EXECUTIVE SUMMARY

Innovation Park@Rutgers:
An Assessment and Development Pathway for a Collaboration and Commercialization Complex at Rutgers-New Brunswick

Accelerating High-Quality Jobs and Business Growth for New Jersey

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Introduction

With the intent of sustaining long-term economic growth, New Jersey recognizes that it must build upon and strengthen its assets as drivers of economic growth for the future. As Governor Christie identified in his State of the State Address on January 11, 2011: "Today, we in New Jersey must rediscover our strengths—and put them to work for our people." Of particular importance for New Jersey’s future economic growth is the ability of the state’s higher education institutions to work in partnership with industry. The recent report from the Governor’s Task Force on Higher Education, led by former Governor Kean, makes clear that "New Jersey needs a strategic partnership between institutions of higher education and the state’s business and industries to stimulate economic growth." 1

It is not only the “size” of Rutgers University’s research and talent generation activities that is of importance, but also the “translation” of this research and talent base into economic impact. This is accomplished by fostering industry clusters, generating new company formation, and advancing new product development with both new and existing firms. This potential, housed in research universities, must be unlocked if a state is to fully realize the benefits research universities offer.

But finding mechanisms to foster this translation is difficult. As the Kean report notes, “Collaborations between university and corporate researchers are difficult for several reasons. Universities must spend considerable effort identifying and marketing campus-based research to prospective partner companies. At the same time, corporations are often unaware of universities’ research efforts.” 2

One best practice approach to address this translation gap is university-related research parks. According to the National Research Council in its study of research park best practices:

“Research parks are seen increasingly around the world as a means to create dynamic clusters that accelerate economic growth and international competitiveness. They are widely considered to be a proven tool to encourage the formation of innovative high technology companies. They are also seen as an effective means to generate employment and to make existing companies more competitive.” 3

Regions across the nation and the world are advancing research parks and other technology-oriented development complexes as key components in creating the physical environments that can generate, attract, and retain technology companies and talent. These research park developments are having significant economic spill-over impacts—developing the physical places that connect innovation assets to unleash economic growth is part of what is needed to succeed in the global economy.

The direct potential impacts from the tenants at Innovation Park@Rutgers, specifically, can be projected using data from an assessment of the current state of research park development in the U.S. and Canada prepared by the Association of University Related Research Parks in partnership with Battelle Technology Partnership Practice. 4 This assessment involved responses from 134 research parks to a detailed AU RP-Battelle survey in 2007, just before the recession hit and the real estate market collapsed across the nation. The AU RP-Battelle survey identified 264,413 direct jobs found across the 134 research parks responding to its survey, with 80 percent of the employment found among industry tenants, 11 percent from university tenants, 6 percent in government tenants and another 3 percent from retail, daycare and other support services. Battelle then estimated the economic impact of these direct jobs, based on the distribution of the types of tenants and their specific activities, calculating a total employment impact of 2.57 jobs from each one job at research parks across the nation. The AU RP-Battelle study also found that the average built out space across all research parks stood at close to one million sq. ft.

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Using these research park parameters from the ALURP-Battelle assessment, at full build out, Innovation Park@Rutgers can expect to create direct employment of over 2,000 jobs across industry, university and other tenants, plus broader job gains of over 3,000 for a total employment of over 5,000 jobs. Based on this high level estimate of employment impacts, Battelle projects that the combined annual total state and local tax revenues generated by this level of direct employment would reach $5.4 million. Combining the full economic impacts of the park including direct, indirect, and induced impacts, the annual state and local tax impacts could reach more than $31 million. This state and local tax estimate uses the IMPLAN input-output model for New Jersey and assumes that the direct jobs at Innovation Park@Rutgers will be distributed across the seven industry targets of opportunity identified as likely tenants by Battelle’s assessment (see Section 2 on development drivers).

Also of importance, though harder to quantify at the outset, will be a set of even broader qualitative potential impacts, including:

> Increased industry-university collaborations with established companies that can provide industry access to technology expertise and talent found at Rutgers University, and improve their growth prospects in New Jersey.

> More effective technology commercialization of university research into spin-out companies that can benefit from flexible space along with close access to the university researchers driving the technology advancements.

> Greater competitiveness of New Jersey for major new federal research grants and investments that increasingly require the ability to bring together multi-disciplinary research along with industry partners in a common site.

> Providing Rutgers’ students with internship opportunities that can ease their transition into finding full time jobs upon graduation, while creating relationships with New Jersey companies found within the research park.

Taken together, these quantitative and qualitative potential economic impacts of Innovation Park@Rutgers are quite substantial and offer the promise of a new economic driver for innovation-based development and its resulting high quality, high paying jobs for New Jersey.

Rutgers as a Driver for Innovation and Economic Development in New Jersey

Rutgers University is already making significant contributions to advancing New Jersey’s economy. In total economic impact, Rutgers University is estimated to generate 6 dollars for every 1 dollar of state funding. A 2009 study found that in return for the state’s $595.3 million investment in 2008, Rutgers University generated a total economic impact of $3.8 billion in that year. Rutgers directly employs more than 27,000 individuals including more than 9,900 full-time faculty and staff; approximately 13,700 students and temporary employees; and over 3,600 visiting scholars, trades people, and other employees. In state spending, activities by the university create an additional 7,985 jobs through both direct purchases and capital improvements.

Beyond this, Rutgers University is also one of the nation’s premier public research universities with distinctive areas of research excellence that can drive innovation and economic development. Research expenditures at Rutgers University reached $433 million in FY 2010 up from $237 million in FY 2001. Among public research universities without a medical school, Rutgers University stood 7th in the nation in FY 2009, the most recent year for comparable data nationwide. Among all public research universities in FY 2009, Rutgers University stood 30th in the nation.

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5 This estimate of state and local taxes assumes no property taxes, since the facilities at Innovation Park@Rutgers may be exempt.
6 Industry employment and wage data presented in this section are for 2009 and derived from the U.S. Bureau of Labor Statistics (BLS), Quarterly Census of Employment and Wages (QCEW) which provide the most current and detailed industry employment, establishment, and wage data at the county, state, and national levels. QCEW provides comprehensive data reported by companies for workers covered by state unemployment insurance laws. Battelle purchases an enhanced version of these data from a private vendor, the Minnesota IMPLAN Group, Inc. The enhanced IMPLAN file is used because it provides estimates for employment in industries where BLS does not release detailed information due to confidentiality concerns.
The research excellence at Rutgers University is broad based. Based on an analysis of peer-reviewed publications using Thomson Reuters University/Institutional Science Indicators, a widely used measure of scholarly activity, Rutgers University stands out in over 40 fields in either the quality of its publications (citations per publication) or its share of U.S. publications. In six research areas, Rutgers has more than one percent of the national research funding, including mathematical sciences, chemistry, oceanography, chemical engineering, agricultural sciences and materials engineering.

Just as important, Rutgers stands out as a generator of talent for New Jersey. Over 200,000 of its living alumni reside in New Jersey. Its programs span over 100 majors at the bachelor's level, 100 master's programs and 80 doctoral and professional programs. The impact of Rutgers University on the talent base for New Jersey reaches across every county in the state.

**Advancing Innovation Park@Rutgers**

Given New Jersey's need to advance economic development, it is imperative that Rutgers University continue to seek ways to foster partnerships between higher education and industry. Innovation Park@Rutgers is a bold new initiative to build a community of innovation at the New Brunswick campuses of Rutgers University—with a particular focus on linking the Busch and Livingston campuses in Piscataway. The value of Innovation Park@Rutgers is to serve as a catalyst for commercialization of university research and a bridge for industry to more easily and intensively access the research and talent base found at Rutgers University.

In order to provide an expert and independent assessment of the potential, as well as guide the focus, program, and development pathway for Innovation Park@Rutgers, Rutgers University engaged Battelle's Technology Partnership Practice, which is part of the world's largest independent nonprofit research and development organization.

A key objective of this effort was to identify the targets of opportunity that build upon the research and talent base found at Rutgers University. The task was then to determine how best to link these opportunities to broader industrial development in New Jersey. Based on this analysis, Battelle was then tasked to set out a conceptual framework for advancing the Innovation Park@Rutgers.

Guiding the project were two advisory committees that were formed by Rutgers University to assist the Battelle project team. The advisory committees provided relevant past reports and studies that served as a basis of initial information, identified key stakeholders to interview, reviewed findings and provided additional input and feedback. The “external” advisory committee was comprised of industry and economic development leaders from across New Jersey. The “internal” advisory committee was comprised of University leaders. (See inside back cover for a listing of the Advisory Committee members).

**Key Findings for Advancing Innovation Park@Rutgers**

A detailed analysis examining the research strengths at Rutgers within the overall context of New Jersey’s economy identified several high potential areas as targets of opportunity:

- Advanced Enterprise Computing
- Biopharmaceutical Development, Delivery and Manufacturing
- Biomaterials and Regenerative Medicine
- Food and Nutrition
- Logistics and Supply Chain Management
- Renewable Energy Storage, Generation and Efficiency
- Advanced Materials Ceramics, Composites and Nanotechnology
Building on these targets of opportunity, the recommended development pathway recognizes the importance of Innovation Park@Rutgers to serve as a magnet for industry development and not as a large scale commercial real estate opportunity. This places the emphasis on creating an environment that fosters open innovation and leverages industry relationships to grow in the region. This environment will be cultivated by the management and leadership of one central authority—the Office of Economic Development.

As an initial development phase, it is proposed that Rutgers develop a collaborative industry-university complex that focuses initial efforts on:

- The consolidation and expansion of specialized, shared-use laboratories and equipment.
- The availability of co-location space for industry partners, whether well-established multi-national companies or university-related spin-offs.
- Building and expanding comprehensive university-industry partnership programs
- Developing applied R&D facilities that can reduce research to practice and advance working prototypes of technology innovations.

Among the specific facilities to be considered as part of this collaborative industry-university complex are:

- A collaboration and partnering facility to bring together many of the existing industry-university research centers found at Rutgers University into a single facility with available multi-tenant space for partnering and business service organizations;
- A new high performance computing facility that would consolidate and expand the very fragmented computing centers found across the Rutgers campuses, while providing collaborative research and partnering space; and
- A technical and business conferencing center, which would be part of a larger facility also housing currently dispersed corporate and professional education activities that will be consolidated on the Livingston campus.

Moving this development pathway forward will require the formation of a non-profit research park entity that would oversee the development of Innovation Park@Rutgers. This will enable the ability to work in an agile manner and at the speed of business.

The new non-profit research entity would:

- Facilitate industry-university collaborations
- Market the park in concert with industry-university collaborations
- Develop sites in collaboration with private developers
- Plan and determine development restrictions
- Secure financing
- Manage day to day relationships across industry and university partners
- Liaise with relevant university administrative units

To advance this new non-profit research park entity, Rutgers University will enter into long term land leases or transfer land parcels to the Innovation Park@Rutgers with provisions to ensure accountability and results.
**Development Drivers**

University research parks need to be considered in the context of gaining competitive advantage through specialization, by linking with key industry drivers and advancing technology capabilities. For New Jersey, it is important for the Innovation Park@Rutgers, to:

> Target opportunity areas of current and emerging research strengths at Rutgers University that align with growing markets and locally-based industry strengths.

> Position Rutgers to realize connections with industry development.

The backdrop of this assessment is that a new era of open innovation is now driving economic dynamism for the emerging 21st century economy. The legacy of New Jersey’s past economy was built on the shoulders of major industry players relying on internal research labs for innovative ideas. The Bell Labs that made New Jersey a mecca for innovation is now gone. In its place has emerged a more dynamic and distributed landscape for interaction across established companies, emerging technology ventures, and universities. New Jersey must become more competitive in this new context.

**The Context of the New Jersey Economy**

New Jersey stands as one of the most advanced economies in the U.S., offering an excellent place to live, work and raise a family. This high standard of living is based on the industrial strength of the state. In particular, New Jersey stands out in its high concentration of high wage industries, including the following that are more concentrated in New Jersey than the nation:

> **Bioscience industries**, involving pharmaceuticals, research & testing, medical labs and medical devices, are 223 percent more concentrated, with average annual wages of $112,039 and 79,472 workers.

> **Chemical industry** with significant linkages and synergies with the pharmaceutical industry is 56 percent more concentrated, with average annual wages of $79,556, employing 23,456 workers.

> **Corporate headquarters and managing offices** are 30 percent more concentrated, with average annual wages of $120,211, employing 85,680 workers.

> **Software and computer services** are 26 percent more concentrated, with annual wages of $95,823, employing 74,801 workers.

> **Management consulting industries** are 26 percent more concentrated with average annual wages of $87,292, employing 19,523 workers.

> **Finance and banking industries** are 19 percent more concentrated with average annual wages of $100,136, employing 126,127 workers.

This significant industry complex is present in New Jersey because the state offers a high value business environment, particularly in the key factors of talent, R&D and capital, that drive today’s knowledge-based economy.

However, New Jersey has declined over the last decade in one key economic measure—job growth. New Jersey’s private industries lagged significantly behind national job growth during the economic expansion period of 2001 to 2007, growing a meager 1.4 percent in New Jersey compared to 4.3 percent nationally, while during the 2007 to 2009 economic recession, New Jersey’s job loss was only slightly better at -5.7 percent compared to the nation at -6.2 percent.

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7 Industry employment and wage data presented in this section are for 2009 and derived from the U.S. Bureau of Labor Statistics (BLS). Quarterly Census of Employment and Wages (QCEW) which provide the most current and detailed industry employment, establishment, and wage data at the county, state, and national levels. QCEW provides comprehensive data reported by companies covered by state unemployment insurance laws. Battelle purchases an enhanced version of these data from a private vendor, the Minnesota IMPLAN Group, Inc. The enhanced IMPLAN file is used because it provides estimates for employment in industries where BLS does not release detailed information due to confidentiality concerns.
These weaknesses in the jobs situation across New Jersey's major industry sectors point to a more general weakness in economic dynamism found in New Jersey. Over the 1999 to 2008 period, New Jersey did not fare well in new start-ups and suffered significantly in closings and relocations:8

> In the net churning of jobs from openings and closings. New Jersey recorded a loss of 416,120 jobs or an 8.1 percent employment loss from 1999 to 2008, placing it 48th among states. Only Illinois and Massachusetts had a higher loss in churning over this period, and 23 states had a positive churning where jobs from openings exceeded closings.

> In net relocations, New Jersey also recorded job losses, reaching 18,532 over the 1999 to 2008 period, placing it 41st among other states.

> In continuing industry net job performance, New Jersey had a gain of 6.5 percent or 337,836 jobs from 1999 to 2008, reflecting higher levels of existing business expansions compared to contractions. But this level placed New Jersey 24th in the nation, an average performance.

Taking a proactive response to the economic issues of the state, the Christie administration has reorganized and strengthened efforts to make New Jersey a leader for job creation, economic growth, and business investment. These efforts include the Lieutenant Governor's Partnership for Action, which is the hub for all economic development activity in New Jersey. The Partnership for Action is comprised of the newly created Choose NJ, an independently funded and operated 501(c) (3) nonprofit corporation created to encourage and nurture economic growth throughout New Jersey, the Business Action Center which serves as a “one-stop shop” for business and the NJ Economic Development Authority which provides financing for projects and businesses. In addition, Innovation NJ9 was established as a diverse coalition of business, higher education and government with a mission to strengthen and enhance the culture of innovation in New Jersey.

In October, 2011 the final draft of the “New Jersey State Strategic Plan: New Jersey’s State Development & Redevelopment Plan” was released. The State Strategic Plan, chaired by Lieutenant Governor Kim Guadagno, involves targeting economic growth by identifying and promoting growth in regions of the state with clusters of critical or emerging industries. These clusters will be drivers of strong economic growth, and is very consistent with the targets identified for the Innovation Park@Rutgers, such as biopharmaceuticals, life sciences and logistics. In addition, the importance of universities as essential components of the state’s economic development strategy was noted.

“Of particular note is the relationship between RICs [Regional Innovation Clusters] and the location of higher education institutions and institutions that deliver workforce development programs. Higher education institutions and others that deliver workforce development are often located within and often lead to private/public partnership resulting in innovation and economic growth. As such, a statewide “RIC” strategy must recognize the role that the State’s higher education institutions can and must play.” 10

The State Strategic Plan was further bolstered by Governor Christie signing Executive Order No. 78, which authorizes a cabinet-level steering committee to drive its implementation. Consistent with this more growth oriented approach, recent legislation known as the “Grow New Jersey Assistance Program” provides for tax credits to businesses creating or retaining a minimum 100 full-time jobs, and making a capital investment of at least $20 million at a qualified facility.

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9 http://innovationnj.net/

Identifying Opportunities for Innovation Park@Rutgers to Engage University Assets for Advancing New Jersey’s Economy

In this era of open innovation, the economic stagnation impacting New Jersey’s major industry drivers points to the critical importance of mining new ideas and applications and the broader economic development potential of Rutgers University. As the state’s flagship research university, Rutgers needs to be part of creating a new economic dynamism in New Jersey to reverse the economic stagnation of the past decade. The likelihood of successful engagement is quite high because of the rich environment of high wage industries and the presence of talent, technology and capital found in New Jersey.

The Battelle project team undertook this assessment by developing and applying a set of key criteria in order to identify targets of opportunity for advancing Innovation Park@Rutgers, including: Rutgers’ research strengths, commercialization activities and industry research collaborations. The team also analyzed the broader regional industry presence, including both well-established firms and emerging high-growth potential companies, as well as growth potential as informed by market research studies.

Based upon the existing and emerging research strengths at Rutgers, the assessment yielded seven specific targets of opportunity for Innovation Park@Rutgers that align with growing markets and presence of specialized industries in New Jersey. These seven targets of opportunity are:

> Advanced Enterprise Computing
> BioPharmaceutical Development, Delivery and Manufacturing
> Biomaterials and Regenerative Medicine
> Food and Nutrition
> Logistics and Supply Chain Management
> Renewable Energy Storage, Generation and Efficiency
> Advanced Materials Ceramics, Composites and Nanotechnology

The following sets out the major research strengths of Rutgers University and the presence of industry across New Jersey in each of these seven targets of opportunity.

**Advanced Enterprise Computing**

RUTGERS RESEARCH STRENGTHS

Among the major research centers found at Rutgers are:

The Center for Discrete Mathematics and Theoretical Computer Science (DIMACS)
The Center for Dynamic Data Analytics
Center for Transportation Safety, Security Risk
Wireless Information Network Laboratory (WINLAB)
The Center for Autonomic Computing (CAC)
The Center for Computational Design (CCD)
The Rutgers Discovery Informatics Institute (RDI2)

In publications activity, Rutgers stands out in several fields related to Advanced Enterprise Computing, both in the share of U.S. publications and for many fields demonstrating high quality by having a higher citation impact than the national average:

> Software Engineering
> Mathematics
> Operations Research & Management Science
NEW JERSEY INDUSTRY PRESENCE

Statewide employment in software and computer services stands at 74,801 and is 26 percent more specialized than the nation, though it lost 6.2 percent employment from 2001 to 2009.

> A leading niche in Central and Northern New Jersey is found in custom computer programming services, representing 19,380 jobs and a 77 percent greater specialization than the nation. It recorded strong gains of 13.1 percent in the economic expansion years and a small decline of -1.6 percent in the recession years of 2007–2009.

> Leading major firms with significant (1000+) employment base in the state include: Verizon, Telcordia Technologies, ADP, Alcatel Lucent USA and Avaya.

> Corporate headquarters and operations centers are also key users and provide a base for application development and customization in IT and advanced computing. This is evident in the strong presence of financial services, including major operations centers for Wall Street.

> Within larger corporations, R&D centers and management are also often co-located with marketing as part of the HQ operation. Since 2006, the executives of major companies such as Pitney Bowes, Standard Chartered Bank, Audible.com, Mimeo.com, CGC Genetics, Panasonic, Marriott, Manischewitz, among others have made new location or expansion decisions for NJ as home for new corporate headquarters and major operations centers.

> Since 2007, there have been 57 new venture-backed start-up firms in New Jersey in communications, computer hardware and software attracting over $505 million in risk capital.

**Biopharmaceutical Development, Delivery and Manufacturing**

RUTGERS RESEARCH STRENGTHS

Among the major research centers found at Rutgers are:

The NSF Engineering Research Center for Structure Organic Particulate Systems

New Jersey Center for Biomaterials

The Protein Data Bank (PDB)

The Rutgers University Cell & DNA Repository (RUCDR)

Northeast Structural Genomics Consortium

The Center for Deep-Sea Ecology and Microbiology

The Waksman Institute of Microbiology

Center for Molecular and Behavioral Neuroscience (CMBN)

The W. M. Keck Center for Collaborative Neuroscience

The Center for Collaborative Genetic Studies on Mental Disorders

CounterACT Center (Countermeasures Against Chemical Threats) at UMDNJ-Robert Wood Johnson Medical School and Rutgers

The Center of Alcohol Studies (CAS)
In addition two newer centers—the New Jersey Advanced Manufacturing Institute and the Rutgers Center for Catalysis are positioned to play an increasingly significant role in manufacturing and scale-up opportunities.

In publications activity, Rutgers stands out in several fields related to Biopharmaceutical Development, Delivery and Manufacturing Advanced Enterprise Computing, including:

- Pharmacology and Pharmaceutical Sciences
- Medicinal Chemistry
- Toxicology
- Applied Chemistry
- Biochemistry and Molecular Biology

### NEW JERSEY INDUSTRY PRESENCE

In 2009, statewide employment in drugs and pharmaceuticals totaled 30,503 jobs—six times more concentrated than the nation, but dropping at a higher rate. This is reflected in the leading concentration of major pharmaceutical HQ and R&D operations in New Jersey.

A leading niche in Northern New Jersey is found in industrial and consumer chemicals, including cosmetics which employs 15,631—but is also shrinking. Comparable sized bioscience research and testing establishments, led by Qwest Diagnostics, employ 21,118 workers, which is 2.2 times the national concentration and stable over the past decade.

There are a number of venture-backed start-ups in New Jersey in this industrial sector as well. While large pharmaceutical companies have been consolidating, the small biotech company presence in New Jersey has grown from 80 to over 300 firms since the late 1980’s; reflecting 75 new venture backed biotech and medical companies since 2007 that collectively have attracted over $5.5 billion in equity capital.

#### Biomaterials and Regenerative Medicine

### RUTGERS RESEARCH STRENGTHS

Among the major research centers found at Rutgers are:

- New Jersey Center for Biomaterials
- The Center for Biomaterials Research (CeMBR)
- Armed Forces Institute of Regenerative Medicine (AFIRM) with Cleveland Clinic

In publications activity, Rutgers stands out in several fields related to Biomaterials and Regenerative Medicine, including:

- Development Biology
- Cell and Tissue Engineering
- Transplantation
- Nanoscience and Nanotechnology
- Ceramics

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NEW JERSEY INDUSTRY PRESENCE

Drugs and Pharmaceuticals employed 30,503 workers in New Jersey in 2009, with a concentration six times greater than the national average. While employment grew by 12.8 percent from 2001–2009, there was a notable decline in employment of 21.5 percent from 2007–2009.

Bioscience research and testing labs employed 21,118 in 2009, with a concentration 2.29 times the national average. Employment remained essentially stable from 2001–2009.

Food and Nutrition

Food and Nutrition research strength

Among the major research and application centers found at Rutgers are:

- The Center for Advanced Food Technology (CAFT)
- Food Development and Manufacturing Center (FDMC)
- The Food Innovation Center (FIC)
- The New Jersey Institute for Food, Nutrition and Health

In publications activity, Rutgers stands out in several fields related to Food and Nutrition, including:
  - Food Science and Technology
  - Nutrition and Dietetics
  - Fisheries
  - Marine and Freshwater Biology

Statewide employment in the food manufacturing industry stood at 31,215 jobs in 2009, representing a sizable industry for the state. There are a number of large food companies present in New Jersey, including Campbell Soup, Pinnacle Foods, M&M Mars, Unilever and J&J Snack Foods. There have also been a number of venture-backed nutraceutical start-ups in New Jersey, including Rutgers spin-outs.

Logistics and Supply Chain Management

Logistics and Supply Chain Management research strength

While there are a range of operations management research strengths at Rutgers, particularly at the individual faculty level, the most notable applied research center to integrate certain cross-functional business disciplines is the Center for Supply Chain Management at the Rutgers School of Business. The Center offers industry extensive research and consulting experience in logistics management, in-bound/out-bound transportation network design, modeling and optimization, partnership and negotiation, information technology and e-commerce, and end-to-end supply chain management strategies.

In publications activity, Rutgers stands out in several fields related to Logistics and Supply Chain Management, including:
  - Operations Research & Management Science
  - Industrial Engineering
NEW JERSEY INDUSTRY PRESENCE

Like Information Technology, a certain segment of the supply chain and logistics industry cuts across traditional manufacturing and related industries, such as cosmetics and pharmaceuticals, as reflected in the industry membership of SCMC. Nevertheless, some segments can be separately identified. For those that can, statewide employment in the transportation, distribution and logistics industry sector stood at a significant 104,158 jobs in 2009. This represents a 10 percent higher concentration in New Jersey than for the nation.

Renewable Energy Storage, Generation and Efficiency

RUTGERS RESEARCH STRENGTHS

Among the major research centers found at Rutgers are:

The Institute for Advanced Materials and Devices has been organized as an “umbrella” organization to serve as a focus for cutting-edge materials science and device engineering at Rutgers. It includes two groups that are active in the renewable energy storage, generation, and efficiency fields:

Energy Storage Research Group (ESRG)
Center for Advanced Energy Systems (CAES)

Rutgers also has a strong presence in the areas of economics and policy for energy and energy efficiency. This expertise can be found in centers such as the Center for Energy, Economics and Environmental Policy and the Center for Green Building. In addition, the Rutgers Energy Institute integrates Rutgers’ expertise in science, engineering, economics, and policy to foster both fundamental and applied research in the development of sustainable energy production that is compatible with economic growth and environmental vitality.

While Rutgers enjoys an active presence of leading research centers, its overall publications in energy related fields is still at a lower level. This includes the fields of energy and fuels, and electrochemistry.

NEW JERSEY INDUSTRY PRESENCE

New Jersey’s presence in battery and energy storage technologies stands at 2.8 percent of national employment and 3.3 percent of U.S. establishments according to a comprehensive national database of renewable companies developed by Brookings and Battelle in “Sizing the Clean Economy.” Combined battery and energy storage technology companies, Power Battery, Policell Technologies and GlobTek, employed 360 people in 2010 at four locations within the state.

New Jersey also has significant industry presence in waste-to-energy and solar energy sectors that benefit from advances in battery and energy storage technologies. In 2010, 619 jobs were in waste-to-energy, representing 18.1 percent of U.S. waste-to-energy employment. The solar PV industry employed 670 in New Jersey, representing 2.8 percent of national solar PV employment, with leading companies such as Petra Solar and Sundurance. In addition, BASF Fuel Cell and smart grid/metering firm ABB are located in New Jersey.
Advanced Materials, Ceramics, Composites and Nanotechnology

RUTGERS RESEARCH STRENGTHS

Among the major research centers found at Rutgers are:

The Ceramic Composite and Optical Materials Center

The Center for the Integration of Composites into Infrastructure (CICI)

In publications activity, Rutgers stands out in several fields related to Advanced Materials, including:

- Applied Chemistry
- Ceramics
- Coatings and Films

NEW JERSEY INDUSTRY PRESENCE

New Jersey’s presence in the advanced materials industry, including ceramics and composites, stands at 16,493 jobs, which represents a 25 percent lower concentration in New Jersey than for the nation. While this industry segment has higher annual wages than the nation, it has also been declining at a faster rate in terms of employment—a 42 percent decline in New Jersey versus a 29 percent decline in the nation from 2001 to 2009.
Applying Best Practices

In order for Rutgers University to be an economic driver for industrial development and high quality job generation within the region, the university must be able to leverage its current and emerging research focus areas that have relevance to New Jersey’s industrial strengths and competitive advantage. This imperative will not only maximize the potential of Rutgers University to directly spin out and commercialize its technology advances, but will also advance a new innovation infrastructure for New Jersey that addresses the changing competitive forces and dynamics of how companies are pursuing open innovation approaches to new product and process development.

There are now over 175 university-affiliated research parks in the U.S. and Canada, as well as hundreds more across the world that are attempting to accomplish similar goals for their respective regions. Research parks have become a common infrastructure in the innovation ecosystem—connecting university strengths and industry development. The National Research Council found that research parks were particularly well suited to advancing economic development\(^\text{12}\) by doing the following:

> Facilitating cooperation that generates higher returns on existing investments in R&D,
> Meeting the special needs of high-tech industries for infrastructure and associated services,
> Achieving critical mass in terms of co-located research facilities and staff.

To better inform senior management about the development path and key success factors, the team selected and analyzed parks at other state universities with features comparable to the Rutgers profile.

Table 1: Summary of Benchmarks Selected Along Key Criteria

<table>
<thead>
<tr>
<th>Park</th>
<th>Land Grant Mission</th>
<th>ARU Member</th>
<th>Medical School Ties</th>
<th>Deep Industry Partnering Focus</th>
<th>Suburban Setting in Large Metro</th>
<th>Compact Site on Order of 100 Aces</th>
<th>Part of Integrated Campus Plan</th>
<th>Incubation/Spinout Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>bwtech@umbc</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centennial Campus at NCSU</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delaware Technology Park</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purdue Research Park</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University Research Park UWI-Madison</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Lessons Learned

From the benchmark analysis, some key insights emerge that inform the development of Innovation Park@Rutgers:

> Pursuing an active strategy to grow the research park around specific areas of university research strengths is a viable approach. Innovation Park@Rutgers can ensure strong connections between industry and the university through a variety of approaches, including having a voice in tenant approvals, requiring partnership agreements between companies and university research centers and faculty, and marketing university expertise to industry partners.

> Connecting to broader state development efforts is important. It is very standard for a university-affiliated research park to have close ties with overall state development efforts, particularly in business attraction and global marketing and financing.

> Maintaining strong university engagement and linkages in governance and program development is typical. In terms of governance, the university needs to be involved in setting direction and guiding land management for the research park. Operationally, a successful research park will typically have close connections to the university’s technology transfer function and broader commercialization activities. These may be operated separately, but they need to have a presence at the research park.

> A mix of anchor developments and multi-tenant/incubation space is essential in the successful development of research parks. A balanced approach is required to ensure there is an ongoing development momentum to the research park. While a university anchor or single industry tenant facility can jump-start a research park, it is also important to consider the pipeline of tenants and maintain a broad marketing and leasing function.

> Having flexibility in development approaches is important. While all of the benchmarks have worked with private developers, only one has implemented a master agreement, and with mixed results. Instead a development model that allows for different development approaches at different times seems to work the best, rather than having a singular approach. In addition, most parks need to demonstrate there is a market for their particular value proposition before a developer will become engaged. These lessons have been applied to inform the development pathway for the Innovation Park@Rutgers.
Development Pathway for Innovation Park@Rutgers

The assessment of development drivers for Innovation Park@Rutgers lays the groundwork for setting out a realistic and market-driven development pathway, while the benchmarking of successful university-affiliated research parks provides the context on best practice lessons to be mindful of as Rutgers University moves forward.

The key elements of this development pathway considered:

> Guidance from industry executives on development needs and approaches required for Innovation Park@Rutgers to be successful,

> Details on the types of development identified across the targets of opportunity that align Rutgers University and industry sectors found in New Jersey. This included addressing the types of space and unique facilities to be developed, the range of tenants that might occupy it and how Rutgers University’s core competencies can be translated into the use of the research park,

> The real estate dynamics found in Northern New Jersey and how these dynamics will affect the likely demand for space at Innovation Park@Rutgers,

> A realistic development plan for staging the development of Innovation Park@Rutgers,

> Services and physical linkages to connect functions and organizations located in the Innovation Park@Rutgers with the broader university and external communities.

Industry Guidance on Needs and Approaches for Innovation Park@Rutgers

In order to better understand the needs of industry and develop a market-driven pathway for Innovation Park@Rutgers, Battelle interviewed executives at 50 companies and business-related organizations familiar with Rutgers University. This provided an understanding of their collaboration experiences and helped uncover opportunities for potential development associated with Innovation Park@Rutgers.

Several key insights were gained from these interviews:

> For those involved with spin-outs, interviewees expressed a need for space that was near the academic partner/founder, provided access to core labs and instrumentation, and provided value-added business assistance/mentoring services that were cost-effective for a start-up company’s operating budget.

> For those involved with more established firms, interviewees generally expressed less interest in actual physical space, and much more interest in access to emerging technologies, as well as a greater connection to the University as a talent pipeline.

> Both established and emerging firms interviewed expressed an interest in bench to pilot scale-up to pilot production capabilities, as well as some limited interest in space for “skunk works” or other research projects with interdisciplinary research teams.

> Risk capital investors that were interviewed expressed an interest in exploring opportunities that had demonstrated some level of proof of concept, and therefore an environment that fostered commercialization activities was of interest.

> Economic development organizations, industry associations, venture investors, and real estate professionals readily see the need for signature facilities and branding of the location in order to spur development. Some individuals interviewed stated that they would potentially consider locating to a research park if developed.
All interviewed recognized the importance of conference and meeting space in order to create an environment for increased interactions between industry and academia. Many vocalized that their current experiences with attending meetings and conferences were often cumbersome and/or difficult.

All interviewed stated that “location and proximity do matter” in terms of catalyzing interaction, collaboration, and economic growth.

Further discussions revealed a range of potential development opportunities, which do not all translate into immediate demand for space in the park. However, if sufficiently nurtured, these could be “cultivated” into consortial activities that would require certain facilities to advance—contingent on sustained industry engagement with Rutgers.

These include:

- Product testing, development and pilot scale production for the cosmetics industry, drawing from different areas of expertise within agricultural sciences, sustainable packaging, engineering, and supply chain management.
- A product development and testing center for food manufacturers that would represent a “Northern counterpart” for the current Food Innovation Center in Bridgeton, but that would be focused on serving the needs of larger corporations.
- A test bed and smart grid development center for components and systems, leveraging the sustainability investments and systems being developed on the Livingston campus.

Types of Development Identified Across the Targets of Opportunity

Discussions with faculty and industry involved in the seven target opportunity areas point to the priorities for linking collaborative university and industry activities to Innovation Park@Rutgers in terms of the types of space requirements, including:

- Need for Specialized Facilities: Many of the identified targets of opportunity for Innovation Park@Rutgers already involve or will require specialized lab facilities and equipment space to advance collaborations with industry on applied research, product development, testing and scale-up of manufacturing.
- Anchor Industry Tenant Space Needs: Many of the identified targets of opportunity call for closer ties between industry and Rutgers University to realize the possible synergies for development. This can translate into industry serving as anchor tenants for Innovation Park@Rutgers to tap into faculty research relationships, specialized facilities, and the talent base of undergraduate, graduate and post-doctoral students.
- Multi-tenant Lab Space Needs: Many of the identified targets of opportunity represent ground-breaking areas of innovation, where new platform technologies are being advanced that can support spin-off companies and close relationships with high-growth emerging technology companies. In this case, Innovation Park@Rutgers can become a value-added site in the region’s complex of incubation and post-incubation services to high-growth emerging technology companies.
Innovation Park@Rutgers can play a critical role in consolidating, providing better access to and/or expanding the wide variety of collaborative industry-university, shared-use facilities found across the many existing research centers at Rutgers. Most importantly, Innovation Park@Rutgers can provide a signature location for and point of access to these facilities. This will require developing a strong outward facing orientation to engage industry and offer greater multi-disciplinary access to Rutgers’ research and development capabilities.

For the first phase of development, three new facilities have been identified in discussions with university and industry leaders as offering significant value: An advanced computing facility, an innovation collaboration facility focused on biopharma and wireless communications, and a technical and business conference center, all of which are discussed in further detail below.

The first potential opportunity identified is a new high performance computing (HPC) facility that would consolidate and expand the very fragmented computing centers found across the Rutgers campus. Unlike many other leading research universities, Rutgers does not have a centralized computing facility on campus to manage both research and back-office university administrative functions. This creates a more complex and expensive environment for managing the university’s computing needs.

Of particular significance for Innovation Park@Rutgers is that there is substantial demand for computing needs across the Rutgers campus to advance collaborative activities with industry. This includes several key needs for advanced computing to further industry collaborations across research centers at Rutgers. The RD12 will meet these needs by creating an industrial partnership program. This program will provide training and consulting services to industry as well as ensure that industry has access to Rutgers’ HPC resources. Ultimately, the program will increase HPC use across a wide range of industries and advance industrial collaboration with Rutgers researchers.

Recently, a number of research intensive universities have been moving to address growing demands for higher performance computing on both an individual and collaborative basis. One example is the Massachusetts Green High Performance Computing Center (MGHPCC) in Holyoke, Massachusetts. A collaborative initiative of MIT, UMass, Harvard, Boston and Northeastern Universities, with $25 million from the state and participation by EMC and Cisco, this 75,000 square feet, $95 million facility provides more efficient and enhanced computing to enable researchers to address problem opportunities in such fields as drug discovery, climate modeling and other complex systems. In addition, it serves the Holyoke community to bring advanced computing solutions to bear on key public challenges in health, education, security, real estate and government.

On a local note, construction of the Princeton University High-Performance Computing Research Center is expected to near completion soon in the Princeton Forrestal Park. This new 47,000 square feet facility has been sited on the Forrestal Campus in Plainsboro. The two-story building will serve as home of TIGRESS—the Terascale Infrastructure for Groundbreaking Research in Engineering and Science Center—and also will support approximately half of the University’s administrative computing capacity, as well as a large number of departmental systems.
The second potential opportunity identified for the first phase of development is a “Collaboration facility and network,” and is envisioned to be anchored in the Innovation Park@Rutgers with distributed components elsewhere across the Rutgers’ campuses and beyond. The facility, which will include a BioPharma Innovation Cluster (BIC) and an Advanced Manufacturing Institute, will be built to leverage the capabilities of the School of Engineering and the Ernest Mario School of Pharmacy and established centers and programs such as the Engineering Research Center for Structured Organic Particulate Systems (ERC-CSOPS), IAMDN, the College of Pharmacy, the Cancer Research Institute, the Rutgers Business School’s Center for Supply Chain Management, several catalysis consortia, as well as others including WINLAB. The central concept of this proposed anchor facility is to organize capabilities in ways that make them accessible to external partners, thereby lowering the cost and accelerating the pace of product and technology development and commercialization, particularly in the biopharma, advanced manufacturing and wireless communications domains.

The third potential opportunity identified for the first phase of development is a technical and business conferencing facility, which is viewed as key shared infrastructure for advancing this collaborative industry-university applied research complex. It is envisioned that such a facility could host and facilitate meetings ranging from 50 to 200 participants, without competing with classroom uses. Currently, many of the research centers have to go off campus to hold their technical and business meetings, and it is difficult to host industry consortia and other collaborative discussions with industry on campus. Such a facility would be best situated in the Livingston campus, where dedicated parking would also be required. Further synergies could be attained through co-location with continuous and professional education functions that are currently scattered, and in many cases occupy leased space. Such a combination was initially envisioned by Rutgers President Richard McCormick in his vision for the Livingston campus.

**Anchor Industry Tenant Space Needs**

In a number of the target opportunity areas, including advanced enterprise computing, renewable energy and drug development, there are opportunities for established industry partners to locate research and development groups in close proximity to the Rutgers’ research centers and their specialized facilities (see Table 2). While some of these facilities may take the form of a dedicated building, it is likely that many of the industry tenants would more likely take 10,000 to 25,000 square feet of space. This is equivalent to a floor or two of a building. In this case, the anchor industry tenant can provide the upfront occupancy needed to advance a multi-tenant building. There may also be interest in the anchor industry tenant being co-located with the specialized facility of a research center in which they are active.

**Table 2: Potential for Anchor Industry Tenants by Target Opportunity Area**

<table>
<thead>
<tr>
<th>Target Opportunity Area</th>
<th>Potential for Anchor Industry Tenants Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biopharmaceutical Development, Delivery and Manufacturing</td>
<td>Focus on contract research and contract manufacturing organizations. Not likely to be major pharmaceutical or medical device companies.</td>
</tr>
<tr>
<td>Advanced Enterprise Computing</td>
<td>Focus on cloud computing applications development coupled with more efficient and effective provision of computing services for internal and external customers.</td>
</tr>
<tr>
<td>Logistics and Supply Chain Management</td>
<td>Focus on major corporations that need advanced computing to advance approaches to logistics management.</td>
</tr>
</tbody>
</table>

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13 President Richard L. McCormick announced in his annual address to the university September 28, 2007 that his administration was proposing a long-term plan to develop Livingston Campus and bring all of Rutgers’ professionally oriented programs to the Piscataway campus.
**Multi-tenant Lab Space Needs**

The mark of a successful research park is having strong development momentum in multi-tenant lab space. This type of space is ideal for emerging university spin-outs, serving the needs of post-incubator companies, and offering an environment for industry partners involved in significant research projects with Rutgers.

Many of the identified targets of opportunity represent ground-breaking areas of innovation, where new platform technologies are being advanced that can support spin-off companies and close relationships with high-growth potential emerging technology companies. In this case, Innovation Park@Rutgers can become a value-added site in the region’s existing system of incubation and post-incubation services to high-growth emerging technology companies.

Multi-tenant lab space is also the hardest to create, because the commercial real estate market is often resistant to specialized lab space facilities and requires a history of proven success in order to create the speculative space development needed.

**Real Estate Dynamics in Northern New Jersey and Implications for Demand for Space at Innovation Park@Rutgers**

The proposed Innovation Park@Rutgers is situated within the New Brunswick-Piscataway-I-287 submarket, and more broadly in Northern New Jersey, which is one of the largest real estate markets in the U.S.

The primary product type found in the Northern New Jersey commercial real estate market is suburban, low-rise office development offering easy access via the comprehensive highway infrastructure throughout the region. Twenty-one Fortune 500 companies are headquartered in New Jersey. Given its location within the Northeast Corridor, New Jersey is also attractive for international business and home to more than 1,400 foreign-based firms.

Not unexpectedly, given the stagnant industry growth found in New Jersey, recent trends in the Northern New Jersey commercial real estate market are weak. Overall, while the stock of commercial real estate is significant, net absorption of space is close to zero in all of Northern New Jersey as well as in the New Brunswick submarket. The Brunswick/Piscataway/I-287 submarket is faring slightly worse than the larger Northern New Jersey area, particularly in its vacancy levels for class A and B office space.

In addition to examining demand and supply trends in local and regional markets for office and flex space, Battelle also identified and examined properties comparable to Innovation Park@Rutgers, in that they accommodate technology companies in multi-tenant buildings located within corporate and research parks in the area. ¹⁴

**Implications for Innovation Park@Rutgers**

A number of key take-away findings can be drawn from this review of the real estate market in Northern New Jersey:

- There is a mature market for commercial space, including specialized properties targeted to technology companies in Northern New Jersey.
- Net absorption of space is close to zero reflecting the need for new demand drivers that can spur economic development.
- The levels of existing vacancies suggest a long time period before existing office and flex space will be leased.
- New construction, not surprisingly, is weak, so few new properties are coming online.

¹⁴ This comparable property set was developed following interviews with Rutgers’ spin-out companies, technology business associations and commercial realtors.
While the initial sense might be that this is a difficult real estate market for Innovation Park@Rutgers to enter, it instead reinforces the importance of having a new driver for industry growth in Northern New Jersey capable of having broader spill-over impacts. In this well-developed, but poor performing commercial real estate market, Innovation Park@Rutgers needs to differentiate itself and generate absorption from the unique, high-value setting it can offer companies partnering with the university who gain quicker and more frequent access to its resources and assets. By doing so, Innovation Park@Rutgers can serve as a magnet for new development and create a new dynamic for attracting companies to Northern New Jersey.

Staging the Development of Innovation Park@Rutgers

The development of university-affiliated research parks is best understood as a marathon and not a sprint. Among the benchmark research parks examined, the pace of development is not one of “build it and they will come,” but one of sustained growth and development over decades. Among the more recent benchmark research parks, bwtech and Delaware Technology Park have grown at 16–28,000 square feet per year, taking 9 to 16 years respectively to reach 250,000 square feet and typically adding one new building every 3–4 years. In the adjacent and more densely developed Central Philadelphia market, the University City Science Center has developed at twice the pace of these others, absorbing 38,000 square feet annually over its first 26 years when it reached 1 million square feet (1989), after taking 11 years to reach 250,000 square feet, and 15 years to reach 500,000 square feet.

The initial development phase needs to be staged in order to demonstrate a unique “value proposition” that captures the opportunity areas for leveraging research excellence and industry collaboration, as well as addressing local economic conditions. For Rutgers, this phase needs to recognize the pivotal role of that Innovation Park@Rutgers serves as a magnet for industry development and not as a large scale commercial real estate opportunity. This means creating an environment that focuses more on open innovation and leveraging industry relationships to take root and grow in the region.

Therefore, for the initial development phase, it is proposed that Rutgers develop a collaborative industry-university complex that focuses initial efforts on:

> The consolidation and expansion of specialized, shared-use laboratories and equipment.
> The availability of co-location space for industry partners, whether well-established multi-national companies or university-related spin-offs and start-ups.
> Building and expanding comprehensive university-industry partnership programs.

What was also discovered through this process is that Rutgers has a number of scattered, off-campus research and educational tenancies that have been sited on an individual basis; some of these may be appropriate for realignment and incorporation into the park, based upon their industry engagement and commercialization missions.

Table 3 sets out an initial set of activities that can comprise this initial collaborative industry-university complex:
Table 3: Phase I – Collaborative Industry-University Complex

<table>
<thead>
<tr>
<th>Target of Opportunity</th>
<th>Related Rutgers Competencies &amp; Capabilities</th>
<th>Industry Presence &amp; Expressed Interests</th>
<th>Target Tenants &amp; Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collaboration Facility</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Research Center/Advanced Manufacturing Institute</td>
<td>Focus on pre-competitive manufacturing and de-risking opportunities in context of changing BioPharma industry, and trends to open innovation Wireless security and customized device and systems development, using the broader campus as a test bed</td>
<td>Strong interest from FDA, and partnering Pharma companies in expanded role Established industry partners would realize value from opportunity to more closely link with broader base of talent, Busch campus links</td>
<td>ERC and Affiliates looking to engage in precompetitive research WINLAB, Supply Chain Management Center and Specific individual company project teams (partnering facility users)</td>
</tr>
<tr>
<td>Outreach and Technical Assistance Activities that support programming and resident organizations</td>
<td>Technology transfer and Commercialization, Industry Liaison and Outreach</td>
<td>Provide a focal point for businesses and entrepreneurs to engage with the university around technology development and commercialization</td>
<td>Tech Transfer and Industry Liaison and related services, tech business associations and networks</td>
</tr>
<tr>
<td>Linkages to Core Labs in Research and Testing Capabilities</td>
<td>Previous track record that delivering these services leads to broader relationships, increased industry sponsorship Increasing institutional commitment to technology commercialization</td>
<td>Specialized and fast growing industry in biosciences research and testing</td>
<td>Focus on core research service companies with innovative technologies Management of these functions based in part at the Collaboration Building Lab Animal Services Management</td>
</tr>
<tr>
<td>Multi-tenant and Lab Space for Emerging Companies in the biosciences, renewable energy, IT and materials</td>
<td>Entrepreneurial culture, but few major companies spun out</td>
<td>Specific demand for RU spinouts to be proximate to their “parent” labs bioscience space Attraction of venture capital investments for bioscience companies Specialized and fast growing industry in biosciences research and testing</td>
<td>Focus on emerging University spinouts and licensees; externally originated ventures with need for frequent interactions Selected student ventures</td>
</tr>
<tr>
<td><strong>High Performance Computing Center</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Computing and Collaboration</td>
<td>Need and opportunity to increase capacity and energy efficiency</td>
<td>Strong talent and hiring flows in financial services</td>
<td>Collaborative Projects with IT Companies</td>
</tr>
<tr>
<td><strong>Continuing Education and Business Conferencing Facility</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuing Education</td>
<td>Division of Continuing Education</td>
<td>N/A</td>
<td>ITV, Center for Continuing and Professional Development, Noncredit Registration Staff, Off Campus Programs Staff, Technology @ Continuing Studies, Noncredit Operations Staff, Offices of Winter and Summer Sessions, Osher Lifelong Learning, Center for Government Services, Office for Visiting Students, the Center for Online Hybrid Learning and Technology.</td>
</tr>
<tr>
<td>Scientific and Business Conference Meetings and Networking leading to increased Industry Engagement</td>
<td>This facility would aggregate current demand across RU centers and host external meetings</td>
<td>Meetings with plenary flex space 50–250; with breakout rooms up to 40 pp each; customer friendly integrated supports—including university meeting management; w/ adequate parking, transit links and other logistics in a “one-stop” center.</td>
<td>Internal and External Technology and Venture Development meetings</td>
</tr>
</tbody>
</table>
What is not being emphasized in this initial phase of development is either incubator space or post-incubator multi-tenant space. Currently, New Jersey has several incubators, both “virtual” and physical. Altogether, these incubators offer over 400,000 square feet of space, including wet labs and international soft landings. Notably, eight of these have either a university or federal lab affiliation, including Rutgers. It is expected that in the second phase, as these incubators fill up, there may be an opportunity for Innovation Park@Rutgers to be a future site for additional incubator space.

In terms of future multi-tenant space, Innovation Park@Rutgers should focus on meeting the demand of close industry partners to locate their primary research and development units. As these companies seek to expand, headquarters, administrative services and manufacturing activities should be encouraged to locate in the broader commercial real estate market.
Moving Forward—Advancing Innovation Park@Rutgers

Building upon the development pathway and focus areas presented above, the next elements of the plan involve key principles that will guide this approach and follow from an agreed upon development pathway and program. This includes aligning governance, management, programmatic activities, physical linkages and financial resources.

These key principles are to:

- Encourage focused, collaborative research and foster robust economic development that increases the level and intensity of industry sponsored research and development, as well as broader and deeper engagement with the university.
- Facilitate the commercialization of new technologies originating both internally and externally.
- Strengthen Rutgers’ ties to the business, entrepreneurial and other communities throughout New Jersey and beyond.
- Heighten awareness of Rutgers’ role as an engine for economic growth in New Jersey.
- Serve as a magnet for business and professional leaders, students and entrepreneurial faculty for research, commercialization and advanced professional and leadership education.
- Draw from a diverse set of funding sources and revenue streams, becoming financially self-sustaining over time, while leveraging Rutgers’ land and other assets to add value.

The leadership of a Rutgers unit that is well versed in economic development strategy and implementation, such as the Office of Economic Development, will be necessary to ensure that the Park is developed in a manner that is consistent with these key principles.

Governance

The organizational mission is to advance and develop the park in collaboration with the University and serve as a business oriented interface and catalyst, “working at the speed of business.” This calls for the establishment of a non-profit research park entity affiliated with Rutgers University, but able to operate in an agile, business-like manner.

Under this recommendation, the University will lead in the formation of a special purpose entity, a 501(c)(3) non-profit corporation, with an original board comprised of 9–13 leaders from the University, government and the business community, all with an interest in the success of the park. The university president, or his/her designee, would chair the board.

This non-profit corporation will be responsible for developing and placing quality research park facilities and sites on the market. It would also have the power to accept the transfer of land or a long-term land lease from Rutgers University, to enter into agreements with private developers to contract facilities, and to obtain financing for developments consistent with established parameters.

The non-profit research park entity would be responsible for outreach industry, and for establishing partnerships with state and local economic development organizations.

Provisions for university support (staffing, access to resources) to the non-profit research park entity would be important in the early stages of development, both to ensure close alignment with the university, as well as to keep operating costs low until the initial facilities are developed and positive cash flow established.
Management

The Park Corporation would hire an experienced Research Park Director, which could possibly be a joint appointment with the university. This person should report to the Associate Vice President of Economic Development. The staffing would be lean, following a matrix management approach that leverages and works with the University and other organizations in the areas of technology transfer, commercialization, industry liaison and grants management—all offices within the Office of the Vice President for Research and Economic Development. This outsourced model will keep overhead low, and maintain flexibility.

During the initial 2-3 year period prior to the opening of the first buildings in the Park, management would be developing momentum and positioning the Park to have an active deal flow of potential tenants and partners. In general, unless the tenants are university lab spinouts, the industry prospects for research park residency will be generated through established and growing relationships with research centers and faculty at Rutgers University. Thus, the interface with University’s technology transfer and industry liaison functions, as well as key schools and research centers will be essential, and will be facilitated by co-location and/or joint programs at Innovation Park@Rutgers.

Programmatic Approach

To ensure the success of Innovation Park@Rutgers there needs to be a set of specific programmatic activities, including:

> Proactive marketing and outreach.
> Developing consortia with university centers that will lead to future space and programmatic demands in the park.
> Promoting the park to prospective tenants and partners, including the provision of a University “Value Added” Program. This value added program should organize and package benefits to potential industry tenants at Innovation Park@Rutgers. Prior to the opening of the Collaborative Industry-University Complex, opportunities to create a staging area for tenants should be pursued where feasible. The Park should be managed to actively promote collaboration with technology transfer, commercialization and industry liaison efforts that have been advanced by the Office of the Vice President of Research and Economic Development. It should also coordinate with the outreach and engagement efforts of key research centers and various schools, including Engineering, Pharmacy, Business, Arts and Sciences, and Communication & Information, among others.

Site Linkages

A combination of public transportation, pedestrian and bicycle pathways and clear automobile routes will be needed to enhance the visibility of and access to the Park—particularly for the external business community. Further, there is an opportunity to take advantage of the planned improvements to Route 18 which will provide an improved vehicular route into the Park directly from I-287. This should be enhanced by clear signage along access routes, and capitalize on the Park’s adjacency to and visibility from Route 18, at the junction of the Busch and Livingston campuses.
Financial Principles

The success of Innovation Park@Rutgers depends upon a close, synergistic relationship with Rutgers University.

To establish the unique value proposition of the Innovation Park@Rutgers, Rutgers University can either enter into long-term land leases or convey ownership of land parcels for the Innovation Park@Rutgers to the non-profit research park entity, which will in turn use the value of this land and its proximity to the larger University technology and talent base to advance its mission. Having the ability to leverage this unique site as a key asset, the non-profit research park entity can both do business with developers and leverage potential financing sources.

The university will also be a critical “anchor tenant” at Innovation Park@Rutgers utilizing the presence of its applied research centers with robust industry partnerships to be the initial tenants at the collaborative industry-university campus development, which will define the first phase of the research park’s development. Having these anchor university tenants will allow for the provision of modest amounts of multi-tenant space for partnering companies and entrepreneurs connected to these research centers, and provide the basis for future growth.

While this plan calls for university centers to serve as anchor tenants for initial buildings that are planned for the phase 1 corporate collaboration complex, proceeding with the Park Corporation in developing buildings will provide greater flexibility, speed to market and financing options consistent with the key principles stated earlier. In particular, following this route will enable the Innovation Park@Rutgers to draw from a diverse set of funding sources and revenue streams, becoming financially self-sustaining over time, while leveraging Rutgers’ land and other assets that add value.

As a means of demonstrating how the Park could become financially self-sustaining over time, Battelle analyzed the financial feasibility of two of the Park’s Phase I buildings: the collaboration facility and the continuing education and business conferencing facility.

Battelle measured the financial feasibility of these centers in terms of the following:

**Internal rate of return**

is a standard financial tool in capital budgeting to measure the extent to which a project over time can generate revenues at a level that offsets its costs. Since it is expected that all of the construction and tenant improvement costs will be financed at a rate of 5 percent, the internal rate of return must exceed 5 percent for the project to be viable.

**Annual breakeven**

For the collaboration facility, Battelle examined the financial feasibility of three scenarios—a 90,000 gross square feet (gsf) facility, a 120,000 gsf facility and a 150,000 gsf facility. The collaboration facility will offer both office and lab space—and for each scenario it is assumed that 60 percent of the facility will be office and 40 percent labs. It is expected that in each of these scenarios, Rutgers University will lease 60,000 square feet (sf) to launch the facility. The university tenants will be a mix of identified research centers that already pay lease costs at facilities outside of the university—and so would not require new university funding. In addition, current university units which are relevant to industry engagement, such as the Office of Technology Commercialization, Office of Research Alliances, Office of New Ventures, Office of Economic Development, Professional Science Masters Program, Office of Federal Research Relations and Corporate Agreements Office, will be relocated to this building.
For industry tenants, Battelle is estimating an annual absorption of just 10,000 sq. ft. per year. The continuing education and business conferencing facility will be designed to house the following entities: iTV, Center for Continuing and Professional Development, Noncredit Registration Staff, Off Campus Programs Staff, Technology @ Continuing Studies, Noncredit Operations Staff, Offices of Winter and Summer Sessions, Osher Lifelong Learning, Center for Government Services, Office for Visiting Students, the Center for Online Hybrid Learning and Technology. It will also serve the larger university community and the surrounding community for meetings, noncredit offerings, and association gatherings. The overall building would need to be approximately 80,000 square feet to sustain more than 110 administrative offices; 28 cubicles; 10 smart and distance learning classrooms; 8 executive board rooms; 6 traditional conference rooms; 4 break rooms; 2 television studios; 2 computer labs; 1 executive tiered meeting space; numerous IT storage closets; a 1500 person ballroom; several vendor areas for food and business centers. Currently the Division of Continuing Studies is paying approximately $750,000 for rent in space around the city of New Brunswick at an average cost of $21 per sq. ft. on a triple net leasing basis.

One cost outside of the financial feasibility of the facilities that would be expected to be provided by Rutgers University, but may be offset by positive cash flow from the building operations in later years, is that of the management team at Innovation Park@Rutgers. It is expected that this cost would be approximately $400,000 per year, supplemented by a matrix management approach with collaborating university units—particularly those within the Office of the Vice president for Research and Economic Development.

In addition, while the university will transfer land parcels or long-term land leases to the park corporation, it is also assumed that the university will provide for the appropriate infrastructure and related site improvements to the building sites on an agreed upon schedule over time.

The results of Battelle’s financial analysis, summarized in Table 4, suggest that both facilities provide a positive internal rate of return, and reach breakeven on an annual basis by year 6.

Battelle’s analysis demonstrates that by addressing its mission of accelerating and growing Rutgers’ engagement with industry and commercialization, the Innovation Park@Rutgers can achieve a double bottom line: increasing economic impacts for the state of New Jersey, while generating value and revenues for its customers and the university and becoming self-sustaining over time.

### Table 4: Results of Battelle’s Financial Analysis of the Proposed Collaboration Facility and the Continuing Education and Business Conferencing Facility

<table>
<thead>
<tr>
<th>Type of Facility</th>
<th>Internal Rate of Return (IRR)</th>
<th>Breakeven Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collaboration Facility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90,000 gross sf</td>
<td>12.4%</td>
<td>Year 6</td>
</tr>
<tr>
<td>120,000 gross sf</td>
<td>12.1%</td>
<td>Year 6</td>
</tr>
<tr>
<td>150,000 gross sf</td>
<td>11.4%</td>
<td>Year 6</td>
</tr>
<tr>
<td><strong>Continuing Education and Business Conferencing Facility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80,000 gross sf</td>
<td>11.6%</td>
<td>Year 6</td>
</tr>
</tbody>
</table>
Conclusion

Research parks are viewed as creating that nexus for industry clusters to thrive in today’s global, knowledge-based economy. Christian Helmers from the London School of Economics finds that firms within the same industry benefit from being co-located at a research park. Pisano and Shih refer to this phenomenon as creating geographically based “industrial commons.” As they explain, “Once an industrial commons has taken root in a region, a powerful virtuous cycle feeds its growth. Experts flock there because that’s where the jobs and knowledge networks are. Firms do the same to tap the talent pool, stay abreast of advances, and be near suppliers and potential partners.”

To create the vibrant industrial commons needed for economic development, regions across the nation and the world are advancing research parks and other technology-oriented development complexes as key components in creating the physical environments that can generate, attract, and retain technology companies and talent. These research park developments are having significant economic spill-over impacts for their regions. Perhaps best known is Research Triangle Park, which was the signature development for the Raleigh-Durham region, which now encompasses 7,000 acres (up from 4,400 at its outset in 1959), more than 22.5 million square feet and more than 38,000 full-time equivalent employees along with an estimated 10,000 contract workers. Another example is Shady Grove Research Park in Montgomery County, MD that became the epicenter for that region’s growing biotechnology cluster that now spreads up and down the I-270 corridor.

For Rutgers University, there is a significant opportunity for Innovation Park@Rutgers to create an environment that fosters more emphasis on open innovation and spurring industry relationships to grow in the region. The success of Innovation Park@Rutgers will be in its ability to establish collaborative industry-university partnerships and in so doing, fuel New Jersey’s competitiveness and economic growth.

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