 schools; and keeping Nebraska's best and brightest here and working in our state. As noted above, during the 2017 legislative session several substantive steps have already been taken to address these concerns and demonstrate the continued commitment of the State of Nebraska to this critical industry.

I would like to thank all of the members of the committee, industry, and community for their assistance and efforts to advance this important sector.



Senator Adam Morfeld
District 46

Advancing Nebraska's Biotechnology Economy

Final Recommendations Report

Prepared for Bio Nebraska Life Sciences Association

November 30, 2016

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Executive Summary

Nebraska is home to an emerging biotechnology sector that yields important innovations in healthcare, energy, agriculture, and other fields. This industry is also a source for high-wage, high-skills jobs throughout the state. Although biotechnology presently represents a small share of Nebraska’s overall economy—accounting for approximately 2% of employment—it has the potential to be a major component of a new economy for the state that is characterized by high levels of innovation and high-paying, meaningful careers in dynamic sectors.

SRI conducted this study to assess Nebraska’s biotechnology sector, and produce recommendations for state-level actions to expand this strategically important industry. SRI’s research uncovered a number of strengths of this sector, including a rising concentration of high-wage employment, strong university R&D performance and life science graduates, and collaborative opportunities with the existing agricultural sector, operating in a generally business-friendly, low-cost climate. SRI also identified several major challenges for the sector, which are described below, along with associated recommendations for realigning existing state policies and targeted actions to support the biotechnology economy.

Element	Challenge & Recommendations
Talent	<p>Insufficient supply of talent, including trained workers for the specialized biotechnology work environment</p> <ul style="list-style-type: none"> ➤ Create a state organization to provide customized bioscience workforce training to companies locating to and expanding within the state
Risk Capital	<p>Scarcity of risk capital and early-stage financing, from both public and private sources</p> <ul style="list-style-type: none"> ➤ Expand the Angel Investment Tax Credit, and prioritize businesses in strategic industries ➤ Increase appropriation for Business Innovation Act (BIA) financing programs ➤ Establish a Nebraska Biotechnology Venture Fund
Business Environment	<p>Poor alignment of state tax incentives with the needs of high-tech, high-skill businesses, and lack of affordable laboratory space for biotech startups.</p> <ul style="list-style-type: none"> ➤ Revise Nebraska Advantage Act tax credits to reward high-wage job creation and investment ➤ Tailor facilities and services offerings at the Nebraska Innovation Campus based on industry needs, including those of startups
Networks	<p>Low awareness of the scale and importance of Nebraska’s biotechnology sector, and its associated employment and investment opportunities</p> <ul style="list-style-type: none"> ➤ Develop a brand for Nebraska’s biotechnology sector, supported by a dedicated organization focused on marketing and networking

Introduction

Nebraska has experienced strong, continuous economic growth over the last decade, even through the Great Recession. In many respects, the state is in a favorable position, with exceptionally low unemployment and high labor force participation. On the whole, Nebraska boasts a high quality of life, well-educated and skilled workforce, and relatively low cost of living.

However, Nebraska is at a turning point. The state's future economy should focus on growth based on innovation and high-skilled sectors and occupations, rather than job growth of any kind. Cost of living in Nebraska is lower than in other areas of the country but it is rising, and the comparatively low wages of the state's workers have not kept pace.

The Significance of the Biotechnology Sector to Nebraska

There is good cause for the biotechnology sector to merit significant attention from Nebraska's state policymakers. Although only a small portion of Nebraskans are directly employed by the biotechnology industry, the sector brings significant value beyond mere number of jobs. In light of Nebraska's remarkably low unemployment, the state should focus on developing high-value industries, rather than aiming for job growth in general. Furthermore, though Nebraska remains a business-friendly environment, rising costs of living make it less plausible (or desirable) that it can successfully compete in the twenty-first century on a low-cost strategy.

Nebraska's emerging biotechnology sector could be an important driving force behind a new innovation-based economy that provides the state's workers with high-wage, high-skill jobs in high-demand sectors. Average wages in this sector are much higher than the statewide average (by >50%), and have increased at a faster rate in recent years. Nationally, biotechnology company revenues are estimated to have grown by more than 10% per year over the last decade, indicating a sustained demand for the industry's innovations.¹ The biotechnology sector builds organically on Nebraska's historical economic strengths in agriculture, agribusiness and food production, and thus is a natural target for economic development, more so than other high-tech industries which may lack a statewide footing in the region. Nebraska's biotechnology sector includes a wide variety of companies developing new, cutting-edge products and technology for applications in healthcare, energy, food and agriculture. Importantly, these companies are already widely distributed throughout Nebraska and benefit both urban and rural communities in the state.

As a final note, advances in biotechnology are certain to play a critical role in addressing global challenges—alleviating and eliminating disease, feeding a growing population, reducing our environmental footprint—and growth in this sector is likely to generate positive social impact while supporting meaningful careers.

¹ Robert Carlson, "Estimating the Biotech Sector's Contribution to the US Economy," *Nature Biotechnology* 34 ,no.3 (2016): 247-255, <http://www.nature.com/nbt/journal/v34/n3/full/nbt.3491.html>.

Project Background

The Bio Nebraska Life Sciences Association partnered with SRI International to assess the state's biotechnology sector, and produce recommendations for state-level actions to expand this strategically important industry. The contents of this report, and the recommendations within, are based on the following sources of information:

- Analysis of a variety of state science and technology, innovation, and economic indicators, including data on education, workforce, employment, state budgets, business dynamics, venture capital, and R&D.
- Interviews with approximately twenty biotechnology industry stakeholders to gather qualitative, on-the-ground insights on the factors contributing to and restricting the biotechnology industry's health and expansion in the state.
- Case studies of best practices of state and regional programs for supporting specialized industry clusters.

Structure of the Report

First, the report begins with SRI's innovation ecosystem analysis of Nebraska's biotechnology sector. SRI employed its innovation ecosystem framework, which assesses regions with respect to six functional elements: Talent, Risk Capital, Access to Markets, Business Environment, Ideas, and Networks. The assessment combines the analysis of quantitative metrics with the qualitative insights gathered from the stakeholder interviews. Second, SRI reviews its findings, and describes a select number of challenges facing the industry identified in the course of our research that are likely to be major obstacles to its future expansion. Third, SRI provides recommendations to address these challenges, in two parts: general recommendations to align state policy to support high-tech, high-growth industries, and targeted recommendations specific to catalyzing the development of the biotechnology industry. These specific recommendations are based in part on state- and regional-level best practices for developing specialized industry clusters. Finally, the report provides brief case studies that describe these programs in greater detail.

Biotechnology Innovation Ecosystem Analysis

Summary

SRI employed its innovation ecosystem framework in its analysis of Nebraska’s biotechnology industry. The framework assesses regions and industry sectors with respect to six functional elements: Talent, Risk Capital, Access to Markets, Business Environment, Ideas, and Networks. A summary of SRI’s findings is shown below.

Nebraska’s Biotechnology Sector: Innovation Ecosystem Assessment		
Functional Element	Findings	Capacity
Talent	<ul style="list-style-type: none"> • High-quality university students; low workforce turnover • Limited supply of life sciences graduates finishing school and staying in-state • Technical skills gap in working in a regulated biotech work environment • Relative lack of entrepreneurial culture 	
Risk Capital	<ul style="list-style-type: none"> • Low venture capital supply overall, and lack of biotech-specific expertise among investors • Limited early-stage financing through state innovation programs 	
Access to Markets	<ul style="list-style-type: none"> • Synergies with existing agricultural base, and medical system with regard to supply chain, partnerships, customers • Favorable location and infrastructure for logistics and distribution 	
Business Environment	<ul style="list-style-type: none"> • Overall low cost and strong business-friendly environment • High state investment in infrastructure • Low business establishment rates • Current incentives favor large, established companies and don’t align well with the biotech industry, especially startups 	
Ideas	<ul style="list-style-type: none"> • Strong academic specialization in bioscience R&D • Low but increasing rate of patenting overall and in biosciences 	
Networks	<ul style="list-style-type: none"> • Collaborative spirit and tight-knit connections among industry stakeholders • Limited formal partnerships between university and industry 	

SRI based this assessment on its interviews with industry stakeholders and analysis of a variety of economic, business, education, and science and technology-related indicators. The report discusses each aspect of Nebraska’s biotechnology innovation ecosystem in detail beginning on the following page.

I. Talent

Our assessment of talent considers the mix of business, entrepreneurship, and technical skills, experience, and attitudes available within a region. A robust population of qualified individuals with science, engineering and technology education and experience is critical to growing Nebraska's bioscience industry, as is a breadth of business and entrepreneurial acumen throughout the state.

Education and New Graduates

Student performance in primary and secondary education can provide indications of the quality of a region's future workforce. Data at the K-12 education level provide a mixed picture of the performance of Nebraska middle and high school students relative to their peers in biotech-related content areas and scientific reasoning. Nebraska eighth grade students scored significantly above the national average on the 2015 National Assessment of Educational Progress (NAEP) in science overall and in life sciences specifically, where they ranked eighth.² The number of high school graduates taking and succeeding on Advanced Placement (AP) examinations in Nebraska has steadily increased over the last decade, but the state lags behind the national average in AP exam participation and performance. Of students taking the AP Biology exam in 2014, 50% of Nebraska students scored 3 or higher, compared to 55% of students nationally.³

Generally speaking, Nebraska residents have a favorable assessment of the state's K-12 education system. Nebraska has achieved one of the highest high school graduation rates in the nation, reaching 89.7% for the 2013-2014 academic year, second only to Iowa.⁴

In recent years, Nebraska has mirrored the national average in regards to graduating students in science and engineering fields. From 2005-2012 Nebraska ranked higher than the national average in number of science, engineering, and technology bachelor's degrees conferred per 1,000 individuals aged 18-24, and in 2013 Nebraska's rate of 19.8 such degrees fell just below the national average of 19.9.⁵ Nebraska has also ranked higher than the national average in the number of science, engineering and health

² Accounting for statistical uncertainties, only three states—Utah, New Hampshire, Vermont—scored significantly higher. National Center for Education Statistics, *National Assessment of Educational Progress*, 2015. Data retrieved from NAEP Data Explorer, <http://nces.ed.gov/nationsreportcard/>.

³ The College Board, *10th Annual AP Report to the Nation*, 2014, <https://research.collegeboard.org/programs/ap/data/nation/2014>. See *Nebraska Supplement and Subject Supplement: Biology*.

⁴ U.S. Department of Education, *Common Core of Data (CCD) Data Tables*. 2015. https://nces.ed.gov/ccd/tables/ACGR_RE_and_characteristics_2013-14.asp. Graduation rates cited are 4-year adjusted cohort graduation rates (ACGR).

⁵ National Science Board, *Science and Engineering Indicators 2016*. 2016. <https://www.nsf.gov/statistics/2016/nsb20161/#/>. State Indicators: 8-18.

graduate students per 1,000 individuals aged 25-34 since 2000, with their 2013 rate of 16 graduate students per 1,000 individuals ranking well above the national average of 14.3.⁶

University graduation rates in Nebraska reflect an increased specialization among the state's higher education system in the life sciences. Life sciences graduates from Nebraska universities, primarily at the University of Nebraska Medical Center (UNMC) and the University of Nebraska -- Lincoln (UNL), have increased by 68% over the last decade, from approximately 2,600 in 2004 to 4,400 in 2014. In absolute terms, this amount still represents a small portion of the total graduates in these fields nationally, a consequence of Nebraska's small size. However, life sciences degrees in Nebraska have risen faster than the state total across all disciplines, a 27% increase over the same period. At the doctorate and professional levels in particular, life sciences degrees have also risen, increasing by 36%, from 677 in 2004 to 923 in 2014. In addition, Nebraskan students are more likely than those in most other states to concentrate in the life sciences; in 2014, just over 21% of university graduates majored in life sciences, above the national average of 16%, ranking the state eleventh.⁷

Stakeholders interviewed by SRI held conflicting viewpoints on the level of talent generated in Nebraska. Several individuals noted that the strength of certain university programs, such as chemistry and veterinary science, generally produced high quality graduates that met the needs of the industry, and that they largely considered the talent pool to be a strength of the state.

However, others noted that while the universities produced good quality candidates for employment, they did not train enough students to fill the hiring demands of bioscience companies in the state. Some individuals observed a disconnect between the university system and industry. They believed that the universities did not adequately raise students' awareness of the opportunities in the bioscience field in Nebraska or connect students to companies that were looking to hire, which resulted in many graduates leaving the state for jobs.

One particular skills gap identified in interviews was a shortage of students with the technical training necessary to operate in a highly regulated industry. Several stakeholders said that many of their new hires do not have sufficient knowledge of applicable regulatory codes and reporting requirements, and require additional training after being hired. One stakeholder noted that it is particularly difficult to find qualified candidates for technical support roles, such as bioprocessing technicians or bioengineering support positions, which generally require only an associate's degree but necessitate extensive regulatory training.

⁶ National Science Board, *Science and Engineering Indicators 2016*. State Indicators: 8-20.

⁷ National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey. Accessed via National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://webcaspar.nsf.gov>.

Current Employment

Nebraska's growing biotech workforce is an exception to the state's generally low concentration in science and engineering jobs. In 2014, only 3.8% of Nebraska workers were employed in science and engineering occupations, below the national average of 4.7%. In contrast, employment in life science occupations is higher than the national average.⁸

A variety of measures demonstrate that biotechnology and the life sciences are an increasing area of specialization for Nebraska. For example, a recent national biotechnology assessment calculated a location quotient of 1.42 for this sector in Nebraska, indicating a strong concentration of bioscience jobs across the state's economy. The report found positive trends in establishments (10.0% increase from 2012 – 2014), employment (2.8%), and average wages (5.7%) for the sector.⁹ Nebraska has a particularly strong concentration within the agricultural feedstock and chemicals industry subsector, which has a location quotient of 5.24 and has seen an increase of 10.2% in average annual wage over the last several years. Given the strength of this subsector, Nebraska could consider ways to accelerate growth in complementary industry sectors that could leverage existing infrastructure and by-products. One such example is the recently established Renewable Chemicals Production Tax Credit program in Iowa.¹⁰ The incentive program aims to encourage businesses to exploit the state's existing supply of biomass by further refining it into high-value chemical compounds that have a variety of commercial uses. A similar tax program in Nebraska could encourage more businesses within the feedstock and chemical manufacturing base to grow its industrial biotechnology position beyond fuels and by refining or processing of existing by-products into higher-value resources.

Several individuals noted that the low unemployment rate in Nebraska means a tight labor market, which makes hiring new workers difficult. Additionally, SRI heard from multiple stakeholders that it can be difficult to find candidates from out of state who are willing to relocate to Nebraska, which adds to the challenge of finding a sufficient supply of labor. Several stated that candidates with technical or coding background often are recruited by companies in Silicon Valley or Boston, and it is hard for Nebraska to compete with the allure of those locales. One stakeholder remarked that greater flexibility with teleworking could help businesses take advantage of quality job candidates located outside the state. However, many stakeholders agreed that the native Nebraskans they have hired tend to be hard-working and honest, and generally make good long-term employees.

⁸ National Science Board, *Science and Engineering Indicators 2016*. State Indicators 8-31; 8-33.

⁹ TEconomy Partners and Biotechnology Innovation Organization, *The Value of Bioscience Innovation in Growing Jobs and Improving Quality of Life 2016: Nebraska*. 2016.
https://www.bio.org/sites/default/files/SP_Nebraska_0.pdf.

¹⁰ See Iowa Department of Economic Development, "Renewable Chemicals Production Tax Credit Program," <http://www.iowaeconomicdevelopment.com/Finance/RenewableChem>.

Entrepreneurship

The entrepreneurial environment in Nebraska exhibits some strong points but leaves room for improvement. The state ranks 7th out of the 25 smaller states on the Kauffman Foundation's Entrepreneurial Index in regards to its measure of "Main Street Entrepreneurship", which reflects the density of adult business owners and small businesses in the state. However, Nebraska ranks 17th of the smaller states on the Growth Entrepreneurship Rankings and 13th on the Index of Startup activity, indicating that while the state is ahead of its peers in terms of established small businesses, it is somewhat lagging in encouraging growth and the emergence of new startup firms.¹¹

Several stakeholders also noted a lack of entrepreneurial culture in the state. One stakeholder identified a lack of an entrepreneurial mindset and willingness to take risks and pursue innovative ideas within the state as a significant reason for the underwhelming entrepreneurial scene. Another stakeholder attributed it to a lack of individuals with training in industrial science, meaning individuals who are trained in science with a business purpose and who can commercialize products and take new drugs to market, a critical endeavor for biotech startups. Some stakeholders pointed to the new Innovation Campus at UNL as evidence that Nebraska is taking appropriate steps to foster more entrepreneurship. However, the resources offered and costs of using them present some challenges to start-ups (see later section on Networks).

II. Risk Capital

Access to capital within a region is critical for the development and growth of new companies. In particular, access to investors with sector-specific expertise is an important measure to consider. Financing is especially important for early-stage companies in high-tech fields such as biotechnology to conduct the development and testing necessary to bring their innovations to market. SRI's analysis suggests that the supply of risk capital available to biotech companies in Nebraska continues to be a limiting factor on the industry's growth.

Total venture capital investment in Nebraska has grown in recent years, though there is significant year-to-year volatility in the data. Examining short-term averages, the 3-year average annual investment rose from \$4.9 million for 2010-2012 to \$57.5 million for 2013-2015, nearly a 12-fold increase.¹² Adjusting for population, investment increased from \$2.7 per capita for 2010-2012 to \$30.4 for 2013-2015, with the state's ranking rising from 45 to 23. This expansion provides some indication that the investment climate

¹¹ Ewing G. Kauffman Foundation, *The Kauffman Index: State Profiles*, <http://www.kauffman.org/microsites/kauffman-index/profiles/state?State=Nebraska>.

¹² State Science & Technology Institute, "Useful Stats: Share of U.S. Venture Capital Activity and Per Capita Investment by State, 2010-2015." 2016. <http://ssti.org/blog/useful-stats-share-us-venture-capital-activity-and-capita-investment-state-2010-2015>.

in Nebraska is improving, but due to the outsized impact of a single deal in 2015—sports software company Hudl raising \$72.5 million¹³—it is not conclusive evidence of sustainable growth.

Unfortunately for Nebraska’s early-stage biotech companies, investors in the state are more attracted to traditional investment opportunities, such as real estate or agriculture companies. Bioscience-related venture investments in Nebraska totaled \$44.8 million from 2012 to 2015, accounting for one quarter of the total \$175.7 million investment in the state.¹⁴ Venture capital firms located in Nebraska lack sector-specific expertise in the biosciences, and stakeholders we spoke to largely consented with the opinion that it can be difficult to attract investors to opportunities in biotech and bioscience. Several stakeholders noted that even if they can get initial interest from investors, often that interest wanes quickly when investors realize the high levels of risk and uncertainty that are common in the industry. In general, the adage that investors stick to what they know holds true for Nebraska, and thus fostering additional investor education or incentivization in this area can help overcome barriers to the future growth of Nebraska’s biotechnology sector.

In addressing the lack of investor interest in the bioscience industry, one stakeholder SRI spoke with said that in the early stages of the Nebraska Technology Park (the precursor to the Innovation Campus) there was a staff member dedicated to ensuring that investors had discrete and easy access to the necessary background on possible investment opportunities, which they thought was a valuable approach to attracting investors. However, they said that such an approach disappeared as the park evolved, and that as far as they knew no such concept has been discussed for the subsequent Innovation Campus.

Public financing can also play a role in helping early-stage technology companies bring innovations to the market, and enable them to raise additional follow-on funding from other sources. Biotech companies have received grants from programs funded under the Business Innovation Act (BIA), but the amount of funding available under these programs appears to be inadequate for accelerated growth. Appropriations for BIA programs have stayed at \$7 million annually in recent years, a funding level significantly below the authorized amount, and one that falls far below other state’s investments in innovation programs on a per GDP basis.¹⁵ One program established under the Act – the Nebraska Prototype Program – was highlighted by multiple stakeholders as a very helpful program, but one that would benefit from expanded funding. Apart from the Business Innovation Act, the Nebraska Angel Investment Tax Credit Act was also referenced by several stakeholders as an important program that lacked sufficient funding – as is evidenced by the fact that the credit has been fully claimed on the first

¹³ TechCrunch, “Hudl Scores \$72.5M from Accel to Rally Teams to Its Sports Video Coaching Tool.” 2 April 2015. <https://techcrunch.com/2015/04/02/hudl-sports-video/>.

¹⁴ TEconomy Partners and Biotechnology Innovation Organization, *The Value of Bioscience Innovation in Growing Jobs and Improving Quality of Life 2016: Nebraska*.

¹⁵ For example, Nebraska’s 2014 investment equated to \$62 per \$1 million state GDP, compared to \$154 for Utah (USTAR), and \$225 for Ohio (Ohio Third Frontier). See SRI International, *Supporting Innovation-Led Growth in Nebraska*. 2016.

http://neded.org/files/govsummit/Supporting_Innovation_Led_Growth_in_Nebraska.pdf.

day of the year for the past few years. Increasing these resources would help improve the climate for private capitalization of new and growth companies.

III. Access to Markets

Easily accessible customers are a critical asset for regions seeking to innovate, as they can provide test-beds, co-development opportunities, early revenue, supply chain partners, and long-term customer bases. For the bioscience industry, relevant customers are not necessarily end-user consumers, but instead tend to be other biopharma, animal health, and medically-oriented businesses and institutions that leverage bioscience innovations in their larger operations. For many of the stakeholders SRI spoke with, industry strengths in these clusters and access to these types of institutions was a substantial strength of the state.

SRI's cluster analysis in Nebraska showed a longstanding strength in the agribusiness and food processing industry.¹⁶ Stakeholders noted that access to agriculture and food markets are beneficial, as they can then collaborate with farmers and better identify opportunities in the market; similarly, veterinary health companies can easily communicate and partner with livestock growers. Furthermore, several stakeholders noted that the presence of established firms in these industries offered smaller, emerging companies the opportunity to co-locate and benefit from the established firm's processes and byproducts. Smaller companies that co-locate with established firms can, for example, take advantage of the firm's existing permitting and minimize the amount of paperwork or new approvals they have to obtain. Similarly, some stakeholders we spoke with co-locate with firms whose byproducts are critical inputs to their products and processes, which eliminates certain supply chain issues for the smaller company. The Cargill Biorefinery Campus in Blair was specifically mentioned as an important anchor institution for the biotech sector in Nebraska.¹⁷

Additionally, several stakeholders noted that the presence of important institutions within moderate distance is an attractive quality of the state. For instance, the Kansas City Animal Health Corridor, USDA operations in Ames, Iowa, and US MARC in Clay Center are in close proximity, as is the site for a new U.S. ag bio security research facility in Manhattan, Kansas, which makes it easy for animal health companies in the state to meet with business partners, researchers, and regulators.

Clinical trials are a vital step in the testing and development of new medical treatments, and they generate significant local economic activity. Despite Nebraska's small and relatively dispersed

¹⁶ SRI International, *Nebraska's Next Economy: Analysis and Recommendations for the Economic Development Ecosystem*. (2016): p16-18.

http://neded.org/files/govsummit/Nebraskas_Next_Economy_Analysis_and_Recommendations_web.pdf

¹⁷ Cargill, "Biorefinery Campus Features and Locations,"

<http://www.cargillfoods.com/bioasis/locations/index.jsp>.

population, it is a significant hub for clinical trials. According to a recent study of the impact of biopharmaceutical industry-sponsored clinical trials, 677 clinical trials were active in Nebraska in 2013, enrolling an estimated 11,412 people, and generating a total economic impact of \$220 million.¹⁸ Proportional to state population, this was the highest activity for clinical trials of all states; the economic impact in Nebraska relative to size of the state's economy was among the top ten.

IV. Business Environment

SRI's measure of the business environment assesses regional attributes such as infrastructure, business formation and activity, costs, and entrepreneurial resources that can provide competitive advantages and opportunities. Nebraska benefits from a concentrated and profitable bioscience industry cluster and higher than average investments in infrastructure, but is weak in some measures of entrepreneurship and high-tech employment. Tax credits under the Nebraska Advantage Act are often inaccessible to businesses in biotechnology, which focus more on high-skill, high-paying occupations rather than job volume alone.

Nebraska enjoys a strong reputation as a business-friendly state, and consistently ranks highly on national rankings on this subject. Nebraska ranks third on Forbes' 2015 Best States for Business—up from seventh the previous year—due to low costs, fiscal health, and positive regulatory climate.¹⁹ Similarly, CNBC ranked Nebraska in 11th place in its 2016 America's Top States for Business, based on over 60 measures of competitiveness. In accordance with SRI's analysis and stakeholder opinions, Nebraska scored particularly well in the education and business friendliness categories, but lagged behind in access to capital and technology and innovation (including patenting and high-tech business formation).²⁰ The Lincoln and Omaha-Council Bluffs metropolitan areas rank high on the Kauffman Entrepreneurial Ecosystem Index (EEI), which takes into account measures such as employment in new firms, high-tech sector density, immigration and mobility, and worker churn. They placed 117th and 78th, respectively, out of 354 metros areas, on the index; however, they were not as favorably ranked in employment in new and high-tech firms.²¹

¹⁸ SRI analysis of Battelle Technology Partnership Practice, *Biopharmaceutical Industry-Sponsored Clinical Trials: Impact on State Economies*, 2015, p.12,

<http://www.phrma.org/sites/default/files/pdf/biopharmaceutical-industry-sponsored-clinical-trials-impact-on-state-economies.pdf>.

¹⁹ Kurt Badenhausen, "The Best States for Business and Careers 2015," *Forbes*, 21 October 2015, <http://www.forbes.com/sites/kurtbadenhausen/2015/10/21/the-best-states-for-business-and-careers-2015/>.

²⁰ "America's Top States for Business 2016," *CNBC*, 12 July 2016, <http://www.cbc.com/2016/07/12/americas-top-states-for-business-2016-the-list-and-ranking.html>.

²¹ Ewing G. Kauffman Foundation, *Entrepreneurial Ecosystem Atlas*, <http://eea.availabs.org/>.

Nebraska has demonstrated a high commitment to investing in public infrastructure and buildings, which include transit systems (roads, bridges, rail), along with electric and water treatment systems, and schools, and public irrigation projects, which are key to the state's role in crop seed biotechnology. State capital spending—construction, purchases of buildings, equipment and land, and major renovations—comprised 8.9% of total state spending in 2013—tied for fifth most among all states.²² This commitment has brought returns to the state's competitiveness. A number of representatives from the biotechnology sector interviewed by SRI remarked positively on the general quality of the state's infrastructure and its ability to serve their needs.

There is mixed evidence for the strength of biotech-specific infrastructure in Nebraska. Laboratory space at academic institutions in Nebraska has increased more rapidly than the national average in recent years, indicative of a healthy and growing research cluster. According to the National Science Foundation, research facility space for bioscience-related fields at academic institutions in Nebraska increased from about 2.3 million square feet in 2007 to 2.7 million in 2013, an increase of 14%. Although not dramatic, this increase occurred during an uncertain research funding environment, wherein many states saw steep declines in biosciences research space, and the national total increased only 3.8%.²³ That said, stakeholders reported varying levels of satisfaction with the amount and price of available laboratory space. Some industry representatives, particularly those from established businesses, reported that they could access sufficient space at an acceptable price. Others, however, highlighted a lack of laboratory space affordable enough for start-ups as a significant impediment to entrepreneurship and the growth of innovation within the state. Thus, while the Nebraska Innovation Campus has developed a variety of laboratory spaces available for rent, it can improve its service mix for small startups and small biotech businesses and entrepreneurs.

Representatives of the biotechnology industry stated that they encountered significant difficulty accessing tax credits under the Nebraska Advantage Act. The program fails to acknowledge the value of biotech firms' higher wages and long-term investment in human capital. It is better designed for larger, more established firms that, though they may create higher numbers of jobs, often pay low wages. The emphasis on quantity of jobs rather than quality—even in a state with exceptionally low unemployment—limits the suitability of Nebraska's business environment to the high-skill, high-wage jobs that it is trying to attract. Even when biotech companies met the eligibility criteria to apply for tax credits, the process has proved very burdensome, and even discouraged some from applying.

²² Elizabeth McNichol, "It's Time for States to Invest in Infrastructure," Center on Budget and Policy Priorities, 23 February 2016, <http://www.cbpp.org/research/state-budget-and-tax/its-time-for-states-to-invest-in-infrastructure>.

²³ National Center for Science and Engineering Statistics, *Survey of Science and Engineering Research Facilities, Fiscal Years 2003 – 2013*. Accessed via Integrated Science and Engineering Resources Data System (WebCASPAR), <https://webcaspar.nsf.gov>.

V. Ideas



Idea generation reflects the volume, quality and focus of business-relevant ideas generated within a region. Actors and institutions in industry, government, and academia all contribute to the generation, codification, and dissemination of knowledge that supports bioscience innovation in Nebraska. Nebraska's universities have acquired a strong specialization in bioscience R&D, and patenting activity has grown, albeit from a small base. Data on angel investment and state innovation programs suggest a healthy supply of commercial R&D and business proposals among Nebraska's small businesses.

Research and development (R&D) and patenting are two leading indicators of idea generation relevant to the biotech sector. Although not all R&D projects and patents generate economic returns, high activity in these areas is representative of a productive innovation ecosystem. Nebraska's universities—predominantly UNL and UNMC—are strong bioscience R&D performers, with \$298 million in expenditures in FY 2014. This level equates to \$158 per capita spent on bioscience R&D funding, which places Nebraska in the top quintile of state rankings. Within that funding, the top research categories were biological sciences (\$126.9 million), medical sciences (\$85.9 million), and agricultural sciences (\$73.7 million). Funding from the National Institutes of Health (NIH), the largest public funder of biomedical research, has held steady at roughly \$90 million per year in Nebraska during an environment of constrained federal budgets.²⁴

Bioscience-related patenting activity in Nebraska has steadily increased in the last several years, rising from 90 patents in 2012 to 145 in 2015.²⁵ Over this 4-year period, the greatest share of patents were in agricultural bioscience (43%), followed by medical devices (21%), then pharmaceuticals (14%).

Despite Nebraska's growth in this area, patenting in the sector remains below the national average on a per capita basis: in 2015, Nebraska received 7.6 bioscience-related patents per 100,000 residents, compared to the U.S. rate of 8.1 patents. More broadly, Nebraska also underperforms relative to the national average in patenting rates relative to the size of its science and engineering workforce and academic research workforce.²⁶

The level of idea generation among Nebraskan scientists and entrepreneurs is likely more than sufficient relative to the amount of financing available. For example, in recent years the Nebraska Angel Investment Tax Credit has allocated its entire pool of funding by January 1, demonstrating that angel investors are finding credible investment opportunities in Nebraska small businesses, many of which are

²⁴ TEconomy Partners and Biotechnology Innovation Organization, *The Value of Bioscience Innovation in Growing Jobs and Improving Quality of Life 2016: Nebraska*.

²⁵ *Ibid.*

²⁶ Specifically, patents awarded per 1,000 individuals in science and engineering occupations, and academic patents awarded per 1,000 science, engineering, and health doctorate holders in academia. National Science Board, *Science and Engineering Indicators 2016*. State Indicators 8-48; 8-49.

in high-tech sectors.²⁷ Furthermore, demand for Nebraska Business Innovation Act programs, in particular the Prototyping and Commercialization grants, significantly exceeds supply.²⁸

VI. Networks

Strong networks are critical in an innovation ecosystem, as they help connect ideas, talent, investors and mentorship to markets and each other. SRI's interviews indicate that there is a strong and developing network within the bioscience industry, but that connections between industry and universities could be strengthened. Despite gaps in coordination between some institutions, interview subjects emphasized that stakeholders largely maintained friendly relations and shared positive intentions for the state's future.

Many stakeholders praised the connections between actors in the bioscience industry within the state, largely attributing it to the work of organizations like Bio Nebraska and UNeMed that have connected companies through various networking events. They are able to easily connect with new contacts and obtain the right assistance when they seek it out. Some stakeholders also pointed to a recent bioscience and animal health conference held jointly with Iowa as another opportunity for building connections within the industry.

However, connections between the industry and the universities in Omaha and Lincoln appear to be more tenuous. Several stakeholders reported a disconnect between the universities and companies in the region that they felt impeded growth within the bioscience industry. Some believed that the universities should better communicate industry needs to students, or highlight the quality job opportunities within the bioscience industry in the state.

Industry-sponsored research at Nebraska's universities, an indicator of the quality of innovation networks, has modestly increased in recent years, but continues to account for a small portion of total R&D. In FY 2014, businesses funded \$18 million in R&D in the life sciences, about 6% of all academic R&D expenditures in these fields. This rate is slightly higher than the industry share nationally (5.5%), indicating that biotech businesses see some commercial value in collaborating with the universities in the state. However, improvement in this area is still possible. For example, North Carolina—a state with

²⁷ Silicon Prairie News, "Legislation adds \$1 million annually to available credits." 7 April 2015. <http://siliconprairienews.com/2015/04/nebraska-angel-investment-tax-credit-advances/>.

²⁸ SRI International, *Supporting Innovation-Led Growth in Nebraska*, p.12.

a more established biotech sector and the national leader in this metric—has achieved an industry-sponsored share of R&D of nearly 16%.²⁹

Some stakeholders pointed to the new Nebraska Innovation Campus (NIC) at UNL as evidence that Nebraska is taking appropriate steps to develop better innovation-driven networks. The Innovation Campus was praised for embracing public-private partnerships and supporting a closer relationship between research and industry.

However, others felt that NIC can provide more support to nurture emerging companies. They noted that many of the resources provided by the Innovation Campus were too expensive for start-ups and that the Campus could provide more incubator or wet-lab space in the right packages to address needs of entrepreneurs in early-stage businesses.

²⁹ National Science Foundation, National Center for Science and Engineering Statistics, Higher Education R&D Survey, 2014. Accessed via National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), <https://webcaspar.nsf.gov>.

Findings and Challenges to Address

SRI’s assessment has uncovered a number of strengths of the biotechnology sector in Nebraska, as well as challenges facing this high-value industry. Among Nebraska’s strengths is a concentration of biotechnology employment, which is growing steadily and provides significantly higher than average wages. Nebraska’s universities are strong performers of R&D in the life sciences, and produce well-regarded, knowledgeable workers. Nebraska’s employers operate in a generally business-friendly, low-cost environment, and biotech companies have abundant opportunities to co-locate and collaborate with the state’s existing agricultural base.

As Nebraska seeks to further develop its biotechnology industry, SRI has identified the following as the major challenges the state must address:

Talent

Insufficient supply of talent, including trained workers for the specialized biotechnology work environment. Employers praised the high quality of Nebraska’s workers and the knowledge of graduates from the state’s university system, but the limited number of graduates finishing school and staying in-state makes hiring very difficult. Furthermore, there is a specific shortage of work-ready individuals with the specialized training to operate in the highly regulated and specialized biotechnology workplace.

Risk Capital

Scarcity of risk capital and early-stage financing, from both public and private sources. Venture investment overall is low in Nebraska, and there is a lack of biotech-specific expertise and familiarity among regional investors. Public financing for early-stage businesses available under the Business Innovation Act programs is inadequate.

Business Environment

Poor alignment of state tax incentives with the needs of high-tech, high-skill businesses, and lack of affordable laboratory space for biotech startups. Nebraska Advantage Act tax incentives favor larger, established firms that do not necessarily bring high-paying jobs. Biotech and other technology startups that provide the high-skill, high-paying jobs of Nebraska’s future economy often do not meet the job level requirements, despite their important investments in physical and human capital. Additionally, these startups face a shortage in affordable laboratory space.

Networks

Low awareness of the scale and importance of Nebraska’s biotechnology sector, and its associated employment and investment opportunities. Many people are unaware of the biotechnology industry’s role in Nebraska. This perception problem has adverse, multi-dimensional impacts on career choices, business location and expansion, and investor behavior.

Recommendations

Summary

SRI believes that the identified gaps, if left unresolved, will constrain Nebraska’s movement towards an innovation-based economy, and the growth of the state’s biotechnology sector in particular. In this section, we provide a series of general and sector-specific recommendations for state policymakers to address these challenges. Below is a summary of our recommendations and how they map to the gaps identified in our analysis. These recommendations are subsequently discussed in greater detail.

<u>Gap</u>	<u>Recommendation</u>
Talent	<ul style="list-style-type: none"> ▪ Create a state organization to provide customized bioscience workforce training to companies locating and expanding within the state
Risk Capital	<ul style="list-style-type: none"> ▪ Expand the Angel Investment Tax Credit, and prioritize businesses in strategic industries ▪ Increase appropriation for Business Innovation Act (BIA) financing programs ▪ Establish a Nebraska Biotechnology Venture Fund
Business Environment	<ul style="list-style-type: none"> ▪ Revise Nebraska Advantage Act tax credits to reward high-wage job creation and investment ▪ Tailor facilities and services offerings at the Nebraska Innovation Campus based on industry needs, including those of startups
Networks	<ul style="list-style-type: none"> ▪ Develop a brand for Nebraska’s biotechnology sector, supported by a dedicated organization focused on marketing and networking.

Realigning Existing State Policy for High-Tech Jobs and Growth

A thriving biotechnology cluster in Nebraska requires an overall economic and policy environment supportive of innovation. Nebraska should take steps to reorient its economic development environment to support high-skill, high-value jobs and industries, and foster greater technology commercialization, business formation and investment. SRI recommends that state policymakers do the following:

- **Revise Nebraska Advantage Act tax credits to reward high-wage job creation and investment.** Nebraska’s premiere tax incentives package should focus on the jobs that will form the basis of a forward-looking, innovation-based economy. Many high-tech businesses and startups, due to their emphasis on quality over quantity, do not meet the current job creation and investment floor requirements. These requirements should be removed (replaced with a continuous formula), and tax credits should be restricted to jobs with wages above county median levels. Capital investments that yield no new jobs, but increase sales or wages, should also be considered.
- **Expand the Angel Investment Tax Credit, and prioritize businesses in strategic industries.** The Angel Investment Tax Credit is an important policy instrument for encouraging private investment in early-stage, high-tech enterprises. Demand for this program has far exceeded supply for several years; although funding was recently increased from \$3 million to \$4 million per year, Nebraska should further increase the pool of available credits. Additionally, although the credit is already aimed at businesses in high-tech fields, policymakers should consider mechanisms to prioritize limited funding in industries of greatest strategic value, which could include biotechnology, but other fields such as IT as well.
- **Increase appropriation for Business Innovation Act (BIA) financing programs.** Compared to other states, Nebraska underfunds its state innovation programs by a wide margin. Appropriations are currently at \$7 million annually, far below the \$22 million authorization level. Nebraska should increase its commitment to BIA programs, which support the pursuit of high-tech idea generation, business formation, and university-industry collaboration. An independent analysis found that BIA programs have helped businesses raise significant private sector funding from each dollar in initial state support, and are already generating meaningful economic impacts.³⁰ Further, multiple stakeholders endorsed these programs as well-run and effective in spurring private follow-on funding, but their impacts are limited at current funding levels.

As part of this increase in appropriation, state policymakers could consider new forms of support for early-stage technology businesses. One possibility is a larger, multi-year “block grant” to small businesses in sectors such as biotech, where entrepreneurs face large financial barriers upon business start-up. These grants would be designed for increased flexibility in how businesses could allocate funds, and could be used to not only support R&D activities, but also put towards hiring and training, equipment purchases, and laboratory space. If policymakers were to pursue such a program, it would need to be carefully structured and governed so that a strong stakeholder consensus—as well as technical and business expertise—supports its grant-making process.

³⁰ Eric Thompson, *The Annual Economic Impact of Businesses Supported by Nebraska Business Innovation Act Programs*, University of Nebraska—Lincoln Bureau of Business Research, 18 November 2014.

Nebraska Innovation Campus and University-Industry Collaboration

In addition to actions at the state level, SRI's study supports some adjustments at the university level. Overall, biotech industry representatives were very supportive of the concept behind the Nebraska Innovation Campus (NIC) at UNL, and its goal of strengthening university-industry partnerships. NIC has significant potential to catalyze innovative activity in the state, and the growth of private sector partners and tenants in recent years is an encouraging trend. State policymakers should view NIC as a long-term investment in Nebraska's future economy, as one institution among many in the state that aids the (gradual) transition towards high-skill, high-technology enterprises and jobs. In SRI's experience, NIC should be viewed as a 20+ year project, with expectations and metrics set accordingly.³¹

A potential solution for further improving university-industry collaboration and increasing commercialization of research would be the establishment of a location-based tax credit that supports businesses locating near Nebraska educational institutions. Such an "innovation zone" or "innovation hub" incentive would be available to businesses located in designated areas designed for university-industry collaboration. Because many early-stage businesses do not yet have the income to take advantage of standard tax credits, this mechanism would instead transfer credits to the entity administering the innovation zone, and could be applied towards reducing leasing costs, thus helping to address the shortage of affordable wet lab space reported by many biotech startups.

Venture funding presents an additional opportunity for Nebraska's universities to increase their economic impact and ties to industry. Universities across the country are launching new venture investment funds and programs to supply early-stage capital to university-based and regional technology startups. Some recent initiatives include Red Cedar Ventures ([Michigan State University](#)), Carolina Research Venture Fund ([UNC Chapel Hill](#)), and Purdue Ventures ([Purdue University](#)). The University of Nebraska could likewise expand its economic impact by deploying a small fraction of the University of Nebraska Foundation's resources towards local venture investments; we address this option in greater detail as part of the [discussion of a Nebraska Biotechnology Venture Fund](#).

Targeted Actions for Strengthening Nebraska's Biotechnology Sector

The above actions should bring benefits to Nebraska's biotechnology sector as part of a general increased focus towards innovation-based economic development. However, each industry has unique attributes and needs, and successful state and regional cluster development initiatives require specific, industry-focused programs. Accordingly, SRI describes several targeted steps for strengthening Nebraska's biotechnology sector below. Each recommendation is inspired by a best practice at the state

³¹ This timeline coincides with university officials' communications on the project. See Ronnie Green, "State of the University Address 2016," 22 September 2016, <http://www.unl.edu/chancellor/state-of-the-university-address-2016>; Martha Stoddard, "Some Question Nebraska Innovation Campus' Pace, Funding Requests, Private-Sector Buy-In," *Omaha World-Herald*, 4 May 2015, http://www.omaha.com/news/education/some-question-nebraska-innovation-campus-pace-funding-requests-private-sector/article_39bb3a62-fece-5a61-bc7c-1185ced48ddb.html.

or regional level selected based on its positive impact on industry cluster development and adaptability and/or comparability to the context of biotechnology in Nebraska. These benchmark programs are discussed in greater detail in the appendix.

Create a state organization to provide customized bioscience workforce training to companies locating and expanding within the state

The state should invest in creating an organization with the capability to deliver free (or subsidized) customized workforce training to companies that either are already located in Nebraska and are expanding, or are relocating to the state. While Nebraska currently offers a customized training grant to cover the costs of training for eligible companies, this approach still places the burden of finding or developing the appropriate training with the companies. By creating an organization with the resources and expertise to provide high-quality training to meet the needs of individual companies, the state will be reducing the burden on businesses to train their employees and will help them overcome workforce shortages within the state, particularly within the bioscience industry.

While such an organization could provide training for a variety of industries, it should prioritize the needs of the bioscience industry within the state, which faces a lack of appropriately trained candidates for employment. SRI's research found that while bioscience companies struggled to hire workers in general, they faced an especially difficult challenge in finding workers who had been trained to work in the highly regulated environment necessitated in the industry. Stakeholders reported that they often had to train up new hires, even those with 4-year college degrees, to be able to work according to the codes and regulations that govern production processes in bioscience. A new state workforce development organization could help close this gap.

The organization should be equipped with a staff that is capable of analyzing companies' processes, developing appropriate training curricula, and producing supporting training materials. The organization should also have access to quality trainers to implement training, either via full-time staff or a reliable cadre of contractors, preferably with industry experience. Consideration also needs to be given to providing space for the training to take place – ideally, the organization should be able to bring training to companies, either by training at their facilities or leveraging mobile training labs, but should also have access to their own proprietary space to host trainings.

Georgia Quick Start

The Georgia Quick Start program provides specialized technical facilities via the Georgia BioScience Training Center to meet the specific needs of the bioscience industry. Quick Start also offers an example of how to better align the needs of industry with the educational offerings within the state. It acts as a liaison between the companies it serves and the technical college system, communicating the skill and talent needs of the industry so that the technical colleges can adapt their curricula appropriately. Nebraska should look to create a similar connection between the training organization and educational institutions, to ensure that the educational infrastructure is adequately meeting industry needs. For more information on Georgia Quick Start, please see the Appendix.

While there should be basic criteria to ensure that the companies who receive training are those companies that are investing within the state, the criteria should be flexible enough to apply to companies that may not create large numbers of jobs, but that invest in capital and provide fewer, high-quality jobs. The current guidelines for the Nebraska Job Training Grant provide this flexibility by offering a range of assistance based either on new jobs created, or increases in salaries for current workers following training.³² A similar approach could be taken to the training provided, with either the amount of free training provided, or the amount of cost-sharing of the training provided, being based on either number of new jobs or likely salary increases (or alternatively, new capital invested).

Establish a Nebraska Biotechnology Venture Fund

State policymakers should establish a biotechnology-focused venture fund. The Nebraska Biotechnology Venture Fund would make investments in Nebraska-based biotechnology companies alongside private investors; compared to existing state innovation programs (which should be bolstered as well), the Fund would make a smaller number of larger investments later in businesses' development. The Fund would follow established best practices for state venture capital programs, and make co-investments along with private sources of funding. It would be designed for long-term self-sufficiency based on its investment returns, but in addition to seeking positive ROI, would consider long-term economic development impacts in its funding decisions.

Nebraska has a shortage of risk capital available for early-stage, high-tech businesses, including those in the biotechnology sector. SRI's analysis indicates that there is a sufficient pipeline of worthwhile, commercially-relevant ideas generated by the state's researchers and entrepreneurs (source of demand for capital), and that the constraint on new business formation and expansion is the supply of funding.

To increase the number of Nebraska innovations moving from the laboratory into the marketplace, the state needs more risk capital at both the pre-seed/seed and early venture capital stages. Increasing

³² Nebraska Department of Economic Development, "Customized Job Training", <http://neded.org/business/tax-incentives/customized-job-training>

appropriations for Nebraska Innovation Act programs and incentivizing greater angel investment will help alleviate the first shortfall. The Nebraska Biotechnology Venture Fund will help address this second gap. Although still an early-stage VC fund, its investments would be larger than those made by BIA programs, most likely \$250,000 and above.

Fund Approach

In general, the Nebraska Biotechnology Venture Fund should seek to emulate consensus best practices in program management and due diligence for state venture capital programs, many of which have been documented by the Treasury Department’s State Small Business Credit Initiative.³³ The Fund could be a public or quasi-public entity; if managed independently, state policymakers need to ensure that the financial incentives facing the fund managers are aligned with those of the state. As an established organization with a public serving mission, Invest Nebraska should be considered as a potential candidate organization for managing the Fund. However, the biotechnology fund would need to be clearly separated from Invest Nebraska’s other programs to retain its sectoral focus and concentrate on this particular funding gap. Generally speaking, it may be preferable to select an existing organization to manage the Fund to reduce the burdens associated with forming a new entity, unless constraints on the organization (i.e., investment caps, co-investment requirements) would place undue limitations on the Fund’s capacity to make effective investments.

For Nebraska’s fund, SRI emphasizes the importance of the following attributes: co-investment with other lenders, long-term focus, financial self-sufficiency, and a “double bottom-line” investment approach:

- **Co-Investment:** In general, it is advisable that the Fund should seek co-investments with private sector sources of financing, which signals that other investors see the funded companies as viable, worthwhile investments. A conventional formula is that the public investment constitutes no more than 50% of the total. However, depending on the investment climate, it may occasionally be useful for the Fund to act as a lead investor if it sees strategic value in a particular business.
- **Long-Term Focus:** Venture capital investment requires taking calculated risks, and the Fund is unlikely to produce immediate returns. State policymakers should recognize that individual investments may fail, and that the Fund may not deliver returns even in its first decade. The Fund’s performance should be assessed over a longer period of time as it fulfills its role as “patient capital.” Relatedly, the Fund’s partnerships should be formed with the aim of positioning companies for the next level of traditional venture capital investment as the state’s role phases out.

³³ See *Best Practices from Participating States: Venture Capital Programs*, U.S. Department of the Treasury, April 2014, <https://www.treasury.gov/resource-center/sb-programs/Documents/SSBCI%20VC%20Program%20Best%20Practices%204%2024%202014%20FINAL.pdf>.

- **Self-Sufficiency:** Although the Fund will require an initial window of patient investment by stakeholders, it should be designed for long-term self-sufficiency. After a period of state investment, further funding should be cut off, and the fund designed to operate based on the returns on its investments.
- **Double Bottom Line Approach:** The Fund must make a positive ROI to sustain itself, but maximizing returns should not be the sole aim of the program. Investment decisions should also be based on the strategic potential of the investment to spur economic development and grow high-value jobs in Nebraska.

The exact size of the Fund should be based on careful market research, conversations with stakeholders, and the state’s organizational and financial capacity to operate it. As a reference point, the Maryland Venture Investment Fund has over \$100 million in investments; however, the fund has been in operation in some form for over two decades, invests across high-tech sectors, and is located in a state with an economy three times larger than that of Nebraska. Accordingly, a Nebraska-based fund focused on biotechnology would most likely be an order of magnitude lower.

Venture Support as University-Based Economic Development

Alongside state investments, the University of Nebraska Foundation could also take on an expanded role in supporting venture investments in local biotechnology enterprises. The University of Nebraska system has had a public service component to its mission since its beginnings as a land grant university in 1869; today the university “strives to help build and sustain a state that offers educational and economic opportunities and an excellent quality of life.” A recent independent analysis found that NU does play a major role in supporting the state’s economy, generating a total economic impact of \$3.9 billion—3.7% of the state GDP—and directly or indirectly supporting one out of every 36 jobs in the state.³⁴

State Venture Capital Programs

State policymakers have established a number of state venture capital programs in recent decades. These programs are diverse in terms of their funding, organizational models, and investment strategies and conditions. Although these programs operate under a variety of different models, their creation is driven by a common understanding that risk capital for early-stage, potentially high-growth businesses is an essential factor in regional technology-based economic development. The Maryland Venture Fund, MassVentures, and Connecticut Innovations are three programs that could help inform a comparable venture fund for Nebraska. Some commonalities among these initiatives are their partnerships with other investors, long-term focus, and consideration of both internal returns and wider economic benefits.

³⁴ Tripp Umbach, *The Economic and Social Contribution of the University of Nebraska to the Statewide Economy*, January 2016, <https://nebraska.edu/docs/economic-impact/NU-Economic-Impact-Report.pdf>.

Expanding the Foundation's role in catalyzing innovation-based growth through support of high-tech ventures would further bolster NU's economic contributions to the state, and help define it as a leading 21st century "relevant university"³⁵ that applies its assets and capabilities to realizing economic and social potential at the individual, firm, and regional levels. The Foundation's endowment has grown very significantly over the last decade, with total assets increasing from approximately \$1.4 billion in 2006 to \$2.2 billion in 2016.

By investing only a very small portion of its assets into Nebraska-based biotechnology startups, the Foundation could have a significant impact in energizing the growth of innovative businesses that bring high-skill, high-wage jobs to the state. Bioscience-related venture capital investments in Nebraska averaged only \$11 million per year from 2012-2015, indicating that targeted investments by the Foundation, when combined with private co-investments, could address this constraint on the state's biotechnology sector. There are several approaches universities can take to support the flow of venture capital to their regional economy.³⁶ One possible method is for the Foundation to make direct investments in coordination with private investors.

Although the University of Nebraska Foundation is and should be focused on the long-term health of its assets, its portfolio indicates that it nonetheless accepts a degree of calculated risk in its investments,³⁷ supporting the development of high-tech industries would entail some risk, but can bring significant benefits to the regional economy. The long-term perspective of university endowment managers has not prevented them from taking a variety of investment strategies, and investments in private equity—including venture capital—are commonplace.³⁸ On average, endowments with greater than \$1 billion allocate 15% of assets into private equity, with 45% of that allotted to venture capital investments.³⁹

³⁵ See Association of Public and Land-grant Universities and University Economic Development Association, *Higher Education Engagement in Economic Development: Foundations for Strategy and Practice*, August 2015, <http://www.aplu.org/library/higher-education-engagement-in-economic-development-foundations-for-strategy-and-practice/file>.

³⁶ Vance H. Fried, "Venture Capital and the University: The Endowment's Role," *Journal of Private Equity*, Spring 2003, p. 79-85.

³⁷ See University of Nebraska Foundation, *2016 Annual Report*, 2016, <https://nufoundation.org/documents/10156/1597588/2016+Annual+Report/>.

³⁸ Michael McDonald and Lauren Streib, "New Breed of Endowment Managers Beats Harvard at Its Own Game," *Bloomberg*, 15 May 2015, <http://www.bloomberg.com/news/articles/2015-05-15/new-breed-of-endowment-managers-beats-harvard-at-its-own-game>; Janet Lorein, "Yale Made 93% a Year on Venture Capital in Past Two Decades," *Bloomberg*, 7 April 2016, <https://www.bloomberg.com/news/articles/2016-04-07/venture-capital-earned-93-annual-gain-for-yale-over-20-years>.

³⁹ Cambridge Associates, as cited in Yousef Hammad, "Venture Capital and Universities: A Complicated Relationship," *Beco Capital*, 28 August 2016, <http://becocapital.com/venture-capital-and-universities-a-complicated-relationship/>.

Develop a brand for Nebraska’s biotechnology sector, supported by a dedicated organization focused on marketing and networking.

Nebraska should create a brand for its biotechnology sector to increase awareness and improve perceptions. A dedicated organization should be selected or established to aggressively market Nebraska’s biotechnology sector under this brand. Initial priorities for this organization would include advertisement of career opportunities, business recruitment, and formalizing connections between universities, startups, investors, and industry.

A consistent theme among biotechnology industry stakeholders in Nebraska is that awareness of the sector’s activity and opportunities in the state is low. This perception problem should not be dismissed as a secondary concern—what people think of Nebraska has real consequences for the state’s economic reality. A poor perception fuels adverse, multi-dimensional impacts on career choices, business location and expansion, and investor behavior. For example, students who do not know about local biotechnology job opportunities leave the state after graduating. Businesses that lack knowledge of existing biotech clusters and networks in Nebraska also overlook the state as a location.

In response, Nebraska should develop a brand for its biotechnology sector, supported by a dedicated organization focused on marketing and networking. This organization need not be a new state agency, but it should have some level of public support or status. Its responsibilities would include marketing to raise awareness of Nebraska’s biotechnology sector and managing networking events, platforms, and/or programs to increase connections among participants in the sector.

Marketing activities should align with existing state and university marketing campaigns, PR and programs that more broadly advertise the state, particularly in terms of its high quality of life and low costs. Networking events and programs should provide structured channels through which the university and industry communities could coordinate and capitalize on established resources to strengthen the sector, as well as opportunities to connect startups and investors to improve access to risk capital. These networking venues would help university leaders learn what businesses need and allow business leaders to understand the assets available in public research, as well as allowing each side to understand their respective challenges and opportunities.

Potential roles for the organization, operating under a consistent brand identity, include the following:

- Advertisement of in-state biotechnology job opportunities to life sciences college students seeking careers, as well as highlighting these opportunities to pre-college students considering life sciences majors.
- Marketing the state’s strengths as a business location for biotechnology companies.
- Facilitating stronger networks between stakeholders in the biotechnology sector, in particular:
 - University—Industry: Communicating current industry needs and projects to academic researchers, and connecting companies to university faculty with potentially relevant expertise. A regularly occurring means for discussion, whether it be a monthly working group, an annual conference, or some other established forum, that is geared towards aligning the goals and resources of the universities with those of industry (and vice versa) could amplify efforts in both communities to grow the sector.
 - Startups—Investors: Hosting investor days where startups can present their ideas and business plans to investors (including large companies which may license technology or acquire IP), or conversely, existing companies “reverse pitch” their needs to startups, either directly or through some matchmaking mechanism.

Kansas City Animal Health Corridor

The Kansas City Animal Health Corridor (KCAHC) is a regional economic development organization that supports the health and expansion of the animal health sector across the 18-county Greater Kansas City region. KCAHC was formed in the mid-2000s to formalize networks among the region’s longstanding but under-appreciated animal health cluster. KCAHC has worked to improve both the perception of and underlying reality behind this regional sector. It has improved perceptions of the sector from a dated “stock yard” impression to one of high-tech, innovative companies that support high-skill careers. It works as a valuable connector institution that helps a diverse set of stakeholders form collaborations and locate resources.

Coordinate Business Recruitment along Related Clusters

Alongside the above policy changes, SRI stresses the importance of examining and advertising supply chain partners, and shared input and outputs when recruiting businesses, particularly those in biotechnology. This recommendation does not entail the creation of a new program, but is rather a matter of emphasizing one approach within existing policies and tools. Nebraska policymakers should highlight the advantages that existing business networks, services, and specialized infrastructure in the state offer biotechnology companies. Novozymes’ decision to locate its \$200 million enzyme plant at the

Cargill site in Blair, Nebraska, after an exhaustive international siting search exemplifies the significance of these factors in industry decision making.⁴⁰

The biotechnology sector includes a wide variety of companies involved in developing new products and technology for applications in healthcare, food, energy, agribusiness, agriculture and industries based on biological processes, feedstocks and organisms. It has far-reaching linkages throughout the economy to related clusters, in contrast to relatively “contained” industries like furniture or textiles. For example, within the framework of the U.S. Cluster Mapping project, Nebraska has specialized (and related) clusters in Medical Devices and Biopharma, which in turn have connections to a constellation of industries in the Plastics, Upstream Chemicals, Downstream Chemicals, and Food Processing clusters.⁴¹ Economic developers should take these connections into account when assessing how new biotechnology businesses can take advantage of Nebraska’s existing industrial landscape.

⁴⁰ See Art Hovey, “Novozymes Ready to Roll at Blair,” *Lincoln Journal Star*, 30 May 2012, http://journalstar.com/business/novozymes-ready-to-roll-at-blair/article_f944c91d-bd7b-5535-aceb-ac7549830ff4.html.

⁴¹ See “Cluster Linkages and Economic Diversification,” U.S. Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School, <http://www.clustermapping.us/region/state/nebraska/cluster-portfolio>.

Appendix: Case Studies

Skills Development and Retraining: Georgia Quick Start

While there are countless models of workforce development programs across the states, Georgia's Quick Start program is routinely considered one of the most successful.⁴² The program has been in existence for almost 50 years and has helped train tens of thousands of workers to meet the needs of new, existing, and expanding businesses in the state. Recently, the program has begun operating a new BioScience Training Center, which can serve as a model to Nebraska as to how such a workforce development program can support the bioscience industry.

History

The program began in 1967 as a small workforce training program within the Department of Education. Throughout the years it has grown in size and importance, developing into one of the top incentives used to lure new businesses to the state. Today, the program falls under the Department of Technical and Adult Education as a part of the Technical College System of Georgia and maintains close working relationships with the various community and technical colleges across the state.⁴³ In FY 2015, the program operated with a \$23.07 million budget, \$12.8 million of which came from the state and the rest of which came from federal and other funding sources.⁴⁴

Activities

Quick Start offers customized training to new, existing, and expanding businesses in the state at no charge, so long as the business commits to creating 15 new jobs over a period of 12 months. The training offered is discretionary, meaning that the program has the ability to scale the exact offerings depending upon the size of the company and their likely economic impact on the state. It is often a key element of the economic development incentive packages offered to businesses considering relocating to Georgia, and frequently is cited by companies as a decisive factor in their decision to move to the state.⁴⁵

Once a company expresses interest in Quick Start's services, Quick Start puts together a team to analyze the company's processes and begin developing training materials. To do so, the team begins with an

⁴² Crawford, Mark, "Work Force Development Programs Can Make or Break a Site Selection Deal", *Area Development*, Q3 Summer 2013. <http://www.areadevelopment.com/laborEducation/Q3-2013/workforce-development-programs-effect-site-selection-2892211.shtml>

⁴³Koon, Mary, "Quick Start", *New Georgia Encyclopedia*, 19 August 2013. <http://www.georgiaencyclopedia.org/articles/business-economy/quick-start>

⁴⁴*The Governor's Budget Report: Fiscal Year 2016*, 2016: p 391. https://opb.georgia.gov/sites/opb.georgia.gov/files/related_files/site_page/FY_2016_GovernorsBudgetReport.pdf

⁴⁵ Quick Start, "Inside the Quick Start Process". https://ltgov.georgia.gov/sites/ltgov.georgia.gov/files/imported/vgn/images/portal/cit_11783501/150872290InsideQSProcess.pdf

intensive study of the company's production processes, in order to document every step taken and the skills needed. The analysis is guided by "Instructional Systems Design", a systematic method of analyzing training needs that first considers the theory behind the production process, then moves to evaluating the system underlying production, and finally analyzes the specific component that is produced. This allows trainees to gain a broader comprehension of the production process and better understand the context in which they are working.

After the team has analyzed the process and identified the skills needed to be trained, they start developing curricula and materials to support the training. Quick Start has a full staff of graphic designers and illustrators, as well as desktop publishers, and each office is able to fully produce the necessary job aids, charts, and computer programs. Teams work with company officials to make sure that the company's culture, brand, and corporate philosophy are infused throughout the training materials and curriculum.⁴⁶

After the training has been designed and necessary materials have been produced, Quick Start relies on a team of contractors with previous industry experience to lead the training. The location of the training depends on the needs and capacities of the company; Quick Start has facilities in which it can conduct the training, but it also has mobile capabilities and can bring the training to the company if that better suits their needs.⁴⁷

In addition to providing high quality, customized training to companies, Quick Start acts as a liaison between industry and the technical colleges, to ensure that the workforce needs of companies can be met by the technical degree programs offered. Quick Start communicates the skills and talent needs of the companies they serve to the technical college system, which can then adapt their curricula to better meet those needs.

BioScience Training Center

Quick Start is also now in charge of operating the new George BioScience Training Center, a \$14 million facility built by the state as part of an economic incentive package to bring pharmaceutical manufacturer Baxalta to Georgia.⁴⁸ The Center is initially focused on training employees for the new Baxalta plant, but

⁴⁶ Quick Start, "Inside the Quick Start Process".

https://ltgov.georgia.gov/sites/ltgov.georgia.gov/files/imported/vgn/images/portal/cit_11783501/1508722_90InsideQSProcess.pdf

⁴⁷ *ibid.*

⁴⁸ Trubey, J. Scott, "Georgia bioscience center a new recruiting tool", *The Atlanta Journal – Constitution*, 10 September 2015. <http://www.myajc.com/news/business/georgia-bioscience-center-a-new-recruiting-tool/nncQn/>

was designed to be used by other companies in the industry as well, making it an attractive incentive to bring bioscience jobs to the state.⁴⁹

The facility has a variety of classrooms and lab spaces designed to emulate bioscience manufacturing plants in order to train a wide range of skills and techniques. Spaces have been designed specifically to train tasks from gowning, which can be very specific and regulated in a field such as biosciences, to cleaning walls and floors, which requires different combinations of cleaners and chemicals depending on the process being performed.⁵⁰ The center will provide the highly specialized, sterile training environments that employees need to work effectively in the tightly regulated bioscience industry, environments that would be difficult for companies to provide themselves.

Impacts

As mentioned earlier, Quick Start is a critical component of economic development incentive packages offered to companies looking to relocate or expand. Many companies cite Quick Start as a key factor in their decision to move to Georgia, as the program offers an established structure and large body of institutional knowledge that many workforce development programs from other states can't compete with.

In regards to the bioscience industry, the training Quick Start is providing at the new center is helping to overcome a lack of skilled workers that could otherwise prevent companies from moving to the state. Previously, it was difficult for Georgia to compete in the bioscience industry as companies preferred locations such as the Research Triangle in North Carolina, which has a more established bioscience workforce. However, Quick Start is now able to generate pools of skilled bioscience workers by providing the necessary training in their new center, helping to overcome the labor gap that could be seen as an obstacle for many companies.

Further, the development of the BioScience Training Center and the new companies it is attracting is bringing greater attention to bioscience as a possible career path for students. Local technical colleges are expanding their facilities and adapting their curricula to support growing interest in the bioscience industry, as students can see firsthand the possible employment opportunities available in the field.

State Venture Capital Programs

State venture capital programs have become more prevalent over time, speaking to the value that policymakers see in spurring flows of risk capital to early-stage, potentially high-growth businesses in their regional economies. Though most state venture capital programs invest across a spectrum of target industries, there is precedent for sector-specific funds. For example, Kansas created a targeted

⁴⁹ Area Development, "Construction Begins on Georgia BioScience Training Center near Atlanta, Georgia, 31 March 2014. <http://www.areadevelopment.com/newsItems/3-31-2014/georgia-bioscience-training-center-construction-begins112902.shtml>

⁵⁰ Rasmussen, Patty, "The Centerpiece of Our Pitch", *Site Selection*, September 2015. <http://siteselection.com/LifeSciences/2015/sep/training.cfm>

fund with the Kansas Bioscience Authority (KBA), which supports innovative businesses in agribusiness, animal health, and human health. The Nebraska Biotechnology Venture Fund would likewise be focused on investing in companies in a target industry (or a set of biotech subsectors), though it need not emulate the entirety of KBA's operating model. Additionally, the Massachusetts Clean Energy Center (MassCEC) operates an Investments Program that makes direct equity and venture debt investments in Massachusetts-based clean energy companies. However, the Investments Program operates as part of MassCEC's suite of programs, which received state-funds, and although the program generates returns for MassCEC, it is not strictly a self-sufficient fund.

In SRI's research, no single program emerged as a stand-out model for Nebraska to emulate. Therefore, we highlight several state venture capital programs that can help guide the design of a Nebraska Biotechnology Venture Fund.

Maryland Venture Investment Fund

The Maryland Venture Investment Fund (MVF) is an early-stage, evergreen capital fund that supports high-growth companies in the State of Maryland. Although MVF has existed in some form since 1994, the vast majority of its capital was raised in 2012 based on proceeds of an innovative online auction of insurance premium tax credits. The fund now has over \$100 million in assets under management.⁵¹

On the advice of a special legislative commission, the fund was moved in 2015 from the then-Department of Business and Economic Development (DBED) to the quasi-public Maryland Technology Development Corporation (TEDCO). This change was based on TEDCO's history of success in supporting entrepreneurship and high-tech businesses, and to consolidate state programs.⁵² TEDCO is an independent organization created by the State of Maryland in 1998 that catalyzes innovation in the state through mentoring, funding, and networking for entrepreneurs and start-ups.

MVF's new location within TEDCO allows it to capitalize on TEDCO's existing seed funding programs, an arrangement the MVF's managing director compared to baseball's minor league system of grooming players (in this case companies).⁵³ MVF's investments are usually between \$500,000 and \$1.5 million, and the fund seeks to closely advise companies to ensure their long-term success in the region. MVF is open to partnering with other investors, but often acts as a lead investor in the most promising startups. The shift in investment strategy reflects a recognition of the gap that state venture capital programs can help fill beyond seed funding.

⁵¹ See Maryland Venture Fund, "About," <http://www.marylandventurefund.com/about/>.

⁵² See Maryland Economic Development and Business Climate Commission, *Report of the Maryland Economic Development and Business Climate Commission*, February 2015, <http://msa.maryland.gov/megafile/msa/speccol/sc5300/sc5339/000113/020000/020859/unrestricted/20150235e.pdf>.

⁵³ Scott Dance, "Five Minutes with Andy Jones, Managing Director of the Maryland Venture Fund," *The Baltimore Sun*, 6 February 2016, <http://www.baltimoresun.com/business/bs-bz-five-minutes-andy-jones-20160206-story.html>.

MassVentures

MassVentures is a quasi-public venture capital organization that supports Massachusetts' innovation-based economy by funding early-stage, high-growth Massachusetts technology startups. Formerly the Massachusetts Technology Development Corporation, MassVentures was formed in 1978 and received initial funding from the Economic Development Administration (EDA); the state followed with subsequent funding of \$4.2 million spread over 1982-1988, which MassVentures used to create an evergreen venture capital fund.

MassVentures typically makes Series A investments in companies in the amount of \$250,000 - \$500,000, including companies run by first-time CEOs/founders and in underserved industry segments, and often acts as a lead investor. MassVentures provides not only capital, but also operational guidance and networking support, helping position companies for additional rounds of funding from later-stage, private investors. Over the lifetime of its venture capital fund, it has generated positive returns on its investments, and MassVentures-supported companies have raised more than \$1 billion in additional capital, employing an estimated 2,400 people in the state.⁵⁴

Connecticut Innovations

First established in 1989 by the state legislature, Connecticut Innovations (CI) provides financing, strategic guidance, and networking assistance for businesses throughout the state of Connecticut. CI's venture investment arm focuses on technology-intensive companies in industries where the state has competitive advantage, such as software and IT, biosciences, clean tech, digital media, and advanced manufacturing.

As with MassVentures, CI is a quasi-public entity: although managed like a corporation, it has a public component to its mission. Its investment philosophy is based on a double bottom line approach, which takes into consideration long-term investment returns, but also the generation of high-revenue companies that spur high-quality job growth. CI's investments commonly range from \$500,000 - \$1 million, and are directed at companies headquartered in the state or willing to relocate.⁵⁵ For fiscal year 2016, CI reported nearly \$20 million in proceeds across its portfolio, and leveraged \$134 million in additional capital based off its \$43 million investment.⁵⁶

Common Themes

The above programs exhibit some commonalities that can inform a comparable venture fund for Nebraska. Although they often co-invest, they acknowledge the power they can play as a first investor. For example, CI prefers to invest alongside other partners, but recognizes the leadership role it must take to act as an early-stage investor to catalyze investments in the state. These funds are driven by long-term investment strategies that consider the returns their investments make to the organization itself, as well as to the wider regional economy. In addition to funding, they offer a rich mix of advising

⁵⁴ See MassVentures, "About Us," <http://www.mass-ventures.com/about-us/>.

⁵⁵ Connecticut Innovations, "Investment Philosophy," <http://ctinnovations.com/vc-entrepreneurs>.

⁵⁶ Connecticut Innovations, "Fiscal Year-End Recap 2016," <http://ctinnovations.com/financialsnapshot>.

and networking services to their companies, with the ultimate goal of boosting these companies to the next level of private investment or market entry.

Marketing and Networking: Kansas City Animal Health Corridor

The Kansas City Animal Health Corridor (KCAHC) is a regional economic development organization that supports the health and expansion of the animal health sector across the 18-county Greater Kansas City region that covers portions of both Kansas and Missouri. KCAHC's priorities include supporting collaboration and innovation within the animal health industry, public policy coordination and advocacy, and workforce development. Key components of KCAHC's activities that are instructive for Nebraska's biotechnology industry are its efforts in marketing and networking.

Organization

KCAHC is an affiliate organization to the Kansas City Area Development Council (KCADC), a larger, long-running general purpose economic development organization. KCADC has a history of examining the unique strengths of the region and creating affiliate organizations to market and support these strengths: KCAHC is one such organization, as is KC SmartPort, focused on distribution and logistics. KCAHC is a small organization itself and is housed within KCADC, though it has its own advisory board and funding stream, which is primarily provided by private sector board members.

KCAHC is not a public agency. However, it maintains a close working relationship with local and state governments. The Kansas and Missouri state governments both recognize KCAHC's role and importance, and use its materials and events in their marketing and economic development efforts.

History

As part of a broader community revitalization effort in the mid-2000s, Kansas City leaders mapped regional economic assets. One study found a remarkable concentration of animal health and nutrition and related manufacturers and distributors headquartered in the region, representing nearly one-third of global animal health sales.⁵⁷ Although many industry insiders were generally aware of the region's specialization, the extent of the region's assets was not widely known, and this new knowledge helped catalyze forward-thinking industry leaders to formalize their networks and launch the KCAHC as a collaborative initiative to invest in the industry's and region's shared economic success.

Activities

KCAHC conducts some business recruitment, as well as workforce development, such as working with local educational institutions to offer relevant manufacturing certifications, and providing resume sharing and matchmaking services between workers and employers. Much of KCAHC's efforts, though, have been towards elevating the status of the animal health industry in the region. KCAHC has helped improve perceptions of the sector from a dated "stock yard" impression to one of high-tech, innovative companies that support high-skill careers. It acknowledges the long-standing roots of the animal health

⁵⁷ Brakke Consulting, Inc., *Review of Kansas City Area Animal Health Assets*, 17 August 2006, <http://www.kcpt.org/files/uploads/2014/01/Final-Brakke-report-for-outside-groups.pdf>.

sector based on its legacy as an agricultural hub, while supporting the region's overall drive to increase its economic and social vitality and creativity.

KCAHC works simultaneously to improve both the perception of and the underlying reality behind the region's animal health sector. KCAHC is a prominent "connector" institution that helps various players, including researchers, startups, workers, job seekers, and established companies, form collaborations and locate resources. It holds a number of events to improve the networks that support regional innovation, including an annual Market Insight Seminar, Homecoming Dinner, and Investment Forum.⁵⁸ The KC Animal Health Investment Forum is one of the few specialized platforms for animal health startups looking to raise capital with or form partnerships with investors and large companies. Aside from encouraging investment, the forum has the auxiliary benefit of showcasing Kansas City's desirability as a place of business or residence for both companies and workers. Attendance at KCAHC's annual events and applications from investors have increased year-over-year; nearly 50 financial institutions and 120 animal health companies attended the Investment Forum in 2016, making it an advantageous networking opportunity for the industry.⁵⁹

Impacts

Over the last decade, KCAHC has helped Kansas City earn a global reputation for the strength of its animal health industry. Although this industry has a long presence in the area, it is now more clearly known as *the* leading region for animal health, and recruitment of both companies and workers within the industry is easier. Anecdotally, animal health divisions of pharmaceutical companies have boosted their reputation and received greater recognition. The Kansas City region is now home to over 300 animal health companies, which are collectively responsible for about 56% of an \$88.2 billion animal health, nutrition, and diagnostic industry, and employ over an estimated 20,000 people. Since the launch of KCAHC a decade ago, 46 new companies have relocated to the region.⁶⁰

⁵⁸ Kansas City Animal Health Corridor, "Annual Events," <http://kcanimalhealth.thinkkc.com/events/annual-events>.

⁵⁹ Sian Lazell, "Kansas City Homecoming Sees Launch of New Service Award and 2016 Iron Paw," *Animal Pharm*, 6 September 2016, <http://kcanimalhealth.thinkkc.com/news/media-coverage/kansas-city-homecoming-sees-launch-of-new-service-award-and-2016-iron-paw>.

⁶⁰ *Ibid.*

Nebraska Bioscience Roadmap

Commissioned by: Nebraska Legislature Natural Resources Committee in fulfillment of LB 246: Development of a Statewide Strategic Plan for the Biosciences

See the complete Nebraska Bioscience Roadmap at www.bionebraska.org.

Technology Platforms

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|---|--|
| 1. Animal Health and Production Improvement | 4. Crop and Water Resource Management |
| 2. Biomass, Biofuels, and Bioprocessing | 5. Food Science Safety and Nutrition |
| 3. Biotherapeutics and Delivery Mechanisms | 6. Regenerative Medicine and Transplantation |

Strategy 1:

Grow Nebraska's university bioscience R&D base around the state's bioscience research technology platforms and better connect Nebraska's universities and bioscience companies.

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| Action 1: | Create and fund a Nebraska Bioscience Eminent Scholars Program. |
| Action 2: | • Provide matching funds for industry/university collaborative applied research projects. |
| Action 3: | • Form technical networks around the bioscience technology platforms to foster information sharing across disciplines and institutions. |
| Action 4: | • Convene an industry/university panel to conduct a review of policies and procedures that affect university/private sector collaborations with a goal of streamlining technology transfer processes and accelerating the number of licenses and start-up companies. |

Strategy 2:

Create an infrastructure to encourage innovation, support commercialization, and assist bioscience entrepreneurs and start-up companies.

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| Action 5: | • Create a Bioscience Commercialization Fund to support proof-of-concept activities and advance the commercialization of bioscience technologies. |
| Action 6: | • Provide in-depth business development assistance to bioscience entrepreneurs and start-up companies. |
| Action 7: | • Enact legislation creating a bioscience angel investment tax credit. |
| Action 8: | Employ business and entrepreneurial students and private sector mentors to assist faculty in developing plans to commercialize their discoveries. |

Strategy 3:

Grow the state's bioscience industry cluster by supporting the retention and expansion of existing and emerging bioscience firms.

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| Action 9: | • Maintain a well-funded bioscience industry organization that can bring firms together to identify areas of concern and advocate for policies and programs to address them. |
| Action 10: | • Address state environmental and regulatory policies affecting bioscience companies. |
| Action 11: | • Provide funding for bioscience industry-related facility infrastructure. |
| Action 12: | • Expand SBIR outreach, provide increased technical assistance to SBIR applicants, and provide matching funds for Phase I awards. |
| Action 13: | Develop a strategy to build a comprehensive venture capital infrastructure in Nebraska. |

Strategy 4:

Develop, retain and attract bioscience talent.

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| Action 14: | • Increase student awareness of local bioscience opportunities through internships and other activities that expose graduate and undergraduate students to Nebraska's bioscience industry. |
| Action 15: | Undertake a campaign to identify experienced bioscience managers, researchers and technicians with ties to Nebraska and recruit them to return to Nebraska. |
| Action 16: | • Survey bioscience industry workforce needs and work with community colleges, regional colleges and universities to develop and implement curricula. |