

EXECUTIVE SUMMARY

Optimizing North Carolina's Innovation Ecosystem:

Recommendations to Accelerate Commercialization of University-Based Innovations through Public-Private Partnerships

Performed For: NCInnovation

Performed By: TEconomy Partners, LLC

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TEconomy Partners, LLC is a global leader in research, analysis, and strategy for innovation-driven economic development. Today, we're helping nations, states, regions, universities, and industries blueprint their future and translate knowledge into prosperity.



Executive Summary

Innovation has always stood as the key driver of economic growth. Nations and states that can translate their research base into commercially viable enterprises optimize their potential for job growth and economic prosperity.

This independent study examines North Carolina’s innovation position nationally and among benchmark states.¹ The analysis finds that North Carolina has fallen behind other innovation leaders in its ability to commercialize its world-class research base. As a result, economic opportunities are unrealized, leaving North Carolina at risk of not attaining the transformative benefits that can, and should, accompany its substantial research competencies.

It is recommended that North Carolina adopt proven approaches that have been successfully deployed elsewhere² to accelerate commercialized innovation from its research-intensive universities through public-private partnerships. This public-private partnership model aims to catalyze the formation and scale of high-growth university startups and to advance a more robust innovation ecosystem that serves the entire state. Generating these desired economic outcomes does not happen on its own but rather through a series of intentional, strategic, and proactive policy choices.

Conducting “business-as-usual” will not realize North Carolina’s untapped innovation potential. Instead, North Carolina should address the key challenges holding back its innovation economy by focusing on four strategic recommendations:

- **Develop applied research collaborations across universities structured to solve marketplace problems with commercially viable solutions.**
- **Infuse real-world business development acumen into university research efforts to help commercialize applied research.**
- **Create university-focused seed to early-stage capital funds to capitalize ventures that stem from applied research.**
- **Develop regional innovation networks to provide value-added services and connect academia, industry, and capital.**

¹ TEconomy compared North Carolina to the following benchmark states: Arizona, Colorado, Georgia, Massachusetts, South Carolina, Tennessee.

² Examples of best practices are discussed extensively in the full report.

Study Approach/Methodology

This independent study was commissioned by NCInnovation, a private sector-led organization recently formed to accelerate commercialized innovation from North Carolina universities. NCInnovation engaged TEconomy Partners, LLC (TEconomy), one of the nation's leading innovation-led economic development consulting organizations, to assess North Carolina's innovation landscape and recommend ways to improve it.

TEconomy's approach is **grounded in objective quantitative analysis** of North Carolina's innovation ecosystem, including its strengths and weaknesses compared to leading benchmark states and the differences in performance across North Carolina's regions. The analysis also **reflects the innovation ecosystem activities underway as well as the input, views, and perspectives of key stakeholders**. The recommendations are informed by best practices and designed to be **bold and realistic**.

Areas explored through the quantitative portion of the analysis included:

- **Research and ideation trends** exploring levels of university R&D, leading fields in university publications, industry R&D, and industry-funded academic R&D.
- **Technology diffusion trends** examining university technology transfer measures and patenting activities across industry and universities.
- **Growth capital trends** analyzing venture investments across the risk capital stack as well as sources of non-dilutive grants.
- **Industry growth and dynamics** revealing the level of growth and employment activity within new and younger firms with a special focus on traded-sector activities.

TEconomy's multi-pronged, qualitative approach involved:

- **Innovation asset mapping** of ongoing innovation ecosystem activities involving venture investment resources from university and non-university sources, university-based innovation and entrepreneurial services, and non-university technical and other innovation and entrepreneurial support services.
- **Targeted interviews with stakeholders** to identify regional and innovation-specific trends and identify opportunities to strengthen commercialization assets. These interviews included conversations with academic leaders, venture capital providers, leaders of economic development and entrepreneurial support organizations, and other relevant members of the innovation and entrepreneurship ecosystem. In total, more than 50 interviews were conducted.



Key Findings

North Carolina is an undisputed research powerhouse. North Carolina's industry performed \$9.2 billion in R&D in 2019, ranking second among benchmark states. In addition, with more than \$3.4B in total academic R&D in 2020, North Carolina ranks second among the benchmark states in total academic R&D. However, the state's innovation performance has not measured up to the size of its research base and continues to fall further behind in key measures of research and innovation.

Across numerous innovation measures, North Carolina consistently ranks behind many of its benchmark states:

- **Technology Transfer**—across its research universities, North Carolina places below the top 20 percent of universities in invention disclosures, new patent applications, and startups formed from 2018-2020.³
- **Patent Activity**—North Carolina places below nearly all benchmark states in patents per total R&D, though slightly above the U.S. average.⁴
- **Venture Capital Activity**—North Carolina invested less in venture capital funding compared to the size of its R&D base than nearly all benchmark states and below the U.S. average.⁵ As a proportion of state GDP, venture capital in North Carolina is only half the national average.

North Carolina ranks poorly on these quantitative measures despite the substantial number of innovation initiatives currently underway. Across North Carolina's regions, too many siloed efforts individually are not building a critical mass of activity and provide uneven capacity to advance innovation and high-growth startups, particularly for underserved entrepreneurs in rural areas of the state. A statewide inventory of innovation ecosystem activities found that:

- Of the 311 innovation ecosystem activities identified, 51 percent were based in the Research Triangle region.
- Seventy percent of the state's innovation ecosystem activities are located in six cities (Raleigh, Durham, Chapel Hill, Charlotte, Winston-Salem, and Greensboro), including 78 percent of the state's risk capital activities.

Based on the quantitative analysis, the asset inventory mapping, and discussions with key academic, risk capital, economic development, and private sector thought leaders from across the state, four key challenges impeding North Carolina's innovation economy were identified:

1. Lack of world-class collaborative research focused on finding market solutions to meet global needs in targeted technology fields.
2. Systemic lack of business acumen to understand technology/market assessments and de-risk the technology commercialization process resulting in successful new business formation.
3. Lack of early-stage, indigenous risk capital.
4. Lack of regional collaboration to provide value-added services/assistance to high-growth innovative firms.

3 TEconomy analysis of Association of University Technology Managers annual survey.

4 TEconomy analysis of USPTO Data from Clarivate Analytics and U.S. BEA county GDP data.

5 TEconomy analysis of Pitchbook and U.S. BEA county GDP data.

Recommended Strategic Initiatives

To overcome these key challenges, four strategic recommendations are proposed:

1. Develop applied research collaborations across universities structured to solve marketplace problems with commercially viable solutions.

The breadth and depth of North Carolina's university research base positions it to advance world-class research collaborations focused on market solutions in key technology areas. Missing in the North Carolina innovation ecosystem is a strategic focus on tapping the capabilities across North Carolina's universities to address market-driven needs for transformative innovations that can generate high-growth potential startups.

It is recommended that North Carolina establish Breakthrough Innovation Centers that, unlike traditional university research centers, will advance market-focused, multi-university, translational research centers in targeted areas of technology development.

Each Breakthrough Innovation Center will:

- Offer project funding for ground-breaking solutions to market-focused challenges proposed by multi-university teams.
- Be led by experienced C-level management teams with a proven track record of success in the targeted technology area.
- Form affiliated accelerators to support startups created in collaboration with private sector partners.
- Designate both senior and emerging research leaders as faculty fellows to pursue solutions to market challenges and serve as site minders at their universities to engage other researchers.
- Support a network of shared research labs across leading universities in each field and consider signature shared research lab developments.

2. Infuse real-world business development acumen into university research efforts to help commercialize applied research.

While nearly all of North Carolina's research-intensive universities embrace commercialization efforts, they acknowledge the challenges of bringing real-world business acumen to develop promising innovations and form high-quality startups.

It is recommended that an umbrella organization offer shared-services that infuse real-world business acumen into university research commercialization efforts. Such an organization should work in concert with North Carolina research universities and in close collaboration with existing innovation and entrepreneurial support organizations that are already deploying commercialization initiatives. Based on the challenges identified, there are multiple shared-services needed to enhance the business capabilities across North Carolina's university commercialization activities, including:

- Increasing recruitment of Entrepreneurs-in-Residence and external advisors to identify and assess potential technologies for commercialization, mentor/coach/join management teams, and advise on the development of, and focus on, market- and venture-relevant milestones for innovation projects with commercialization potential.
- Augmenting resources for de-risking high-potential university technologies through proof-of-concept.
- Advancing a network of C-level talent accessible to university startups as advisors and members of their management teams.
- Ensuring smaller research universities with limited staff and resources for technology commercialization have access to needed databases and services to inform commercialization decisions.

3. Create university-focused seed to early-stage capital funds to finance ventures that stem from applied research.

Early-stage risk capital is necessary if university startups are to realize their full potential and evolve into high-growth companies. There is a critical need in North Carolina for private venture capital firms to invest at the earliest stages thereby giving credibility to the endeavor, but more importantly, providing market savvy-advice and business counsel.

It is recommended that North Carolina create university-focused seed to early-stage capital funds (\$250k to \$2m investment tranches) that will:

- Support IP-driven deal flow by partnering with private sector, dedicated, early-stage venture development organizations or form new venture organizations that can manage initial phases of company formation, recruit management, and attract investors to scale high-growth companies.
- Tap growing interest within research universities to advance early-stage risk capital activities to catalyze university technology commercialization. It will be critical to gain the support of university endowments in order to create a critical mass of funding.

4. Develop regional innovation networks to provide value-added services and connect academia, industry, and capital.

There is a need to develop a continuum of services to support innovation-based startups throughout the entrepreneurial development process, especially in areas outside the state's urban centers. These efforts should reflect each region's unique innovation-based opportunities, which often dictate the types of services and resources required to help catalyze scale-up.

It is recommended that North Carolina foster regional innovation networks, especially in underserved regions, to connect academia, industry, and capital in every region of the state. High-functioning regional innovation networks:

- Build a sufficient scale of talented serial entrepreneurs and venture advisors/mentors who can provide intensive, in-depth help and assistance to innovative firms.
- Connect entrepreneurial efforts to existing regional industrial base and emerging opportunities, thereby tailoring each effort to leverage the region's comparative advantages.
- Deliver services throughout the region in coordination with existing efforts, academic assets, and other key stakeholders.
- Consider how best to address the need for physical infrastructure/place-making by leveraging existing assets to catalyze a more robust entrepreneurial culture.
- Address the need for more robust, value-added networking throughout each region and across the state, which is not currently happening at the level of scale necessary to create a pervasive entrepreneurial culture.
- Provide access/vetting to proof-of-concept funding and to early-stage risk capital.
- Ensure programming is culturally specific and accessible to rural and historically underserved populations.

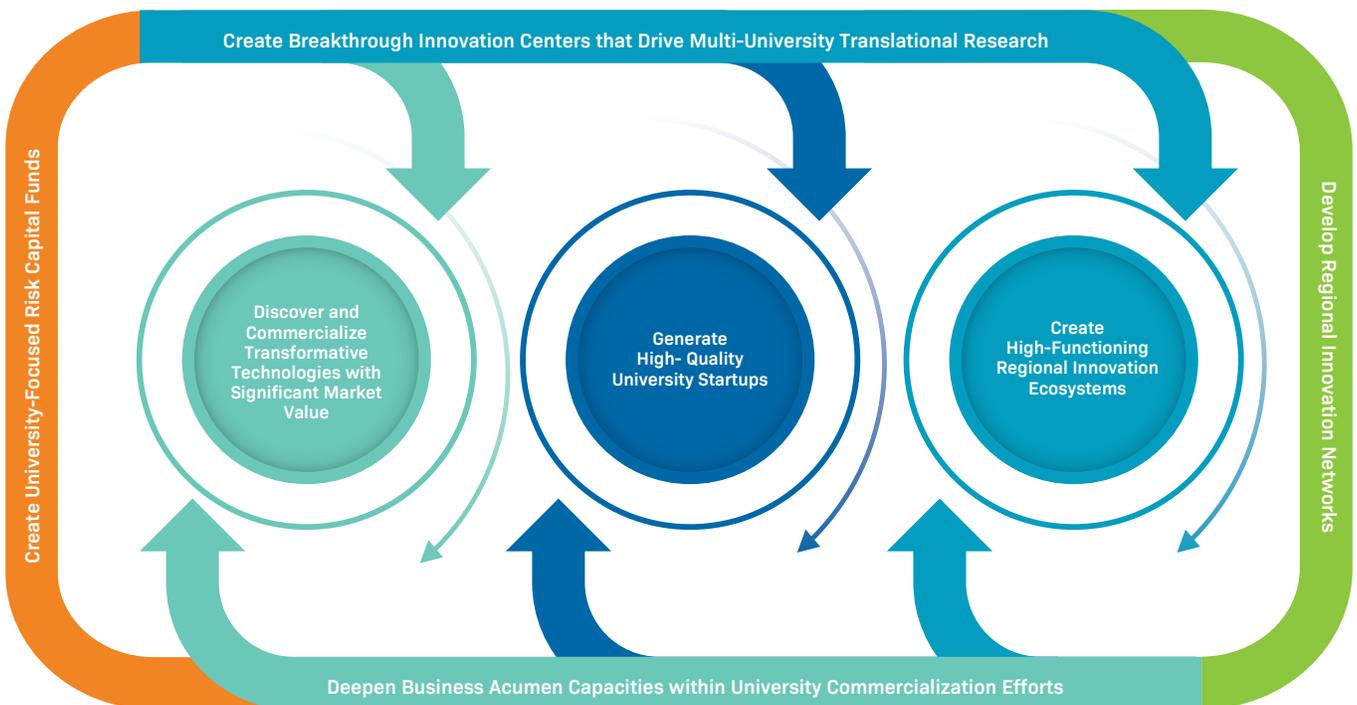


A Call To Action

North Carolina has an historic opportunity to build upon its world-class R&D base by realizing its untapped potential to commercialize innovations and create high-growth startups. ***This can only be done by embracing a tested model for public-private partnerships—one that accelerates commercialization stemming from North Carolina’s research-intensive universities, catalyzes the formation and growth of university startups, and advances a more robust innovation ecosystem that serves the entire state.***

As illustrated in Figure ES-1, the four recommended strategic initiatives will elevate North Carolina’s capabilities to discover and commercialize transformative technologies, commercialize those advances along with other university innovations into high-quality startups, and support the scale-up of those startups in regions across the state. By doing so, North Carolina will address the key challenges hindering the realization of its full economic potential.

Figure ES-1: Roadmap for Transforming North Carolina’s Innovation Economy



Source: TEconomy Partners, LLC.



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