NJPRO

CELEBRATING 20 YEARS OF BUSINESS RESEARCH

1995-2015

The Road to an Innovation Ecosystem

Highlights from the Past Five Years

As the birthplace of American industry, New Jersey historically has been a leading global innovation hub. As home to the telecommunications, chemical and pharmaceutical industries for more than 100 years, the state is world-renowned for its research and development (R&D) capabilities and aptitude for bringing innovations and disruptive technologies to the market.

However, the 21st century ushered in a new era in which R&D must be a collaborative effort among government, higher education and industry. New Jersey is blessed to be home to leading research-based companies whose life blood is innovation. But changing business models and the evolution of different industries have altered how R&D is conducted. Companies no longer can go it alone. For New Jersey to preserve its competitive edge – regionally, nationally, and globally – it must build an "innovation ecosystem" that creates an environment that encourages entrepreneurship and investment in research, promotes partnerships between industries and universities, provides a workforce that can support innovator industries, and bridges the clashing cultural differences between industry and academia.

Through its research over the past five years, NJPRO Foundation (NJPRO) has identified the issues and developed recommendations to meet the challenges inherent in building an innovation ecosystem. In its *Building Bridges Between Academic Institutions, Business and Government to Bring Innovation to the Marketplace*, released in July 2010[1] and *Building Bridges II*, issued in March 2013[2], NJPRO discusses how to create the vital partnerships between state government, academia and the private sector, as these collaborations form the foundation for building a culture of innovation.

Concurrently, in 2010 the New Jersey Business & Industry Association (NJBIA) and the HealthCare Institute of New Jersey (HINJ) joined forces to establish Innovation New Jersey (INJ), a coalition of industry, higher education and government, to foster greater collaboration and build a competitive innovation ecosystem. Together, NJPRO, INJ and its members have worked to implement the recommendations prescribed in the *Building Bridges* reports, leading the charge to break down silos and create a new culture of collaboration.

In the past five years, New Jersey's innovation ecosystem has seen progress in six major areas:

1. Improving the management and marketing of its higher education resources,
2. Enhancing the culture of collaboration among the state's institutions of higher education,
3. Investing in building out its innovation ecosystem infrastructure,
4. Strengthening its Science, Technology, Engineering and Mathematics (STEM) workforce pipeline,
5. Creating additional support programs and opportunities for entrepreneurs, and
6. Improving its ability to attract federal funding.

Advances in New Jersey's Innovation Ecosystem, 2010-2015:

Since 2010, a tremendous amount of activity has been undertaken to establish the foundation for a robust innovation ecosystem. This effort already has started to pay dividends. New Jersey has all the pieces to have a world-class innovation hub: strong research-based industries, outstanding academic institutions, a supportive state government, dynamic entrepreneurs, accessibility to capital and a highly-educated workforce. The challenge has been in taking these assets and ensuring that they are working in unison to create and maintain an effective and competitive innovation ecosystem. In only a few years, the state has made distinguishable and lasting advancements in several areas.

Marketing and Managing Our Assets

Many New Jersey residents can tell the story of the state's rich innovative past, but few can identify what R&D assets New Jersey has today. Until recently, unlike other leading innovation-based state economies, New Jersey did not involve its higher education sector in economic development, leading to a chasm in communications between industry and the state's universities and colleges. Today, the state's higher education system is taking inventory of its research and business development assets and the state is leveraging these resources to attract and retain business and create opportunities for students.

Breaking Down Silos and Creating Statewide Communications

Connecting industry with higher education institutions, the Innovation New Jersey coalition has grown immensely since its founding in 2010. Through its quarterly meetings and weekly communications, the innovation community is networked and kept informed on the latest trends, capabilities and accomplishments in the state. And due to its advocacy efforts, INJ has been successful in encouraging the state's universities to designate and market single points of contact as liaisons to the business community to make it easier for companies to engage academic partners.

Leveraging Higher Education Assets for Business Development

Charged with recruiting and retaining businesses in the state, the Partnership For Action (PFA) has been able to leverage New Jersey's higher education institutions in support of industries' needs in workforce development and R&D.[3] Created by Governor Chris Christie and led by Lieutenant Governor Kim Guadagno, the PFA has brokered deals with dozens of companies, including Allergan and CommVault, by promoting New Jersey's innovation assets around the world.[4] Additionally, PFA was able to create collaborations in research and workforce alignment with countries including the United Kingdom and Mexico[5] and showcase New Jersey's academic assets at such international conferences as the BIO International Convention held in Philadelphia.[6]

Strategic Planning for New Jersey's Innovation Ecosystem

In 2013, the Christie Administration established the New Jersey Council on Innovation, a recommendation made in NJPRO's *Building Bridges II*. Headed by the Secretary of Higher Education, the Council brought together the state's academic and business leaders to develop a strategic plan on how to build out the state's innovation ecosystem. The Council adopted *Building Bridges II* as its blueprint and began work on implementing the report's remaining recommendations, including creating a master database of all academic assets, speeding up the contracting process, developing attractive intellectual property agreements, and ensuring that the state has a steady pipeline in its STEM workforce.[7]

Improving the Collaborative Culture of Higher Education

Since the state was home to many innovator industries that conducted their own R&D, New Jersey did not have an incentive to involve its higher education sector in economic development. However, to diversify their economies, other states learned how to change the culture of their academic communities by encouraging collaborations to meet the challenges faced by industry. A similar culture shift is now underway in New Jersey, with universities collaborating both with industry and each other.

University to Industry Partnerships

Today, New Jersey's universities are directly supporting business needs by investing in relevant physical infrastructure and providing academic expertise. For example, within the past five years, Rowan University and New Jersey Institute of Technology (NJIT) have each established innovation centers compromised of startups as well as major corporations, specifically designed to share the schools' resources with the business community.

Rowan's South Jersey Technology Park (SJTP) offers expertise and research facilities focusing on sustainability, biotechnology, infrastructure and computation. SJTP also has partnerships with the U.S. Navy, Cooper Hospital and the City of Camden.[8]

The New Jersey Innovation Institute (NJII), a corporation of NJIT, supports ventures in such emergent and vital areas as homeland security, manufacturing, health IT and financial services, and has partnered with the U.S. Department of Defense and JP Morgan.[9]

Higher Education Restructuring and Realigning

Moreover, New Jersey now has two research universities with medical schools that are partnering with the life sciences industry to conduct clinical research. In signing the bipartisan "New Jersey Medical and Health Sciences Education Restructuring Act" into law in 2012, Governor

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Refining the State's STEM Pipeline

Meeting the demands of an innovation ecosystem requires the state to continue to focus on STEM education, even as it touts its highly educated workforce. While New Jersey boasts more scientists and engineers per square mile than any other state in the country[18], the state is working to improve its pipeline of STEM-prepared talent to sustain and grow its innovation economy.

Solidifying STEM Pathways for Industry

While it is often thought that obtaining a STEM degree guarantees employment after college, partnerships with employers offer students introductions and firsthand experience in a STEM career. A strategic collaboration like the one between Lockheed Martin and Rowan University offers a template for partnerships on R&D as well as educating future engineers. Through its College of Engineering and its clinics, the two organizations collaborate on next generation radar system products and services for Lockheed customers, while allowing Rowan engineering students to work while they learn. Qualified students not only learn from experienced industry engineers, but they are able to graduate with federal security clearance and an immediate job after graduation.[19]

Likewise, Rutgers University received a $2 million National Institutes of Health (NIH) grant last year to create the Interdisciplinary Job Opportunities for Biomedical Scientists (iJOBS) program. To support the growing number of PhD students entering the private sector and other non-academic employment, the program provides training and education in business management, intellectual property management and clinical and regulatory sciences.[20]

Coordinating STEM Education Efforts

Hundreds of STEM education initiatives are underway in New Jersey. To keep track of these efforts, the Office of the Secretary of Higher Education this year launched the NJ STEM Pathways Network, a public-private alliance to coordinate these efforts. At the Secretary's request, more than three dozen representatives of academia, industry, foundations and government have come together to align the state's STEM resources and share exemplary learning opportunities.[21]

[IMPROVING THE COLLABORATIVE CONTINUED FROM PAGE 3]

Christie overhauled the state's higher education system and created three regional centers of excellence by transferring the assets of the University of Medicine and Dentistry of New Jersey (UMDNJ) to Rutgers and Rowan universities.

With this transfer of assets, Rutgers was able to create a world-class life sciences research infrastructure by bringing all of its life science programs and resources under one roof in the new Rutgers Biomedical and Health Sciences center (RBHS). In South Jersey, Rowan was designated a research university and became one of only two institutions in the nation with both allopathic and osteopathic medical schools.[10] With this new designation and biomedical resources, Rowan was able to enter into an agreement to bring MD Anderson Cancer Center to New Jersey.[11]

Building an Entrepreneurial and Startup Infrastructure

Startups and an entrepreneurial spirit are critical parts of the innovation ecosystem. Taking risks to launch startups, creating new products and working in the forefront of innovation are vital for a robust innovation economy. New Jersey has begun training and supporting existing scientists and engineers while also educating the next generation of STEM professionals as entrepreneurs.

Providing One Stop Shops for Startups

Seeking guidance from seasoned business professionals and seed funding are more often than not, the greatest challenges that startups and young companies face. In 2012, New Jersey launched its first technology accelerator program, TechLaunch. Supported by the NJEDA, Montclair State University, tech industry veterans and private equity investors, TechLaunch provides a 16-week boot camp for tech startups. Additionally, it provides entrepreneurs with mentors, business training, key services and exposure to potential investors in exchange for five percent equity in the company.[22]

The NJEDA also has created a forum for funding and mentoring opportunities for life sciences startups. Last year, the NJEDA launched "New Jersey Founders & Funders," a program designed to connect entrepreneurs at early-stage technology and life sciences companies with potential investors. The program brings together venture capitalists with select companies for one-on-one sessions to discuss development strategies, business models and funding opportunities.[23]

This year, the NJEDA launched an "Executives-in-Residence" program to mentor and coach promising biotech company professionals. In partnership with BioNJ, executives with high level business experience and skills in life sciences offer their insights to mentees at the EDA's Commercialization Center for Innovative Technologies (CCIT).[24]

Bringing Entrepreneurship into STEM Education

New Jersey and its higher education institutions understand that it is not enough to graduate with a purely technical STEM education. The next generation of scientists and engineers also will have to be entrepreneurial. Institutions around the state have begun adopting courses and updating their curricula to incorporate business practices into their STEM programs. For example, Princeton University's Keller Center began offering a formal "Introduction to Entrepreneurship" class last year to "jolt" students into thinking creatively about what it takes to launch a venture.[25] This course is complemented by informal programs like the University's Entrepreneurship Club and the Princeton Social Entrepreneurship Initiative.[26]

At Rutgers University, its Professional Science Master's Program combines the scientific and engineering fields with the entrepreneurial skills that can translate scientific and technical knowledge into profitable products and services. The popularity and variety of courses and concentrations in this program have grown significantly since its creation in 2010.[27]

Strengthening Financial Investments in Infrastructure and R&D

In order to support innovators, an innovation ecosystem needs state-of-the-art technology, facilities and funding to help companies flourish. Over the past five years, New Jersey invested heavily in its higher education infrastructure for the first time in 27 years and adopted targeted financial incentives to spur investment in R&D.

Investing in Higher Education Institutions

In 2012, Governor Christie committed $1.3 billion to fund capital investments at New Jersey's colleges and universities. This included the voter-approved $750 million "Building Our Future Bond Act," the first higher education bond act since 1988.[12] Thus far, the capital investment has supported 176 construction projects on 46 campuses in the Garden State.[13]

Expanding Incentives for R&D Investments

Early in 2013, Governor Christie signed into law the "New Jersey Angel Investor Tax Credit Act," stimulating early stage, or "angel" investments in New Jersey's emerging technology companies. The incentive program, inspired by NJPRO's *Building Bridges II* report, provides tax credits of up to 10 percent of a qualified investment for small startups or entrepreneurs in the technology sector. Under the program, the EDA approved 181 investments in 2014 alone, representing a total of more than $60.2 million of private investment in New Jersey-based companies.[14]

In addition to these new commitments, the state continues the Technology Business Tax Certificate Transfer Program[15] and the Grow New Jersey Assistance Program.[16] Both administered by the New Jersey Economic Development Authority (EDA), these programs provide additional incentives for investment in technology companies in New Jersey. In Fiscal Year 2015 alone, 44 technology and biotechnology companies were approved to share a total of $54 million in tax credits; the average benefit for an approved company was $1.2 million. Additionally, since the 2013 launch of the Economic Opportunity Act (EOA) business incentive program, 21 companies in the technology sector have been awarded a total of $448 million in Grow NJ tax credits and more technology companies are eligible.[17]

Expanding Federal Funding and Partnerships

Obtaining federal research dollars not only helps support an innovation ecosystem, but it also sends a positive message to industry and can attract new innovator companies. While New Jersey receives a modest amount of federal research grants, there is room for New Jersey to grow and compete with other states. To that end, the state and its universities have taken tangible steps to attract increased federal funding by collaborating on their research applications.

Tapping into New Jersey's Federal Laboratories

While New Jersey and Princeton University have always had a strong partnership with the Princeton Plasma Physics Laboratory and the Geophysical Fluid Dynamics Laboratory, the state is home to five other high profile federal labs.[28] Most recently, the Federal Aviation Administration named New Jersey as a testing site for drones under the federal government's plan to authorize the commercialization of unmanned aircraft over the next several years. The William J. Hughes Technical Center at the Atlantic City International Airport now will be working with Rutgers University, NJIT, Stockton University, Stockton Aviation Research and Technology Park and the Airport, on joint research in aviation technology.[29]

University-to-University Partnerships for Federal Funding

New Jersey's institutions of higher education also have proactively partnered to pursue federal dollars. At the end of 2013, the state's academic institutions and state and federal government representatives first met to create a consortium that would become the NJ Big Data Alliance (NJBDA). Founded by Kean University, Montclair State University, NJIT, Princeton University, Rowan University, Richard Stockton University, Rutgers University and Stevens Institute of Technology, the NJBDA will significantly contribute to New Jersey's reputation as a strong competitor in the field of big data and is expected to be catalyst for attracting federal research funding.[30]

Conclusion

Although getting a late start, New Jersey has made dramatic progress over the past five years in coordinating and leveraging its resources into building a functioning and competitive innovation ecosystem. While there is still more to be done, the state's innovative past is modernizing for the 21st Century.

From acknowledging and taking action to bolster its innovator industries, to changing the culture of university relations with industry, to restructuring the state's higher education system to unleash the power of its academic research capabilities, to creating a community that spans the innovation spectrum, New Jersey now has the foundation to support its long-domiciled innovator industries and attract new ones.

Most importantly, for the first time, all stakeholders – industry, universities and colleges, state government, entrepreneurs, funders and others – recognize their need to collaborate in the common pursuit of building the state's innovation ecosystem to spur investment, create jobs and reaffirm New Jersey's position as a global innovation hub.

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About The Foundation

The New Jersey Policy Research Organization (NJPRO) Foundation is an independent public policy research affiliate of the New Jersey Business & Industry Association. NJPRO produces innovative, timely and practical research. NJPRO is New Jersey's leading policy organization conducting research on behalf of New Jersey employers. Governed by an independent Board of Trustees, NJPRO is a nonpartisan, tax-exempt organization. NJPRO depends on the support of companies, individuals and foundations for its income.

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