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Funding for this planning project provided by
the United States Economic Development Administration

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Cover photo: The newly revitalized Livingston Campus at Rutgers University–New Brunswick, future home of Innovation Park@Rutgers
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Executive Summary

The Rutgers Innovation Park (“Innovation Park” or “Park”), an initiative of the Rutgers Office of Research and Economic Development (ORED), is designed to be at the forefront of Rutgers’ efforts to catalyze university-industry-government collaborations that will translate into economic growth and community benefits. Innovation Park will create and support a broad innovation ecosystem that will solidify Rutgers’ position of leadership in the new knowledge economy and serve as a national model for technology-led economic development. Innovation Park will produce a multitude of benefits for the university by creating “communities of innovation” that promote research collaborations, technology transfer and commercialization, job creation and public-private partnerships.

This plan for Innovation Park was developed with input and guidance provided by a broad representation of internal university stakeholders and external stakeholders, including industry and community leaders, and public and state economic development officials. Innovation Park will leverage and build upon Rutgers’ research strengths, particularly those that have robust synergies, linkages and applicability to key industry clusters in New Jersey, and the strongest potential for interdisciplinary collaborations.

Innovation Park will also complement Rutgers’ core values as identified in the university’s 2014 Strategic Plan. It will be a critical asset in shaping “tomorrow’s university” through expanding research capabilities, catalyzing multi-disciplinary exchange, enhancing revenue generation, and providing experiential learning and employment opportunities. The Park will be wholly unique, offering space, programs and resources that do not currently exist in one location anywhere in the state.

In 2015, Rutgers ORED engaged U3 Advisors to develop a business plan and implementation strategy for the project to ensure that the planning for Innovation Park was as comprehensive as possible. U3 Advisors’ analyses built upon an extensive assessment of the Park concept undertaken by Battelle Technology Partnership Practice for ORED in 2012. U3 Advisors focused on the following project components:

- Benchmarking and best practices
- Top-level overview of the local real estate market
- Financial analysis of Park development
- Economic impact assessment
- Evaluation of optimal organization and management structures for the Park
- Creation of an implementation strategy for Phase One development

In conducting the study, U3 Advisors worked closely with a team of experts at Rutgers (Rutgers Team) who brought strong institutional knowledge in university facilities and infrastructure, programming, specialized equipment and services, and academic expertise.
The Park will be based on a service-centric model and will feature programmatic elements that provide a range of resources to support collaborative innovation.

Benchmarking and Best Practices

The U3 Advisors team undertook a comprehensive evaluation of university research parks, concentrating on those affiliated with Rutgers’ Big Ten peers, in addition to several other noteworthy projects. Particular focus was placed on the Nebraska Innovation Center at the University of Nebraska, the University of Illinois Research Park, and the University of Maryland Baltimore BioPark, as these were the most similar to the proposed project at Rutgers.

Principal lessons learned from this evaluation include:

- It is vital that the sponsoring university show early commitment to the project and serve as a catalyst for the park in order to attract developers.
- If partnering with a private developer in an unproven market, a substantive anchor tenancy by a credit tenant – most often the sponsoring institution itself – is necessary.
- Many successful parks are managed by a dedicated independent entity that is responsible for the growth of the park.
- The planning horizon for university research parks is long and the planning effort must assume maximum flexibility.
- Amenities, place-making, and physical connectivity are more important than ever in attracting tenants.

The Rutgers Team also conducted an extensive literature review of factors that contribute to the success of a research park. Based on these findings, the team identified and formulated a range of services and programs that will positively impact the Park’s ability to attract tenants, create economic growth, and foster university-industry relationships. A summary of the findings and the proposed services and programs follows:

- The primary reason that tenants choose to locate in a university research park is to access talent. The Workforce Development Program at the Park will provide tenants with human resources recruitment and screening services, offering tenants seamless access to university students, graduates, and faculty. Education and training programs will be designed to accommodate tenant and community needs.
- University research park tenants value access to university faculty, facilities and equipment. The Rutgers Office of Corporate Engagement (OCE) will connect tenants to university research expertise, facilities, and specialized equipment.
Amenities are more important than ever in attracting tenants. Once complete, Innovation Park will feature walking paths, park-like outdoor settings, dining options, networking events, entertainment spaces, and more. Tenants will be able to attend Rutgers’ cultural and sporting events, and will have access to other university amenities.

University research parks can grow their future tenant base and the local economy by supporting entrepreneurship. Innovation Park’s Entrepreneurship Programs will provide business assistance, mentoring, experiential learning labs, a makerspace, gap-funding, and other resources for entrepreneurs and start-ups.

University research parks are placing greater emphasis on sustainability as a design principal that has the potential to attract tenants. The Park will pursue LEED and WELL Building Standards and will function as a living lab for sustainability. Opportunities will be afforded for experiential learning and collaborative research, while conserving finite resources, reducing energy costs, and creating a healthier environment for tenants.

Top-ranked university research parks positively impact their communities. Community engagement also has a positive effect on the parks themselves, making them more vibrant, and stimulating long-term economic development within the region(s) they occupy. The Community Development Program at the Park will provide training in business skills and career development for local residents and provide funding for community projects.

International partnerships are important tools for attracting foreign tenants and extending a park’s reach. The Park’s International Business Attraction Program will develop and nurture relationships with foreign governments, trade associations, businesses, and universities in order to identify potential research partners and Park tenants. Foreign businesses will be provided with transition space and operations assistance services.

The presence of university research anchors encourages academia-industry research collaborations and contributes to an innovation ecosystem. It is envisioned that Rutgers’ faculty will conduct research at the Park and in the future, university institutes and centers may also be housed on-site. It is proposed that a new Advanced Research Computing building and Food Innovation Center building be anchor facilities at the Park.

Local Market Assessment

The Park will offer state-of-the-art laboratory, production, office and collaboration space, specialized equipment and facilities, and services and amenities to support each phase of the innovation pathway. Park tenants will have direct access to university talent, as well as potential collaborators. There is no comparable facility that currently exists in New Jersey. Pennsylvania and New York are home to successful research parks, and comparisons were made to these markets, when applicable. In addition, based on the life sciences concentration in Central New Jersey, U3 Advisors conducted a high-level overview of the local lab and office market, focusing primarily on the life sciences industry.

Since 2008, the number of life sciences establishments in New Jersey grew by 9.4%, with the market trending towards smaller companies. Large pharmaceutical companies are downsizing their employee base and thus their space requirements. It is also becoming more common to outsource research and development (R&D) activities to start-ups, emerging companies, and universities. As part of their reorganization strategy, companies often choose to locate their slimmed down operations in close proximity to their collaborators in order to have greater access to the research and talent they produce. These changes have led to an oversupply of large blocks of vacant office and lab space. Landlords in New Jersey have been generally
unwilling to carve this space into smaller units for start-ups and midsize companies, making it difficult for these growing businesses to find space that suits their unique requirements. Thus, there is high demand for smaller and in-between size (2,500 – 10,000 SF) lab and incubator space that is currently not being met in the private market.

Many small and midsize companies – the target tenants for this development – are hesitant to invest capital into new real estate, often preferring to allocate their finances to R&D. However, as they compete for talent, some executives are choosing to lease high-end space in a bid to attract top scientists and researchers. Similar to large pharmaceutical companies, another key driver in site selection decisions is proximity to collaborators. BioNJ, New Jersey’s biotechnology industry association, conducted a survey of start-ups in the state and found that 40% seek space nearby to universities. Small and midsize companies in competing markets have shown their willingness to pay above market rents in order to have access to research partners and talent. Small companies including Avid Radiopharmaceuticals, Optofluidics, and Pulsar Informatics are tenants in the University City Science Center in Philadelphia, where the average per square foot rent starts at $77 (inclusive of utilities).

These shifting market dynamics present enormous opportunities for Innovation Park. The university has formal partnerships with many of the state’s top employers, and Rutgers’ innovation has spurred the formation of more than 50 currently active start-up companies. At the Park, tenants will have access to Rutgers as both a collaborator and a source of talent. The Park will fill a market gap by providing state-of-the-art space in varying sizes and configurations. Further, the Park will be designed to facilitate the interactions that are critical to the success of the R&D pipeline, with programs and communal spaces that spark dialogue and co-creation.

Defining the Rutgers Value Proposition

Rutgers’ human capital, facilities, resources and connections will be appealing to potential partners and tenants of the Park. The university was recently recognized as one of the 100 most innovative in the world. It is highly regarded for its research output, with over $700 million in research expenditures in 2015, 300 research centers and institutes and 3,100 patents and applications under management. Renowned scholars and inventors on campus can provide tenants with direct access to some of the world’s brightest minds. Rutgers’ students are among the nation’s best, with SAT scores that exceed the national average and more Fulbright Scholars than nearly every other research university in the U.S.

In addition, Rutgers’ students will have the opportunity to work and study at Innovation Park, providing business executives with a steady stream of talent.

In 2012, the largest higher education merger in U.S. academic history occurred when legislation mandating the integration of most of the University of Medicine and Dentistry of New Jersey (UMDNJ) into Rutgers University was signed into law. As a result, on July 1, 2013,
Rutgers Biomedical and Health Sciences (RBHS) was formed as a major new health care education, research, and clinical division at Rutgers. RBHS serves as an umbrella for legacy UMDNJ schools and clinical units and several pre-existing Rutgers units with key health-related missions. The formation of RBHS provides tremendous opportunities for collaboration in the health sciences that previously did not exist.

Rutgers will leverage its size and diversity to turn the Park into a distinctive place – an innovation ecosystem in the center of Rutgers’ main campus, located within the heart of the Northeast corridor. The Park will support open and collaborative innovation by providing physical infrastructure and programmatic elements that incentivize knowledge sharing and partnership among diverse actors.

The university’s vast resources will be made available to Park tenants. These include:

- Specialized equipment such as Caliburn, one of the nation’s most powerful supercomputers
- Training and education – Courses and programs can be tailored to meet the specific needs of an individual company
- Services to support business formation and growth, such as assistance with product development and manufacturing
- Social and recreational opportunities, including access to Rutgers’ sporting and cultural events

Finally, as previously noted, Innovation Park also presents an opportunity to fill an acute need in the local market for smaller and midsized wet lab space, shared and flexible lab space, in addition to state-of-the-art facilities tailored to an evolving life sciences and tech market that do not currently exist.

**Rutgers Research Strengths**

Building upon the analysis undertaken by Battelle in 2012, U3 Advisors worked closely with the Rutgers Team and an Internal Advisory Board to identify research strengths at the university that have the greatest potential applicability to commercial users. These areas of strength are generally interdisciplinary and can broadly be summarized as follows:

- Advanced computing
- IT, telecom, and cyber security
- Food innovation
- Advanced materials and manufacturing
- Medical devices and biomaterials
- Health sciences
- Energy storage, generation, and efficiency
- Logistics and supply chain management
- Chemistry/cosmetics/personal care

Refining this list, the Rutgers advisory groups, together with ORED and U3 Advisors, confirmed that advanced computing and food innovation are well developed programs, with existing industry partners who may be recruited to locate at the Park. They have the strongest potential for further development as programmatic anchors for Phase One of the Park.
Proposed Phase One Development

Considering the university’s research strengths and local industry needs, U3 Advisors recommends that Phase One of the Park include three buildings (in priority order):

- **Advanced Research Computing Facility** – 45,000 SF of high performance computing and data infrastructure, classrooms, offices, meeting rooms and interactive space
- **Food Innovation Center** – 60,000 SF of food manufacturing, commercialization and collaboration space, research labs, and a research and development kitchen
- **Industry Collaboration Building** – 90,000 SF of Class A office and laboratory space, conference rooms, dining and collaboration space. The Collaboration Building will serve the core mission of Innovation Park by bringing private tenants to the site to collaborate with and benefit from Rutgers’ research enterprise.

Park tenants, regardless of which building they lease space in, will have access to programs, services, and amenities designed to spur company formation, grow high-potential businesses, and retain and attract talent.

Advanced Research Computing Facility

Advanced computing infrastructure and expertise are critical resources that impact the productivity of industry, security of data, and the ability of researchers to understand and develop solutions to complex challenges. Investment in these resources is crucial to ensuring the resiliency and strength of New Jersey’s economy, as well as the competitiveness of Rutgers’ researchers.

Rutgers has taken a leadership role in initiating collaborations focused on advancing big data initiatives through its founding of the New Jersey Big Data Alliance (NJBDA), a consortium of New Jersey higher education institutions focused on expanding access to advanced computation resources and talent, and the recent installation of Caliburn, the second most powerful supercomputer in the Big Ten. Development of an advanced research computing facility at Innovation Park will allow university researchers and businesses from all disciplines and sectors to access computing equipment they may not be able to afford, or may not have the knowledge to operate.

The Rutgers Discovery Informatics Institute (RDI2), “New Jersey’s center for advanced computation”, has strong existing partnerships with private industry and an advanced research computing facility will provide more opportunities for corporate co-location at Innovation Park, in addition to generating significant auxiliary income. Co-locating industry and university users of the system will encourage academia-industry collaboration, on-site education and training programs, internship and employment opportunities, and more.
Food Innovation Center

Since 2001, more than 1,500 entrepreneurs and companies have sought Rutgers’ expertise in food science, engaging with the university via its existing Food Innovation Centers located in Piscataway and Bridgeton. These centers offer space, technical support, product manufacturing and process development, food safety training, and other business services. There is tremendous and increasing demand for services at the centers, and both programs are at capacity.

It is proposed that the entirety of the Food Innovation Center operation currently located in rented off-campus space in Piscataway be moved to the Park. Its new location on campus will allow for academic engagement, student experiential learning opportunities, and multidisciplinary and multi-sector collaborations. The new center will support the entire innovation pathway, from research to product development to commercialization. Research will focus on the links between diet and health, bringing together experts in food and agricultural sciences; health, wellness, and life sciences; data analytics and advanced computation technology; to explore the potential for functional and medical foods, personalized nutrition and personalized medicine to transform the industry. This interdisciplinary approach will position the university as an international leader in the scientific understanding and development of a systems approach to food innovation.

The new Food Innovation Center will provide immediate auxiliary income opportunities for the Park. Based on a successful track record of revenue generation at the centers in Piscataway and Bridgeton, the funding strategy for the new center will be strategic and multi-faceted. Funding sources and revenue streams include space rental, fees for manufacturing, product development, advisory programs, membership and training programs, and other fee-based services.

Industry Collaboration Building

The Park is designed to be at the forefront of Rutgers’ efforts to catalyze university-industry-government collaboration that will translate into tangible economic growth. In developing the Park, it will be integral to establish firm links between research and application. Rutgers’ faculty, researchers and students will work and study on-site, allowing for maximum contact and regular interaction with industry tenants. This approach will:

- Generate experiential learning opportunities, showing students the applicability and value of their chosen field and enabling them to test ideas in practice
- Advance faculty achievement and innovation
- Create an environment that fosters collaborative and interdisciplinary discovery

The Industry Collaboration Building will be positioned to serve as the hub for these activities. Companies in this building will provide opportunities for research collaborations, internships, mentorships, and recruitment opportunities to Rutgers’ students. Flexible Class A office and laboratory space will be available to meet a full range of needs while allowing companies to grow and
expand within the building. The building will also feature specialized labs, meeting/training rooms, conference facilities, Rutgers corporate programs, collaboration spaces, a makerspace, dining facilities, and other amenities that are designed to stimulate networking and partnership creation.

**Environmental Assessment**

Rutgers engaged Amy S. Greene Environmental Consulting to undertake a comprehensive environmental assessment, site evaluation, and site survey of the 40-acre parcel identified as the location for the Innovation Park development. The work included soil testing, geotechnical assessment, wildlife and endangered species evaluation, flood zone mapping, historic preservation evaluation, and wetlands delineation and mapping, among other assessments. As a result of this study, Rutgers can now clearly define the developable area of the site for both Phase One and future phases of development. The Rutgers Team worked closely with Rutgers Facilities to develop a sustainability plan that addresses energy efficiency, conservation strategies and technologies, and design standards for Innovation Park.

**Economic Impact Assessment**

U3 Advisors, in conjunction with BJH Advisors and the Rutgers Team, completed an economic impact analysis of the proposed Phase One development scenario for the Park. The analysis found that the project has potential to generate significant economic impact in the state, estimated at:

- 800+ direct employees (assuming full occupancy) who can potentially produce over $500 million in aggregate increased economic activity
- 1,330 indirect and induced jobs
- Over 200 direct construction jobs
- $12.2 million in tax revenue

As demonstrated above, research parks can promote economic development and increase economic growth in the communities and regions in which they are located. They also have a direct and positive impact on their host institution(s). To more clearly identify the potential impact of the Park on Rutgers University, the Rutgers Team surveyed Association of University Research Park (AURP) members about the value of their park(s) to their university. The team also conducted a comprehensive literature review of research park metrics. Key findings of the survey and literature review indicate that having a research park can lead to increases in:

- Corporate contracts
- Research funding
- Patent activity and commercialization of research
- Interactions with industry
- Donations/giving to the university
- Student internships
- Hiring of alumni
- Entrepreneurial activity
- Publication rates

Further, AURP members shared that their institution’s affiliation with a research park raised the profile of their university and enhanced their ability to recruit pre-eminent scholars. The Rutgers Team also developed a list of indicators for tracking and assessing the Park’s effect on the university, the community, and the economy. These metrics will be used to drive continuous advancement, benchmark success and identify areas in need of improvement.
Financial Analysis

U3 Advisors undertook a financial analysis of the proposed Phase One development of Innovation Park that sought to answer three principal questions:

1. What is the “gap” in rent that may need to be filled to allow for a viable project and provide a developer with its required return on cost?

2. Could Rutgers be financially better off leasing the premises for a 30-year term from a private developer or building and owning the premises itself?

3. What is the financial impact to Rutgers if the university owns only the Advanced Research Computing Facility and Food Innovation Center?

The first question considers the financial implications of initially constructing all three Phase One buildings. Using conservative assumptions regarding local market rents of $25–$30 per square foot and an 8% developer return-on-cost requirement, there could be significant financing gaps for a developer in pursuing construction of all three Phase One buildings. However, a significant portion of this gap is driven by financing for the Industry Collaboration Building. It is estimated that the gap may range from $36 million–$48 million, depending on the amount of space and the rent that can be charged in the Industry Collaboration Building leased to credit tenants. To make the project feasible for a developer, Rutgers and/or other credit tenants would be required to fully lease the Industry Collaboration Building at a minimum rent of $45 per square foot or $3.7 million per year. Based on comparisons with similar facilities in New York City and Philadelphia which are leasing space at much higher rents (over $75 per square foot), further exploration into the feasibility of securing a higher rental rate of $45 per square foot is worthwhile. Opportunities to reduce the financing gap include pre-leasing more non-Rutgers space in the Industry Collaboration Building at higher rent levels, identifying a developer with lower return-on-cost requirements than 8%, or utilizing public incentives. For example, the value of a 15-year payment-in-lieu-of-taxes was estimated at $8.1 million.

Finally, because of market conditions and the considerable leasing commitment Rutgers would likely have to make at the Industry Collaboration Building, it may be preferable for Rutgers initially to build and own the Advanced Research Computing and Food Innovation facilities. Because of Rutgers’ lower cost of capital and potential revenue opportunities at these facilities, Rutgers cost of occupancy at these buildings over 30 years could be relatively low.

The financial analysis conducted as part of this study was a high level estimation of the costs of ownership under varying scenarios. As a next step, Rutgers should engage with a commercial real estate consultant to conduct a more in-depth financial analysis based on actual building plans and assessment of the market, as well as expected rent levels for the specialized, state-of-the-art space that will be constructed in Innovation Park. In addition, a Request for Information from potential developers would help to inform the range of options that could be available to fit within the financial parameters that Rutgers is willing to commit to.
Governance and Management Approach

A variety of models exist for the ownership, governance and financial structure of research parks and for the relationship between the research park and the sponsoring university. These include direct governance by the university, governance by a university-affiliated independent entity, governance by a university research foundation, governance by a private developer, or a hybrid approach. In selecting the appropriate model for Innovation Park, the university must consider several significant factors, including the academic and commercial objectives of the planned facilities, the mission and objective of the university, the possibility and depth of relationships with Rutgers’ private sector industry partners, the availability of public incentives, and the local real estate market.

Considering the above, the consultant team recommends that the Park be governed by a special purpose 501(c)(3) nonprofit corporation, wholly owned by the Board of Governors of Rutgers University. The nonprofit corporation may be led by a Board of Directors chaired by Rutgers’ President or the President’s designee, comprising members representing the university research enterprise (ORED), private industry leaders and, possibly, representatives from New Jersey state government. The benefits of this structure are that it balances independence and flexibility with university control, ensures continuity in project management and mission, provides an entity that is wholly committed and directly responsible for the Park’s development and growth strategy and is buffeted from university politics and institutional volatility.

Implementation Strategy (Phase One)

It is recommended that the special purpose entity, or the Rutgers Board of Governors, own the Advanced Research Computing Facility and the Food Innovation Center, in addition to common facilities, roads, infrastructure, and parking facilities on the site. The Industry Collaboration Building, which can be included as part of Phase One or postponed to a future phase, depending on market conditions, could be owned by a private developer on land ground leased from Rutgers University or the special purpose entity. The ground lease term could be negotiated with the developer with the improvement reverting to Rutgers at the end of the term. It should be noted that the financial analysis currently shows that the economics of the Industry Collaboration Building may not support a ground rent, though the ground lease can be structured so that Rutgers can participate in any net proceeds and capital events, such as refinancing or asset sale.

Table 1 shows the proposed implementation timeline for Phase One, with a site development plan commencing immediately, concurrently with the establishment of a governing structure. Planning for the Phase One Rutgers buildings, the Food Innovation Center and the Advanced Research Computing Facility, should also commence immediately. The Industry Collaboration Building can be on its own independent scheduling track, either taking place during Phase One or a future phase, with ample time allotted for a comprehensive developer solicitation process, negotiation and preleasing.
Marketing Strategy

The special purpose governing entity, in collaboration with ORED, should lead a comprehensive marketing and outreach effort for Innovation Park. Communications should be targeted at both industry-specific and general audiences. Marketing materials should highlight the opportunities for collaboration with the university and the services available to tenants, in addition to the real estate component.

Current members of the External Advisory Board, such as BioNJ and the New Jersey Technology Council, can serve as resources for conducting industry outreach. These groups have members that are likely targets for attraction to the Park, and they regularly engage with government agencies, investors, chambers, and others that can amplify and extend the reach of Park communications.

Once a private developer partner is selected for the Industry Collaboration Building, the developer should coordinate its leasing efforts with the Innovation Park’s larger identity branding initiatives.
Chapter 1: Project Overview and Context
Project Overview and Context

I. Introduction and Report Objectives

Innovation Park@Rutgers (“Innovation Park” or “Park”) is a Rutgers University-led initiative to develop a signature corporate and community collaboration/commercialization complex that will serve as a national model for technology-led economic development. Located on the university’s main New Brunswick campus, it will act as the front door to Rutgers, serving industry, the university, and the community. Innovation Park will create and support an innovation ecosystem that spans New Jersey and beyond, facilitating collaborations between and across academia and industry, while incubating and growing high-potential businesses. The Park will initially focus on Rutgers’ core competencies that closely align with New Jersey’s key industry sectors and that have the strongest potential for interdisciplinary collaborations. Thematic programs will operate at the intersections of these sectors and disciplines, breaking down traditional silos in order to encourage discovery and knowledge sharing.

Park users will have access to specialized equipment and facilities, a skilled and educated workforce, and resource networks. Innovation Park will be wholly unique, offering space and resources that do not currently exist in one location anywhere in New Jersey. The Park will provide tremendous benefits, catalyzing convergent research and groundbreaking solutions to complex research problems, technology commercialization, job creation, and university-industry partnerships that stimulate economic growth for Rutgers University and the State of New Jersey.

Innovation Park complements Rutgers’ core values as identified in the university’s 2014 Strategic Plan. Specifically, it will promote innovation and encourage collaborations across disciplines and between the university and external stakeholders. The Park will be a critical asset in shaping “tomorrow’s university” through its facilitation of “adaptive and flexible connections between the academy and the economy.” The Park will spur public-private partnerships and enhance cooperation between Rutgers and “the business communities that will employ our students and translate the products of our research into practice.” Having industry co-located on campus will enable “the flow of knowledge between the academy and these local, national, and global business communities."

Innovation Park will stimulate integrated innovation – the coordinated application of scientific, technological, social, and business innovation to develop solutions to complex challenges – by bringing together a diverse group of researchers, students, industry leaders, and community members seeking to address barriers to progress in tackling critical global problems. This approach will create experiential learning opportunities, showing students the “applicability and value of their chosen field” and enabling them to “test ideas in practice and see how they are applied in a social context.” This approach will also “advance faculty achievement and innovation, and create an environment that fosters collaborative and interdisciplinary discovery.”
Why an Innovation Park?

Beginning in the 1950s but accelerating in the 1980s, universities across the United States developed university-related research parks that promoted proximity to and interaction among university researchers, private industry, and student workforces. These parks are viewed as “important as a mechanism for the transfer of academic research findings, as a source of knowledge spillovers, and as a catalyst for national and regional economic growth.” In 2013, the Battelle Technology Partnership Practice conducted a survey of more than 130 university-related research parks across North America and determined that overall, these parks “provide a location in which researchers and companies operate in close proximity, creating an environment that fosters collaboration and innovation, and promotes the development and commercialization of technology.” Battelle found that university research parks employ more than 300,000 workers in North America and that every job in a research park generates an average of 2.57 jobs in the larger economy.

Research parks also provide numerous and direct benefits to their host universities, which may include:

- Additional opportunities for experiential learning through student projects and internships
- Elevation of reputation and recognition of the university
- Improvement in rates of job placement for students and alumni
- Escalation in entrepreneurial activity
- Growth in the number of patents and patent licensing
- Increases in commercialization of university research, research funding, and donations to the university
- Stronger linkages with industry
- Development of transformative academic disciplines and curricula
- Recruitment of top research faculty

University research parks are also an important resource for local industry, providing access to core university facilities and a diverse range of businesses services. These include assistance in accessing capital from public and private sources, technology and market assessment, business planning, and more.

In order to be successful, the development of a research park must be considered within the larger context of market and financial feasibility. As many institutions have learned, a university research park is not a “build it and they will come” endeavor and, without careful deliberation and planning, a park has the potential to become a financial liability. To achieve its mission, the Park at Rutgers must leverage and build upon the university’s existing research strengths, particularly those that have robust synergies, linkages, and applicability with existing and growing New Jersey industry sectors. The Park presents an opportunity for Rutgers to expand its research capabilities, catalyze multidisciplinary collaborations, enhance revenue generation, foster public-private partnerships, provide unique employment and internship opportunities for students, and increase its impact on the state economy.

The principal objectives of Innovation Park @Rutgers are as follows:

- To provide facilities and programs that catalyze integrative research, spur the creation of new academic disciplines and curricula, support the discovery of transformative solutions to challenging research problems, and nurture the creation of breakthrough commercial applications.
• To promote collaborations between industry and academia that are built upon co-located resources and innovation initiatives catalyzed by Rutgers’ areas of research excellence. The Park will have an industry focus and the private sector will play a role in its governance.

• To develop state-of-the-art facilities that encourage cross-disciplinary innovation; support academic research, internships, and workforce training enterprises; and accommodate incubation programs in a culture of entrepreneurship;

• To increase technology transfer, licensing, and general commercialization of Rutgers research;

• To provide state-of-the-art space for growing and midsized companies that is not currently available, does not exist, and/or is not affordable in the Central New Jersey market;

• To serve as an economic development catalyst that promotes growth and diversification of strategic industry sectors in New Jersey.

Given the significance of this project, the university engaged a consultant, U3 Advisors, to evaluate the viability of a public-private partnership model that minimizes Rutgers’ investment, risk, and exposure, while ensuring a financially self-sustaining project that addresses the goals and objectives outlined above.

Innovation Park@Rutgers: Opportunity and Approach

Background and Context

Innovation Park@Rutgers is the result of the recognition that the university must create greater value from its primary mission of research, teaching and outreach. It is led by the university’s Office of Research and Economic Development (ORED), with input and guidance provided by a broad representation of internal university stakeholders, as well as external stakeholders including industry and community leaders, and public and state economic development officials.

Innovation Park is the first and only initiative of the university to create a physical space that co-locates industry and academia, providing industry with a one-stop shop where they can access talent, facilities and services. The Park will promote multidisciplinary collaborations and support all phases of the innovation pathway, from research through commercialization.

Park programs will be designed to build on Rutgers’ strengths and address New Jersey industry’s desire for “frictionless” university-industry interactions. In bringing industry onto campus, the university will be able to offer experiential learning opportunities and future career prospects to students. Programs will be modeled on best practices learned at the Rutgers Honors College, the Rutgers Food Innovation Centers, the Small Business Development Center, and other centers. In addition, best practices gleaned through research and discussions with park managers across the country have been incorporated into the planning process for the Park.

The concept for Innovation Park has been introduced to stakeholders from industry, government, the community, and academia. Through more than 40 letters of support and
letters of intent, stakeholders have voiced a demand for this type of space and associated programs. A number of industry representatives have expressed interest in potentially locating all or a portion of their operations in the Park.

Battelle Assessment of the Innovation Park Concept

The effort to develop Innovation Park@Rutgers dates back to 2011, when ORED engaged Battelle Technology Partnership Practice to undertake an assessment and development pathway for a collaboration and commercialization complex at Rutgers-New Brunswick.

This assessment, presented to Rutgers in 2012, evaluated the university’s core research focus areas, growth opportunities, and institutional readiness for collaboration in order to identify key drivers for development of the Park. The Battelle study examined the broader regional economic context from an industry and real estate perspective, interviewed over 150 university and industry stakeholders, and undertook a best-practices evaluation of applicable university research parks.

Battelle drafted a conceptual framework for the initial development of the Park that included preliminary recommendations for the facilities and space types in the first phase of construction. The plan also identified how Rutgers University’s core competencies could advance development of Innovation Park. The principal core competencies at Rutgers identified by Battelle included the following:

- 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 including Ceramics, Composites, and Nanotechnology

Battelle’s work also included a high-level financial analysis. A more comprehensive financial analysis, programmatic design and implementation plan, branding and marketing plan, and governance and management approach were reserved for a Phase Two effort. Based on its Phase One analysis, Battelle determined that the Innovation Park concept was viable and there was both external and internal demand for this type of development at Rutgers.

The Innovation Park project was put on hold, however, following Rutgers’ 2013 absorption of the University of Medicine and Dentistry of New Jersey and the creation of the state’s academic health center, Rutgers Biomedical and Health Sciences (RBHS). In 2014, Rutgers joined the Big Ten and the Big Ten Academic Alliance (previously known as the Committee on Institutional Cooperation), a consortium of 14 world-class research universities. With Big Ten membership and major schools of medicine, a school of nursing, ancillary research institutes, and health science-related centers and programs now incorporated institutionally into Rutgers-New Brunswick, the university is in an even stronger position to contribute value to Innovation Park.

Though the overall Innovation Park concept was temporarily put on hold, ORED and its Rutgers partners continued with preliminary programmatic development of the Park, based on Battelle’s initial identification of areas of opportunities. Most significantly, this included the
establishment of advanced computing capabilities on the proposed site of the Park with a modular data center installed in December 2015 and equipment following in the spring of 2016. The installation of this equipment has already garnered national and international attention for Rutgers. In June 2016, the Rutgers supercomputer was ranked #2 most powerful in the Big Ten, #8 among all U.S. education institutions, #49 among academic institutions globally, and #165 among all supercomputers worldwide.

**Rutgers Preliminary Planning**

In 2014, preliminary planning for Innovation Park resumed and, as part of the Rutgers master planning effort, ORED, in collaboration with Rutgers Facilities, identified an approximately 40-acre greenfield site on the Livingston campus at Rutgers–New Brunswick as the future site of Innovation Park.

ORED established a Rutgers Team consisting of university representatives from a variety of units and schools throughout the New Brunswick campus. In addition, internal and external advisory boards were formed, composed of stakeholders with institutional and industry knowledge and experience which is integral in planning for Innovation Park.

**U.S. Economic Development Administration (U.S.–EDA) Funding**

In May 2015, Rutgers was awarded a $500,000 grant (one of only ten issued nationwide) from the U.S.–EDA to develop an implementation strategy and sustainable business model for the Park. In addition to addressing potential synergy between RBHS and other Rutgers academic programs, as well as areas of opportunity that were not considered in the original Battelle report, the new implementation report aimed to:

- Develop a unique value proposition for Innovation Park and its role in the New Jersey market
- Prepare an updated financial analysis of the commercial viability of the proposed Park, taking into account external funding resources
- Recommend amenities and services to be offered to Park occupants and tenants
- Suggest an optimal governance and management approach for Innovation Park
- Draft an effective implementation strategy, including an optimal Phase One development plan

**Scope**

Based on a competitive selection process, Rutgers ORED engaged U3 Advisors in November 2015 to undertake the business plan and implementation strategy development. The U3 Advisors team brings strong knowledge in financing, university-developer partnerships, and place-making. In addition, the U3 Advisors team has hands-on experience working with university clients on innovation center projects such as Cornell Tech in New York City, the New York Genome Center, the Princeton University Forrestal Center, and the University of Maryland’s technology park initiatives.

The scope of this study is quite expansive, drawing from multiple disciplines and areas of expertise. The U3 Advisors team worked closely with the Rutgers Team and tasks were allocated based on each team member’s area of expertise. The U3 Advisors team undertook the following study components:

- Benchmarking and Best Practices
- Top-level overview of local real estate market
- Financial analysis of Park development
  - Identification of financing mechanisms and strategies for long-term financial stability
• Economic impact assessment
  – Assessment of the Park’s impact on regional growth and economic development
  – Evaluation of job creation impact of Park
• Evaluation of optimal organization and management structures and development of implementation strategy

The Rutgers Team brings strong institutional knowledge in university facilities and infrastructure, corporate engagement, international partnerships, entrepreneurship programs, workforce development, community engagement, environmental sustainability, research analytics, and RBHS program integration, in addition to specific programmatic expertise in food innovation and advanced computing. As such, the Rutgers Team contributed the following components to this study:

• Evaluation of RBHS assets and collaboration opportunities
• Identification of opportunities for international collaboration and partnerships
• Environmental assessment, site surveys and infrastructure needs
• Development of a sustainability plan and assessment of energy efficient building technologies
• Development of an innovation ecosystem plan, metrics and impact assessment
• Development of an advanced cyber-infrastructure plan
• Development of a food innovation/food science infrastructure and program plan
• Secured Letters of Interest from businesses
• Recommendations of programs, amenities and services to be located at the Park
• Development of a plan for supporting student and industry entrepreneurship
• Research on the economic benefits to universities of having a research park
• Identification of regional resource networks and partnerships
• Evaluation of Rutgers-industry partnerships and potential tenants for the Park

Concurrently, there were several components of this project and study that required close collaboration between the U3 consultants and the Rutgers Team. These included an analysis of employer needs based on industry clusters, the fiscal impact assessment, risk assessment and mitigation strategies, and a marketing/branding strategy.

**Approach**

In undertaking this study, the U3 Advisors team conducted research, including primary stakeholder interviews, review of market reports, and independent evaluation, in addition to relying on the firm’s first-hand experience consulting with peer institutions on the planning and development of research and innovation facilities. These assessments and experience guided the findings and recommendations as they relate to private sector space and facility needs, financial assessment of the proposed program, organizational and management structure, and a Phase One implementation plan.

It is important to note that, in establishing a framework for these recommendations, the U3 Advisors team carefully reviewed the 2012 Battelle study. U3 accepted many of the conclusions of the Battelle study while building upon and updating these findings where necessary, particularly in consideration of the subsequent creation of RBHS and Rutgers entry into the Big Ten. In undertaking the best practices and benchmarking component, for example, U3 accepted the valuable lessons from the five university research parks that Battelle had evaluated while considerably expanding this cohort to include institutions with academic medical centers.
Revisiting the Opportunity

Successful university research parks serve both as facilitators for commercialization of university research and as catalysts for economic development. These parks are often intended to promote collaboration between university faculty and students and private industry by:

- supporting relationship-building between companies and researchers
- incubating new businesses
- linking researchers and other technology generators with the marketplace
- leveraging the greatest research competencies of the sponsoring academic institution and economic strengths of the state and/or region.

In addition to direct job creation, a well-planned park may attract investment in new commercial technologies being spun out of academic research, and support indirect and induced job creation in the surrounding region.

Links between Research and Industry

The proposed Innovation Park provides opportunities to leverage research strengths at Rutgers that closely correlate with industry clusters that excel in New Jersey. Several of these research competencies were identified in the Battelle report and include food science, advanced computing, clean energy, biopharmaceuticals, advanced materials, and continuous manufacturing. The absorption of RBHS within Rutgers also presents new opportunities in life sciences, medical devices, nutrition, and wellness. Additional interdisciplinary initiatives in chemistry, cosmetics, and personal care correspond closely to industries whose local strength distinguishes the state from other regions.

Location and Real Estate Market Considerations

The Central New Jersey market, with its historic position as a leading U.S. cluster for the pharmaceutical industry, boasts a highly skilled workforce that has helped the region emerge as a preferred location for the many midsized companies that have formed as a result of shifts in the pharma sector. These companies have a demonstrated need for smaller laboratory spaces (2,500–10,000 SF) that are currently scarce in New Jersey, particularly in the Central New Jersey market, providing an opportunity for Innovation Park to meet a space and facilities need. There is also a high demand for incubator space in the region as the existing incubators, most notably the New Jersey Economic Development Authority’s Commercialization Center for Innovative Technologies in North Brunswick, have no available space.

The identified site on the Livingston campus provides tenants with adjacency to the Livingston and Busch campuses, fostering potential interdisciplinary collaborations with Rutgers’ engineering and applied science programs and the business school. The location will also provide tenants with access to Rutgers faculty and students in addition to university core facilities, which could prove to be valuable assets for start-up and mid range companies. Importantly for Rutgers, the proposed site is also owned and controlled by the university and fully entitled for development as a university research park. While Rutgers’ research initiatives and some trends in the local market present exciting opportunities for Innovation Park, there
are considerable challenges that must be fully considered and addressed owing to the start-up nature of this project and the unproven market of the proposed site.

The Central New Jersey commercial real estate market has been a challenging environment since the 2008 economic crisis, though some recent trends, particularly in the commercial laboratory sector, offer opportunities for the Park. Currently, the Central New Jersey office and lab market and the Piscataway and New Brunswick submarkets are characterized by an overabundance of second-generation space, relatively low rents, and higher than average vacancy rates. The proposed Innovation Park will provide state-of-the-art, specialized space that does not currently exist in the local market, in addition to having the potential to meet the demonstrated demand for “in-between” lab space of 2,500–10,000 SF. However, given the challenges that the local real estate market presents, Rutgers will have the obligation to create value at this site in order to stimulate development and distinguish this project from other projects and space in the tri-state region. It will also need to make a commitment to significant leasing in the initial buildings in order for the project to gain traction and to secure a developer.

Phase One Development

It is proposed that the Phase One development of Innovation Park will include an Advanced Research Computing Facility, a Food Innovation Center, and an Industry Collaboration Building. Each of these will fill a gap in the local market, providing tenants with access to specialized equipment, talent, and services:

- **Advanced Research Computing Facility** – Companies often lack the financial and human capital to build capabilities in advanced computing, which are key to remaining competitive in today’s global markets. The Park houses one of the nation’s most powerful supercomputing systems which will be available for use by industry. Rutgers’ faculty and staff will assist businesses in using the equipment and analyzing industry big data.

- **Food Innovation Center** – Clients of the Rutgers Food Innovation Center–North will be relocated to the Park. Major food companies have expressed interest in locating (and in some cases expanding) their R&D operations at the Park, where they will have access to industry experts, equipment, testing and demonstration labs, consumer study groups, student interns, and faculty collaborators.

- **Industry Collaboration Building** – Open to companies across a range of industries, the collaboration building will be designed to meet the highest industry standards.
and anticipate future workplace priorities. Comprising laboratory and office space, event and meeting rooms, and open spaces, the physical layout of the building and the programs offered within will foster interactions. Modular laboratories will allow companies to quickly scale in size as their business evolves. Tenants will benefit from educational seminars, networking events, and one-on-one meetings with resource providers.

**Moving Forward**

The development of Innovation Park can be a viable project with the right combination of opportunities, assets (both physical and programmatic), financing, and leadership. Rutgers has outlined a compelling program for the site that builds upon the university’s interdisciplinary areas of excellence, while seeking to capitalize on the benefits and nexuses to those industry clusters that most distinguish New Jersey from its competitors.

The information in this report seeks to more clearly define the value proposition Rutgers brings to this endeavor, including program opportunities and requirements, within the context of a comprehensive overview of best practices by peer institutions and an updated assessment of the local real estate market. A high-level financial analysis was undertaken that evaluates the project’s capital and operating costs and more clearly defines Rutgers’ cost of occupancy and likely required capital and operating subsidies. An implementation strategy was also created that identifies an organization and management approach, requirements for a developer solicitation, timeframe and other considerations.

**II. Benchmarking and Best Practices**

In order to develop a contextual framework and guide the analysis and recommendations for the proposed Innovation Park, the U3 Advisors team undertook a benchmarking and best practices evaluation of a cohort of university and research parks around the country. In selecting this cohort and its applicability to the Rutgers initiative, the evaluation considered the mission and objectives of each project; its location and size; research or specialization focus (if any); the role of the sponsoring institution; ownership and management structures; financing approach; and programs, services, and other amenities.

**2012 Battelle Best Practices Findings**

It is important to note that, as part of its July 2012 development pathway report for Rutgers, Battelle Technology Partnership Practice performed a comprehensive best practices study, which U3 Advisors expanded upon. In undertaking its evaluation, Battelle selected and analyzed parks at other state universities around the country that it determined had features comparable to the Rutgers profile, specifically large land-grant universities with strong commercial incubation and spinout programs. As RBHS had not yet become part of Rutgers at the time of its report, Battelle did not consider medical schools and health science programs as an important part of its benchmarking analysis.

Battelle’s benchmarking evaluation focused on five research parks:

1. bwtech@UMBC (University of Maryland Baltimore County, UMBC)
2. Centennial Campus (North Carolina State University, NCSU)
3. Delaware Technology Park (University of Delaware, UD)
4. Purdue Research and Technology Park (Purdue University); and
5. University Research Park at the University of Wisconsin Madison (UW-M).

With the exception of UWM, all of these research parks are affiliated with universities that do
not include medical schools. Three of these parks have a strong focus on university-industry partnership, while Purdue and UWM do not.

Excluding Purdue’s research park, which dates back to 1961 and is one of the most established in the nation, this cohort of research parks generally dates from between the 1980s (when UD and UWM started their planning efforts) and the early 2000s, which is when the bulk of the development at bwtech@UMBC occurred. bwtech@UMBC is also the only one of these examples that was initially developed via a master developer model. The two more established parks at Purdue and UD are managed and developed by university-affiliated independent nonprofit entities—respectively, the Purdue Research Foundation and Delaware Technology Park, Inc.—while University Research Park and Centennial Campus are owned by their respective universities but developed through a more ad-hoc university/ developer hybrid model.

Battelle identified five principal lessons learned from this cohort of research parks:

- Pursue an active strategy to grow the research park around specific areas of university research strengths
- Connect to broader state-led development efforts, particularly as they pertain to business attraction, marketing, and financing.
- Maintain strong university engagement and linkages in the governance structure of the research park. The university should be actively involved in setting the direction of the park. Maintaining close connections with the sponsor university’s technology transfer office and broader commercialization efforts is also important.
- Pursue an active mix of large anchor tenants and multi-tenant/incubation space as an essential feature of the research park. A university anchor and/or large anchor tenant can serve as important catalysts for development of the park, but it is also important to consider a broader pipeline of tenants.
- Ensure that any development approach to the park incorporates flexibility. Pursue a development model that allows for calibrated responses to market changes. A master development model may be too rigid. The university must ensure that there is a market for the value proposition it has established before pursuing any developer partnership.

U3 Advisors’ Benchmarking and Best Practices Analysis

In expanding upon the 2012 analysis undertaken by Battelle, U3 Advisors considered two important developments that have taken place in the interim since Battelle’s report: (1) Rutgers’ absorption of the University of Medicine and Dentistry of New Jersey and the creation of Rutgers Biomedical and Health Sciences (RBHS) in July 2013, and (2) Rutgers’ joining the Big Ten Conference and its associated academic consortium, the Big Ten Academic Alliance (formerly known as the Committee on Institutional Cooperation), in July 2014.

Because of these actions, U3 Advisors determined that its benchmarking and best practices analysis should consider a high-level overview of all research parks at Rutgers’ new Big Ten peers. In addition, a larger peer group outside the Big Ten was considered that could serve as applicable models to inform Rutgers’ efforts. The additional examples the U3 Advisors team...
identified included institutions with medical schools, successful projects based on university research strengths, and noteworthy management and governing structures. The consultants also included some projects that offer cautionary examples to Rutgers. In addition, they revisited UD, which started developing its Science, Technology, Advanced Research (STAR) campus after the completion of the Battelle report.

**Big Ten Peers**

Of Rutgers’ 13 fellow Big Ten institutions, 11 have university-affiliated research parks. Two of these, Purdue and the UWM, were evaluated in the Battelle Report. The others are:

1. **Pennsylvania State University (PSU) Innovation Park.** A 118-acre project focused on tech companies and light manufacturing. Buildings are owned by multiple developers while the park is managed by PSU staff.

2. **University of Maryland M Square.** A suburban research park with a strong federal government presence developed as a joint venture with a Maryland-based suburban office developer. University reports mixed success.

3. **University of Illinois Research Park (UIRP).** A comprehensive research park developed in partnership with a local private developer. Known for strong industry-university partnerships.

4. **University of Iowa Research Park.** Strong university presence with a focus on incubation. Established with significant state funding and tax abatements.

5. **University of Nebraska Innovation Center (UNIC).** First phase opened in 2014 with a strong focus on agriculture and food science. Developed in partnership with a private developer. Significant university presence in Phase 1 will allow for more speculative development in future phases.

6. **Michigan State University (MSU) Corporate Research Park.** Four tenanted buildings and multiple development sites. Park is owned and managed by MSU Research Foundation. University reports mixed success.

7. **University of Michigan North Campus Research Complex.** A 28-building corporate campus acquired by the university from Pfizer in 2008. Focus is on university-industry partnerships with a particular focus on medicine and the auto industry.

8. **Ohio State University (OSU) SciTech.** A 56-acre campus developed and managed by a partnership entity comprising OSU, the State of Ohio, and the City of Columbus. Strong university presence.

9. **Indiana University Technology Park.** Opened in 1996 with university presence only; now seeking tenants. University anchors include the Cyberinfrastructure Building and IU Data Center with supercomputer.

It should be noted that the two remaining Big Ten institutions, the University of Minnesota and Northwestern University, do not have affiliated research parks and may serve as cautionary examples for Rutgers. Near the University of Minnesota campus in Minneapolis-St. Paul, a proposed privately owned and developed innovation park has remained in the planning stage for over a decade. Both a lack of active interest or collaboration from the university and the inability by the developer to align multiple interests have been cited as explanations for the failure of this project to move forward. Near the Northwestern campus in Evanston, IL, a park developed jointly by the university and the City of Evanston in the 1980s ultimately failed to attract sufficient tenants and closed. Subsequently, in the early 2000s, the Cleveland-based developer Forest City developed the Illinois Science + Technology Park at the former Searle pharmaceutical campus nearby. This project has not proven successful for Forest
City, which announced at the end of 2015 that it is actively looking for buyers of the property after sustaining extensive financial losses. The Forest City project never had a direct connection to the university.

**Additional Research Park Projects of Note**

In addition to Rutgers’ Big Ten peers, the U3 Advisors team selected a number of research park development projects with applicable lessons for the proposed Innovation Park. These projects include:

- **University of Maryland BioPark (UMBio)** at UMB, which is noteworthy for its successful multiphase partnership with a developer that has an excellent national track record working with research universities;

- **University of Miami Life Science and Technology Park**, built in partnership with the same developer as at UMBio and with a focus on both health and applied sciences;

- **Nanotech Center at SUNY Polytechnic in Albany**, notable for its successful focus on industry partnerships in the field of nanotechnology;

- **Wake Forest Innovation Quarter**, an urban research park in Winston-Salem, NC that is a partnership between Wake Forest University, Wake Forest Baptist Medical Center, the City of Winston-Salem and the State of North Carolina. The Innovation Quarter has a focus on medicine, bioscience, materials science and information science. It is being developed by the same private developer as UMBio and the University of Miami.

- **Technology Square at Georgia Tech**, significant for its focus on advanced computing and industry partnerships.

Finally, a brief case study of the Cornell Tech applied sciences campus in New York City was also included, based on U3 Advisors’ experience as consultant to that project. While Cornell Tech does not have exact parallels to Rutgers’ initiative – it is as much a new academic campus as it is a commercial research park – its developer partnership model does have applicable lessons for Rutgers.

A full overview of U3 Advisors’ benchmarking and best practices analysis is included in Appendix A.

**Lessons Learned**

Based on the benchmarking and best practices analysis that U3 Advisors undertook, key observations and trends that were noted include the following:

1. **Lesson 1: Role of the Sponsoring University**
   
   1. At successful research parks, the sponsoring university needs to serve as a catalyst and show early commitment, in both research programming and facilities, to attract developers. This is particularly true in an untested or weak market. At most projects the consultants examined, the sponsoring institution occupies a significant portion of the space, either in institution-owned facilities or as a tenant in developer-owned buildings. At UMBio’s Phase I, UMB was required initially to lease 85% of the developer-owned building; this requirement was reduced substantially in future phases. At UNIC, the university’s relocation of its Department of Food Science & Technology and establishment of a Food Innovation Center in leased space allowed the developer to initiate the next speculative phase of development.
   
   2. The sponsoring university should provide opportunities for industry-university co-location and collaboration. This is the guiding planning principle at Cornell Tech: the 242,000 square foot “Bridge” building is specifically designed as a “corporate co-location” facility where companies can collaborate with university researchers.

A strong university-industry partnering focus is also prominent at the University of Nebraska, the University of Michigan, UD, SUNY Polytechnic, and UMB.
3. Any university programs at the research park should have an interdisciplinary focus that has synergies with private industry sectors. At Cornell Tech, Cornell University’s School of Engineering and its Department of Computer and Information Science developed three interdisciplinary, entrepreneurship-focused academic programs that correlated with New York City’s industry strengths: Mobile Social Interaction focused on mobile applications and social media technology; Technologies for a Healthier Life focused on health science-related technology and Technology for the Built Environment. At UNIC, the initial Phase I focus is on food science and agriculture, while the University of Michigan North Campus Research Complex focuses on technologies related to the automobile industry and the health sciences.

Lesson 2: Benefits of Medical School Presence

Historically, many of the most successful university research and innovation parks in the country were those located adjacent to academic medical centers (AMCs) and focused on life sciences and biotechnology. These parks provide access to critical resources and expertise sought by industry. Biopharmaceutical and other life sciences-related businesses are increasing their engagement with the public sector – in particular with universities and AMCs – in an effort to:

- Identify breakthroughs and advances in basic research that present clinical development opportunities
- Improve existing therapies and treatments
- Access science and medical talent

In order to understand and develop effective treatments and ultimately a cure for complex diseases such as Alzheimer’s and Parkinson’s, researchers recognize the need for collaboration. Consortiums, coalitions, and other partnerships have emerged to coordinate and direct drug discovery efforts – working across university disciplines, sectors, and geographies, and bringing together foundations, universities, research institutions, and private companies.

While UMB is an example of a stand-alone medical institution, most medical schools exist as part of a comprehensive research university and therefore allow for collaborations across various disciplines, such as engineering and computer science. For example, the Wake Forest Innovation Quarter, while largely focused on medicine and biomedicine, has leveraged Wake Forest University’s strengths in materials science and information science.

The high costs, long timeframe, and difficulty in developing new medicines have changed the research and development landscape and elevated the position of AMCs and university life sciences-related centers and labs. In 2006, “approximately 60% of all research funding to universities was provided to support the academic life science research enterprise.” On average, private industry funding totals one-tenth to one-half of the support received by AMCs across all funding sources.

In addition to funding research, some companies are actively engaging in joint research projects with universities. In 2010, Pfizer launched its Centers for Therapeutic Innovation (CTI) to leverage academic expertise to improve productivity and decrease R&D costs. The centers provide laboratories that house antibody engineers, protein scientists, assay biologists, and project managers. Pfizer locates these centers on university campuses, or in close proximity to medical facilities, to allow its researchers to collaborate with university and medical researchers. Pfizer established a CTI at the University of California, San Francisco and the University of California, San Diego, and has several CTIs in Boston and New York City.

Joint research projects may focus on biological targets or mechanisms that are not well understood. The National Institutes of Health spends
more than $1 billion annually on research of specific categories of disease and conditions that it has designated a high priority (such as substance abuse and aging). Lower priority-designated diseases and conditions receive less funding. Through public-private partnerships, industry and academia can pool resources and expertise to study these lower priority-designated diseases and conditions, many of which “have a significant impact not only on health and longevity but also on the quality of life and work productivity of the vast majority of U.S. citizens.” These types of partnerships have the potential to improve the health and wellness of New Jersey’s residents, while enabling university faculty and students and industry to develop expertise in areas of unmet need.

One of the primary ways in which industry engages with AMCs is through clinical trials. Tufts Center for the Study of Drug Development analyzed 3,000 grants involving nearly 450 industry sponsors and 22 medical schools and found that three quarters of the grants were joint clinical trials. Site selection of clinical trials is a critical component of the commercialization pathway. Choosing the wrong site can lead to significant delays and added costs. A large body of research exists on this topic – highlighting the importance of carefully choosing an appropriate site and the potential to reduce health care costs by better managing clinical trial site selection. Many companies hire contract research organizations (CROs) to oversee the administration of clinical trials. These CROs will have regular correspondence with clinical trial investigators and may choose to locate in areas where large numbers of trials occur.

Each year, Rutgers supports 350 clinical trials (industry-sponsored and Rutgers investigator-initiated studies). More than 200 principal investigators conduct trials in over 50 therapeutic areas. Rutgers has specific expertise in cancer trials. The university has the state’s only National Cancer Institute-designated comprehensive cancer center and one of only 14 National Cancer Institute-designated Minority-Based Community Clinical Oncology Programs in the U.S., providing access to trials that are available nowhere else in New Jersey, and in few locations in the nation. The Cancer Institute of New Jersey enrolls 15% of all of its new adult cancer patients in clinical trials, compared to a nationwide average of less than 5%. CROs that regularly engage in cancer trials may choose to locate their operations at the Park, which will be located only miles from the cancer institute.

What characterizes the most successful university medical schools is a record of innovation and technology transfer, and an interdisciplinary focus, in addition to a strong research presence at the respective research parks. Three of the parks included in this benchmarking analysis – UMB, the University of Illinois, and Wake Forest University – fit this description. Among Rutgers’ Big Ten peers, UIRP has also developed a strong interdisciplinary focus that includes medicine. While UI’s main medical campus is in Chicago, there is a smaller medical school presence at the flagship campus in Urbana-Champaign that has facilitated a strong medical device sector at the research park. In 2015, it was announced that a new medical school focused on biomedicine will be established at Urbana-Champaign, which will allow for more cross-disciplinary opportunities at the research park.

In order for the medical school-park relationship to be most effective, U3’s analysis indicates that the medical school should have a physical presence at the park and a role in its programming. At Wake Forest Innovation Quarter, the medical school has a central role in the development and programming of the park, with representatives on the board of the governing entity. In addition, the medical school located some research departments in buildings within Innovation Quarter in order to promote industry-academic co-location and collaboration.
Rutgers’ acquisition of the University of Medicine and Dentistry of New Jersey and the establishment of Rutgers Biomedical and Health Science (RBHS) does present favorable circumstances for Innovation Park@Rutgers. This is particularly so when evaluating RBHS’s existing interdisciplinary components, including the Cancer Institute of New Jersey, the Center for Advanced Biotechnology and Medicine, and the Environmental and Occupational Health Sciences Institute, among others. Combining the New Jersey Medical School with Robert Wood Johnson Medical School places RBHS squarely among many of its Big Ten peers in terms of NIH funding, with $71.5 million received in 2015, a 28% increase over 2006 funding levels.

In 2014, RBHS released its strategic plan, which cited the objectives to “foster integration and collaboration across RBHS and between RBHS and the university’s non-RBHS programs and build academic strength in health throughout Rutgers” and “establish partnerships with pharmaceutical and biotechnology companies.” Further, RBHS has a need for new and expanded lab space to accommodate its growth trajectory. Innovation Park can provide much needed space for RBHS uses and facilitate connections to life sciences businesses that will be located on-site.

Rutgers’ AMCS have a record of innovation and technology transfer. Significant innovations in medicine can be attributed to the university, including the discovery of the first gene mutation linked to Parkinson’s disease; two of the newest anti-HIV drugs, Intelence and Edurant; and the use of interferons in treating cancer. Research conducted at Rutgers’ AMCS generate spin-off companies and technology licensing revenue. As an example, Aquarius BioTechnologies Inc., a bio-delivery drug discovery company with a novel and proprietary technology platform for treating infectious diseases, was developed at Rutgers and acquired by Matinas BioPharma Holdings – a New Jersey-based company, in January 2015. Medical students studying at Rutgers are developing their own life sciences businesses through the Biomedical Entrepreneurship Network. Faculty and student spin-offs will be able to lease space at Innovation Park, where they can access state-of-the-art labs and equipment, and be located in close proximity to their founders and research partners.

Life sciences companies, in particular CROs that engage in cancer clinical trials and companies that seek collaborative opportunities to develop treatments for complex diseases and conditions, will benefit from co-location in the Park through access to Rutgers’ AMCS – and their research, resources, and talent. These companies may also experience increased levels of patent activity. A recent study found that firms located in a university park that has an associated medical school have a higher level of patent activity. The findings of the benchmarking and best practices indicate that in order to capitalize on the presence of the medical schools and affiliated programs within RBHS, it will be important for RBHS to establish a presence in the Park and contribute to its programming, maintain a strong culture of innovation and technology transfer, build a strong framework for translating early science to applicable technologies, and help researchers translate expertise into initiatives that are product and services driven.

Lesson 3: Planning for Flexibility

While some projects that were examined were undertaken within a comprehensive master plan and others have been developed in a more phased and/or ad hoc approach, it is important to note that any plan for the project must incorporate maximum flexibility as one of its principal assumptions. The market for office and lab space is fluid and dynamic, and it is difficult to project trends and needs far out into the future. The Delaware Technology Park, for example, began with considerable support from DuPont.
and a strong focus on materials science. As DuPont’s plans evolved and its commitment to the park lessened, the park’s focus on materials science diminished and a new focus was developed toward health sciences in future phases. At Cornell Tech, all space is being designed with maximum flexibility, though this is more easily done at facilities that are dry lab and office space dedicated to applied sciences. While there are greater challenges in providing flexible and smaller wet lab space, the consultants identified a number of models that Rutgers might explore:

- The Bioinnovation Center, part of Phase 2 at UMBio
- The Science Hotel model developed by the life sciences-focused developer Alexandria at its Alexandria Center for Life Sciences near NYU Langone Medical Center in Manhattan
- The New York Genome Center’s sequencing, clinical, and innovation labs in Manhattan

Lesson 4: Facilities and Amenities

1. It is important to provide a variety of space options that address the needs of companies throughout their arc of growth. At UIRP, the university and its developer partner cooperated to provide this range of spaces, from the university-operated incubator to “in-between” spaces (for incubator graduates, anywhere from 2,000–10,000 SF of space) to larger lab and office suites. There is also a Technology Development and Fabrication Center. It should be noted that the smaller incubator and in-between spaces may need to be subsidized by university or public sources. The Bioinnovation Center at UMBio was partially funded through Maryland state resources.

2. Amenities, place-making, and physical connectivity are increasingly important. A representative from the University of Maryland (UM) advised that some of the principal shortcomings of the M Square project are its isolated suburban setting, the lack of connectivity to downtown College Park and the university, and the general lack of amenities that workers want nearby. While UM is working with its developer partner, Corporate Office Properties Trust, to develop more amenities at M Square, it is also pursuing a more pedestrian-scaled and amenity-rich “innovation district” near downtown College Park and the campus. The University of South Florida (USF) issued an RFP in 2015 for the second phase of its Research Park in suburban Tampa with a specific call for more amenities (e.g., conference facilities, food, and ancillary retail) and place-making initiatives. Common areas and casual dining facilities also facilitate informal meeting and collaboration between employees of different tenants in addition to between representatives of industry and academia.

3. Conference and convening facilities are an important component of a successful research park. As one can imagine, large conference centers that can host industry-related events are key to fostering collaborations and learning. It should be noted, however, that it is difficult to entice private developers to invest in expensive hotel or formal conference spaces in an unproven market; these facilities are often postponed until the park has proven itself as a desired destination.

- At the University of Illinois, the developer (Fox-Atkins) and the university jointly developed a medium-sized hotel and conference center (known as the “iHotel”) seven years after the initial opening of the research park. While the conference center has exceeded expectations, the hotel has struggled in the local market.

- At the USF Research Park, a full-service conference facility is owned and managed by the USF Research Foundation, while conference space at a nearby Embassy Suites Hotel is “soft” branded as part of the research park.
• UNIC, which opened in 2014, repurposed a disused historic exhibition hall as a conference center, which is managed by the University of Nebraska Alumni Association.

• At UMBio, a small conference center, which includes an auditorium and two conference rooms, was developed in the Phase 2 developer-built building.

4. Use of university core facilities and equipment is a valuable amenity, particularly for start-up or medium-stage companies who would otherwise not have access to such expensive equipment, tools, and services. For larger anchor tenants, these shared items may not be as much of a draw.

Lesson 5: Programs

1. University-developed programs can serve as a tool to attract and sustain tenants. Among the peer institutions and projects that were reviewed, the consultants observed that the UIRP is a leader in this area, offering extensive programs to both established and start-up companies. This includes a university “concierge” service that allows and facilitates tenant access to university departments and affiliates, and “Experts in Residence” programs that provide tenants with university-affiliated specialists in such fields as data analysis, logistics, and supply chain economics.

2. Programs designed to foster innovation and entrepreneurship among faculty, students, and other university affiliates are also a valuable component of the projects that were evaluated. At Cornell Tech, there is an embedded culture of entrepreneurship with multiple opportunities for joint programs with private industry and strong collaborations between the Johnson School of Business, the School of Engineering, and the Department of Computing and Information Science. The Cornell Entrepreneur Network leverages Cornell’s alumni network of start-up founders and business leaders to provide mentoring programs while the Cornell Startup Studio awards successful student start-ups space at a Cornell co-working facility. At UIRP, there is an established Entrepreneur-in-Residence Program and professional service programs that leverage university resources to offer grant assistance, legal services and other assistance. Many research parks include workshops and networking programs for their tenants as well.

Lesson 6: Governance and Management Structures

The research parks at the Big Ten and additional institutions that U3 Advisors reviewed have a variety of ownership and management structures that generally fall into the following governance categories:

A. Direct University governance

B. Affiliated Entity governance
   a. Independent nonprofit entities that are wholly controlled subsidiaries of the sponsoring institution
   b. Nonprofit corporations whose Board of Directors comprise members of the Board of Trustees, senior officers of the university and, sometimes, industry representatives
   c. 501(c)3 nonprofit corporations directly owned by the university

C. Governance by independent university research foundation

D. Developer partnership
   a. Public-private partnerships between the university and a private developer partner
   b. Partnerships between university-affiliated entity and private developer
Governance by an independent, dedicated university-affiliated entity that is wholly committed to successful growth and management of the park is an ideal model that ensures continuity in park governance and mission. This model has been successfully implemented at the UIRP, which is governed by the university of Illinois Research Park LLC, in partnership with a private developer, and UNIC, which is governed by the Nebraska Campus Development Corporation, in partnership with Tetrad Development.

At UM’s M Square development, the University’s Office of Real Estate is directly responsible for the park’s development strategy and the partnership with UM’s developer partner, Corporate Office Properties Trust. The Assistant Vice President for Real Estate at UM spoke with U3 Advisors and noted that the governance structure of M Square has not been optimal, because the Office of Real Estate cannot provide the focused attention and long-term independent strategic planning that the park requires. At UD, Purdue, and the University of Illinois, independent entities are responsible for park governance and development strategy (with a developer partner at the University of Illinois). The relatively autonomous structure of these independent entities includes separate boards and leadership, and has facilitated continuity and flexibility that may be more difficult to achieve within the traditional university bureaucracy.

Funding Sources

The cohort of university research parks that were examined generally rely on a combination of four funding sources: (1) university sources, including revenue bonds; (2) private developer funds; (3) state-appropriated funds and state economic development funding sources; and (4) private philanthropy. Few university-related research parks have been developed without significant capital and leasing contributions from the sponsoring institution. Many universities can then leverage that initial investment to attract funding from other sources. At UNIC, the developer secured over $10 million in tax-increment financing to pay for initial infrastructure and site work.

Lesson 7: Developer Partnerships

In developing an academic innovation center where commercial facilities, commercial laboratories, proto-manufacturing, incubators, demo space, and ancillary food and retail are key, third-party development partners can play a valuable role. Of the 21 university research parks that were examined (summarized in Appendix A), 13 involve some kind of partnership between the sponsoring academic institution and a private developer partner.

For most universities, development of commercial partnership facilities is outside the institutional core mission and expertise. By relying on third-party developers, the university is more able to develop a critical mass for the project in its first phase while still preserving its resources and minimizing the impact on its balance sheet.

At some of these parks, such as those at the University of Illinois, UMB, and the University of Nebraska, the partnership is mutual and collaborative, with the university contributing land through a ground lease and the developer bearing financial risk to develop the site. Through its ground lease, the sponsoring institution is able to maintain long-term control of the project vision and planning. Agreements between the academic institution and the developer may also give the university final say over the types of tenants that are allowed in the park, though agreements that are too restrictive may prove too hindering, particularly in an untested or weak market.

At other parks, such as those at Purdue University, PSU, and the University of Wisconsin, the university or its governing entity sell development parcels directly to developers and maintain no ownership of land, giving up
risk but also control. While the Purdue Research Foundation has found this model successful (and still maintains ownership of a significant number of commercial properties at the park), it provides fewer opportunities for the school to guide vision and planning and also denies it long-term control of the land.

It is important to note that while the developer partnership is still the predominant model for development of the university research park, after the financial crisis of 2008, developers have become more risk averse and hesitant to enter into such agreements without significant lease commitments from the sponsoring institution.

Case Study A:

Building a Developer–University Partnership at the University of Nebraska (UN)

UNIC is a project that has many parallels for Rutgers. The project, built on the former grounds of the Nebraska State Fair adjacent to the university campus in Lincoln, was conceived with a strong focus in those areas where the UN has considerable research strengths that also correlate with the local economy – food science and agriculture. The master plan for the first phase of the park calls for 280,000 square feet accommodated in four separate buildings: two corporate collaboration lab/office buildings, a food innovation center, and a greenhouse innovation center. The first two buildings – the food innovation center and greenhouse innovation center – opened in fully renovated and repurposed state fair buildings in 2014. The total cost of Phase 1 was estimated at $225 million; to date, almost $160 million has been invested in Innovation Campus since its inception in 2011. Of the total, 60% has come from the university’s developer partner, over 20% from the university, 15% from the state, and 5% from private philanthropy.

UNIC is particularly noteworthy as an example for Rutgers due to its new Food Innovation Center, a 178,000 SF complex serving private/public partnerships. The center provides world-class facilities for the university’s Department of Food Science and Technology, ConAgra Foods, Inc., and other private companies in leased space. It features wet/dry lab research space, food-grade and non-food-grade pilot plant space, a state-of-the-art distance education classroom, and office space. The Food Innovation Center was constructed and is owned by UN’s developer partner, though the university is currently the facility’s largest tenant.

b. Governance

UNIC is under the governance of UN, which owns the land and has leased it to a non-profit 501(c)3 entity called the Nebraska Innovation Campus Development Corporation (NICDC). The Board of Directors of NICDC comprises five private sector industry representatives from across the state and four UN officials, including the President of the UN system, the Chancellor of the UN-Lincoln campus, the Vice Chancellor for the Institute of Agriculture and Natural Resources, and the university’s Vice Chancellor for Research.
c. The Developer Partnership

In 2011, UN and NICDC designated a developer partner, Nebraska Novo LLC, which is a partnership between Woodbury Corp., a Utah-based developer with experience developing commercial and academic research buildings, and a local partner. Subsequently, Woodbury Corp. pulled out of the partnership and was replaced by an Omaha-based developer, Tetrad Properties.

Shortly after designation, the university and Nebraska Novo entered into a Phase 1 agreement where the developer assumed much of the financial risk for developing the site. Under the terms of the agreement, Nebraska Nova is a non-exclusive developer that has agreed to finance the infrastructure improvements and to build or renovate facilities based on leasing commitments for 50% of the space obtained from the developer, NICDC or the university. This arrangement allows start-up, infrastructure, and site prep costs to be allocated to each site, including those sites that may not be built out by the developer. The NICDC will be entitled to 10% of net rent for each site development lease. Before any closing, the NICDC will have the ability to review and approve both prospective tenants and preliminary design of the buildings and related improvements.

d. University Commitments

While the university’s developer partner is assuming financial risk in the development of this project, the university has also made a significant commitment to lease a majority of the current space at the park. Of the 380,000 square feet repurposed or constructed since 2011, 65%, or 248,000 square feet, is directly leased by UN. In 2015, the university relocated its Department of Food Science and Technology into the UNIC Food Innovation Center, leasing an additional 117,000 square feet. This move, resulting in over 50% of the existing space being leased, triggered a commitment by the developer to undertake the next speculative development, 80,000 square feet of new construction for private sector office and lab space.

The NICDC also created a specific position of Director of Strategic Alliances for Food, Fuel and Water to lead recruitment of businesses integral to the Innovation Campus’s focus.

Case Study B:

Building a Developer–University Partnership at the University of Maryland Baltimore

UMBio was established adjacent to UMB, the medical campus of the University of Maryland system, with a mission to accelerate biotechnology commercialization and economic development both in Baltimore and throughout Maryland.

The park comprises over 600,000 square feet in three office and lab buildings, built in three phases.

The park’s general success can be attributed to a strong and interactive partnership between the university and the developer, Wexford Science + Technology. Wexford is a highly experienced

Courtesy of University of Maryland Baltimore BioPark
developer that partners with universities on similar life science research parks in several markets; the company understands how to best leverage the university’s research strengths to build a robust tenant base. Nonetheless, UMB was required to take a very significant lease commitment in the project’s first phase.

a. Governance
UMB conducted a feasibility study and master plan for the bioresearch park in 2003 and worked with the City of Baltimore to assemble the initial parcels and secure necessary zoning and entitlements. Concurrently, the university created a 501(c)(3) non-profit corporation, the University Health Sciences Research Park Corporation, to direct the park’s activities. The corporation controls the land and manages the master plan on behalf of the university. The corporation is led by the university’s Vice President for Research and Development and a small group of UMB Office of Research and Development employees provides staffing to the corporation with oversight from a Board of Directors comprising ten members from the private sector.

b. Developer Selection
UMB, through the corporation, selected Wexford Science + Technology (then Townsend Capital) through a competitive process in 2003 to develop the Phase I commercial building. It should be noted that Wexford was not appointed Master Developer, nor was it guaranteed designation as developer of future phases of the park. Wexford’s building, a 120,000 SF lab and office building, opened two years later in 2005 with UMB leasing almost 80% of the space.

Following the opening of the Phase I building, the corporation issued a developer solicitation for the Phase II building; Wexford was selected once again. The 238,000 SF building opened in 2007 with a smaller leasing commitment from the university. Wexford was eventually also designated for the 250,000 SF Phase III commercial building, with zero leasing commitment from the university.

c. Support from State of Maryland
The State of Maryland provided $4 million through its Sunny Day fund to help fund expensive build out of wet lab and office space for new tenant companies. In the Phase II building, the Maryland Technology Development Corporation (TEDCO) helped to finance the BioInnovation Center, a facility that comprises pre-built wet lab and office space for emerging companies.

d. Commitments by Developer
For its buildings, Wexford pays the university a ground rent and Common Area Maintenance (CAM) charge. The ground lease is for a 65-year term. The university does not participate in capital events.

Wexford helped fund additional land assembly and infrastructure for subsequent phases of the park and, as part of Phase I, built and still owns the 638-space parking garage that serves the park.

As it has done at all of its university research park developments, Wexford coordinates closely with the university and the corporation on research synergies. Wexford also shares the cost of park marketing and staffing.

e. Commitments by University of Maryland Baltimore
As described in this case study, UMB agreed to substantial lease commitments in the first building and a reduced occupancy commitment in the second. It pays Wexford market triple-net rent with a tenant improvement allowance.

An essential component of the successful partnership between UMB and Wexford was the university’s commitment to develop a well-defined research program for the park. In
addition to locating a new Forensic Medical Center and Proton Treatment Center at the park, UMB provides tenants access to critical university resources and special equipment in addition to facilitating business advisory programs. UMB also provides security and other university services at the park.

f. Community Programs and Workforce Development

The corporation showed an early commitment to supporting community and workforce development programs. There is a dedicated fund, supported by a small portion of tenant rent payments that provides grants for community projects.

As UMBio has an economic and community development mission, it supports education and workforce development initiatives that train local residents for potential jobs in the BioPark. In 2009, the Baltimore City Community College opened a Life Sciences Institute at the BioPark, which grants two-year Associate’s degrees to local students and prepares them for a four-year Bachelor’s degree in medical technology.

Case Study C:

**Building an Interdisciplinary Medical Research Park: Wake Forest**

The Wake Forest Innovation Quarter is located near the university campus in downtown Winston-Salem, NC and encompasses 2.5 million square feet of office, lab, classroom and residential space in 16 buildings on 145 acres surrounding an urban square. The Innovation Quarter’s primary areas of focus are biomedicine, materials science and information with an interdisciplinary approach. Urban placemaking is also a key goal of this development, with residential and retail components that include many amenities.

The Innovation Quarter is a partnership between Wake Forest University, Wake Forest Baptist Medical Center (an independent entity), the city of Winston-Salem and the state of North Carolina. A nonprofit Wake Forest Innovation Quarter entity controls the land and manages most partnerships. This entity is led by the Chief Innovation Officer of Wake Forest University, the CEO of Wake Forest Baptist Medical Center and the university’s head of real estate. The entity has entered into a partnership with Wexford Science + Technology for development of the Innovation Quarter.

The project began in 2001 with the development of a Wake Forest University medical research building on the site of a former RJ Reynolds cigarette plant. However, the project was stalled considerably, particularly after the recession of 2008, and the majority of construction has taken place since 2011. The Innovation Quarter is characterized by a mix of newly constructed research buildings and repurposed early 20th century industrial buildings.

The Wake Forest Innovation Quarter’s partnership with Wexford Science + Technology began in 2012. Wexford redeveloped the former RJ Reynolds building into a $100 million facility known as “Biotech Place” that is anchored by several research departments of the Wake Forest School of Medicine and private sector life science companies. Wexford opened a second building, a 234,000 square foot lab and office facility, in 2014. Tenants in this building include the Medical School, the Medical Center, private technology companies, and a co-working space (Flywheel).

Case Study D:

**Challenges and Outcomes of Third-Party Development: Cornell**

Many of the peer institutional research parks the consultants examined include facilities that are occupied by the sponsoring institution for academic programs. Building academic facilities via third-party development models,
however, is more challenging than employing such models for non-core and commercial uses. This is because higher education, by its nature, is not a moneymaking enterprise; opportunities for public-private partnerships are necessarily limited by this reality. Academic facilities, particularly those that are STEM-related, are often expensive and complex to design and build. These challenges make the spaces less attractive for a developer to build, own, and receive its required return.

At Cornell Tech on Roosevelt Island in New York City, Cornell settled on a hybrid approach; the school selected a private developer, New York City-based Forest City Ratner Companies, as master developer for the campus and developer/owner of the corporate co-location/collaboration building. Forest City Ratner also developed Cornell’s Phase I Academic Building, though this was done on a fee basis, with the university maintaining ownership. Ultimately, Cornell also decided that the university would develop and own the Executive Education and Conference Center.

In pursuing third-party development partnerships, Cornell encountered a number of challenges that arose from the startup nature of the project and the unproven market of Roosevelt Island. Despite the site’s proximity to Midtown Manhattan, Roosevelt Island had always been primarily residential as well as slightly isolated by its geography; it had no history of commercial development that could provide a leasing track record or rent comparables for lenders. In addition, while locations outside Midtown and Downtown Manhattan often come with property tax abatements, no such abatements were available on Roosevelt Island. On top of that, the target tenants for the corporate co-location/collaboration building were smaller tech companies that were likely not creditworthy, presenting additional challenges in securing financing.

As a result, Cornell found that free land and “ready-to-go” sites were not enough to attract private development to such a pioneering project. Tax relief from the city of New York, similar to the abatements offered at other locations outside the Manhattan core, would be essential. In addition, developers would not be able to contribute their pro-rata share of development costs and still receive a reasonable return. Cornell therefore had to provide additional subsidies to leverage developer investment, including 1) contributing the site development costs as “patient” equity, 2) leasing back one-third of the space at the corporate co-location/collaboration building to give the developer a credit lease, and 3) providing a limited pledge to cover the gap between market commercial rents and the rents needed to yield the developer’s required return. While these subsidies were not originally intended, Cornell structured them so that they optimally addressed the university’s needs, limited its exposure, set clear limits, and provided long-term return on its investment capital. In addition, Cornell ensured its participation in net operating income and proceeds from capital events, such as sale or refinancing.

III. Market Assessment – Opportunities and Competitive Analysis

With its location at the nexus of the Busch and Livingston campuses, access to Rutgers core facilities and research, and its ability to promote interaction with faculty and students, the proposed Innovation Park presents a unique development opportunity that currently does not exist in New Jersey. The Park will offer state-of-the-art laboratory, R&D, office, and collaboration space where companies can readily access talent, specialized equipment and facilities, and collaborators within a vibrant university community. Much more than a traditional real estate development, the Park will function as the catalyst for an innovation ecosystem that bridges
the divide between disciplines, academia and industry. University, industry, government and community partners will be able to work in a collaborative environment across sectors and disciplines, along the entire innovation pathway from basic research through commercialization. It is anticipated that the Park will also generate substantial direct and indirect impacts for the university, as well as for the local and state economy. These include creating new products, solutions, technologies, academic disciplines and jobs.

In order for Innovation Park to establish critical mass in its initial phase and to distinguish itself in a market that has still not fully recovered from the economic crises of the past decade, Rutgers will need to serve the role as the primary driver of this project, providing the necessary financial support, programming, synergies and collaboration opportunities. To better understand the current real estate environment, U3 Advisors conducted a high-level analysis of the New Jersey real estate market, focusing on office and research laboratory uses in Central New Jersey, particularly in the New Brunswick and Piscataway submarkets. In undertaking the market assessment, U3 Advisors focused primarily on the life sciences, though a brief commentary on the food and advanced computation/technology industries is also provided. It should be noted that food manufacturing and advanced computing require specialized space beyond general office and laboratory, and such spaces do not currently exist in the local market. Thus, it was not possible to do an assessment of these types of facilities. In conducting the research, the consultant team reviewed office and lab market reports and interviewed several real estate brokerage firms. The results of the assessment are meant for informational purposes and to serve as an overview of the real estate market. More extensive research and discussions with real estate professionals/developers who have an in-depth knowledge of the market should be undertaken as a next step in the process.

Life Sciences Market - Overview

The most recent Cushman & Wakefield New Jersey Pharma/Life Sciences Market Report, released in August 2015, found that the life sciences industry remains a vital driver of the state’s commercial real estate market. As of early 2014, there were more than 3,000 operations within the biopharmaceutical cluster in New Jersey, with an economic impact of $26 billion annually. The state is home to headquarters or operations of 13 of the 20 largest biopharmaceutical companies in the world, and in 2015, Business Facilities magazine ranked New Jersey as the #1 state for biotech growth potential. Between 2010 and 2015, pharma and life sciences companies accounted for 22% of all new Class-A office leasing in New Jersey, with the Hudson Waterfront submarket in northern New Jersey being the only major submarket in the state not dominated by pharma and health. According to Cushman & Wakefield, over 80% of life science leases in New Jersey in the past five years have taken place in the Interstate 78, Princeton/Route 1 and Morris County submarkets. In addition, New Jersey added over 55,000 jobs during 2015, recording its strongest private sector employment growth in 15 years.
Life Sciences Market – Challenges & Opportunities

In assessing the opportunities Innovation Park presents for Rutgers, it is important to examine these within the context and understanding of current market dynamics. This section provides a high level overview of the challenges and opportunities in the office and lab space market, with a focus on space for life science companies.

Consolidation and Cost-Cutting Trends

Many of the challenges in the local market are due to large pharma companies moving or consolidating their campuses as their business models change to reduce in-house R&D costs. Roche, for example, recently left its multi-building facility in Nutley, New Jersey, in favor of New York City’s Alexandria Center. Merck’s office headquarters in Whitehouse Station is currently for sale and its R&D lab and support facility in Summit has been purchased by Celgene. Novartis vacated over 365,000 square feet in Florham Park, hoping to lease that space out as it consolidates into space in Morris Plains and East Hanover. Bristol-Myers Squibb is consolidating into a new 650,000 square foot campus in Lawrenceville, leaving leased space in Plainsboro and West Windsor, and Daiichi Sankyo departed Edison and Parsippany to consolidate in Basking Ridge.

One of the drivers for this structural change is the expiration of patents on core drugs that generated substantial revenue for many years, resulting in some pharmaceutical companies experiencing a decline in profits. At the same time, the cost of bringing a drug to market has increased significantly. In order to maintain a healthy bottom line, large pharma companies are increasingly downsizing their R&D departments, partnering with early stage innovators and consolidating their operations. Instead of conducting R&D in-house, big pharma is now engaging in external partnerships with academia and risk sharing across multiple companies. Some are even opening incubator facilities, giving them access to new technologies and products being developed by biotech start-ups. Johnson & Johnson has launched such an initiative, JLABS, in several cities throughout the U.S.

According to Cushman & Wakefield, “many drug companies now want to be near university centers of excellence that conduct life science related research (i.e. California and Massachusetts), something the Garden State does not have in terms of scope and size.” Some of the biggest names in the industry cite proximity and access to collaborators as a priority when making business location decisions. For example, Eli Lilly & Co., ImClone Systems, Pfizer and Roche have all sited R&D functions at the Alexandria Center for Life Science in New York City. Eli Lilly shared that its expansion at Alexandria will “improve collaborations between local academic institutions and medical schools.” ImClone reported that its new location in New York City offers “unprecedented access to academic research organizations” and Pfizer noted that the center is “an ideal place to establish partnerships.”

Because New Jersey does not currently offer the type of collaborative environments that pharma companies now seek, several major life sciences tenants have relocated their R&D operations out-of-state in recent years, leaving a large amount of available space on the market. As of the third quarter of 2015, there were 1.7 million square feet of rentable lab and R&D space in the state, accounting for 25% of all non-owner occupied stock. The CBRE New Jersey Office Report (1Q2016) states that the vacancy rate in the Piscataway/New Brunswick submarket went down slightly from 28.6% in the fourth quarter of 2015 to 28.1% in the first quarter of this year, though it remained higher than in both Central New Jersey (17.9%) and the state overall (20.7%). After a lull during the
third quarter of 2015, investment sales activity improved in the fourth quarter, with roughly 1.1 million square feet sold – a significant portion of sales were recorded in Middlesex County. According to the Cushman & Wakefield Office Snapshot 4Q2015, “healthy demand should continue into 2016, but several large blocks of space on the horizon could keep the market from improving substantially further.” As an example, the BellWorks campus in Holmdel will add more than 800,000 square feet of available Class A space to the market. In July 2016, iCIMS signed a lease to move into 340,000 square feet of space at Bellworks.

However, it should be noted that the stock of vacant space in the region is of varying age and condition, with a significant portion being second generation space that requires costly renovation to meet the evolving needs of new users. This is a key factor contributing to the lack of market activity in the region. According to the JLL Life Sciences Outlook 2015, “Landlords of second-generation and older lab facilities will need to invest in renovations and upgrades to attract tenants and maintain occupancy levels.”

Another challenge in filling older space is that having the “newest equipment and work stations are… vital to attract employees.” Given the competition for talent, companies may choose to locate in newer facilities in order to recruit the most sought-after candidates. The minimal new construction that is taking place in Central New Jersey is being driven by pharma, most notably Bristol-Myers Squibb’s plans to consolidate into a new campus in Lawrenceville in the later part of 2016.

Trends in Firm Size and Space Demand

While New Jersey is experiencing some out-migration of big pharma, since 2008 the number of pharma/life sciences establishments in the state has grown by 9.4%. A consistent takeaway from the consultant team’s interviews is that the local market is trending toward smaller companies. While large pharma downsizes their employee base and their space, more R&D activity is occurring at small start-ups and emerging companies, leading to an increase in demand for incubator (generally less than 1,000 square feet) and “in-between” lab space (approximately 2,500 to 10,000 square feet).

Despite the demand, the local market is not meeting the needs of start-up and smaller companies. A Princeton-based broker who represents these small, emerging bioscience companies stated that landlords in this market aren’t willing to lower rents, offer significant tenant improvement allowances, or carve larger space into smaller blocks to accommodate smaller companies. BioNJ, a membership organization representing the state’s biotechnology industry, recently conducted a survey targeted to life sciences entrepreneurs. Two out of five respondents expressed difficulty in finding appropriately sized real estate – primarily due to high costs, and a lack of space located nearby to universities and collaborators.

Meeting the Demand

The proposed Innovation Park can fill the identified gap in the New Jersey market, providing space within the 2,500 to 10,000 square foot footprint that is designed to encourage collaborations – between industry and academia, across industries, and within an individual company. Rutgers faculty and staff will work on-site, along with service providers, community groups and government agencies. Company leaders will be able to walk down a hall and knock on the door of a food scientist or a biochemist, sip coffee with a postdoc student, or chat with a government employee on the way to the parking lot. Executives will have access to the variety of resources necessary to start and/or grow a business, all in one place. The location on the Rutgers campus will also provide quick access
to faculty, students and research facilities, and provide opportunities for student internships.

The design of the Park will accommodate small and large tenants, allowing big pharma to locate next to start-up and emerging companies and potential partners. Modular lab space will give companies the flexibility to expand or contract in size to suit their changing needs, while shared equipment, resources and common areas will contribute to a feeling of being located within the supportive environment of an incubator. Various options can be considered for reducing rental costs for the smallest users. As one example, big pharma companies have partnered with incubator and accelerator facilities in the Kendall Square neighborhood of Cambridge (MA), covering rental costs for the most promising start-ups.

Innovation Park will be constructed to meet current best practices and anticipate future trends in workplace priorities such as:

- **Shared computers and equipment** – Equipment and computers will be available to multiple tenants; Rutgers faculty/staff/students with expertise in data analysis will work on-site and be available to assist companies in running reports and assessing data.

- **Flexible space that can quickly be converted from lab to office or vice versa** – As companies progress from R&D through commercialization, their space needs also evolve.

- **Open spaces and break areas** - Light-filled spaces that are warm and inviting, creating a place where individuals are comfortable and want to spend time interacting with others who may not work in their department or even their company.

- **Small and large meeting rooms**

- **Library-like settings** – Quiet spaces where individuals can focus on writing or data analysis, within a communal environment.

- **Amenities** – So that life sciences companies can recruit top talent, on-site amenities will be provided to cater to the lifestyle demands of young and highly skilled workers.

**International Opportunities**

Demand for smaller blocks of space is fueled by the growth in the number of small life sciences establishments, as well as by international companies. According to Mary Franzwa Ryan, President of Franzwa Real Estate Advisors, LLC, “The Park can capitalize on the current significant increase in the number of established foreign companies desiring R&D space in the US.” Ryan advises that, “These companies prefer to start their first US location conservatively with a small lab (under 10,000 sf). This Park and its unique proximity to the university will be very desirable.”

New Jersey is home to more than 1,100 multinational companies representing 40 nations, and ranks among the top U.S. states for foreign direct investment (FDI). FDIMarkets reports that from 2013 through 2015, an average of 103 FDI projects were either completed or announced in New Jersey annually. Choose New Jersey, an economic development organization tasked with attracting and retaining jobs in New Jersey, summarized all of the real estate inquiries it received from international life sciences companies between 2013 – 1Q2016. Out of a total of 36 international life sciences companies asking about space availabilities in the state, 15 sought lab space and 17 sought office space. The majority of inquiries were for space of less than 10,000 square feet (11 of 17 lab inquiries; 14 of 17 office inquiries). Choose New Jersey also shared that many of the European companies expressed interest in locating within a “science park,” while a significant number of Asian companies expressed a preference for space with existing equipment on-site. Innovation Park has the potential to meet the needs of international companies by offering space in a science park.
and providing access to specialized equipment (some of which will be located on-site at the Park, with the rest located nearby on Rutgers campuses). Furthermore, the Park will offer laboratories and offices of various sizes, so that companies can graduate into larger spaces as their businesses grow.

It is the intention that Rutgers will pursue a “Soft Landings” designation for the Park. Developed by the International Business Innovation Association (InBIA), the world’s leading organization advancing business incubation and entrepreneurship, the Soft Landings program recognizes “select incubators as having specialized programs and/or facilities for helping companies break into international markets.” Organizations that achieve this designation gain global exposure for their demonstrated leadership in working with foreign companies. InBIA leverages its vast network of contacts and resources to market Soft Landings facilities to foreign firms, making it easy for those seeking space or program support to identify and connect with the relevant facilities in their target market.

Rutgers has significant experience assisting foreign companies in accessing the U.S. market. Two of the university’s existing incubators have achieved Soft Landings designation – the Rutgers Food Innovation Center-South and the Rutgers EcoComplex. The Rutgers Food Innovation Center is the only food incubator in the world to have this distinction. The Soft Landings program has proven to be a powerful tool in attracting foreign firms to New Jersey. As an example, the Rutgers Food Innovation Center has served clients from the nations of Italy, Spain, Israel, Greece and Brazil, to name a few.

Innovation Park can be a magnet for foreign firms by offering specialized programs and facilities, as well as flexible space options of less than 10,000 square feet. Rutgers is respected worldwide as a leader in supporting the research and business needs of foreign firms, and can further strengthen and solidify this position through designation of the Park as a Soft Landings facility.

**Lifestyle Markets**

According to CBRE, occupier preferences continue to concentrate on employee-central work environments. Known as lifestyle markets, they are “easily accessible, have a considerable retail presence, and allow individuals to live, work, and play within a concentrated, high-energy neighborhood.” The Hudson waterfront is an example of a lifestyle market. One of U3’s broker contacts agreed that, “Parsippany, Hoboken, Jersey City – these places are popular for younger workers and also empty nesters, because of proximity to New York City, transit, etc.” Given the importance of “lifestyle” features, the Park planning team should ensure that the proposed Innovation Park incorporates amenities and transit connections as demand indicates, to attract tenants to the location seeking these types of features. Innovation Park, despite not being located in a “lifestyle market,” can still attract young workers. “Sought-after student researchers are attracted to dynamic university research parks because of the potential jobs that might be offered after graduation, along with opportunities for students to pursue their own research and to engage with private sector leaders in their fields.”

It should be noted that while it is true that there has been a general shift toward more urban or lifestyle markets, especially among the millennial generation, companies do not often make location decisions based solely on access to public transit or other amenities. In fact, “Many large companies say that a city or region’s population of desirable workers is the top factor in location decisions” and “half of corporate real estate executives rated talent availability as the leading consideration in moves and expansions, according to a survey of
229 executives released by real estate services firm CBRE, Inc. in March [2016]. "

New Jersey is the #2 state in the country for biochemists and biophysicists and ranks #3 nationally for specialized employment in research, testing, and medical laboratories. It is also the only state in the country with a high degree of specialization in four of five major bioscience subsectors – drugs and pharmaceuticals; research, testing, and medical labs; bioscience-related distribution; and medical devices. 42.1% of the life sciences workforce in New Jersey is located in Central New Jersey, and companies including Merck, Novo Nordisk, and Bristol-Myers Squibb have sited operations in the region in order to access the local talent pool. Nearby Somerset County ranks #1 in the state for the percentage of its population holding a bachelor’s degree or higher.

Rutgers University is a major asset in the region, ranking among the top 100 universities for innovation worldwide. With 1,600 active U.S. and foreign patents and patent applications and more than 67,000 students, Rutgers is an important contributor to the local talent pool. The university is developing new programs to increase the number of STEM graduates, further enhancing the state’s reputation as one of the nation’s best locations for recruiting life sciences employees. As an example, the Woodbury Bunting-Cobb Residence Hall for Women in STEM is the first of its kind in the nation, and is part of a larger project to encourage women to pursue degrees and careers in STEM.

The workforce of the life sciences industry in New Jersey is largely comprised of Generation X and Baby Boomers. According to the New Jersey Department of Labor and Workforce Development, “The workforce of the Life Sciences industry is older than average with slightly more than 50 percent aged 45 and up. The largest disparity among age cohorts occurs in the 35 - 44-year-old age group, where nearly 30 percent of the life sciences industry cluster is found.” These workers typically own homes and cars in the suburbs, and may prefer a parking lot to public transit, making urban lifestyle markets less appealing to life sciences employers. Innovation Park will offer the best of both worlds, access to student and faculty talent, academic collaborators and amenities. The Park should benefit from the considerable investment in retail and entertainment that is taking place at the Livingston campus. Amenities that will be located in the Park include a café, walking path, educational programs, access to a 300-acre environmental preserve, entertainment, meeting and event space, among many other amenities. Shuttle service to downtown New Brunswick can be provided, based on demand. Free buses, targeted to the student population, are currently available to anyone seeking to travel between campuses.

**Rental Rates**

The CBRE New Jersey Office Report (1Q2016) states that office rents in the Piscataway/New Brunswick submarket continue to be low, currently averaging $21 per square foot, compared to $24 in the larger Central New Jersey market and $25.45 in the state overall. While the per square foot cost for space at Innovation Park will be substantially higher than the state overall average per square foot cost, companies have demonstrated their willingness to pay a premium for the “right” space. According to JLL, “While reducing real estate costs is a growing consideration in life sciences site selection, a key motivator is proximity to a thriving, diverse community of innovators. That is, a low-cost location without a high-value talent pool may not yield the same return on investment as a higher-cost location populated with exceptional researchers.”

Because New Jersey does not have a comparable site to Innovation Park, it is difficult to estimate the rate that tenants would be willing to pay to locate there. Comparing state-of-the-art...
specialized facilities with existing stock of older generic space can provide some information, but is not a reliable methodology to estimate potential rental rates for the Park. Neighboring states have privately developed facilities that share some similarities to the proposed Innovation Park. The Alexandria Center for Life Science in New York City and the University City Science Center in Philadelphia are able to provide some additional information regarding rental rate potential. The Alexandria Center encompasses 700,000+ square feet of office and lab space specifically designed for the biopharmaceutical industry. As of 3Q2015, the occupancy rate at the Alexandria Center was 99.6%, at a rental cost of $70–$80 per square foot. According to the JLL Life Sciences Outlook United States 2015, the average per square foot cost to lease space in New York/New Jersey is $24.

The University City Science Center clusters research and higher education institutions with talent and start-ups, creating a hub for innovators from all disciplines to collaborate and exchange ideas. Rental rates start at $77 per square foot (inclusive of utilities, access to shared facilities and services). Philadelphia has over 10 million square feet of rentable lab space, while New York has less than 8 million.22 It must be noted that both of these centers are located in premier urban markets. While New York has a scarcity of commercial laboratory space, the rates being paid at both centers indicate that there are companies willing to pay significantly higher rents in order to be located in a collaborative, talent-rich, state-of-the-art environment.

The companies that may have the most difficulty affording higher rent space are small, start-up firms. As noted earlier, the BioNJ survey results showed that small firms may view costs as a barrier to finding suitable real estate. One of the consultant team’s broker contacts sees that “companies – especially newer/smaller ones – don’t want new, expensive space; they’re happy with renovated or older space.” He noted that, for many of the newer and smaller companies, priority investments are research and development, not real estate – especially not expensive new construction. In order to save money, small firms may co-locate within an incubator facility, pooling their resources for a shared receptionist, office equipment, and more. This type of space is in high demand. New Jersey’s largest life sciences incubator, the Commercialization Center for Innovative Technologies in North Brunswick, is full. Other incubator facilities located throughout the state are close to capacity. This creates another opportunity for the Park.

Similar to large pharmaceutical companies, a key driver in site selection decisions for small and midsize firms is proximity to talent and collaborators. In fact, the BioNJ survey found that 40% of respondents seek space nearby to universities for these reasons. In the competition for talent, some executives are choosing to lease high-end space in a bid to attract top scientists and researchers. Small and particularly midsize companies in competing markets have shown their willingness to pay above market rents in order to have access to research partners and talent.

These shifting market dynamics present enormous opportunities for the Park. The university has formal partnerships with many of the state’s top employers, and Rutgers’ innovation has spurred the formation of more than 50 currently active start-up companies. At the Park, tenants will have access to Rutgers as both a collaborator and a source of talent. The Park will fill a market gap by providing state-of-the-art space in varying sizes and configurations. Further, the Park will be designed to facilitate the interactions that are critical to the success of the R&D pipeline, with programs and communal spaces that spark dialogue and co-creation. Several New Jersey start-ups (including Rutgers spin-outs) have already indicated their interest in locating at the Park, via signed letters of interest.
Market Comparables

In undertaking an assessment of the local market, it is important to identify comparable projects that can serve as benchmarks for the proposed development. As previously mentioned, this is challenging for Innovation Park as currently, no newly constructed, state-of-the-art commercial R&D facilities exist in the state. Additionally, a university-affiliated research park, particularly one connected to the state’s premier land grant research university, would be wholly unique. While there are no direct parallels, the two strongest comparables for examination in the local market are the privately developed New Jersey Center of Excellence at the former Sanofi complex in Bridgewater and the Technology Centre of New Jersey in North Brunswick, developed by the New Jersey Economic Development Authority (NJ EDA).

The New Jersey Center of Excellence, developed and co-owned by Advance Realty Group, is a redevelopment of a former Sanofi campus. Located on Routes 202/206, the complex is an existing 700,000 square feet of biology and chemistry labs, a vivarium (animal testing/breeding facility), offices, GMP (Good Manufacturing Practice) and warehouse space; an adjacent 150,000 square foot building houses a cafeteria and fitness and conference centers for tenants. After being vacant for over three years due to condition issues and the large size of the floorplates, new leases have recently been signed, bringing the vacancy down to 30%; Nestle Health Sciences recently rented 180,000 square feet of R&D space and received over $14 million in tax credit assistance from the state of New Jersey in order to locate there. In April 2016, Advance Realty Group announced they were moving forward with development of a “mixed-used village” at the site that will include 400 units of upscale housing, hotels, restaurants, retail, and a movie theater complex, underlining again the importance of lifestyle amenities.

The Technology Centre of New Jersey is a NJ EDA-sponsored project located on Route 1 in North Brunswick, less than ten miles south of the Livingston campus. There are currently six existing buildings – approximately 325,000 square feet of lab, production, and office space – and three build-to-suit sites (560,000 square feet) on the 75-acre campus. The Technology Centre, with over $100 million invested in facilities and improvements, targets emerging R&D companies in the biosciences, microelectronics, advanced materials, and communications technologies industries. In the first quarter of 2016, the reported vacancy rate was 39%, but most of the space on the campus is only available in large blocks and is in very poor condition. Rents for lab space are $25–$30 per square foot, triple net (utilities, maintenance, taxes and other expenses are not included in rent).

The state’s largest life sciences incubator, the Commercialization Center for Innovative Technologies (CCIT), is located on the campus of the Technology Centre of New Jersey. This 46,000 square foot bioscience incubator is doing well, reflecting the healthy demand for incubator space in the local market. CCIT is currently full, with 19 small companies leasing flexible lab-office suites anywhere from 500 to 6,000 square feet, in leases that do not extend beyond four years. The incubator provides its life science and biotech companies access to shared resources like an autoclave, NMR (nuclear magnetic resonance), and conference rooms, as well as business services like financial and business mentoring, networking opportunities, and assistance with funding and government incentive programs. CCIT has generated significant economic impacts since it opened its doors in 2002. Forty companies have graduated from the facility, tenants (graduated and current) have generated a total of over $130 million in revenues during their time at CCIT, and received $385 million in 3rd party funding. Amongst the state’s thirteen incubators, there is little available space and this
gap can provide an excellent opportunity for Rutgers to serve an important niche.

In addition to these projects, it should also be noted that Rowan University has developed the South Jersey Technology Park at its campus in Mullica Hill. There is currently one 45,000 square foot building with approximately 22,500 square feet devoted to laboratory and office space for academic research and 22,500 square feet available for private tenants. Also, the University Heights Science Park, a joint venture of Rutgers–Newark, NJIT and Essex Community College, has several companies located on its sites in Newark. Neither of these projects is anticipated to be a competitor to Innovation Park, due to their distance, size and development model. There are other speculative commercial research development projects in New Jersey that have been mentioned in the press, including the HUB in Downtown New Brunswick, though there has been no evidence that these projects have the requisite financial backing or are moving forward in a demonstrable way.

As previously mentioned, significant investment has gone into collaborative campuses in New York and Pennsylvania. The results are impressive and include high occupancy, high rental rates, and an increase in interaction between industry and academia, not to mention the substantial benefits (i.e. new jobs, increased tax revenue) to the local and regional economy. Though these facilities are located in urban settings and Innovation Park will be in a suburban location, insights can still be gleaned by examining these models.

In Philadelphia, 29 new development projects were advanced or completed in the last 12 months at University City, representing nearly six million square feet of office, research, academic and medical space for a projected value of over $2.2 billion. Remarkably, even as office inventory has grown by 26% in less than a decade, University City has a region-leading 97.4% office occupancy rate. The following additional projects in Philadelphia are also particularly relevant to the proposed Innovation Park:

- The FMC Tower in University City is being marketed as Philadelphia's first “Vertical Neighborhood.” The final phase of Brandywine Realty Trust’s 2.7 million square foot Cira Centre South development, FMC Tower is a 49-story building that contains 622,000 square feet of office space and efficient floor plates that encourage collaborative workspace concepts. Anchor tenants in the office portion of the Tower include the University of Pennsylvania. The office space in FMC Tower is 75% leased. Tenants pay $51 per square foot all-in (triple net + operating expenses + metered electric). CBRE reports that the average rental cost for office space in downtown Philadelphia during the 1Q2016 was $27.80.23

![Commercialization Center for Innovative Technologies (CCIT)](image-url)
• Drexel’s Innovation Neighborhood, a 12-acre project, creates a new gateway to Drexel’s campus and University City. Drexel is moving into the final stages of its RFP process to select a master developer for Innovation Neighborhood which will house technology partnerships, industrial joint ventures, interdisciplinary academic and research programs, business incubators and more. Offices and laboratories, classroom space and residential and retail property will develop in tandem to create a dense, mixed-use neighborhood. It is the centerpiece of Drexel University’s strategic focus to create an “innovation nexus for research, technology transfer and economic development.”

• The 23-acre Pennovation Works site sits adjacent to Penn’s campus and Health System on the Grays Ferry Crescent of the Schuylkill River. This new development is devoted to advancing research and innovation, and the commercialization of research into new products, services and entrepreneurial ventures. Pennovation Works will be anchored by the Pennovation Center, a 58,000 square foot facility opening in August 2016 that will be a hub for innovators from all disciplines to collaborate and exchange ideas. Upon completion, the three-story Pennovation Center will house a mix of tenants in a combination of private office suites, basic wet and dry labs, meeting and conference rooms, special event spaces, and a co-working space with over 200 desks supporting individual entrepreneurs and start-ups seeking an affordable and flexible office.

The Alexandria Center for Life Science in New York City developed by Alexandria Real Estate Equities offers laboratory and office space specifically designed for the biopharmaceutical industry. Over 700,000 square feet of space has been constructed, and an additional 350,000 square feet is planned. Tenants include Roche, Lilly Oncology, ImClone Systems, Firmenich, Kadmon Pharmaceuticals, and NYU Langone Medical Center, among others. Center features and amenities include: LEED Gold certified; capital financing and/or investment for qualified tenants; tenant services such as laboratory design, planning and construction as well as laboratory operations and management; digital conference and event center; restaurant and café; urban farm; on-site parking, 24/7 security; and green space.

Alexandria Real Estate Equities recently announced its plans to construct a 15,000 square foot incubator, Alexandria LaunchLabs, at the Center. Start-ups can lease space starting at $1,995 per month, which includes an office workstation and laboratory bench in a shared suite, as well as access to the center’s amenities.

Market Opportunities

The proposed Innovation Park presents several opportunities for Rutgers to capitalize on its research strengths, to build state-of-the-art flexible new space needed by smaller-stage companies, and to provide an environment that builds on and fosters connections between Rutgers and New Jersey’s leading industries.

While New Jersey is often the first stop for East Coast bioscience companies looking for space, it’s clear that the private market has failed the many small and midsized firms seeking second-stage (post-incubator) space in the local region. As evidenced by CCIT and broader market research, and noted in this chapter, at the present time there is strong demand for incubator & “in-between” lab space in the 2,500-10,000 square foot range to cater to emerging companies, especially in the life sciences sector. Innovation Park can provide such space and its location and access to Rutgers core facilities is likely to be more attractive to these companies than existing space in the market.
One of the brokers interviewed believes “there will be enough demand two to four years out where higher profile users – 20,000–40,000 square feet of space – will want new construction, higher-end specialized lab facilities such as those that currently exist at the Alexandria Life Science Center in Manhattan, but won’t want to pay New York City rents.”

In addition, the advanced research computing and food innovation buildings will provide highly specialized facilities that are not being provided in the real estate market, yet are in high demand by industry and academia.

**Technology/Advanced Computation Market – Overview**

U3 Advisors reviewed U.S. Economic Census Data for Central New Jersey and confirmed a shift in the local economy away from large pharmaceutical and research & development operations toward more technology and data-focused industries. In 2014, New Jersey’s technology cluster accounted for 359,700 jobs or 11% of all private sector employment statewide. Middlesex County had the most employment in the technology industry amongst all other counties in New Jersey, with nearly 54,000 jobs. The New Jersey Department of Labor and Workforce Development predicts that computer and mathematical occupations in the state will grow by 16.5% from 2012 to 2022. Worldwide, the technology industry is faced with a dearth of talent. More than half of all IT leaders report a technology skills shortage. According to The Wall Street Journal, the most in-demand skills are big data/analytics, project management and business analysis.24

Technology companies are choosing to locate in amenity-rich areas and are redesigning or constructing open office floorplans in order to attract talent. Although more than half of all New Jersey technology workers are aged 45 and up, a number of New Jersey technology businesses have chosen to base their operations in a lifestyle market, in an effort to recruit millennials.

**Technology/Advanced Computation Market – Challenges and Opportunities**

Though Innovation Park will not be located in a lifestyle market, it is well positioned to take advantage of the growth in the tech industry. The Park will be designed to facilitate access to collaborators from a variety of backgrounds as well as specialized equipment, which may mean the difference between success and failure for a tech company. “…High-tech products and industries are more multidisciplinary than they used to be. Success often requires excellence in more than one field of technology and in other lines of business.”25

Innovation Park will also provide direct access to individuals who possess the computation skills that are most in-demand. Rutgers recently added a Professional Science Master’s Degree in Business Analytics to its curriculum offerings. Information Week rated the new degree among its Top 20 Big Data Analytics Master’s Degrees nationally. The program prepares students for careers in predictive modeling, business intelligence, analytics, and data mining. Companies that locate at the Park will be able to hire student interns, graduates, and faculty consultants from this and many other data analytics and computer science programs offered at Rutgers.
Much of the growth in the tech industry is due to the explosion in the amount of data that we are producing – so called big data. According to MGI and McKinsey’s Business Technology Office, “Leaders in every sector will have to grapple with the implications of big data, not just a few data-oriented managers.” Analyzing large data sets will become “a key basis of competition, underpinning new waves of productivity growth, innovation, and consumer surplus.” Analyzing big data requires a significant investment in equipment and talent. Many companies lacking such resources outsource the work to third party suppliers. The International Data Corp. (IDC) states that, “The ever-increasing appetite of businesses to embrace emerging big data-related software and infrastructure technologies while keeping the implementation costs low has led to the creation of a rich ecosystem of new and incumbent suppliers.” By 2019, spending on big data products and services will reach $48.6 billion (based on a 23.1% compound annual growth rate from 2014 to 2019).

Rutgers recognizes the importance of advanced computation as an essential component in academic and corporate research and as a core technology for the Park. In May 2016, the university purchased and installed supercomputing equipment on the proposed site of Innovation Park, utilizing $10 million in funding from the New Jersey Higher Education Trust Fund. The innovative system architecture and support will supply high-performance computational and data analytics capabilities to researchers for years to come. Shortly after installation, Caliburn, as the system has been named, was the most powerful computing system in the region, #2 among all Big Ten schools and #8 in the nation as ranked by TOP500. Companies and researchers in the Park and around the state will be able to access this resource. The system will be housed in a proposed 45,000 square foot state-of-the-art Advanced Research Computing Facility in the Park. The facility will also have cubicle space, meeting space, and computing areas for lease.

Food Manufacturing Market – Overview

New Jersey is home to 1,900 food manufacturing companies that employ 31,000 people. Middlesex County has the fifth highest employment in food manufacturing of all 21 New Jersey counties. According to the New Jersey Department of Labor and Workforce Development, “The food manufacturing industry has exhibited steady growth in New Jersey from 2009 through 2014, both in terms of employment and the total number of establishments.” JLL reports that during 2014–2015, food and beverage companies leased 2.1 million square feet of space in New Jersey.

New Jersey has historically been a location of choice for the food industry. Campbell Soup Company established its headquarters in Camden in 1869 and Mars has been producing M&Ms in Hackettstown since the 1940s. Nestle, Pinnacle, Goya and Unilever are also located here. In recent years, New Jersey has received an influx of New York food businesses like Junior’s Cheesecake and Streit’s Matzo who are moving to the state for lower cost facilities and access to a specialized workforce. The food industry is a major component of New Jersey’s economy with $126.79 billion in gross sales volume generated in 2012.

Food Manufacturing Market – Challenges and Opportunities

The food industry in the U.S. is “forecast to grow at a steady rate of 2.9% CAGR through 2022,” according to a report produced by The Association for Packaging and Processing Technologies. The growth in the food industry has been driven by shifts in consumer demographics, buying patterns, and health-related concerns. Major industry trends, such as an increase in spending by millennials and concerns regarding environmental sustainability and health and wellness benefits, “drive a tremendous need for constant innovation among food companies. In order to survive and grow,
these companies must be able to put new ideas into production quickly." Scott Kupperman, Founder of Kupperman Location Solutions, who specializes in serving the food industry, has seen that “Location solutions that foster and support this need for innovation in as many ways as possible are becoming sought after…” Furthermore, “The presence of existing food clusters – reflected in the form of legacy and recently located food-processing activities that have thrived – is also a critical factor being sought.”

Innovation Park will be well positioned to attract food companies. The Park will become the new home to the existing Food Innovation Center–North program that is currently located in Piscataway. This well-established program has revenue generating clients and services already in place. In addition, the expertise of staff who currently manage the Food Innovation Center–South (FIC–South) program in Bridgeton will be leveraged to develop new research and collaboration opportunities, as well as safety certification and other training programs. These programs and facilities are unique in the country and will be expanded in a proposed 60,000 square foot Food Innovation Center in the Park. The facility will be U.S. Food and Drug Administration (FDA) and U.S. Department of Agriculture (USDA) inspected and “best in class” in terms of sanitary design, fit and finish, and operating protocol. In addition, the building will have uniquely designed lab and collaboration space that will facilitate multi-disciplinary public-private research in functional and medical foods. Companies that locate at the facility will have direct access to Rutgers faculty and staff, student interns, educational programs and services, as well as flexibly designed space. An existing client of the Food Innovation Center–North (FIC–North) program, Pinnacle Foods Inc., shared that having a presence at FIC–North has “helped us to advance the development of our products. The ability to do product development in a research setting enables us to further our research efforts evaluating multiple options we could never do in a production setting.”

Innovation Park can also leverage the tremendous success of the FIC–South in international business attraction:

- Designated as a Soft Landings site by the International Business Innovation Association for its expertise in welcoming non-domestic firms to the U.S. market; Currently the only food-based incubation program in the world with this designation
- Memoranda of Understanding with agencies and entities in several foreign countries, and clients that have originated from Italy, Spain, Israel, France, Greece, Brazil, Columbia, Jamaica and Costa Rica
- Created an international network of food business incubation and innovation programs, called Global FoodBIN (Global Food Business Incubation Network)

Innovation Park will offer an environment that will be highly sought after by those in the food industry. The two innovation centers that currently exist at Rutgers have been tremendously successful. The FIC–North is at capacity with a waiting list, and the FIC–South receives one to two inquiries per day from individuals who want to lease space and/or access a program(s) available at the Center. Since 2001, the centers have assisted over 1,500 food businesses.
Defining the First Phase of Development

While the proposed site for Innovation Park can accommodate up to one million square feet of development, it is recommended that the Park be developed in an incremental progression that is shaped by market demand and financing capacity. Based on current market conditions, absorption rates and conversations with commercial real estate professionals, a viable Phase One will accommodate approximately 150,000 – 300,000 square feet of development. Considering market demand and university space needs, it is proposed that the first three buildings include a 45,000 square foot Advanced Research Computing Facility, 60,000 square foot Food Innovation Center and 90,000 square foot Industry Collaboration Building.

Current market economics indicate that Rutgers will need to provide a credit anchor tenancy to ensure project financing and make private development feasible. It will also be important in Phase One to provide a critical mass of amenities, including restaurants and retail, in order to attract knowledge workers. While the Livingston campus provides many of these amenities, there should be options on-site that are not so dominated by undergraduate culture.

This section provided a high level overview of the challenges and opportunities of the New Jersey real estate market and for the Park, as well as an overview of several key industry sectors relevant to the Park development. This information is only meant to provide context for the project. It is recommended that as a next step, a beta test of the concept and a more in depth assessment of market demand and willingness to pay for the type of space that is planned for the Park be conducted.
Chapter 2:
Defining the Rutgers Value Proposition
Defining the Rutgers Value Proposition

I. Rutgers University Resources and Local Market Needs

Rutgers University is an ideal partner for emerging and established companies that wish to be part of New Jersey’s growing innovation economy. Innovation Park will be positioned to encompass a thriving community of technology companies and academic enterprises and will offer opportunities for industry-university collaboration, access to the university’s technology expertise and talent, and shared use of Rutgers facilities and resources.

Location

Innovation Park is located in the heart of the Northeast Corridor with easy access to the nation’s largest and most dynamic population centers. Situated between Rutgers’ Busch and Livingston campuses, the Park will be adjacent to the university’s hubs for engineering, life sciences, and applied sciences, as well as the new Rutgers Business School. The surrounding Central New Jersey region is a global center for large pharma and midsized life sciences companies. The region boasts a highly skilled workforce and is home to almost 75% of the state’s R&D laboratory facilities. With proximity to New Jersey Transit, Amtrak, the New Jersey Turnpike and highways 18 and 287, the site also offers easy connections to both New York City and Philadelphia.

Rutgers Research

Rutgers University is one of the nation’s premier public research universities and has a longstanding tradition of academic excellence and breakthrough research in the advanced technologies that are essential to New Jersey’s key industries. Rutgers’ interdisciplinary approach – particularly in the fields of advanced computing, food and nutrition, biomaterials, and restorative technologies – offers a competitive advantage to private sector partners whose needs may span a number of disciplines. Rutgers also has a growing track record in business partnerships and commercialization and Rutgers’ innovations play a critical role across New Jersey’s leading industry sectors. Rutgers brings an unequalled vision and commitment to development of Innovation Park. As the State University of New Jersey, facilitating the growth of the state’s economy and technology ecosystem is part of Rutgers core mission.

State-of-the-Art Facilities Tailored to an Evolving Life Sciences and Tech Market

Central New Jersey is home to Johnson & Johnson, Bristol-Myers Squibb, and other large pharmaceutical companies. However, the New Jersey life sciences landscape is currently undergoing a significant evolution away from dominance by large, global, pharmaceutical corporations to a more diversified economy characterized by more nimble midsized biotech and generic drug companies.

Innovation Park is well positioned to serve the needs of this emerging sector by providing the type of specialized state-of-the-art laboratory and other facilities that currently do not exist in the New Jersey market. These include more flexible multi-tenant lab spaces for mid-sized companies, continuous manufacturing and bioprocessing, in addition to meeting and conference facilities and co-location spaces that facilitate industry-university collaboration. The Advanced Research Computing Facility will have unmatched computing power in this market and will serve as a valuable resource for companies across many sectors.

Programmatic and Physical Resources

Innovation Park will allow companies located there to take full advantage of the university’s many programmatic resources, including entrepreneurial support, continuing professional and technical education for employees, and proximity to sponsored research and engagements. By
locating on the Rutgers campus, companies will be able to more easily recruit top talent from campus while also having access to student interns that can provide an educated workforce with a high potential for full-time recruitment after graduation. In addition, companies will have access to Rutgers facilities, including use of the Advanced Research Computing Facility, laboratories and other shared resources.

**Leveraging Rutgers Strengths**

Innovation Park will serve a variety of industries, but will prioritize those that align with Rutgers’ research strengths and New Jersey’s key industry clusters. Working closely with the Rutgers Team, and expanding upon the original findings of the 2012 Battelle report, U3 Advisors examined state level industry sectors in terms of concentration and contribution to the state economy. Those that aligned most strongly with Rutgers institutional strengths were identified as having the greatest potential for real-world impact. The target areas were identified as:

- Advanced computing
- IT, telecom, and cyber security
- Food innovation
- Advanced materials and manufacturing
- Medical devices and biomaterials
- Health sciences
- Energy storage, generation, and efficiency
- Logistics and supply chain management
- Chemistry/cosmetics/personal care

**II. Rutgers Ecosystem Development**

The Park will be more than a collection of people and buildings. It will create and support an innovation ecosystem, defined as a “distinctive collection of people, firms, institutions and relationships [that] combine in finely tuned ways to not only provide scientific advances… but to also turn ideas into products and take them rapidly to market….”

The Park will encompass economic and physical assets and facilitate networking assets:

- **Economic assets**: Companies, organizations, departments, centers
- **Physical assets**: Buildings, public spaces, and other infrastructure
- **Networking assets**: Relationships among individuals, companies, organizations

Individually, each category is important, but a successful ecosystem depends on their combination. In *The Rainforest*, Victor Hwang and Greg Horowitt contend that the most productive systems allow talent, ideas, and capital to flow throughout the system. Critically it is the networking assets – relationships – that determine the level of connectedness in an ecosystem. The ecosystem model at Innovation Park is outlined in more detail in the diagram included as Figure 1.

Through the strategic design of infrastructure to facilitate face-to-face interactions, as well as programmatic initiatives, Innovation Park will bring together people from diverse backgrounds and different disciplines and engage them in collaborative work toward a common goal. The buildings located in the Park will not be siloed by sector, but rather will be organized in thematic programs focused on complex systems. As one example, Rutgers is partnering with Tel-Hai College and the Israel Economic Development Taskforce in the area of healthy, functional foods. This program will cut across academic disciplines and industry sectors, engaging Rutgers’ food scientists and graduate students, health sciences, consumer goods manufacturers and behavioral nutritionists, legal experts and health care providers.

Rutgers is in process of formalizing a relationship with Wageningen University & Research and other international universities and partners to study, innovate solutions, and disseminate knowledge related to complex systems. The universities will develop best practices for engaging academics in multidisciplinary projects. This engagement can have a compounding effect, as the
frequency of collaboration between academia and industry increases when research centers are “focused on multidisciplinary or programmatic research.”4

Universities are “recognizing the power of crossing traditional academic lines thinking to develop relevant solutions” to the complicated challenges facing society. “This recognition is triggering the creation of innovation centers that drive cross-pollination and fuse creative fields…”5 Innovation Park’s signature programs align with the university’s research strengths and regional market trends. Importantly, the work conducted at the Park will occur at the junctions – where big data meets food, or where advanced materials impacts the life sciences.

Tenants of the Park will have access to experts in business and technology (from Rutgers faculty and industry), service providers, sources of capital, student interns, and other resources that will aid them in moving their innovations from the lab to the market. Many of these resources will be physically located on-site, but tenants will also benefit from linkages to Park collaborators located throughout the region, the U.S. and abroad. Formal programs will encourage networking and sharing of ideas, both within the Innovation Park ecosystem and outside of its physical boundaries. Furthermore, the Park will be fashioned to enhance the potential for serendipitous encounters, as innovation is chaotic and uncontrollable, and it is often through unplanned and chance introductions that new ideas are formulated. The Park will feature collaboration spaces, cafes, walking trails, and information boards (both digital and physical).

Through the provision of economic and physical assets and the facilitation of networking assets, Innovation Park will nurture a community of innovators that share a culture of entrepreneurship. These innovators will leverage the tremendous assets of Rutgers and New Jersey’s economy to further scientific discovery, advance
understanding of complex systems, and invent novel solutions to global challenges. The Park will fill a gap in the existing New Jersey market, as no physical or virtual place today provides this combination of assets.

III. Rutgers Program Opportunities

Summary

The Park will serve as a convener of ideas, bringing students, faculty, industry, and the community together to develop solutions to grand challenges, launch new businesses, and build meaningful connections between the academy and external stakeholders. The Rutgers Team identified and formulated a range of programs that will attract and support industry tenants and Rutgers’ faculty and students, who will learn, experiment, and work at the Park.

Programs will include:

- Advanced Research Computing
- Food Innovation
- Amenities and Business Services
- Corporate Engagement
- International Business Attraction
- Workforce Development
- Entrepreneurship
- Community Development
- Sustainability
- Rutgers Biomedical and Health Sciences
- Institute for Restorative and Regenerative Technologies

The Park programs will benefit Rutgers’ faculty and students and will elevate the university’s reputation, helping to attract quality applicants. According to a 2014 survey conducted by the Cooperative Institutional Research Program, incoming college freshman cite being “able to get a better job” as the top reason for choosing to attend college. At the Park, students will have the opportunity to engage with industry, without leaving campus. The Workforce Development Program will connect students to internship and job opportunities, providing them with invaluable hands-on experience and potentially, a lifelong career.

The Corporate Engagement and International Business Attraction Programs will recruit businesses to the Park and connect those businesses to university faculty and students for joint research and other collaborative opportunities. Students will see first-hand the real world applications of their disciplines, while faculty will gain private sector research and development partners, often a prerequisite for applying for federal funding. Through interactions with industry, faculty will also hear from employers about the skills and traits that lead to success in the workplace. This feedback can inform course offerings and classroom discourse, making a university education a more valuable tool for achieving workplace readiness.

An increasing number of colleges and universities are offering courses and programs that teach entrepreneurial skills and support student-founded start-ups. In less than 30 years, these offerings have increased 20x. Supply is being driven by demand, as a majority of 18–34 year olds, otherwise known as millennials, currently own or want to someday own a business. Millennials are choosing to launch businesses that generate profits along with social benefits. The Huffington Post reports that social entrepreneurship is “one of the hottest career options for millennials.” The Park Entrepreneurship Programs will provide a designated location where entrepreneurs can interact and collaborate and resources to assist students in launching new businesses. Resources will also be available to support university spin-outs.

The Park community development program will provide an avenue through which Park tenants and users can collaborate with community members to initiate projects that will positively impact the local community. These projects can potentially be scaled and developed into benefit corporations.
Young people feel that they have “more at stake than any other generation when it comes to matters of health and the environment.”10 The Park will be constructed in compliance with LEED standards and will function as a living laboratory for sustainability, via the installation of a microgrid and other energy efficient infrastructure and technology. Faculty and students will be able to study, test, and assess various tools for greening the environment, while learning and working in a setting that is made more resilient and healthy through the implementation of sustainability initiatives.

The Park will offer “lifestyle” features that are especially important to young workers, such as outdoor and recreation space, dining options, and more. These amenities can facilitate collaboration, as students, faculty and workers may choose to eat meals or workout on-site, increasing the potential for spontaneous introductions and knowledge spillover that will contribute to the Park’s innovation ecosystem.

Companies in key industries that align with Rutgers’ research and New Jersey’s economic strengths will initially be the focus for tenant recruitment, including food and advanced computing and during a later phase, health and life sciences. Specific programs have been proposed that will leverage the university’s expertise in these areas and catalyze industry-university partnerships. Through these programs, students will network with employers from some of the state’s strongest and fastest growing industries, potentially providing them with local job opportunities that will allow them to establish roots in New Jersey.

This chapter provides an overview of each of the Park’s programs, with a focus on their significant components, program leaders, physical components, beneficiaries and revenue opportunities. More detailed descriptions of each of these programs and initiatives are included in Appendix B.

Rutgers Advanced Research Computing Initiative

Overview/Purpose. Rutgers University’s 2014 Strategic Plan calls for the creation of on-campus advanced cyberinfrastructure capabilities that will benefit not only the university, but also industry throughout the state. In 2014, the Rutgers Discovery Informatics Institute (RDI²) secured $10 million through the New Jersey Higher Education Leasing Fund for the purchase of supercomputing equipment. This equipment, known as Caliburn, was installed in the Spring/Summer of 2016 and ranks #2 among Big Ten schools and #8 in the nation in terms of computing power. Concurrently, through the efforts of RDI² and Rutgers Office of Economic Development, the university established the new Office of Advanced Research Computing (OARC) in early 2016. Leadership with proven knowledge and experience in launching internationally respected academic research computing and cyberinfrastructure ecosystems was recruited to head up OARC. These two large-scale commitments by both the state and the university lay the groundwork for establishing a sustainable advanced research cyberinfrastructure (ACI) environment at Rutgers. Under an umbrella program tentatively called the Advanced Research Computing Initiative (ARCI), a scalable next-generation ACI environment is being provided that leverages local, regional, national, and cloud resources to create a powerful solution to meet advanced research computing needs and to catalyze an environment conducive to innovation. With a centralized ACI ecosystem anchored by a state-of-the-art Advanced Research Computing Facility, academic, industry and government partners will have a nationally recognized and trusted resource for their research computing and big data needs.

A more detailed description of the ARCI program and proposed building can be found in Section IV of this chapter.
**Program Leaders.** Overall leadership of the initiative is provided by the Senior Vice President, Office of Research and Economic Development and the Senior Vice President for Information Technology. The two primary units that will comprise the ARCI are RDI and OARC. These units will work together to advance the research computing capabilities and computational and data driven research across the university.

**Justification.** Access to advanced computation equipment and the ability to collect and analyze big data sets has become central to research, innovation and entrepreneurship in almost every discipline and industry sector. Developing an ACI at Rutgers in a flagship building, which itself can contribute to data science research, will ultimately be less expensive and more reliable than the fragmented systems Rutgers currently has in place. Researchers will see a considerable decrease in the labor and time they need to manage their own research computing resources and they will realize economies of scale not possible with smaller, individual systems. Cutting edge research will be conducted at a much faster pace and will benefit from the expertise and collaboration of the RDI and OARC staff.

**Program Components.** ARCI will offer programs, services and facilities that provide:

- Access to Caliburn, the nationally ranked supercomputing system at Rutgers
- Coordination and facilitation of high performance computing (HPC) and data science research
- An interdisciplinary, collaborative environment for academic and industry researchers
- Coordination of advanced computing equipment and data storage (a noted concern among researchers)
- Public and educational outreach programs
- Cybersecurity/Information Security resources

Centralizing advanced computing equipment and its management reduces costs and increases the synergies among researchers using it, thus encouraging and attracting more (and higher caliber) research and researchers. The establishment of ARCI will support economic development throughout New Jersey, and bring recognition to Rutgers for its state-of-the-art ACI capabilities. It will be a valuable tool in recruiting the brightest minds in the STEM disciplines – researchers of both this and future generations who will transform the world with their work. It will create jobs, generate economic impacts for Rutgers and the state, and also provide Rutgers with a unique connection to the community.

**Beneficiaries.** The primary stakeholders include Rutgers research faculty, students, and staff. Research computing and data management are critical to the computational and data-enabled sciences and engineering (CDS&E) disciplines such as biological/life/environmental sciences, physical and earth sciences, engineering, computing and information sciences, and increasingly humanities, arts, and social sciences. External stakeholders include colleges and universities, industry, and government on local, regional, national, and international levels, as well as the local community. Faculty will have the ability to pursue research to advance technical fields and inspire a new generation of tech leaders. Students will spend their days in a unique environment of engaged learning, which brings academics and the tech community together to develop transformative ideas. Industry partners participating in ARCI programs will have at their disposal the brightest students and future tech leaders in fields including computer science, information science, electrical and computer engineering. Engaging local primary and secondary school students in programs that spur interest and excitement in data, computer and computational/data-enabled disciplines will also be a primary focus.
Building Attributes. The total size for the proposed Advanced Research Computing Facility is approximately 45,000 square feet of mixed-use space, which will include a machine room and data center, a multi-story interactive lobby and event space, classrooms and meeting space, makerspace, approximately 12 traditional offices, and open work space dedicated to facilitating collaborative efforts among team members and partners.

Revenue Opportunities. The potential for revenue generation grows exponentially with the success of the ARCI programs and services. The committed ongoing financial support being provided by the university’s central administration will allow ARCI to supplement the cost of providing HPC resources to researchers, partners, faculty, staff, and students, thereby providing an outstanding product well beyond what most users could afford otherwise. The university support will be further supplemented by leveraging grant funds brought in by RDF, OARC and the researchers themselves, much of which will be made possible by the technological advances and advantages gained with the establishment of the centralized ACI. Industry partners may choose to either contribute to equipment and computational resources or to purchase access to existing resources, while many researchers will likely “buy out” ARCI personnel hours for dedicated support and expertise. By becoming effective users of ACI resources, researchers and industry partners will become more successful with funding opportunities, publications, partnerships, and collaborations.

Rutgers Food Innovation Center

Overview/Purpose. Rutgers has shared its expertise in food science with more than 1,500 entrepreneurs and companies via programs and services offered at the university’s existing food innovation centers currently located in Piscataway (Food Innovation Center–North) and Bridgeton (Food Innovation Center–South). Both programs have received tremendous interest from industry and are at capacity. The existing Food Innovation Center–North (FIC–North) operation is housed in outdated leased space too small to accommodate demand. It is proposed that this existing operation, with revenue generating clientele and services already in place, be relocated to Innovation Park. Here, its successful program supporting technology and business knowledge transfer will be integrated with faculty, staff and students at Rutgers University. The new FIC–North facility will complement the Rutgers Food Innovation Center–South (FIC–South) program and together they will serve to network and aggregate the food industry with academia, government agencies, and domestic and international research partners. Comprehensive services and state-of-the-art facilities and equipment will support the entire innovation pathway from research to product development to commercialization. In addition, new multidisciplinary research and academic programs will be developed and fostered to catalyze the integration of three scientific disciplines:

- Food and Agricultural Sciences
- Health, Wellness and Life Sciences
- Data Analytics and Advanced Computation Technology

As a result of this innovative, multidisciplinary approach, Rutgers will be positioned as an international leader in the scientific understanding, development, and commercialization of advances that will emerge from the integration
and triangulation of these disciplines. Technologies will be transferred from Rutgers faculty; students will be provided unique opportunities for experiential learning; and innovative products will be developed and commercialized; resulting in the creation of new or expanded businesses, and new products. This approach will generate significant economic impacts for Rutgers and New Jersey, and contribute to the improvement of the health and wellness of people globally.

A more detailed description of the Food Innovation program and proposed building can be found in Section IV of this chapter.

Program Leaders. The faculty and staff at the Rutgers FIC–North and FIC–South, the Office of Economic Development, and an external advisory board will provide management, scientific expertise and strategic leadership to this program, and will coordinate resources needed to support it.

Justification. There is substantial justification for this project.

- The food industry is rapidly evolving, as consumers have become much more proactive and educated about the foods they eat. They are demanding products that support their goals for health and wellness. Innovation in the food industry is being driven by scientific advances validating the relationship between diet and disease, prompting the need for a multidisciplinary, public-private partnership approach to research in academia;

- There is no program throughout Rutgers University that provides for multidisciplinary academic engagement and student experiential learning in the food industry, and the Rutgers FIC–North and FIC–South will serve as models throughout the university and the nation for achieving these goals. The relocation of the FIC–North program on-campus, and an expansion of its programs to support academic and student interests, will enable this to occur.

- The FIC–North program and facility is currently located in a leased warehouse in Piscataway, and this facility has exceeded its useful life. Significant repairs are needed in the near future that will be Rutgers’ responsibility. Thus, it is time for this very successful program to move to new space that is properly designed and outfitted for its unique function.

- There is tremendous and increasing demand for services at both of the Food Innovation Center locations, and both programs are at their capacity. All FIC–North activity will be moved to the Park, generating revenue that will cover a significant amount of operational costs.

- Professional staffing and program infrastructure are already in place at both of the Food Innovation Center locations, and the integration of these two programs will enable enhanced support to occur with no or minimal increases needed in staffing.

- The FIC–South has been recognized globally for its best practices and impacts, and has been named “Incubator of the Year” amongst incubators globally, and also is the only “Soft Landings” program in the world that focuses on the food sector, based on its programs in international business attraction. This recognition and these international partnerships will be enhanced and expanded, and will enable global opportunities to occur with Rutgers faculty for scientific and academic cooperation, leading to technology discovery and industry transfer.
Program Components.

- **Rutgers FIC–North:** The entirety of the Rutgers FIC–North operation will be transferred to the on campus location. In addition, the management team of the Rutgers FIC–South will provide leadership at the new center. FIC–North’s primary mission is economic development coupled with food technology/safety related education and training. Services include space and technical support for clients to produce saleable product on a commercial scale, product and process development aimed at creating new foods and beverages, food safety training, advanced analytical services, and business mentoring designed to coach entrepreneurs about the food business.

- **Systems-Based Research:** The Food Innovation research program will focus on the intersection of three scientific disciplines: Food and Agricultural Sciences; Health, Wellness and Life Sciences; and Data Analytics and Advanced Computation Technology. The integration of these disciplines will enable cutting edge research to be conducted in the area of healthy, functional and medical foods, and ultimately in areas that include personalized nutrition and personalized medicine.

- **Services:** Available services will include business planning, market research, sales strategy; capital access; regulatory requirements, intellectual property assessment and other legal matters; product and process development, product commercialization testing, sensory analysis; equipment assessment, quality assurance and food safety; ingredient and packaging sourcing, nutrition analysis, analytical testing; assessment of distribution channels; and entrepreneurial and workforce training. Research support in the form of partnership development, administrative support, funding opportunities, and research project management will also be offered.

- **Connectivities:** Physical spaces, virtual/electronic networks, and mentoring will be provided to bring people together to initiate, encourage and support cross-disciplinary work and collaborations, provoke conversations, introduce specialists to existing and novel problems, and otherwise generate a rich multidisciplinary network to fertilize innovation and collaborations.

Beneficiaries.

- Faculty in the areas of Food and Agricultural Sciences; Health, Wellness and Life Sciences; and Data Analytics and Advanced Computation Technology

- Students who will have experiential learning opportunities in business plan development, market research, economic analysis, food science, food production, nutritional science, quality assurance, food security, package engineering, industrial and process engineering, data analytics, life sciences, package design, public policy, etc.

- Start-up and established companies in the Food, Life Sciences, Nutraceuticals, and Allied Food sectors that are seeking to fund and/or partner on research objectives, gain access to new technologies, commercialize new technologies, develop and manufacture new products, expand operations, enter new markets, etc.

**Building Attributes.** The new FIC–North facility will include about 60,000 square feet of space for manufacturing, research, and training, and will incorporate a shared-use and dedicated food processing environment, offices, research
labs, an R&D kitchen, commercialization space, cold storage, and collaboration spaces. Many of the spaces can generate revenue from business/technical mentoring and training, and research funding.

**Revenue Opportunities.** Based on a successful track record of revenue generation at FIC–North and FIC–South, the funding strategy for the new Food Innovation Center at the Park will be multi-faceted and strategic. Funding sources and revenue streams include (but are not limited to) space and storage rental, advisory fees, training programs, membership programs, and other service fees.

**Amenities and Business Services**

**Overview/Purpose.** Rutgers’ size and diversity allows it to offer numerous services and amenities to faculty, students, industry and surrounding communities. Corporate executives choose where to locate their business based on access to talent, and highly sought after employees often expect to work in an amenity rich environment that includes recreational opportunities, dining options, and spaces that promote interaction and collaboration across businesses and industries. The Park will provide a variety of amenities and value-added services to tenants, making it a destination where innovative businesses want to locate.

**Program Leaders.** Staff in the Office of Economic Development (OED) will work with internal and external resource providers, and will be instrumental in coordinating the expansion and development of services that will be offered to tenants. Once the Park opens, facilities and program managers will be located on-site and will have responsibility for ensuring that tenants have access to the resources they need to grow their businesses.

**Justification.** Leaders of several successful research parks and members of the Park External Advisory Board have stressed the necessity of providing amenities and services to tenants. In a report prepared for Rutgers by the Battelle Technology Partnership Practice, the growth of “mixed-use campuses” was cited as evidence that in order to be successful, university research parks need to create an ecosystem that fosters innovation and collaboration by providing spaces and programs that bring diverse groups of people together and offers essential business services.

**Program Components.** Amenities and value-added services will be provided by Rutgers University and external resource providers including state agencies, law firms, banks, and others. These amenities and services will be available to all tenants, and many will be tailored to specific groups of tenants. For example, foreign executives will have access to the federal-level SelectUSA program that provides 1-on-1 support for international companies new to the U.S. market.

**Beneficiaries.** Park tenants will have access to many of the resources needed to develop and grow their business, at any stage of the innovation pipeline, without having to leave the boundaries of Innovation Park. The Park will provide a work environment that encourages collaborations, promotes productivity, and meets the business development, recreational, educational, and entertainment needs of its tenants and their employees.

**Revenue Opportunities.** Because the Park will offer a range of amenities and value-added services to tenants, companies will be willing to pay a premium to lease space within Innovation Park. Some amenities may be offered on a fee-for-service basis, such as use of specialized laboratory equipment.
Corporate Engagement

Overview/Purpose. Rutgers is a vital partner for business and industry. The university’s 2014 Strategic Plan envisions that the Rutgers of tomorrow will achieve success by enhancing existing and forming new relationships with businesses, leading to expanded opportunities for student experiential learning, job placement, and funding for cutting edge research. Emphasizing the benefits of collaboration, the Plan recommends that Rutgers create a single, business-friendly portal of entry to the university, among other initiatives. In 2014, the Office of Research and Economic Development began to implement these recommendations, creating an Office of Corporate Engagement (OCE). The mission of the office is to:

- Increase industry-sponsored research and other types of corporate engagement
- Streamline the process for industry engagement and enable ease of navigation to Rutgers’ programs and expertise

The office gathers intelligence on potential partners, proactively outreaches to business, facilitates engagements, and communicates Rutgers’ vast resources. The OCE acts as a “one stop shop” for business and industry, facilitating introductions to Rutgers researchers, corporate contracts and career services staff, and others. The OCE will relocate to the Park, which will function as a physical entry point for business and industry to the university, and will be instrumental in identifying and recruiting corporate tenants.

Program Leaders. The OCE falls under the umbrella of the Office of Research and Economic Development, and Corporate Engagement staff include the Director and Manager of Stakeholder Relations.

Justification. Global competition, patent expirations, and technological changes are spurring industry-academia collaborations as businesses increasingly rely on external partners as sources of innovation. Further, a substantial skills gap in the current U.S. workforce is necessitating industry involvement in the development of curriculum and experiential learning opportunities. Universities that remain relevant in a dynamic marketplace align educational content and research with industry needs. This alignment between industry and academia can produce multiple benefits for universities including:

- Internships and job placements for students and alumni
- External funding
- Participation in groundbreaking research with real-world applications

The development of the Park will aid OCE in its mission to increase corporate engagement. For instance, in order to lease space in the Park, businesses will be required to establish or maintain a formal relationship with Rutgers. According to members of the Association of University Research Parks, research park tenants often sponsor university research and license university technology. Most hire student interns and university alumni.

Program Components.

- Central Point of Entry for Industry: In late 2014, OCE launched a business portal (https://businessportal.rutgers.edu/) that allows business and industry to search for Rutgers research expertise, licensing opportunities, job training and employee recruitment services.
• Proactive Outreach: OCE contacts potential partners and initiates a dialogue around business growth strategies, company needs and objectives. This knowledge and insight informs follow-up and future outreach efforts. The proactive nature of the outreach allows Rutgers to express interest in and to nurture meaningful relationships with the business community.

• Facilitating Industry Engagement: OCE responds to industry requests for research expertise, working with an OCE-created network of Rutgers “scouts” to facilitate an industry/faculty match.

• Intelligence: Through participation in trade organizations and meetings with local industry associations, OCE gathers intelligence that is used to identify and assess potential partners.

• Communications: OCE is developing a communications strategy that aims to familiarize business and industry with Rutgers’ research strengths and programs.

**Beneficiaries.** Industry partners generally fall within sectors that are strong in New Jersey (often evidenced by above average location quotients) and that align with Rutgers’ research strengths, such as life sciences, computing, food, and telecommunications.

Various Rutgers’ offices, centers and schools engage with industry, based on faculty members’ areas of expertise or existing resources and services. OCE reduces the time, effort, and money spent to identify partners and formalize a relationship, thereby increasing company revenues and university external funding.

**Revenue Opportunities.** Since January 2015, OCE has been responsible for executing 27 industry partnerships, with funding totaling over $1.1 million. In the future, companies may choose to locate R&D functions in the Park in order to have direct access to faculty, students, and specialized labs and equipment, generating leasing income for the university.

**International Business Attraction**

**Overview/Purpose.** At Rutgers University, diversity is an everyday ingredient of university life and one of the school’s greatest strengths. Rutgers’ slogan, “Jersey Roots, Global Reach” celebrates the university’s impact abroad. Recognizing that the increasingly complex challenges of the 21st century transcend national borders, the university encourages faculty to engage with their international peers and offers a range of hands-on learning opportunities to equip students with the knowledge, awareness and skills necessary to be good global citizens.

Rutgers’ activities in the international arena extend beyond the higher education community. Universities are powerful assets for attracting foreign direct investment, and Rutgers is no exception. Two of three Rutgers incubators have been awarded a Soft Landings designation by the International Business Innovation Association for their expertise in acclimating non-domestic firms to the U.S. market. Innovation Park’s proposed location in Central New Jersey makes it an especially attractive landing pad for foreign businesses and entrepreneurs. State-level initiatives have been launched to support the growth of foreign enterprises and New Jersey is recognized as one of the top destinations in the U.S. for immigrants and
multinational companies. The Park will leverage the already existing assets and programs at the university, state and federal levels to recruit international tenants and to support collaborations between Rutgers and foreign companies, universities, research institutes, and others.

**Program Leaders.** The Assistant Director in the Office of Economic Development (OED), is responsible for developing and managing the international business attraction program. She will work in close coordination with the Office of Research Commercialization, the Office of Corporate Engagement, and the Centers for Global Advancement and International Affairs (GAIA), as well as various external partners.

**Justification.** Attracting foreign direct investment and engaging in new collaborations with international partners will benefit Rutgers economically. U.S. higher education R&D expenditures from foreign sources is on the rise. U.S. funding agencies, such as the National Science Foundation (NSF), encourage and support collaboration between U.S. and foreign institutions. Through making potential collaborators aware of Rutgers’ resources and areas of expertise, the international business attraction program can lead to economic benefits such as:

- Increased levels of funding for R&D from foreign sources
- Increased levels of funding for research from federal agencies such as the NSF

Having foreign businesses locate on Rutgers main campus will also directly benefit students and faculty. Employers seek employees with cultural competency, language skills, and experience working or traveling in foreign markets. Through internships, research projects, and other types of interactions, students can learn valuable skills and cultural lessons from foreign executives. Faculty will have the opportunity to conduct joint research with international partners in a shared space on campus.

The state economy will be bolstered through this program via an increase in foreign direct investment and greater recognition of New Jersey as an ideal business location.

**Program Components.**

- Identify and Recruit International Companies: Rutgers will work with internal and external stakeholders to target potential tenants that will contribute to the Park’s innovation ecosystem. Emphasis will be placed on companies that align with Rutgers’ research strengths.
- Transition Assistance: Rutgers will offer services specifically designed to ensure that international firms have a smooth transition to the U.S. market, such as visa assistance, counseling, and orientation programming.
- Operations Assistance: Rutgers will connect foreign executives to resource providers with expertise in topics including payroll, tax, and regulatory compliance.
- Showcase New Jersey and the Park: OED staff will develop marketing materials tailored to an international audience.

**Beneficiaries.** Internally, beneficiaries include faculty, staff, and students across all campuses and disciplines, who will have the opportunity to collaborate with foreign business executives, researchers, and scientists. External beneficiaries include foreign executives who will have immediate access to the talent, facilities, and resources needed to establish and grow their businesses in the U.S.

**Revenue Opportunities.** International companies may lease lab or office space within the Park, rent university equipment, or hire Rutgers faculty as consultants. They may also take advantage of one or more programs that will be made available to them on a fee-for-service basis, such as business development seminars.
Workforce Development

**Overview/Purpose.** According to Manpower Group’s 2015 Talent Shortage Survey, nearly 1/3 of U.S. employers have difficulty filling job vacancies and over 40% admit that talent shortages are having a negative impact on their ability to meet client needs. Increasingly, access to a skilled workforce trumps all other location considerations. Human resources services are highly valued by employers, and sought after in research parks.

The Workforce Development Program at the Park will provide business tenants with seamless access to a diverse, skilled workforce, while maximizing professional development opportunities for Rutgers students and alumni, Park workers, and community members, and promoting enrollment in Rutgers’ educational programs.

**Program Leaders.** A Director of Workforce Partnerships will act as a liaison between Park employers, Rutgers, and the community. University Career Services will oversee employee recruitment and screening services that will be offered at Innovation Park. The Division of Continuing Studies will provide training and professional development courses and programming. The Rutgers Team will collaborate with external partners to provide job skills to community members.

**Justification.** Battelle’s 2012 Survey of North American Research Parks reported that human resources services are highly valued by employers. The Workforce Development Program will be included as part of the marketing pitch for attracting tenants to the Park. The Rutgers Team researched the benefits to universities of having a research park and found that having a park can lead to increases in student internships and hiring of alumni. At Innovation Park, Rutgers students and postdocs will learn about new career options, connect with potential employers/research partners, and gain valuable work experience.

**Program Components.**

- Human Resources Recruitment and Screening Services: Rutgers staff will connect tenants to Rutgers students and alumni, entry-level workers from the community, and senior-level experienced workers from the community and beyond. Staff will assist tenants in identifying and hiring the best candidates by pre-screening resumes, conducting initial interviews, and more.
• Professional Development and Degree Education: Employees of Park tenants will have access to an array of education options from short on-line courses to Ph.D. programs.

• Career Development Workshops, Services, and Events: Students and employees of Park tenants will be offered a comprehensive set of tools with which to prepare for, or advance their careers.

• “Pipeline” Education Programs for the Community: On-campus programs run by select partners will provide education and training designed to place youth and adults from the surrounding communities into entry- and mid-level jobs in the Park.

• Technical Assistance for External Partners: The Director of Workforce Partnerships will identify funding sources, build responsive education programs, and coordinate and facilitate connections between workforce partners and Rutgers programs.

Beneficiaries.

• Rutgers students and postdocs will have access to internships and job opportunities, as well as a more coordinated set of career development services.

• Rutgers University will have access to new streams of prospective students, sourced from Park employers and community partners.

• Community members will be able to enroll in education and training programs that prepare them for open jobs in the Park.

• Park tenants will save time and money on human resources functions.

• The Workforce Development Program will positively impact the local and state economy by retaining skilled Rutgers graduates in New Jersey. Businesses located outside of the Park will benefit from the knowledge and workforce overflow from the Park.

Revenue Opportunities. Lease-paying tenants may choose to locate in the Park in order to have access to a skilled and talented workforce. Efforts will be made to engage external partners to provide funding for workforce development programs.

Entrepreneurship Programs

Overview/Purpose. Between 2013 and 2014, start-up activity in the U.S. experienced its largest year-over-year increase of the past 20 years. College graduates are more likely to choose entrepreneurship than those with no college degree. In order to meet the demand for entrepreneurship training and education, an increasing number of colleges and universities are providing resources and services to support entrepreneurs and grow small businesses.

Rutgers offers classes in entrepreneurship, operates several incubators and makerspaces, and hosts student entrepreneurship clubs. The population of Rutgers’ student entrepreneurs and innovators is growing, as evidenced by an almost doubling in the number of students choosing to minor in entrepreneurship from 2013 to 2015. The university supports entrepreneurial-minded faculty and staff through the Office of Research Commercialization, which has assisted in the launch of over 100 start-up companies.

Entrepreneurship activities within the university community, though numerous and diverse, are decentralized and occur across many buildings and campuses. Innovation Park is the ideal
location to nurture this ecosystem, as it will provide a central place in which entrepreneurs can access services and expertise; a high-quality infrastructure to support the innovation pipeline; and will facilitate interdisciplinary collaborations and networking among industry, academia, and the community.

Program Leaders. Staff from the Office of Economic Development will coordinate the various resources and services that will be offered to entrepreneurs. A number of different Rutgers offices and departments will lend their expertise to the start-up community, including the Office of Research Commercialization (ORC), Rutgers Business School and the Division of Continuing Studies, among others.

Justification. New Jersey was recently ranked the fourth most innovative state in the nation. Rutgers can leverage its location in New Jersey to attract new students to its entrepreneurship programs and to connect aspiring entrepreneurs to mentors from local businesses. During meetings with deans, department heads and program leaders within Rutgers, the Park Team received tremendous interest to either create new entrepreneurship programs or to assimilate programs that have been successful on other campuses, at the Park. Students have also been vocal in their desire for entrepreneurship programming to be based out of one location, where they can interact with other entrepreneurs from diverse disciplines and from industry.

Program Components.

- **Phase 1–Business Assistance, Mentoring, and Programming:** Entrepreneurs tend to be focused on their research and on bringing technology to fruition, yet are often unaware of the business elements that are required to successfully launch a product or service. At the Park, entrepreneurs will have access to services providers, mentors, and experts who can provide assistance with market research, legal matters, grant writing, data analytics, and more.

- **Phase 2–Entrepreneurship & Experiential Learning Lab:** The Lab will be located in the Industry Collaboration Building in the Park and will provide affordable lab and office space to aspiring entrepreneurs. Lab tenants will be required to complete a seven to ten week education and training program.

- **Phase 3–Gap-Funding for University Research:** Promising research at Rutgers often faces a funding gap between the research and commercialization phases. In order to address this gap, ORC will manage an evergreen fund that will provide financial support and business expertise to early-stage Rutgers technologies.

Beneficiaries. University students, faculty and staff will have access to centralized services and resources to assist them in launching new business ventures. These resources and services will also increase the success rate of start-ups.

Companies located within the Park will benefit through interactions with students and faculty who are developing innovative new products and services that may directly impact their existing business operations. Tenant companies as well as those located outside the Park can establish research partnerships, joint ventures, or other relationships with university start-ups.

The university will receive an increase in revenue from royalties and new applied and sponsored research dollars, as businesses and investors increasingly look to Rutgers as a leading source of next generation technologies.

Revenue Opportunities. Lease-paying tenants may choose to locate at the Park in order to have access to entrepreneurship resources and services. Other lease-paying tenants, such as services providers, may opt to locate in the Park in order to have direct access to entrepreneurs. Various programs may be offered on a fee-per-service basis, including educational seminars.
Community Development

Overview/Purpose. Rutgers University has a threefold mission to provide for the instructional needs of New Jersey’s citizens, conduct cutting edge research, and perform public service. The university takes its responsibility to be a good neighbor seriously and has initiated a variety of programs and services designed to meet the needs of the communities in which its campuses are located.

The university contributes millions of dollars to local economies. From 2009-2010, Rutgers-New Brunswick spent more than $125 million on goods and services within Middlesex County. In addition to generating revenue for local businesses, Rutgers seeks to address specific community issues. The university’s 2014 Strategic Plan outlines several goals, including connecting research to community needs and improving the health and wellness of individuals and populations locally. Innovation Park will leverage the resources and expertise of students, faculty and tenant companies to launch programs that generate economic, health, and other positive outcomes for the local community.

Program Leaders. Staff in the Office of Economic Development will coordinate institutional, academic, and student efforts with external partners to develop programs that will have an enduring impact within the local community. Once the Park opens, a program manager will be located on-site and will have responsibility for managing community programs.

Justification. University research parks generate substantial benefits for their host institutions. The most successful parks also transform the surrounding community. The Rutgers Team and U3 Advisors conducted significant benchmarking of university research parks and found that the top-ranked parks positively impact their communities. Community engagement also profits the parks, making them more vibrant, and stimulating long-term economic development within the region(s) they occupy.

Through engaging with community members, students and faculty will be able to connect research to real-world applications, participate in meaningful service learning, and become active citizens in the cities in which Rutgers’ campuses are located. Community leaders have identified specific needs of key populations, many of which closely align with Rutgers’ areas of strength.

Program Components. Through the Park, three community engagement programs will be established.

- Business Skills: Training will be provided to small businesses and entrepreneurs on topics such as marketing, social media, accounting, and other business basics.
- Education Outreach: Rutgers will partner with Middlesex County College to expand its existing teacher training initiative to include experiential and service learning opportunities. Innovative, cross disciplinary programs such as food science, big data and wellness will allow educators to expand their breadth of knowledge in complex systems and interdisciplinary instruction and learning.
- RNeighborhood Investment Initiative: Funds will be allocated to projects that address community priorities and have the potential to produce the greatest impact. A community advisory board will be part of the funding selection committee.
Beneficiaries. The primary beneficiaries will be members of the local community, who will have access to educational, financial and other resources delivered through the Park's community development programs. Students and faculty will have new opportunities for engagement within the communities where they live and learn. Park tenants will be invited to participate in community programs. Companies that opt to participate will be able to offer service learning opportunities to employees, brand themselves as responsible corporate citizens, and develop relationships within the community that may generate new customers, business partners, or new hires.

Revenue Opportunities. Donors and sponsors will be secured to establish the financial foundation for the program. Once Innovation Park space has been leased, funds for the program will come from a portion of each lease payment. The amount available for projects each year may change based on rent revenues, with possible supplemental funding secured through donations.

Sustainability

Overview/Purpose. As part of its 2014 Strategic Plan, Rutgers University identified five integrated themes that touch on some of the most pressing issues and problems of the 21st century, including sustainability. Rutgers seeks to become a leader in developing scholars that are equipped to address environmental challenges. In so doing, Rutgers will promote linkages between the university’s campuses and schools and externally with communities and industries, recognizing that interdisciplinary collaboration is essential for advancing viable solutions. Rutgers will create living laboratories for sustainability by implementing models of sustainable practices on its campuses.

The inclusion of sustainability design and programmatic elements at Innovation Park will promote research collaborations, university-industry partnerships, and community development, while adding economic, social, and environmental value to the Park’s bottom line.

Program Leaders. A Rutgers team comprised of staff/faculty from University Facilities, Rutgers Center for Green Building, and others (to be determined), will assist in crafting the developer RFP. The Rutgers team will work with various external partners to recommend and implement sustainable design specifications and sustainability programming.

Justification. Implementing sustainability design and programmatic elements at Innovation Park will benefit the Park and Rutgers in a variety of ways, by:

- Making the Park more resilient through the potential installation of a microgrid
- Reducing energy costs via sustainable water infrastructure and compliance with LEED standards
- Creating a healthier environment for Park tenants, through compliance with WELL Building Standard, which can directly impact quality of life and productivity
- Educating the next generation in matters of sustainability
- Offering experiential learning opportunities to students, business leaders and the community
Program Components.

- **Advanced Energy Infrastructure:** The Park will leverage existing assets located on Livingston campus, including a 25MW substation and other utilities. New energy infrastructure, such as a fuel cell, may be developed to support the Park’s advanced computing infrastructure.

- **Sustainable Wastewater Infrastructure:** Opportunities for capturing heat from wastewater effluent, greywater recycling, and more, will be explored.

- **LEED Standards:** The Park will pursue LEED-Platinum or Gold rating for its buildings.

- **WELL Building Standard:** The Park will pursue certification of at least one building, with subsequent monitoring of health and wellness outcomes.

- **Sustainability Education:** The Park will serve as a living lab, providing numerous opportunities for on-site experiential learning. Educational programming will be available to students, tenants, and the community.

- **Living Labs:** Data on systems operability will be available for research and other purposes. Students, business leaders, and community members will be able to study, observe, and interact with design elements and infrastructure.

- **Ecological Preserve:** Interactive programs in environmental stewardship and recreation will connect the Park with the adjacent 300 acre Ecological Preserve (EcoPreserve).

**Beneficiaries.** The Park will function as a living lab for sustainability, affording numerous opportunities for experiential learning and collaborative research to students, faculty, community members and tenants. The sustainability plan for the Park will also benefit the citizens of New Jersey by conserving finite resources.

Revenue Opportunities. Rutgers faculty and staff will have greater opportunities for securing grant funding through collaboration with internal and external partners on sustainability projects. The Park will offer various programs and services on a fee-per-service basis, including seminars on environmental topics, and contracted advanced computing services which will be supported by the energy infrastructure. Delos, the creator of the WELL Building Standard, seeks pilot projects and has expressed interest in partnering with Rutgers. This presents an opportunity for Rutgers to secure financial and other assistance.

**EcoPark Concept**

The Park will be designed to minimize its environmental footprint, while reducing operating costs and enhancing quality of place for its tenants. Innovation Park will incorporate the natural setting of the adjacent EcoPreserve into its overall design to provide greater connection to the environment that surrounds it. Landscaping will feature native flora and provide habitats for wildlife. Living infrastructure such as constructed wetlands and green design using eco technologies will provide benefits such as rainwater capture and energy efficiency. Outdoor recreation spaces will provide opportunities for interacting with nature and the Park community. Shenzhen Bay Tech Eco-Park and various other eco and eco-industrial parks provide inspiration for Rutgers’ vision of the Park’s green infrastructure and design.
Innovation Park will be uniquely positioned to impact sustainability initiatives at Rutgers and its surrounding communities. The Park will bring companies from various sectors together in one location. These entities will operate at different stages in the supply chain and will have diverse experiences and expectations related to environmental initiatives. Collectively, they can act as a microcosm of New Jersey, providing an opportunity for conducting environmental research and piloting green projects.

The Park Sustainability Program will seek to improve the economic and environmental performance of tenant businesses by promoting collaboration in managing water, energy, waste, transportation, and other resources. Various initiatives may be considered, such as coordinating deliveries of supplies to reduce truck traffic, purchasing green office and lab supplies in bulk, and sharing excess and waste materials. Environmental metrics for Innovation Park, such as energy usage and waste diversion, will be tracked and shared with tenant companies and Rutgers’ students and researchers.

**Rutgers Biomedical and Health Sciences**

**Overview/Purpose.** Rutgers Biomedical and Health Sciences (RBHS) was officially formed on July 1, 2013 via the New Jersey Medical and Health Science Education Restructuring Act which merged most of the former University of Medicine and Dentistry of New Jersey with Rutgers University. The merger greatly enhanced opportunities for increased academic collaboration, innovation, commercialization, and economic development across the region.

RBHS is an academic health center that:

- Provides patients and the community with health care for everyday needs and specialized services for complex diseases, illnesses and injuries
- Offers unique care not available elsewhere in the region
- Teaches generations of health care professionals
- Develops technology and carries out research that improves lives

Preliminary analyses by RBHS administration and research leadership suggest high value in RBHS utilization of Park space.

**Program Leaders.** There are a number of RBHS programs (existing and proposed) that align with the mission of Innovation Park. Leadership of specific programs will vary, based on faculty expertise, interest, and experience. As examples, Tomer Davidov, MD FACS will be the program leader for the Rutgers Medical Device Accelerator and M. Maral Mouradian, MD will lead the Developing Novel Therapeutics for Neurodegenerative Diseases program.
Chapter 2: Defining the Rutgers Value Proposition

**Justification.** The Park will serve the RBHS Strategic Plan’s cited objective to “foster integration and collaboration across RBHS and between RBHS and the university’s non-RBHS programs...” by providing a location in which RBHS units share space with Rutgers food science, advanced computing, and other disciplines, allowing for diverse interdisciplinary interactions. Further, most if not all of the priority development targets in the RBHS Strategic Plan could be well-served by specialized space and equipment and interactive RBHS tenancy in the Park.

Another goal of the strategic plan is to “establish partnerships with pharmaceutical and biotechnology companies.” Co-locating RBHS programs at the Park, alongside industry leaders, will assist RBHS faculty, staff and students in forming and strengthening relations with industry. Offering access to brand new space and equipment at the Park will also be part of the RBHS recruitment package for prospective new hires.

**Program Components.**

- **Rutgers Medical Device Accelerator:** A Center will be created to house physicians and engineers who can collaborate in developing novel medical devices that address unmet clinical needs.

- **Developing Novel Therapeutics for Neurodegenerative Diseases:** Translational studies will be undertaken to identify therapeutic targets and molecules for developing treatments for degenerative disorders of the brain and novel disease modifying therapies that will slow the progression of certain disorders.

**Revenue Opportunities.** Biomedical and pharmaceutical companies may choose to lease space in the Park in order to be nearby to RBHS programs and units. Through interdisciplinary collaboration and external partnerships, RBHS faculty and staff may be able to increase their success in securing grant and other funding for the development of treatments and other health and wellness-related initiatives.

**Institute for Restorative and Regenerative Technologies**

**Overview/Purpose.** With the creation of RBHS, Rutgers’ potential for internal collaboration between technology innovation and health care has burgeoned. The Institute for Restorative and Regenerative Technologies at Rutgers University (IRT@RU) will bring together diverse Rutgers system-wide communities and global collaborators to exploit the rapid discovery and development of new biomaterials, cell based therapies, devices and drugs.

**Program Leaders.** Dr. Joachim Kohn, Board of Governors Professor of Chemistry and Chemical Biology will be the founding director of the IRT@RU and Dr. Sangya S. Varma, Chief Operating Officer of the Center for Biomaterials will serve as the codirector.

**Justification.** The development of IRT@RU will create a unified, integrated and robust infrastructure that will break down traditional silos and showcase Rutgers’ expertise in advanced R&D in restorative technologies. IRT@RU will also provide a streamlined pathway for corporate engagement and will strengthen the local bioscience cluster by providing for the rapid transfer of discoveries from Rutgers laboratories to the marketplace.

**Program Components.** IRT@RU will be built as a networked consortium focusing in the following areas.

- **Research Partnerships:** Stimulate innovative basic, applied and translational research in biomedical science focused on bone, tissue and organ restoration...
• National Programs Funded by Federal Grants and Contracts: Coordinate and support biomedical technology programs focused on restorative technologies

• Education and Outreach: Serve as a focal point for biomedical education and professional development in restorative technologies

• Technology Transfer and Translation: Contribute to the activities of the Office of Research Commercialization and the Office of Translational Science by developing and sustaining expertise in regulatory science; establishing and promoting interactions with businesses and angel investors; and supporting entrepreneurial activities of faculty

Beneficiaries. IRT@RU will directly benefit the university in several ways:

• Increase in funding for research secured through connections developed between RBHS and research/engineering divisions of the university

• Greater recognition of Rutgers as a leading biomedical research institution, making it easier to recruit preeminent faculty and high performing students

• Common-core services and resources will be provided by IRT@RU to Rutgers centers/institutes/ departments/others in the fields of life sciences, physical sciences, biomedical sciences, engineering and biomaterials

• Increase in intellectual property developed by Rutgers faculty/staff/ students who are engaging with internal and external partners to commercialize new medical, health and wellness products

Revenue Opportunities. Life sciences companies may choose to lease space in the Park in order to be nearby to IRT@RU. Through interdisciplinary collaboration and external partnerships, IRT@RU faculty and staff may be able to improve their success in securing grant and other funding for the development of biomaterials, cell-based therapies, devices and drugs.

IV. Phase One Proposed Buildings

Introduction

In assessing local industry needs and their alignment with the university’s areas of strength, U3 Advisors recommends that Phase One of the Park include three buildings (in order by priority):

1. Advanced Research Computing Facility
2. Food Innovation Center
3. Industry Collaboration Building

Each of these buildings will offer space for Rutgers’ uses and external partners. The Advanced Research Computing Facility will house the Advanced Research Computing Initiative Program; the Food Innovation Center will be home to the Food Innovation Program; and the Industry Collaboration Building will be the primary location for various programs including corporate engagement, international business attraction, workforce development, and others. Companies that choose to locate in the Advanced Research Computing Facility or the Food Innovation Center will have access to all of the services offered through the programs that will be based in the Industry Collaboration Building, in addition to specialized amenities and resources that are unique to the Advanced Research Computing and Food Innovation buildings.
A detailed overview of the buildings and affiliated programs that are proposed for Phase One development follows.

1. **Advanced Research Computing Facility Overview**

Rutgers University’s 2014 Strategic Plan calls for the creation of on-campus advanced cyberinfrastructure capabilities that will benefit not only the university, but also the surrounding region and state of New Jersey. In 2014, the Rutgers Discovery Informatics Institute (RDI²) secured $10 million through the New Jersey Higher Education Leasing Fund (ELF) for the purchase of supercomputing equipment. This equipment, known as Caliburn, was installed in the Spring/Summer of 2016, and ranks #2 among Big Ten schools and #8 in the nation in terms of computing power. Concurrently, through the efforts of RDI² and the Rutgers Office of Economic Development, the university established the new Office of Advanced Research Computing (OARC) in early 2016. Leadership with proven knowledge and experience in launching internationally respected academic research computing and cyberinfrastructure ecosystems was recruited to head up OARC. These two large-scale commitments by both the state and the university lay the groundwork for establishing a sustainable advanced research cyberinfrastructure (ACI) environment at Rutgers. Under an umbrella program tentatively called the Advanced Research Computing Initiative (ARCI), a scalable next-generation ACI environment is being provided that leverages local, regional, national, and cloud resources to create a powerful solution to meet advanced research computing needs and to catalyze an environment conducive to innovation. With a centralized ACI ecosystem anchored by a state-of-the-art advanced research computing building, academic, industry and government partners will have a nationally recognized and trusted resource for their research computing and big data needs.

**Purpose**

ACI is an overarching theme for Innovation Park@Rutgers, and will serve as the central core to support the technology and computing needs of industry, faculty research and other scholarly activities. Strategic initiatives led by RDI² and OARC will provide a scalable next generation ACI environment that leverages local, regional, national, and cloud resources, creating a powerful solution to not only meet the computing needs of industry, academia, and government, but to create an environment conducive to facilitating innovative ideas. The motivation for this undertaking are the challenges created by the growing scale and complexity of models, data, the internet of things, alternative energy solutions, economics, human dependency, and environmental impact and “addressing these challenges requires a holistic approach that includes R&D, industry engagement, workforce development, policies and regulations, and sustainable business models.” With an ACI ecosystem for the entire university community managed by the Rutgers Advanced Research Computing Initiative, the university and industry partners will be provided with a recognized and trusted “place to go” to develop infrastructure solutions and workflows to enable science, education, and scholarly achievements that are not possible today.

**Program Leadership**

Overall leadership of the initiative is provided by the Senior Vice President, Office of Research and Economic Development and the Senior Vice President for Information Technology. The two primary units that will comprise ARCI are RDI² and OARC. These units will work together to advance the research computing capabilities and computational and data driven research across the university.
Leadership of RDI², operation of the ELF/Caliburn computational/data platform, and creation of ACI-enabled computational and data research opportunities and partnerships with researchers throughout the university, is provided by Manish Parashar, PhD, Director, Rutgers Discovery Informatics Institute and Distinguished Professor of Computer Science. RDI² is the university leader in advanced cyberinfrastructure, and brings extensive expertise in multidisciplinary computational and data-enabled research with collaborations across the university. RDI² was established as the Rutgers-wide multidisciplinary advanced research computation center, with the goal of creating a comprehensive and internationally competitive advanced cyberinfrastructure and associated research program at Rutgers. It has established successful research collaborations with computational groups across Rutgers and with industry. It is also playing a leadership role in the state’s cyberinfrastructure and big data efforts. RDI² has already obtained over 50 grants totaling more than $40 million, including very large cyberinfrastructure grants. It has architected and is currently deploying the largest research computing platform in Rutgers history. It also operates one of the largest production data cyberinfrastructures for the U.S. National Science Foundation’s Ocean Observatories Initiative.

Leadership of OARC and coordination of a university-wide, centralized research computing service is provided by J. Barr von Oehsen, PhD, Associate Vice President for Advanced Research Computing. OARC provides system personnel and services to support and manage research computing resources, provides technical expertise and user services, and helps bridge the gap between researchers, campus IT, and local, regional, and national CI ecosystems. OARC is uniquely placed in the university’s structure, reporting to both the Senior Vice President for Research and Economic Development, and the CIO/Senior Vice President for Information Technology. This allows OARC to act as the bridge between the IT and research communities, representing researchers and their ACI needs to the university’s Office of Information Technology senior staff. Since the recent inception of OARC and the subsequent relationship with the OIT, the OIT has become a strategic partner in support of the OARC’s mission and has made substantial contributions to help OARC meet its goals to increase support to the research community.

Additional staff includes the personnel of RDI² and OARC (approximately 30 staff members including scientists, researchers, data specialists, systems administrators, network architects, and administrative personnel). Together, both RDI² and OARC will drive research computing and computational/data-enabled science at Rutgers, across the state, and beyond.

**Beneficiaries**

The primary internal stakeholders include a diverse set of Rutgers University research faculty across all campuses, departments and units. Research computing and data management are of critical value to all computational and data-enabled science, engineering, medicine, and business disciplines, such as biological/life/environmental sciences, physical and earth sciences, engineering, computing and information sciences, and increasingly humanities, arts, and social sciences. Additional internal stakeholders include Rutgers students at all levels of education and disciplines, future students and faculty, and the overall university community and central administration. The team has garnered the support of Rutgers president, the central administration and research communities. This support has been and remains steadfast and overwhelmingly positive.

External stakeholders include colleges and universities, industry, and government locally, regionally, nationally, and internationally. Locally, outreach to and programming for the
community, particularly K-12 youth, will be a priority for ARCI. Engaging local primary and secondary school students in programs that spur interest and excitement in data, computer and computational/data-enabled disciplines will be a primary focus.

Current regional collaborations include the New Jersey Big Data Alliance (NJBDA), a consortium of NJ government, academia, and industry that was initiated by RDI\(^2\) and the OED “to address, in a strategic and coordinated manner, the significant and immediate challenges posed by the proliferation of data sources and the resultant deluge of digital data.”\(^16\) Current members include Rutgers University, New Jersey Institute of Technology, Rowan University, Richard Stockton College, Kean University, St. Peter’s University, Montclair University, Stevens Institute of Technology and the College of New Jersey. Representatives from the New Jersey Economic Development Authority, the State of New Jersey Office of Information Technology, and multiple industry representatives also participate in NJBDA activities. This alliance is an excellent model for building multi-institutional partnerships.

RDI\(^2\) and OARC are engaged in collaborative planning with other universities and organizations in the Mid-Atlantic States as well, including the University of Pittsburgh, Pennsylvania State University (PSU), Drexel University, Temple University, City University of New York (CUNY), NJEdge.Net (the New Jersey Research and Education Network) and the Keystone Initiative for Network Based Education and Research (KINBER).

Beyond the New Jersey region, partnerships are being explored with Rutgers’ Big Ten/CIC peers and universities/organizations nationwide, such as the Open Science Grid (OSG). Existing national programs that Rutgers is a part of include Internet2, the OSG, XSEDE and CASC, the latter two through RDI\(^2\). Partnerships with international universities and organizations are also being considered. Industry partnerships, both local and national, are expected to be a vibrant element of the Advanced Research Computing community.

**Program Details**

Proposed programs to be conducted by the Rutgers ARCI include, but are not limited to the following:

- **State-of-the-Art Research Computing and Data Management**

  The most substantial service that will be offered by the Rutgers ARCI is the coordination and facilitation of advanced high performance/throughput computing and data science resources. Academic and industry-affiliated researchers will benefit from an interdisciplinary, collaborative environment in which to perform leading-edge research with access to computing and advanced data analytics equipment and programs which may otherwise be unavailable to them or cost-prohibitive to maintain on their own.

  Just as important as the facilitation of research, is the coordination of HPC equipment and data storage that will be provided. Data storage is a noted concern of researchers across the globe. ARCI will fill this existing gap at Rutgers, providing a rich storage infrastructure and transforming Rutgers’ research computing capabilities.

  An approach that will be explored is a model where researchers will be encouraged to “buy in” to a condo model structure, which will grant the uppermost level of access and support at a highly competitive price. Such a “condo model” is a traditional approach which provides guaranteed access to researchers as well as a significant return on investment due to the ARCI’s ability to provide a match for purchased compute nodes. Access will also be available to non-“owners” and students, free of charge, on a first come, first serve/as available basis. Other models based
on best practices in the community will also be explored.

- Public and Educational Outreach Programs

A vibrant public space and pioneering programs for students and community members will make the Advanced Research Computing Facility the flagship destination of the Innovation Park campus. Next generation scientists, engineers, and students from many disciplines will be drawn to the facility for training, workshops, and seminars in cutting edge advanced high performance/throughput computing (HPC) technologies, given by both the ARCI staff and world-renowned figures in the HPC community. ARCI will be a means for sharing knowledge and expertise between Rutgers communities and the public. Innovative programs will bring in local community members and work to entice the next generation of computational and data scientists.

- Cybersecurity/Information Security

Out of this age of unprecedented technological advancement, a new field has rapidly arisen: cyber/ information security. The need to protect information and privacy, especially as data generation grows exponentially and without end, is perhaps one of the most inexhaustible challenges of this generation. ARCI will offer security services and solutions for university and industry partners, and may offer courses for students delving into the protection of information and information systems, data rights and ownership, liability and risk, theft and destruction.

Needs/Gaps Being Addressed

Advanced high performance/throughput computing is fundamental to the research mission of Rutgers University. The establishment of the Rutgers ARCI will provide essential expertise, services and equipment that are currently missing at Rutgers. It will provide a high-quality infrastructure to support those who perform grant-funded and scholarly research, and it will allow for a tremendous increase in interdisciplinary collaborations, the need for which are felt ever more keenly following the Rutgers/UMDNJ merger. Researchers at Rutgers who currently utilize HPC for their work have historically not had the support of the university and had to fund this capability themselves. This approach does not allow for effective or efficient long-term planning. It is not cost effective, and unfortunately, HPC-enabled research often has to be outsourced to other universities or organizations who have the proper facilities to manage it. “The advantages of centralizing [HPC equipment and administrative organization of it] are to reduce the costs and increase the synergies among researchers using advanced high performance/throughput computing… Each time a faculty member is hired or large grants are received that require higher powered computing, hundreds of thousands or millions of dollars are spent adding power and air conditioning to a building that was not designed for that purpose…”17

In this era of the “new Rutgers,” following both the acquisition of a medical school and induction into the Big Ten, an advanced cyberinfrastructure with appropriate resources and services is more crucial than ever before. Addressing these needs will bring advancement in research with a clearly defined return on investment. Furthermore, with the merger of UMDNJ and Rutgers University, Rutgers now has a critical gap in data security that must be addressed. Many laws regulate the privacy of medical data including storage, management, sharing, and analysis of such information. Without a dedicated central facility to manage this confidential data, Rutgers will fall behind in its ability to utilize HPC in biomedical and clinical research.
**Justification for the Program**

Computation and data have become central to research, innovation and entrepreneurship in almost every discipline. Developing an ACI at Rutgers in a flagship building, which itself can contribute to data science research, will ultimately be less expensive and more reliable than the fragmented systems Rutgers currently has in place. Researchers will see a considerable decrease in the labor and time they need to engage in to manage their own research computing resources and they will realize economies of scale not possible with smaller, individual systems. Their work will be conducted at a much faster pace and they will benefit from the expertise and collaboration of the OARC and RDI² staff.

The establishment of the Rutgers ARCI will also support economic development throughout the New Jersey region, and bring recognition to the university for its state-of-the-art ACI capabilities. It will be a valuable tool in recruiting the brightest minds in the STEM disciplines – researchers of both this and future generations who will transform the world with their work. ARCI will create jobs and tax revenues, as well as provide Rutgers with a much-needed connection to the community.

**Benefits and Value Proposition of Program**

Industry partners participating in programs at the facility will have at their disposal the brightest students and future tech leaders in fields including computer science, information science, electrical and computer engineering. Students will spend their days in a unique environment of engaged learning, which brings academics and the tech community together to develop transformative ideas. Faculty will have the ability to pursue research to advance technical fields and inspire a new generation of tech leaders. This perpetual loop (Figure 1) benefits all involved:

- The university provides funds for sustainable base operational support, maintenance and upgrading of equipment, and support in resource match funding.
- In return, Rutgers is more enticing to faculty, staff, and students of the highest caliber, thereby generating both new tuition and grant funds. ARCI helps to grow the field of next generation computer and data scientists.
- Investigators see the commitment that the university has made to research computing and understand that they are able to perform HPC-enabled research with maximum support. Principal Investigators obtain funding to perform research exceeding that which was previously possible. Success stories and increased publications from this research also allow OARC and RDI² to bring in new funding from external sources such as the National Science Foundation and National Institutes for Health to further support ARCI, its equipment, staff, and programs.
- Industry sees the cutting edge research taking place at Rutgers and wishes to partner, investing in their state university and generating economic growth for the region. Ready access to students provides industry with a next generation workforce solution. Programs such as the cybersecurity/information security program give them new reasons to work with Rutgers.

**Building Design**

To reach its full potential, the proposed Rutgers Advanced Research Computing Facility will include a machine room and data center, a multi-story interactive lobby and event space, classrooms and meeting space, makerspace, offices and open work space dedicated to facilitating collaborative efforts amongst team members. ARCI itself will catalyze socio-technical changes
in research across all fields of science and engineering, using architecture that encourages open collaborations among different disciplines and stimulates new thinking. Modern architecture will assimilate with smart building design and technological advancements in green computing to produce a space that speaks to creativity and collaboration while maintaining an ecologically responsible and pioneering footprint. The building will integrate technology into a highly reconfigurable work environment with:

- Smart rooms
- Immersive displays
- Multimedia integration
- Abundant natural light
- Public mixed-use space including open lobby/event area and makerspace for imagination and ingenuity
- Data visualization displays
- Walls of screens and interactive touch technology
- Data collection and management through the building itself and the materials that are found within
- Workspace that encourages collaboration and creative thinking
- “Hotel” space for short-term projects

**Revenue Opportunities**

The potential for revenue generation grows exponentially with the success of the ARCI’s programs and services. The committed ongoing financial support being provided by the university’s central administration will allow ARCI to supplement the cost of providing HPC resources to researchers, partners, faculty, staff, and students, thereby providing an outstanding product well beyond what most users could afford otherwise. The university support will be further supplemented by leveraging grant funds brought in by RDI², OARC and the researchers themselves, much of which will be made possible by the technological advances and advantages gained with the establishment of the centralized ACI. Industry partners may choose to either contribute to equipment and compute resources or to purchase access to existing resources, while many researchers will likely “buy out” OARC personnel hours for dedicated support and expertise. By becoming effective users of ACI resources, researchers and industry partners will become more successful with funding opportunities, publications, partnerships, and collaborations.
Conclusion

The remarkable change at Rutgers University of the past few years – the integration with UMDNJ, and the university’s entrance into the Big Ten/CIC – establishes Rutgers as a truly comprehensive research university. Now is the time to further define university goals and follow through to turn them into reality. This is a distinct opportunity to improve the quality and excellence of university resources and services while re-establishing reputation and focus. By providing strategic leadership in advancing Rutgers University’s research and scholarly achievements through next generation computing, data science, networking, and creative learning, RDI2, OARC, the Office of Research and Economic Development and the Office of Information Technology, the Rutgers ARCI will facilitate multidisciplinary collaborations and provide the framework for sustainable and cutting edge advances in research, education, and entrepreneurship. The university-supported advanced cyberinfrastructure and services will cultivate exceptional scholarship, attracting first-rate faculty and students, and defining a high level of commitment that will strengthen all as Rutgers moves into the next stage of its history.

2. Food Innovation Center

Overview

The Food Innovation Center at Innovation Park will be positioned as a network hub, knowledge aggregator, business accelerator and portal to a food industry cluster that services Rutgers University, industry, the state of New Jersey, and domestic and international research partners. Comprehensive services and state-of-the-art facilities and equipment will support the entire innovation pathway – from research to product development to commercialization. The facility will house the existing Food Innovation Center–North program currently in Piscataway, a well established program with revenue generating clientele and services already in place. In addition, new multidisciplinary research and academic programs will be developed and fostered to catalyze the integration of three scientific disciplines:

- Food and Agricultural Sciences
- Health, Wellness and Life Sciences
- Data Analytics and Advanced Computation

As a result of this innovative, multidisciplinary approach, Rutgers will be positioned as an international leader in the scientific understanding, development and commercialization of advances that will emerge from the integration and triangulation of these disciplines. Innovative products will be developed and commercialized resulting in the creation of new companies, new/expanded businesses and new products, generating economic impacts for Rutgers and New Jersey, and improving the health and wellness of people globally. Cutting edge research in the areas of Healthy, Functional and Medical Foods, as well as in other areas centered around food production, distribution, and storage will be targeted.

Scientific advances, consumer and industry trends are driving the need for this type of multidisciplinary, public-private partnership approach, these include:

- Scientifically validated relationships between diet and disease including the effect of diet on the following issues: diabetes and metabolic syndrome; hypertension and cardiovascular disease; cancer therapy; arthritis, osteoporosis and inflammation; gastrointestinal issues like irritable bowel syndrome, celiac disease, etc.; and many others.
- Advances in personalized medicine and personalized nutrition, in which research in genomics has begun to create new medicines (and ultimately food products), which target, more effectively, specific patient genomic segments that improve patient health outcomes.
• The global marketplace for health and wellness products, expected to be approximately $1 trillion in 2017 (Euromonitor) that has resulted from consumer awareness about the critical role of nutrition and dietary compliance in wellness promotion and disease prevention.

• Worldwide obesity epidemic – i.e. 2/3 of the U.S. population is overweight or obese.

• Aging baby boomers, and their increasing interest in health and longevity.

• Upward spiral of healthcare costs, which has driven the public and private sectors to focus on strategies for prevention and improved medical outcomes.

• Worldwide adoption of the Internet, which has empowered consumers to seek their own personal healthcare solutions.

• Technology, which has enabled an “audience of one” personalization occurring in a wide range of industries.

• Disruptive consumer technology, based on advances in big data analytics, microcomputers, and high performance computing. Examples include new “smart” devices that constantly and seamlessly stream data in real time regarding users’ blood pressure, pulse rates and glucose levels. This has also been adapted to similar technologies applied to an ear clip device and even to a contact lens. The ability to integrate large volume data sets from a variety of sources in real time, combined with advanced analytics to provide insights and predictive models of patient health and outcomes, has transformed health monitoring and diagnostics.

Program Leaders

The Rutgers Food Innovation Center, the Office of Economic Development, and a team of faculty advisors will provide management, scientific expertise and advisory leadership to this program, and aggregate the resources that will be needed to support it. In accordance with best practices in industry cluster development, networks of faculty researchers throughout Rutgers will be established to identify and engage academic partners at research institutions throughout the world. Based on a strong track record of business development, the team will also help to identify and recruit start-up, as well as established food companies that can fund, partner, utilize and/or otherwise benefit from this innovation pathway approach, resulting in company formation, expansion and job creation.

Rutgers Food Innovation Centers

The Park Food Innovation Center (Park FIC) will benefit greatly from two internal support systems at Rutgers that will be transferred and/or leveraged to the new Park facility. This will enable the new facility to have professional infrastructure, global recognition, and a revenue stream within months of its opening. These include: 1) existing fee-paying food industry clientele from the private sector, as well as active grant-funded projects, as the entirety of the operation at the Rutgers Food Innovation Center–North (FIC–North) will be transferred to the Park FIC, and 2) professional expertise in the food industry, together with a series of revenue-generating programs and a network of resources, as the management team of the globally-recognized Rutgers Food Innovation Center–South (FIC–South) will be leveraged and provide leadership in the program management of the Park FIC.

• Food Innovation Center–North

In addition to bringing together faculty expertise from diverse disciplines across Rutgers, the Park Food Innovation Center will also house the personnel, resources and clientele at the existing Food Innovation Center–North (FIC–North), as this entire program will be transferred from its current location to the Park location. The
FIC–North was founded in the 1990’s as part of the Center for Advanced Food Technology (CAFT), a unit of the Rutgers Department of Food Science. It became a unit of the New Jersey Agricultural Experiment Station when CAFT was dissolved in 2009. In 2010, the center was rebranded as the Food Innovation Center–North, a sister unit of the NJAES FIC–South in Bridgeton, NJ. The primary mission of FIC–North is economic development coupled with food technology/safety-related education and training. The Center derives support from the Department of Defense (Combat Ration Support Network), the food processing industry, facility space rental coupled with technical support and fee-for-service projects. FIC–North is currently housed in a 31,000 SF leased facility located in Piscataway. The facility operates under continuous USDA inspection, as well as FDA and local Board of Health inspection. The center provides space, equipment and services to tenant clients who are mainly small entrepreneurs, allowing them to focus on developing and growing their business. The center also provides Rutgers students with opportunities for paid internships, class tours, mentoring for product development competitions and guest lecturers when requested.

The facility contains 7,500 SF of USDA FSIS and FDA-inspected manufacturing space, as well as a Product Development Laboratory, Quality Control Laboratory, Pilot Plant, Warehouse and other support space including an information resources room, a conference room, and offices. The facility and related equipment are available for short- and long-term use for proprietary product and process development.

The Product Development Laboratory is available on a daily or weekly basis for clients interested in producing preliminary product samples. It contains typical bench-scale and restaurant sized kitchen equipment. The Quality Control Laboratory contains basic instrumentation and laboratory materials necessary for bench-top ingredient, packaging, and product testing during the formative stages of R&D projects. Instruments include pH meters, refractometers, viscometers, water activity meters, and a moisture oven. Pilot Plant equipment includes a pilot size sterilization retort with multiple heating modes (steam, steam/air, water spray, full water immersion, still, and agitated), homogenizer, colloid mill, meat injection equipment, steam jacket kettles and associated pumps, Lee Kettle with Turbo-Shear mixer, baking ovens (Rack, Pizza, Reed), walk-in freezers and refrigerators, pilot Anhydro spray drier, ribbon blender (5 cu. ft.), Hobart Mixers, environmental chambers and assorted kitchen utensils.

The center has three main programs aimed at producing revenue and meeting the needs of New Jersey regional businesses and the nation:

- **CORANET (Combat Ration Network)**
  - DoD funded contract research and development focused on improving the manufacturability and quality of rations for the nation’s military.

- **TEP (Technology Extension Program)**
  - Space rental and fee-for-service programs targeted at existing food companies and entrepreneurs in New Jersey.

- **Instrument Support (Mass Spec Lab)**
  - Fee-for-service mass spectrometry serving mid-size to large companies in need of advanced analysis and identification of food compounds, environmental and packaging material
contaminates, dietary supplements and drugs. In addition, this program provides low or no cost services to Rutgers faculty, as time permits. This program is housed in the Food Science building on the Cook Campus.

The services provided to the food industry include use of space and technical support allowing clients to produce saleable product on a commercial scale, product and process development aimed at creating new foods and beverages for clients ranging from start-ups to major global food companies, food safety training and business mentoring designed to coach entrepreneurs about the food business and advanced analytical services.

Since 2010, FIC–North has served over 150 clients, ranging from major global food processors to the smallest entrepreneur. Programs and projects are tailored to meet client needs, budgets, and expectations. Tenant clients and large food processors provide a predictable source of revenue and small entrepreneurs are a potential source of future tenants/clients.

- Food Innovation Center–South

Rutgers Food Innovation Center South (FIC–South) is a globally recognized food business incubation and economic development accelerator program of the Rutgers New Jersey Agricultural Experiment Station. FIC–South provides extensive programs in training and workforce development; customized and comprehensive business and technical mentoring services; and a 23,000 SF USDA and FDA-inspected facility that enables design, development, analysis, commercialization and manufacture of value-added food products for sale to retail and food service markets. The FIC–South has served over 1,500 clients since its formation in 2001. It has been named as the 2016 “Food Incubator of the Year” by the International Business Innovation Association (InBIA) and recognized as an “Agricultural Innovation Center Demonstration Program” by the USDA.

Of significant strategic value to the growth of the Park FIC program, will be the ability to leverage the tremendous success that has been gained by FIC–South in international business attraction and academic cooperation. FIC–South has been designated as a Soft Landings site by InBIA, the world’s largest association of small business support organizations, due to its focus and successes in international business attraction, and is currently the only food-based incubation program in the world with this designation. The FIC–South currently has Memoranda of Understanding with agencies and entities in several foreign countries, and clients that have originated from Italy, Spain, Israel, France, Greece, Brazil, Columbia, Jamaica and Costa Rica. This includes a highly publicized partnership with Tel-Hai College in Israel, focused on the field of Healthy, Functional and Medical Foods. In addition, the FIC–South has attracted domestic clients from as far away as California and Hawaii, including a company that is pioneering the field of scientifically-derived imitation meats made entirely from plants.

In accomplishing its mission, the FIC–South works very closely with New Jersey government offices associated with economic development, including Choose NJ, the Business Action Center, the NJ Department of Agriculture, and USDA Rural Development. These resource partners, and many others that the FIC–South has developed, will become immediate partners of the Park FIC. In addition, the FIC–South has created an international network of food business incubation and innovation programs, called Global FoodBIN (Global Food Business Incubation Network). A plan to formalize this network into a “trade association” has resulted from a federal grant to the FIC–South from USDA Rural Development. USDA considers this concept a project of national priority, and this will result in a significant amount of new business opportunities for the Park FIC as a result.
**Beneficiaries**

The primary beneficiaries of this program will be the following:

- Faculty who will be able to conduct novel applied multidisciplinary research, working in collaboration with other researchers at Rutgers University, and at university partners worldwide, in the areas of Food and Agricultural Sciences; Health, Wellness and Life Sciences; and Data Analytics and Advanced Computation. As a result, cutting edge computational science will be applied to food in all its manifestations: production, processing, distribution, storage, sale, consumption, and disposal. This research will be translational to many aspects of the food and feed sector, and the research, product development and manufacturing infrastructure that will exist will enable a seamless pathway connecting science and technology at Rutgers to potential novel applications to the food system in the U.S. and the world.

Applications could also include genomic science directed toward:

- Understanding the idiosyncratic component to human and animal wellness and its relation to diet.
- Analyzing the genetic variety in food crops and its relation to production efficiency and stress tolerance.
- Analytical science (chemistry and physics) applied to development of novel sensors for food quality and safety.
- Materials science applied to development of novel packaging and storage containers that reduce waste and provide smart sensing and reporting abilities.

- Students who can gain experiential learning opportunities with faculty and/or food industry clients, where they can work on individual projects, team projects and/or in a consulting environment. This will provide unique opportunities to gain practical hands-on experience through internships, cooperative education, class projects, and potential employment in the food industry. Opportunities for students can exist in areas as diverse as business plan development, market research, economic analysis, food science, food production, nutritional science, quality assurance, food security, package engineering and design, industrial and process engineering, data analytics, life sciences, public policy, etc.

- Optimizing food distribution and storage using modern network theory to improve efficiency and reduce waste (currently ~35% of all food produced in the U.S. is thrown away.)

Applications could also include genomic science directed toward:

- Analyzing the food microbiome of specific crops (coffee, cocoa, soybeans, etc.) and the gut microbiome of humans and livestock.
- Analyzing and predicting bioactive components (peptides, small molecules, etc.) of specific foods for both human and animal health based on both established and novel bioinformatics techniques and analyses of structural data in the Protein Data Bank located at Rutgers.

- Analyzing and predicting bioactive components (peptides, small molecules, etc.) of specific foods for both human and animal health based on both established and novel bioinformatics techniques and analyses of structural data in the Protein Data Bank located at Rutgers.
• Start-up and established companies in Food, Life Sciences, Nutraceuticals and Allied Food Sectors, that are seeking to fund and/or partner on research objectives, gain access to new technologies, commercialize new technologies, develop and manufacture new products, expand operations, enter new markets, etc.

The Park Food Innovation Center will aggregate the food industry value chain and also aggregate a network of resources to meet the diverse needs of projects and opportunities that will result. These resources will include:

• Domestic and international academic research partners
• Federal, state and community agencies
• Industry trade associations
• Venture capital and investor groups, and foundations
• Industry suppliers and service providers
• Business mentors and consultants

An illustration of this cluster, which shows the primary beneficiaries located in the center, and the many entities that will serve as resource providers is illustrated in the following figure:

Program Components

Systems-Based Research

The food innovation research program will focus at the intersection of three scientific disciplines:

• Food and Agricultural Sciences
• Health, Wellness and Life Sciences
• Data Analytics and Advanced Computation

The integration of these disciplines will enable cutting-edge research to be conducted in the area of Healthy, Functional and Medical Foods, and ultimately in areas that include personalized nutrition and personalized medicine. A systems approach to research will be the hallmark of the center.

It is anticipated that a great number of faculty researchers will be attracted to this unique program and the special opportunities that convergence of these disciplines makes possible. Research labs, research management, collaboration/integration facilitation and administrative support will provide the foundation needed to jumpstart and grow new research partnerships.

These researchers may originate from many departments within Rutgers University including (this list is not indicative of all departments, only demonstrative):
• Rutgers School of Environmental and Biological Sciences (SEBS), Departments of:
  – Agricultural, Food and Resource Economics
  – Animal Sciences
  – Biochemistry and Microbiology
  – Food Science
  – Nutritional Sciences
  – Plant Biology and Pathology

• Rutgers School of Arts and Sciences (SAS), Departments of:
  – Biological Sciences
  – Cell Biology and Neuroscience
  – Chemistry and Chemical Biology
  – Cognitive Science
  – Computer Science
  – Exercise Science
  – Genetics
  – Molecular Biology and Biochemistry

• Rutgers School of Engineering (SOE), Departments of:
  – Biomedical Engineering
  – Electrical and Computer Engineering
  – Packaging Engineering
  – Chemical Engineering

• Rutgers Biomedical and Health Sciences (RBHS), Departments of:
  – Biochemistry and Molecular Biology
  – Medicine
  – Neuroscience and Cell Biology
  – Pathology and Laboratory Medicine
  – Pharmacology

• Interdisciplinary and/or Inter-University Partnerships:
  – IFNH (New Jersey Institute for Food Nutrition and Health)
  – RDF (The Rutgers Discovery Informatics Institute)
  – DIMACS (Center for Discrete Mathematics and Theoretical Computer Science)

Services, Space and Connectivities
To be effective, the Park Food Innovation Center will need to include key services, spaces and connectivities that are critical to establishing a true multidisciplinary innovative environment that catalyzes partnerships, business development and economic growth.

Services that consist of subject matter expertise provided by a network of industry professionals in areas that may include: industry trends and technologies; business planning, market research, marketing and sales strategy; capital access, regulatory requirements, intellectual property assessment and other legal matters; product and process development, product commercialization testing, sensory analysis; equipment assessment, quality assurance and food safety; ingredient and packaging sourcing, nutrition analysis, analytical testing; assessment of distribution channels, entrepreneurial and workforce training. Research support in the form of partnership development, administrative support, funding opportunities, and research project management.

Space that consists of: a shared-use food processing environment equipped to meet the many variable processing needs of clients, while being U.S. Food and Drug Administration (FDA) and U.S. Department of Agriculture (USDA) inspected and “best in class” in terms of sanitary design, fit and finish, and operating protocol; R&D kitchen; research laboratories that can support short and intermediate term (1-12 months) multidisciplinary research projects conducted by Rutgers scientists, visiting scientists, students, etc; presentation/conference rooms to support private as well as public presentations, training and meetings; and administrative offices.

Connectivities that consist of both physical spaces and virtual/electronic networks that bring people together to initiate, encourage and support cross-disciplinary work and collaborations, provoke conversations, introduce specialists
to existing and novel problems, and otherwise
generate a rich multidisciplinary network to
fertilize innovation and collaborations.

The Park Food Innovation Center will provide
a mentoring team that can advise faculty,
entrepreneurs and established food businesses
throughout the research and development pro-
cess. The food industry is a specialized industry,
with challenging product and process develop-
ment, food safety and regulatory issues. In
addition, food businesses need assistance with
business strategy and planning, marketing and
sales, and assistance with access to capital. Staff
will provide or facilitate the following types of
professional mentoring services for its clients:

**Business and Partnership Development**

- Feasibility Studies and Business Plan Development Guidance
- Market Research and Trends Assessment
- Competitive Intelligence
- Innovation and Ideation
- Qualitative and Quantitative Consumer Research, e.g. focus groups
- Marketing, Sales and Distribution Channel Strategy, including Export Assistance
- Human Resources and Organizational Hiring
- Product Costing and Pricing Analysis and Benchmarking
- Grant Writing Guidance
- Access to Resources and Guidance with Sources of Capital
- Access to Resources and Guidance with Legal Matters such as Legal Structure Considerations, Corporate Governance, Intellectual Property, Employment Law, Brokerage Agreements, Strategic Partner and Cooperative Agreements, etc.
- Corporate and university engagement

**New Product Development**

- Concept Generation and Prototype Development
- Ingredient Sourcing and Evaluation
- Formula Optimization and Least Cost Product Development
- Packaging Selection for Cups, Trays, Pouches, Jars, etc.
- FDA and USDA Regulations Counseling
- Nutritional Analysis and Labeling Determination
- Product Commercialization Testing
- Sensory Analysis
- Recipe/secondary Usage Development
- Product Preparation Directions
- Manufacturing Strategy

**Technology Commercialization**

- Process Assessment
- Engineering and Equipment Assessment
- Packaging Technology Assessment
- Product and Package Sustainability
- Intellectual Property Assessment
- Patents and Trademarks Advice
- Technology Transfer

**Quality Assurance and Food Safety**

- Shelf Life Testing
- Analytical Standards Development
- Food Safety and Food Security Strategy
- Crisis Management Support
- Quality Assurance Documentation, including Raw Material and Finished Product Specifications, GAP’s, GMP’s, SOP’s, SSOP’s and HACCP
• Supplier Auditing
• Preparation for Third Party Audit
• GFSI Standards, including SQF and BRC

Community Engagement

• Community Food and Nutrition initiatives, such as
  – “Farm to School” initiatives
  – Community farmers markets

• Business networking and linkages, and strategic alliances with other local, State, Federal, and international programs

Development and Support of Experiential Learning Program for Students in areas such as:

• Development of Business Plan Competition and other entrepreneurial event support
• Development of state and community food industry conferences
• Access to faculty and staff at Rutgers
• Access to customers – Retail, foodservice, industrial
• Access to consultants and service providers – Product development, engineering, nutrition analysis, lawyers, accountants, etc.
• Grant writing support for program development and expansion
• Database development and marketing

Benefits/Outcomes

Impacts of the Park Food Innovation Center will be substantial, and it is important to measure these impacts from the outset of the program. These impacts include:

• Academic Impacts
  – Grant funds secured by faculty and staff (including NIH, USDA, NSF, foundations, etc.)

• Faculty research collaborations, particularly in the interdisciplinary areas of Food and Agricultural Sciences; Health, Wellness and Life Sciences; and Data Analytics and Advanced Computation

• Research and service agreements
• Patents/Licensing
• Publications
• University-University research collaborations/MOU’s
• Public-Private partnerships and industry/corporate joint ventures/MOU’s
• Student experiential learning and internships
• Student employment resulting from experiential learning/internships
• Faculty exchange program participants
• Student exchange program participants

• Economic and Social Impacts
  – Entrepreneurship training and education – clients trained
  – New businesses created
  – Number of active corporate clients
  – Number of graduate corporate clients
  – Number of employees currently employed by clients and graduates
  – Aggregate revenues of client companies
  – Direct and indirect jobs created/retained
  – Increased client revenue/profits
  – Equity capital (including angels and venture capital financing), secured by clients
  – Debt capital secured by clients
  – Grant funds secured by clients (including SBIR etc.)
- Patents and intellectual property transferred to industry
- Number of formal training events/seminars, and persons trained
- Commercial space taken in community from graduates
- Community health and nutrition education, including chronic disease prevention, and wellness and health promotion

Building Design

It is proposed that the Park Food Innovation Center will be designed for manufacturing, research and training with meeting rooms, offices, research space, an R&D kitchen, program services, etc., in which most of these usages would also generate revenue from business/technical mentoring and training, and research funding.

Within this facility, a variety of spaces for food production, as well as administrative and educational needs, research and other services will be provided. A summary of these spaces is as follows:

Administrative Office Space
- Reception area
- Offices for clients
- Offices for staff that will be assigned to the Center
- Open office area for students and visitors/clients/others to use
- Office for USDA FSIS Inspector (a dedicated office is required)
- Business office and file storage
- Break rooms
- Meeting and conference rooms
- Men’s and Women’s rest rooms

Wet Processing Pilot Plant and Small-Scale Manufacturing
- Room Temperature: Ambient, air conditioned
- Process Capabilities: Designed for an extensive range of thermal processing capabilities including blanching, steaming, cooking, roasting, and baking, and hot-filling followed by quick-chilling, and includes a bottling line and cup/tray filling line allow for semi-automated production. This area could also include still and/or agitated retorts.
- Product Capabilities: Soups, sauces, jams, jellies, salad dressings, dips, beverages, entrees, fruit and vegetable purees
- Potential Equipment Needs: 6-burner range(s) with oven, kettles, combi-oven(s) for dry and/or wet heat application, still and/or agitated retorts, stainless steel tables/work-surfaces, scales, bottling line for hot-filling liquids, labeler, etc.

Dry Processing Pilot Plant and Small-Scale Manufacturing
- Room Temperature: Ambient, air conditioned
- Process Capabilities: Devoted to equipment used for blending, mixing, rolling, extruding, sheeting, proofing, retarding, baking, dehydrating, and cooling
- Product Capabilities: Baked goods, as well as seasoning blends, and dehydrated fruits, vegetables, and herbs utilizing a variety of food technologies.
- Potential Equipment Needs: Dough mixers, oven (roll-in with water softener system), proofer/retarder, stainless steel oven racks, stainless steel work tables, shrink wrap machine, tubular frame rolling racks and sheet pans, dehydrator, metal detector

Refrigerated Processing Pilot Plant and Small-Scale Manufacturing
- Room Temperature: Refrigerated (33°–50°F)
• Process Capabilities: Devoted to equipment used for fresh-cut fruits and vegetables; and preparing value-added meats/poultry, using microbial reduction technologies in a controlled environment

• Product Capabilities: Fresh-cut fruits and vegetables, value-added meat and poultry and seafood products. This would also include applications for culled, undervalued, and surplus agricultural commodities in order to create value-added products from lower grade raw materials that may otherwise be destroyed.

• Potential Equipment Needs: Washing system (used to wash fruits and vegetables to remove surface dirt and debris, utilizing chlorine or PAA solution, with an associated water chiller to cool down wash water), mechanical peelers (peel pineapple, etc.), Spin Dryer (used for vegetables to remove excess moisture after washing), slicing equipment, dicing equipment, meat slicers, stainless steel tables, metal detector.

Commercialization Space

Dedicated, leasable processing space will be made available for individual clients that are approximately 1,500–3,000 SF each. The space will be established such that interior walls can be moved as needed to expand or decrease space, based upon the needs of the client. Commercialization space will have market appeal to any of the following types of companies:

• “Graduation” Space for local entrepreneurs – Successful entrepreneurs that have outgrown use of the pilot plant facilities or other small-scale operations will be able to “graduate” to a commercialization facility within the Park Food Innovation Center, and gain access to greater production space and scale. They can establish their own operation in this dedicated environment on a long-term basis.

• “Landing Pad” for domestic and international food businesses – The Park Food Innovation Center will also serve to attract out-of-state and international food processing companies. Many will require larger spaces and long-term usage that this type of commercialization space can provide.

• R&D and Manufacturing Facility for local and regional food businesses – Food companies will be able to utilize dedicated space for product R&D and manufacturing. This commercialization center will enable such companies to expand their operations, and enter into new markets.

Packaging Room

• Room Temperature: Refrigerated (33°–50°F), but can be used as an air-conditioned area for packaging of shelf stable products

• Process Capabilities: Devoted to equipment used for assembly and packaging of raw or pre-cooked and chilled, frozen or ambient components into finished packaging.

• Product Capabilities: All product categories

• Potential Equipment Needs: Machine for packaging products with vacuum/MAP capabilities and variety of tooling options, vertical form-fill-seal machine with vacuum/MAP capabilities, double chamber rotary tray sealing machines with MAP capabilities, stainless steel tables with conveyors and product picking stations for assembling products, etc.

Raw Material and Finished Goods Storage

• Raw material and finished product storage will be required for all three conditions: Ambient, refrigerated and frozen.
**Maintenance Area and Chemical Storage**

- Cleaned equipment that is used on a regular basis can be stored in the existing potwash area and throughout the facility. Another location will need to be determined for a maintenance area and for storage of infrequently used equipment.

- A lockable chemical storage area will be required for sanitation chemicals, bactericidal agents used in footbaths, chemicals used for washing produce and other food products, etc.

**Equipment Storage**

- Provision will be needed for a large amount of mostly portable equipment that will be used on a temporary basis and will need to be stored when not in use.

**Shipping and Receiving Dock(s)**

- A receiving and shipping area, potentially enclosed, to enable the receipt of goods in a sanitary fashion. In addition, there needs to be an effective and sanitary way for inbound and outbound movement of both raw materials and finished products to occur.

**Laboratories for Multidisciplinary Translational Research.**

- The science labs in this building will be uniquely designed to support multidisciplinary translational research activities. The labs will include a collaborative research space, with the infrastructure (electric, ventilation, water, gas, vacuum, etc.) to support a range of physical, chemical and biological research activities, but with the flexibility to be configured in many different ways.

**Makerspace**

- A high-level “Makerspace” model is envisioned, where labs can be organized into distinct collaborative environments and equipped with a range of research instrumentation that could change depending upon the ongoing research projects. This space would support not basic research, but rather specific, targeted, collaborative translational research projects in which basic research ideas would become novel food products or processes. These would not be typical labs such as those found throughout the university or in commercial real estate, but unique “collaboratories” that currently do not exist at Rutgers or elsewhere in the region.

**Food Microbiology and Chemistry Lab**

Testing that may be conducted, such as:

- Microbiology Testing - Finished products, in-process testing, raw material testing, environmental monitoring, shelf life studies, etc.
- Chemical Analysis and Standards Testing
- pH analysis
- Brix Testing
- Moisture and water activity testing
- Consistency/Bostwick
- Colorimetry
- Residual gas analysis for MAP products (Oxygen, CO2)
- Enzyme Inactivation Tests
- Antioxidant Strength Assay (titration)
- Salt Analysis Testing (Hygrometer)
- Thermometer calibration
- Packaging Analysis - Seal Integrity and Leak Detection Testing

**R&D and Demo Kitchen**

- Adjacent presentation area for product demonstration, with computer and projectors
- Refrigerator/freezer, stoves, ovens, sinks, microwave, kettles (e.g. 5-gallon, 10-gallon), combioven, stainless steel tables/ work-surfaces, scales, various table top equipment.

- Storage cabinets
- Pots, pans, utensils, dishwasher
Education, Training, and Presentation Space Needs

- Training rooms for courses in Good Manufacturing Practices and other courses
- Conference Rooms for use by in-house clients, conducting focus groups, etc.
- Sensory Testing Room for Organoleptic Evaluation of Client Products

Connectivities

- Innovative ideation spaces for meetings, brainstorming, etc.
- Virtual spaces to support brainstorming, collaboration, making cross-disciplinary connections, etc.
- Interactive area for holding Meetup Groups and Events

Revenue Opportunities

Based on a successful track record of revenue generation at FIC–North and South, the funding strategy for the Park Food Innovation Center will be multi-faceted and rely on a holistic approach that is consistent with the breadth of services that will be strategically developed. A great deal of potential funding and revenue-generating opportunities exists, and these opportunities are directly related to the types of services that will be provided to the community. These funding sources and revenue streams can originate from the following categories:

- Processing Space & Equipment Rental
- Co-Packing Fees
- Business and Technical Mentoring and project management fees
- Education Seminars
- Membership Programs
- Storage Rental
- Office and Conference Room Rental and Associated Fees
- Product, Process and Package Development
- Consumer Research & Focus Groups
- Sensory Analysis
- Nutrition Labeling
- Microbiology, Analytical Chemistry and Physical Testing
- Royalties

Other revenue sources could be supported by:

- Administrative and financial support at Rutgers University
- Federal, State, and Local Grants
- Private Sector Corporations
- Foundations and Philanthropists
- Equipment Donations
- Sponsors (e.g., Banks, Accounting Firms, Law Firms, etc.)

3. Industry Collaboration Building

Overview

A principal mission of Innovation Park@Rutgers will be to drive innovation, generating the talent and research that can expand technology-related sectors of New Jersey's economy. In order to achieve the objectives of this mission, partnerships with private industry will be integral to attracting the best talent and to establishing firm links between research and application. The Industry Collaboration Building will be a privately developed and owned facility, located in the heart of Innovation Park, proximate to both the Busch and Livingston campuses, in order to allow its tenants to have maximum contact and regular interaction with Rutgers’ faculty, researchers, and students.

Program Leaders

It is recommended that the Industry Collaboration Building be financed, constructed, owned and operated by a private developer partner, with Rutgers leasing a portion of the facility as a credit tenant. Rutgers, through its Office of Research and Economic Development, expects to work collaboratively with the developer in identifying potential tenants for the facility. A key driver of interest by private tenants will be the research agenda of Rutgers’ leading
faculty and access to students. Drawing upon its strong industry relationships and active alumni networks, Rutgers is positioned to be a valuable resource to the selected developer in identifying appropriate companies to tenant the building.

**Justification**

Based on existing university-industry partnerships, letters of interest and market analysis, Rutgers believes that there will be demand from private companies that would like to be located at the proposed Innovation Park. While it is possible that the Industry Collaboration Building may accommodate one prominent anchor tenant in addition to Rutgers, it is expected that the building will be capable of housing a diverse range of tenants in spaces of varying sizes.

**Program and Operations**

It is Rutgers’ goal that the majority of the Industry Collaboration Building be leased by private technology-related companies. However, it is understood that, in order for this development to be financially feasible, Rutgers will likely have to initially lease a significant amount of space as a credit tenant. It is expected that this Rutgers space will include administrative space, incubator space, and meeting space. While it is proposed that the Industry Collaboration Building be owned and operated by a private developer partner, it is recommended that Rutgers collaborate with the selected developer in the governance of the building, including having some role in the selection of tenants.

**Beneficiaries**

The Industry Collaboration Building will place Innovation Park at the nexus of technology and enterprise. The core academic and research activities at Rutgers and at Innovation Park’s Advanced Research Computing and Food Innovation facilities are positioned to generate and attract substantial commercial and entrepreneurial activity, including sponsored research, student engagement, collaborative research agreements with companies, protomanufacturing, and incubator and accelerator programs. The Industry Collaboration Building will provide private sector tenants with state-of-the-art commercial and office space that does not currently exist in the Central New Jersey market. The Industry Collaboration Building’s tenants will have access to Rutgers faculty, researchers and students and it is desired that companies in the Industry Collaboration Building will provide internships, mentorships, and recruitment opportunities to Rutgers students. The selected developer of the Industry Collaboration Building will have multiple opportunities to engage with Rutgers leadership to gain a deep understanding of the university’s research agenda, develop research linkages, refine the leasing strategy, and identify potential tenants.

**Building Attributes**

Rutgers envisions the Industry Collaboration Building as a flexible Class A office and laboratory building that will provide significant opportunities for interaction with the Rutgers academic community and become known as one of the premier tech addresses in Central New Jersey. The building will comprise approximately 90,000 gross square feet of office space and wet/dry lab space. The building should provide the levels of service tenants expect in such a property, with amenities and design that are desired by a wide range of technology-related companies. Tenant spaces should be flexible to meet a full range of space needs from private
Development Structure

The development terms for the Industry Collaboration Building will depend upon the development structure that is ultimately selected for the project. It is recommended that the development of this building is 100% financed, constructed, owned, and operated by a private partner. In this scenario, Rutgers would convey a long-term ground lease to the selected developer and would be prepared to contribute a cleared and ready-to-build parcel for the construction of the Industry Collaboration Building, providing considerable cost savings for the developer.

U3 Advisors’ financial analysis, outlined in Chapter 4, demonstrates that, to make this project financially feasible for a private developer, the initial land cost, including ground rent, should be minimal. Rutgers may seek to recoup its investment in infrastructure, site development, and landscape. It is recommended that Rutgers collaborate with the selected developer in the governance of the building, including having some role in the selection improvements over time as the building becomes successful. This could be accomplished via a participation rent, after payment of an agreed-upon return to the developer or other means to be identified by Rutgers and a future developer partner.

V. Economic Impact Assessment

Introduction

Economic development is driven by building blocks in the economy: entrepreneurs, innovation, workforce, investment climate, support for businesses in expanding markets, and the connection between universities and industry. These components feed industry specialization and commercialization of new technologies, creating regional competitive advantages and economic growth.

University innovation parks have emerged to stimulate the university/industry dynamic, bringing together critical elements for innovation (i.e., intelligent people, research, entrepreneurial training, and collaborative spaces to encourage professional networking) and taking advantage of their geographic proximity and interaction with one another. University innovation parks can help entrepreneurs overcome challenges to creating high-growth businesses by providing incubation space, mentorship, and specialized programs and services. They can also offer strategic advantages to existing companies competing in the global economy. For example, university researchers may collaborate with businesses to develop new manufacturing processes, products or materials.

U3 Advisors, in conjunction with BJH Advisors, (collectively the “Consultants”) completed an economic impact analysis of a potential development scenario for the three proposed Phase One buildings of Innovation Park. The analysis estimates the number of direct, indirect, and induced jobs created through the construction (estimated in worker-years) and operation of the project, as well as its overall earnings and economic output in the local economy.

Rutgers staff completed an additional tax analysis to determine fiscal impacts of Innovation Park for the federal government, state and local municipalities. The tax impact analysis is detailed in Section V(iv). In addition, the Rutgers...
Team conducted a survey and research on the direct and indirect benefits to universities of having a research park. These findings are summarized later in this chapter.

Methodology

The analysis relies on information related to construction spending, development programs, and tenant mix associated with the development scenario created by Rutgers. The consultants used published guidelines, public data sources, and assumptions to estimate inputs, primarily those related to number of workers and associated earnings for each scenario, not available from Rutgers (e.g. the U.S. Green Building Council’s report on employees per square foot and the U.S. Bureau of Labor Statistics 2015 Occupational Wage Survey).

Direct Effects. Direct effects from construction are derived from the construction budget and average annual wages for construction workers in the region. The Consultants estimated post-construction permanent jobs at Innovation Park based on industry standards regarding building area per employee and average annual wages for the relevant sectors in the region.

Multiplier Effects. When an entity invests in capital projects or operations, it generates a larger impact on the economy through payments to suppliers and consumer spending. These impacts, known as “economic multiplier effects,” measure the increased demand for temporary and permanent employment and associated spending on total output (other business spending), earnings (individual earnings and income), and employment (total number of jobs) generated by the ongoing activity of the project and operations.

To estimate these multiplier effects on the regional economy, this analysis applies IMPLAN I-RIMS multipliers. These multipliers are developed based on data collected by the U.S. Department of Commerce’s Bureau of Economic Analysis (BEA) and are used to estimate the impact on a region’s economy from an initial change in sales, income, or jobs created by a particular event or project.

For a given region, input-output models can estimate three types of multiplier effects:

1. Direct – the number of jobs, output, and/or earnings required to complete the construction project. This includes construction jobs, purchases at local building supply stores, and wages earned by local construction workers.

2. Indirect – multiplier effect jobs, output, and/or earnings related to business-to-business expenditures, or created because of increased input demand.

3. Induced – multiplier effect jobs, output, and/or earnings related to consumer spending, or created by direct or indirect workers spending their household incomes in the local economy.

The analysis described in this section applies IMPLAN I-RIMS multipliers that correspond to the state of New Jersey to direct output projections for the Park. In addition, the ongoing economic activity estimates do not take into account assumptions related to whether the jobs are moving from one site presently at the university or in the region to the new project location.

Findings

i. Direct Effects

Temporary Construction Effects. According to assumptions provided by Rutgers, construction hard costs are estimated at $49 million, or approximately $250 per square foot (Does not include site costs, soft costs, or TIs; does include LEED 4 standards). The Consultants assume that 50% of the hard-cost budget is composed of labor and that each construction employee will earn an average of $120,000 in wages and benefits annually (New Jersey construction wage). Based on these assumptions, Innovation Park will create 205 direct construction jobs (measured in worker-years).
**Permanent Effects.** The direct effects associated with permanent jobs are a function of square feet of space by use and industry at Innovation Park and average income per worker year by industry.\textsuperscript{18} The project is estimated to generate 810 post-construction permanent jobs. Table 2 below presents the number of jobs by industry. Table 3 below presents the earnings and total output associated with these direct permanent jobs.

**ii. Indirect and Induced Effects**

**Temporary Construction Effects.** The direct employment (measured in worker-years) and output generated from the construction of Innovation Park is expected to catalyze an additional 141 indirect and induced jobs (also measured in worker-years), $15 million in indirect and induced earnings, and $39 million in indirect and induced output in the New Brunswick economy. These effects are presented in Table 4 on the following page.

### Table 1: Direct Effects from Construction Activity

<table>
<thead>
<tr>
<th>Program</th>
<th>Advanced Research Computing Facility</th>
<th>Food Innovation Center</th>
<th>Industry Collaboration Building</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total GSF</td>
<td>45,000</td>
<td>60,000</td>
<td>90,000</td>
<td>195,000</td>
</tr>
<tr>
<td>Output (a)</td>
<td>$11,793,600</td>
<td>$17,297,280</td>
<td>$20,207,880</td>
<td>$49,298,760</td>
</tr>
<tr>
<td>Earnings (b)</td>
<td>$5,896,800</td>
<td>$8,648,640</td>
<td>$10,103,940</td>
<td>$24,649,380</td>
</tr>
<tr>
<td>Employment (c)</td>
<td>49</td>
<td>72</td>
<td>84</td>
<td>205</td>
</tr>
</tbody>
</table>

(a) Based on unlevered construction budget - Rutgers cost to build  
(b) Assumes labor accounts for 50% of project costs  
(c) Estimated number of worker-years. Annual average wages and benefits are assumed to be $120,000

### Table 2: Direct Employees by Industry

<table>
<thead>
<tr>
<th>Program</th>
<th>Advanced Research Computing Facility</th>
<th>Food Innovation Center</th>
<th>Industry Collaboration Building</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Office' Employees</td>
<td>197</td>
<td>193</td>
<td>237</td>
<td>627</td>
</tr>
<tr>
<td>'Lab' Employees</td>
<td>0</td>
<td>78</td>
<td>105</td>
<td>183</td>
</tr>
<tr>
<td>Total Direct Jobs</td>
<td>197</td>
<td>271</td>
<td>342</td>
<td>810</td>
</tr>
</tbody>
</table>

Source: U.S. Green Building Council, Rutgers, BJH

### Table 3: Direct Effects from Permanent Jobs

<table>
<thead>
<tr>
<th>Program</th>
<th>Advanced Research Computing Facility</th>
<th>Food Innovation Center</th>
<th>Industry Collaboration Building</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output (a)</td>
<td>$48,765,807</td>
<td>$140,001,617</td>
<td>$123,619,775</td>
<td>$312,387,200</td>
</tr>
<tr>
<td>Earnings (b)</td>
<td>$19,181,250</td>
<td>$21,677,850</td>
<td>$30,531,526</td>
<td>$71,390,627</td>
</tr>
</tbody>
</table>

(a) Derived using IMPLAN multipliers  
(b) Derived using BLS Occupational Wage Survey Wage Rates
Permanent Effects. On-going annual activity at Innovation Park will generate 1,335 indirect and induced permanent jobs, $74 million in new indirect and induced earnings, and over $200 million in indirect and induced output in the New Brunswick economy. These findings are presented in Table 5.

iii. Aggregate Economic Impact

Temporary Construction Effects. Table 6 presents the aggregate direct, indirect, and induced economic impact from the construction of Innovation Park. The analysis estimates that the project will generate 346 more worker-years, $40 million in additional earnings, and $88 million in total output from construction activity.

Permanent Jobs. Table 7 presents the aggregate direct, indirect, and induced economic impacts from permanent jobs associated with Innovation Park. The project will generate 2,146 jobs, $146 million in earnings, and over half of a billion dollars in direct, indirect, and induced output.

### Table 4: Indirect and Induced Economic Impacts from Construction Activity

<table>
<thead>
<tr>
<th>Program</th>
<th>Advanced Research Computing Facility</th>
<th>Food Innovation Center</th>
<th>Industry Collaboration Building</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output (a)</td>
<td>$9,365,144</td>
<td>$13,735,545</td>
<td>$16,046,815</td>
<td>$39,147,504</td>
</tr>
<tr>
<td>Earnings (b)</td>
<td>$3,578,107</td>
<td>$5,247,891</td>
<td>$6,130,950</td>
<td>$14,956,948</td>
</tr>
<tr>
<td>Employment (c)</td>
<td>34</td>
<td>49</td>
<td>58</td>
<td>141</td>
</tr>
</tbody>
</table>

Source: IMPLAN multipliers

(a) Based on unlevered construction budget - Rutgers cost to build
(b) Assumes labor accounts for 50% of project costs
(c) Estimated number of worker-years. Annual average wages and benefits are assumed to be $120,000

### Table 5: Indirect and Induced Economic Impact from Permanent Jobs

<table>
<thead>
<tr>
<th>Program</th>
<th>Advanced Research Computing Facility</th>
<th>Food Innovation Center</th>
<th>Industry Collaboration Building</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>$36,665,694</td>
<td>$86,071,454</td>
<td>$78,275,139</td>
<td>$201,012,287</td>
</tr>
<tr>
<td>Earnings</td>
<td>$14,612,660</td>
<td>$30,969,584</td>
<td>$28,756,460</td>
<td>$74,338,704</td>
</tr>
<tr>
<td>Employment</td>
<td>240</td>
<td>392</td>
<td>703</td>
<td>1,335</td>
</tr>
</tbody>
</table>

Source: IMPLAN multipliers

### Table 6: Aggregate Economic Impact from Construction Activity

<table>
<thead>
<tr>
<th>Program</th>
<th>Advanced Research Computing Facility</th>
<th>Food Innovation Center</th>
<th>Industry Collaboration Building</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>$21,158,744</td>
<td>$31,032,825</td>
<td>$36,254,695</td>
<td>$88,446,264</td>
</tr>
<tr>
<td>Earnings</td>
<td>$9,474,907</td>
<td>$13,896,531</td>
<td>$16,234,890</td>
<td>$39,606,328</td>
</tr>
<tr>
<td>Employment</td>
<td>83</td>
<td>122</td>
<td>142</td>
<td>346</td>
</tr>
</tbody>
</table>
iv. Additional Fiscal Impacts

It is estimated that the construction of the Park will generate approximately $12.2 million in tax revenues for the federal government, the state, and local municipalities. As Table 8 shows, approximately $3.8 million will go to state and local authorities in the form of corporate, personal, and property taxes. Estimated federal, state, and local tax impacts are generated from the direct, indirect, and induced impacts from construction of the Park. Included are estimates of taxes on employee compensation, proprietor income, indirect business taxes (including property taxes), household income, and corporations. The tax impacts from the construction phase are a one-time impact that may occur over multiple years.

Table 9 describes the estimated annual tax impact generated by the operations of the Park of approximately $52.2 million, of which $16.6 million is expected to go to state and local municipal governments. This represents the sum of taxes on employee compensation, proprietor income, indirect business taxes (including property taxes), household income, and corporations. The tax impacts from Park operations occur yearly once the Park is operating at full capacity.

**Direct and Indirect Benefits to the University**

Research parks provide a multitude of benefits to local, regional, and state economies. They can also directly benefit their host institutions. The Rutgers Team solicited feedback from Association of University Research Park (AUERP) member institutions regarding the impact their park(s) has on their university. The Rutgers Team also conducted research on the topic, sourcing much of the data from research park annual reports. The findings of the survey and research revealed that having a research park can lead to increases in university patent activity, internship and job opportunities for students and alumni, and more.
Through research parks, industry can license university technologies or fund research projects. Nearly half of all tenants located in the Research Park at the University of Illinois have licensed technology from the university. At the Purdue Research Park, businesses have provided nearly $22 million in sponsored research. Some universities receive gifts and donations from tenant companies. The Project Manager at the Stout Tech Park advised that the University of Wisconsin “received many donations for labs on campus from local Tech Park companies.”

Many research parks offer space, resources and services to support the creation of new businesses. These new businesses may be launched by university faculty, staff or students and may be based on technologies that were discovered by the university. From 2000 – 2010, 81 new companies were created at the Purdue Research Park from Purdue-discovered technologies. Roughly one third of the companies located at the University of Waterloo’s David Johnston Research + Technology Park were built by undergraduates and university faculty.

Companies often choose to engage with universities in order to have access to their student populations. The Executive Director of the LSU Innovation Park shared that “…Every company at the LSU Innovation Park has student workers and interns. [They] are employing interns on projects and essentially vetting them as future employees.” Research park tenants also employ university alumni. At the Purdue Research Park, Purdue graduates comprise over 20% of the workforce.

Universities that have research parks may be better positioned to recruit highly sought after employees. AURP member institutions reported that having a research park can enhance the reputation of the university, making it easier to hire pre-eminent scholars. Young, entrepreneurial faculty are often attracted to schools that have research parks, because the parks offer a location in which they can launch a business and collaborate with external partners on projects that have real-world applications.

**Conclusion**

Development of Innovation Park has the potential to generate significant economic impact to the New Jersey economy, both in terms of temporary construction impacts, longer lasting permanent jobs, and spillover effects from the increased economic output of both. During construction, 346 worker-year jobs and $88 million dollars’ worth of aggregate impact will be created, based on current construction budget estimates. Once completed, it is projected that the Park will house 810 employees directly, assuming full occupancy. It is estimated that these employees will generate approximately $513 million dollars in aggregate increased economic activity in the local economy. In addition, permanent annual tax impacts were estimated at $52,200,000. These values do not include other types of economic impacts, such as spin-off companies that are developed in Innovation Park and then relocate outside of the Park. Other potential impacts include those accrued to Rutgers University such as increased revenue from grants, private contracts, licensing of patents and other intellectual property.

**VI. Rutgers Metrics, Impact Assessment, Continuous Improvement**

Metrics are used to drive continuous improvement and help to focus people and resources on key objectives. Given the importance of monitoring key indicators to gauge the impact and performance of Park programs and facilities on the university and in spurring innovation and economic development for the state, a metrics tracking and assessment program will be established. All metrics will be clearly defined so that Park management can benchmark its success and identify areas in need of improvement. In order to keep the metrics understandable, the SMART (specific, measurable, achievable, relevant, time-based) model will be utilized in defining them. The purpose of establishing
metrics is to improve the operation, so targets will be set that challenge the Park operation. This will provide more value than focusing on something that is easily achievable or is already being achieved. Metrics tracking and impact assessment will be instituted at the initial stages of the Park development and continue as a standard operating procedure for Park management.

Many university research parks have recognized the importance of tracking metrics and measuring impacts. They see tremendous value in using this information to demonstrate the benefits of the park to the local and state economy, as well as the universities that host them. For example, in January 2009, the Maryland Technology Development Corporation (TEDCO) & University System of Maryland prepared a report on "Technology Transfer Performance of USM Institutions." The report found that "the lack of currently available national benchmarks for comparison makes it impossible to report definitively on a comparative performance of Maryland’s Research Parks."

The report recommended developing a set of performance metrics consistent to the extent possible with national standards by which research park performance could be measured. These recommendations were implemented and metrics data collection and impact assessment are now a standard part of the reporting requirements for Maryland’s research parks. In addition, continuous improvement will be a core operational strategy at Innovation Park. The most widely used tool for continuous improvement is a four-step quality model—the plan-do-check-act cycle, also known as the Deming Cycle:

- **Plan:** Identify an opportunity and plan for change.
- **Do:** Implement the change on a small scale.
- **Check:** Use data to analyze the results of the change and determine whether it made a difference.
- **Act:** If the change was successful, implement it on a wider scale and continuously assess your results. If the change did not work, begin the cycle again.

The continuous improvement program at the Park will emphasize employee and tenant involvement and teamwork; measuring and systematizing processes; and reducing delays in response time.

Based on research findings and discussions with other universities, a list of key metrics and impacts were developed for the Park project. These fall into three main categories: 1) Academic/Research Impacts; 2) Innovation/Entrepreneurship Impacts; and 3) Economic/Social Impacts. The metrics and impacts will be further defined and revised once the Park is operational and it becomes clearer what needs to be tracked. Also, this review process is important because the Park will evolve and change over time, and the metrics and performance indicators need to change accordingly.

Examples of metrics and impacts to be tracked include:

**Academic/Research Impacts**

- Research funding from grants (including NIH, USDA, NSF, foundations, etc.)
- Number/value of industry agreements (including service agreements, research agreements, etc.)
- Publication rates
- Public-Private partnerships and industry/corporate joint ventures/MOU’s

- University-University research collaborations/MOU’s/Inter-institutional Agreements
- Faculty research collaborations, particularly in the main areas of focus
- Partnerships with other research parks/research institutes (foreign or domestic)
• Success in attracting high performing research faculty (particularly in key areas of focus)
• International Faculty exchange program participants
• International Student exchange program participants
• New multidisciplinary research clusters formed (i.e. Intersection of Food/Big Data/Health Sciences)

**Innovation/Commercialization Impacts**

• Number of disclosures filed and patents filed, issued
• Patents and other intellectual property licensed to industry
• New start-ups founded by faculty, staff or students based on Rutgers technology
• 3rd party funding raised
• Entrepreneurship training and education – number of programs held, number of clients trained
• Other entrepreneurship events (Competitions, Meet-ups, etc.) held at the Park

**Economic and Social Impacts**

• Direct and indirect jobs created/retained
• Student interns working for Park or tenant companies

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1 National Governors Association Chair’s Initiative: Growing State Economies Twelve Actions, 2011 – 2012
2 The Rise of Innovation Districts: A New Geography of Innovation in America, May 2014, Katz, Bruce and Julie Wagner
4 Universities and Colleges as Economic Drivers, 2012, Lane, Jason and Bruce Johnstone
5 The Next Hot Trend On Campus: Creating Innovation, February 25, 2015, Brad Lukanic
6 Why do Americans go to college? First and foremost, they want better jobs, February 17, 2015, The Washington Post
7 College Entrepreneurship Programs Expand, October 14, 2009, Crain’s New York Business
8 Scientific Opinion Poll: Millennials Identify Student Debt, Retirement Savings as Barriers to Entrepreneurship, January 27, 2016, Small Business Majority
9 What is Social Entrepreneurship?, September 9, 2015, The Huffington Post
10 The Millennials A Generation Invested in Health and the Environment, November 2014, Glass Packaging Institute
11 U.S. Employers Suffer Largest Talent Shortage in Skilled Trades, 2015
13 U.S. Entrepreneurship Rates Reverse Trend, Reach New Heights
18 Square feet of space by use and industry from the U.S. Green Building Council and the National Institute of Health with some Rutgers University specifications.
20 IBID
22 IBID, pg 24
23 “Continuous Improvement” http://asq.org/learn-about-quality/continuous-improvement/overview/overview.html
Chapter 3:
Environmental Assessment
Environmental Assessment

The environmental and site assessment work was conducted by Amy S. Greene, LLC, licensed environmental specialists. A complete description of all work completed, as well as maps and analytical and other reports are contained in a separate report. The following is a summary of tasks and findings conducted for this project.

Site Survey:
On-site field surveys were conducted by a licensed professional surveyor to establish property boundaries, existing topography at one foot contours and to locate existing utilities and physical features. A metes and bounds description of the property limits was also completed.

Wetland and Open Water Delineation, New Jersey Department of Environmental Protection (NJDEP) Regulatory Line Verification Application and Site Survey/Wetland Delineation Plan:
Site investigations of existing soils, vegetation and hydrology were conducted to determine the limits of freshwater wetlands and open waters on the site which are regulated under the NJ Freshwater Wetlands Protection Act. Wetland and open water limits were flagged in the field and surveyed to complete a Wetland Delineation Plan to include in the Letter of Interpretation, Regulatory Line Verification application. A wetland report was also developed for inclusion in the application as were various site maps and data required by the NJDEP. A complete application was submitted to NJDEP and a Wetland Delineation Plan was approved on July 14, 2016 by the Division of Land Use Regulation.

NJDEP Flood Hazard Verification Application, Engineering Report and Site Survey/Flood Hazard Verification Plan:
An engineering analysis was conducted to determine the extent of the floodplain on the site which is regulated under the Flood Hazard Area Control Act. Existing data sources were also reviewed to predict the extent of the regulated riparian zone on the site. This data was compiled and placed on the site survey to complete the Flood Hazard Verification Plan. A Flood Hazard Engineering Report was prepared for inclusion in the application for a Flood Hazard Area Control Act Verification, as were various site maps and data required by the NJDEP. A complete application was submitted to NJDEP and a Flood Hazard Area Verification approval was issued by the Division of Land Use Regulation on May 13, 2016.

Rare, Threatened and Endangered Species Habitat Assessment:
Potential habitat for three federally listed threatened and endangered species was identified on the site. The bog turtle results are discussed below. Potential on-site foraging habitat exists for both the Indiana bat and Northern long-eared bat, though no evidence of their presence on the site was observed. Habitat determination is based on the presence of forest trees of appropriate size and circumference, as well as the presence of additional habitat features including snags in mid-decay, riparian corridors and forest canopy areas with greater than 50% cover. Further coordination with the U.S. Fish & Wildlife Service (USFWS) will be required to determine if additional surveys or other protective measures will be required once a development plan has been produced.

Delineation Phase 1 Bog Turtle Assessment:
A Phase I bog turtle evaluation was conducted for all palustrine wetlands on-site and for adjacent wetlands within 300 feet of the site in accordance with USFWS standards.
The evaluation includes four on-site wetlands and one adjacent off-site detention basin. No bog turtles or other reptiles were observed during the survey.

Findings: No suitable bog turtle habitat was found.

Vegetation and Wildlife Resources Study:

On-site vegetation and wildlife resources assessment surveys were conducted and existing literature for the site was also reviewed. The study area consists primarily of mature upland and wetland deciduous forest, with components of late successional mixed coniferous (Eastern red cedar) forest in the northern portion of the site. Other vegetation communities identified include early successional edges and modified/emergent herbaceous wetlands. Several invasive species were also observed; most notable was Japanese stilt grass (Microstegium vimineum). This species dominates the herbaceous layer in most of the wetland areas and is prevalent in the upland areas as well. The wildlife species observed are consistent with species normally found in New Jersey’s suburban environment.

Findings: No threatened or endangered species were observed.

Forest Resources Grid Assessment:

The New Jersey No Net Loss Reforestation Act (N.J.S.A. 13:14.1 et seq.) requires that for any State project or any project constructed on State land resulting in the removal of 0.50 acre or more of contiguous forest, the State agency must develop and execute a Reforestation Plan for approval by the NJDEP Division of Parks and Forestry. A Forest Grid Assessment of the referenced property has been completed. This assessment shows that 116 grids intersect the project area. Of these 116 grids, 90 are considered to be forested under the No Net Loss Reforestation Act. Once a development plan is completed for the Rutgers Innovation Park, a more in depth assessment of forest impacts should be completed. Any trees that are disturbed in one of these 90 forested plots will need to be compensated for in a reforestation plan.

Surface Water and Ground Water Resources Study:

Existing mapping resources were investigated and site inspections were conducted to identify all surface and ground water resources on or near the site. Two surface water resources were identified on the site. These are two intermittent, unnamed, water courses that come together near the western boundary of the site to form an unnamed tributary to the Raritan River. The drainage area of these tributaries is 56.7 acres. There is also a recently constructed detention basin that contributes to the flow of the northwestern tributary during storm events. This basin appears to collect drainage from Avenue E which travels along the eastern boundary of the site as well as areas upstream that drain to Avenue E. The on-site streams are designated Freshwater, Category 2, Non-Trout, Saline/Estuarine Waters (FW2-NT/SE1) by the NJDEP Surface Water Quality Standards. Seasonal high water table is generally below 60 inches on parts of the site mapped as the Klinesville soil series. The seasonal high water table is approximately 21 inches on parts of the site mapped as the Lansdowne soil series. Bedrock may be present at depths that range from 25 to 80 inches. Given the depth to bedrock it is not likely that any development on these soil types will have an adverse effect on ground water resources provided surface water runoff is properly managed and there are no discharges of contaminated material on or below the ground surface.

See Appendix D for site map with delineation of wetlands.
Chapter 4:
Financial Analysis
Financial Analysis

Defining Phase One

Before undertaking this financial analysis, the U3 Advisors team worked closely with leadership in the Rutgers Office of Research and Economic Development (ORED) to establish a preliminary Phase One development plan. The plan is comprised of two Rutgers buildings – the Advanced Research Computing Facility and the Food Innovation Center, and an Industry Collaboration Building that will be dedicated primarily to private sector tenants.

While the Advanced Research Computing Facility and the Food Innovation Center will be largely committed to Rutgers programs, they will also accommodate private sector users that can generate auxiliary income. The financial analysis for the Industry Collaboration Building examines a range of scenarios where Rutgers initially occupies between 50 to 100% of the building, with any remaining space being leased directly to private credit tenants. The analysis recognizes the principal goal of reducing Rutgers’ occupancy and financial obligations in this building. An overview of the proposed Phase One development plan is outlined in Table 1.

The U3 Advisors team undertook a high-level financial analysis of the proposed Phase One of the Park development and sought to answer three principal questions:

1. What is the “gap” in rent that may need to be filled to allow for a viable project and provide a developer with its required return on cost?
2. Could Rutgers be financially better off leasing the premises for a 30-year term from a private developer or building and owning the premises itself?
3. What is the financial impact to Rutgers if the university owns only the Advanced Research Computing Facility and Food Innovation Center?

Table 1: Phase One Development Description

<table>
<thead>
<tr>
<th>Component</th>
<th>Advanced Research Computing Facility</th>
<th>Food Innovation Center</th>
<th>Industry Collaboration Building</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Computer facility with high-end HVAC. Private sector users generate auxiliary income.</td>
<td>Shared food manufacturing facility with meeting spaces. Private sector users generate auxiliary income.</td>
<td>Office space and wet/dry lab space. RU would initially occupy 50-100% with remainder leased directly to private tenants; goal to reduce RU occupancy.</td>
<td></td>
</tr>
<tr>
<td>GSF</td>
<td>45,000</td>
<td>60,000</td>
<td>90,000</td>
<td>195,000</td>
</tr>
<tr>
<td>Lab/Computer Facility GSF</td>
<td>45,000</td>
<td>50,000</td>
<td>36,000</td>
<td>131,000</td>
</tr>
<tr>
<td>Office GSF</td>
<td>0</td>
<td>10,000</td>
<td>54,000</td>
<td>64,000</td>
</tr>
<tr>
<td>Efficiency</td>
<td>85%</td>
<td>85%</td>
<td>80%</td>
<td>83%</td>
</tr>
<tr>
<td>NSF</td>
<td>38,250</td>
<td>51,000</td>
<td>72,000</td>
<td>161,250</td>
</tr>
<tr>
<td>Lab/Computer Facility NSF</td>
<td>38,250</td>
<td>42,500</td>
<td>28,800</td>
<td>109,550</td>
</tr>
<tr>
<td>Office NSF</td>
<td>0</td>
<td>8,500</td>
<td>43,200</td>
<td>51,700</td>
</tr>
</tbody>
</table>
Methodology

In order to answer Question 1, the U3 Advisors team created a high-level estimated budget for the proposed Phase One project, assuming development by a private developer. The development budget included both hard and soft costs, contingencies and tenant improvement allowances. In developing assumptions for the Industry Collaboration Building, the U3 Advisors team relied on inputs from experts in New Jersey commercial and lab construction, notably Torcon, a national construction management firm with considerable New Jersey experience and Northeast headquarters in Red Bank, NJ. In developing budgets for the two Rutgers buildings, the U3 Advisors team also relied on estimates provided by Torcon with an added premium informed by recent construction of research buildings at Rutgers. U3 Advisors also worked with Torcon and Rutgers University Facilities and Capital Planning to develop a site development budget, including infrastructure and site work.

The U3 Advisors team then identified market rental rates and operating costs for each of the buildings in order to calculate net operating income. This was informed by the market analysis of lab and office space in Central New Jersey and, particularly, the Piscataway/New Brunswick submarket. The team then determined the developer’s return on cost of the buildings in a stabilized year of operations (assumed to be Year 2) and compared this return to an assumed developer return on cost threshold of 8% in the stabilized year.

In order to answer Question 2, the U3 Advisors team developed assumptions to determine both the total cost of owning the Park for Rutgers and the university’s total cost of leasing.

To determine the total cost of Rutgers ownership, the consultant team prepared an estimated development budget that included all hard and soft costs and contingencies. Again, these costs were based on input from the same sources used to answer Question 1. Assuming that Rutgers would own all three Phase One buildings, the team also examined fit-out costs for the facilities, based on recent fit-out costs for Rutgers research buildings and market fit-out costs for commercial office and laboratory buildings. U3 Advisors then calculated the net present value of ownership operating costs, using a discount rate of 4.75%. This was offset by auxiliary income from the Advanced Research Computing Facility and Food Innovation Center, cost savings from moving the Food Innovation Center out of leased space, and rental income from private tenants in the Industry Collaboration Building.

To determine the total cost of leasing the facilities, the consultant team determined the rental payments that would be necessary for the project to be feasible to a private developer and developed a net present value cash flow of 30 years of rental payments with a discount rate of 4.75%. In addition, the consulting team considered the calculated fit-out costs and offset these by tenant improvement allowances that would be provided by the landlord. For Question 3, the consultant team isolated the costs of development and ownership of the Advanced Research Computing Facility and Food Innovation Center only, with the assumption that Rutgers may postpone development of the Industry Collaboration Building to a future phase.

The estimated development budget for all three components of the proposed Phase One development, summarizing both the cost to construct by a private developer and by Rutgers, is shown in Table 2.
Scenarios for Evaluation

To frame the financial evaluation, the U3 Advisors team developed four Rutgers occupancy scenarios (Scenarios A, B, C, and D) to be considered under both a Rutgers ownership model and a private developer ownership model. In each scenario, Rutgers occupies 100% of the Advanced Research Computing Facility and 67% of the Food Innovation Center. However, the scenarios allow for a sensitivity analysis of Rutgers occupancy of the Industry Collaboration Building, with it occupying 100% of this building in Scenario A, 67% in Scenario B, and 50% in Scenario C. Under Scenario D, it is assumed that only the two Rutgers buildings are developed and that the Industry Collaboration Building is postponed until a future phase.

Under the Rutgers ownership model, for Scenario B and Scenario C, private tenants in the Industry Collaboration Building pay market rents of $30 per square foot for lab space and $25 per square foot for office space (except again in Scenario A, where there are no private tenants.) Under the developer ownership model, for each scenario it is assumed that private tenants in the Industry Collaboration Building pay market rents (except again in Scenario A, where there are no private tenants.) However, under each
scenario in the developer ownership model, the analysis assumes two options for Rutgers’ rents at the Industry Collaboration Building – one a market rent and the other a rent that is calculated in order to ensure that the developer receives its required 8% return on cost. As noted, there is no Industry Collaboration Building in Scenario D.

An overview of Scenarios A, B, C, and D is provided in Table 3.

**Question 1: Identifying the Potential Financing Gap**

For each of the scenarios outlined in Table 3, the consultant team examined stabilized Year 2 net operating income, assuming the developer builds the project and leases to both private tenants and Rutgers at market rents.

Based on the analysis of the Central New Jersey real estate market that is reviewed in Chapter 1, the consultant team assumed rents of $30 per square foot for lab and computer facilities and $25 per square foot for office space. For the Industry Collaboration Building, the consultant team assumed an absorption rate of 9% per year and a vacancy rate of 25%.

Operating expenses were developed using input from the 2012 Battelle report, current operating expenses at existing Rutgers facilities, and U3 Advisors’ experience based on the Cornell Tech project in New York City. Specific line item expenses include maintenance, utilities, insurance, Innovation Park staffing and, for scenarios assuming private developer-owned buildings, property taxes. Estimated annual operating expenses range from $24 per square foot at the Industry Collaboration Building to $26 per square foot at the Food Innovation Center and

### Table 3. Scenario Overview

<table>
<thead>
<tr>
<th>Scenarios Examined</th>
<th>Rutgers Ownership</th>
<th>Developer Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario A</td>
<td>• RU Rent: None</td>
<td>• RU Rent: Feasible Project</td>
</tr>
<tr>
<td>RU Occ.</td>
<td>• Rutgers Ownership</td>
<td>• Developer Ownership</td>
</tr>
<tr>
<td></td>
<td>• Market Rents</td>
<td>• Feasible Project Rents</td>
</tr>
<tr>
<td>Priv. Occ.</td>
<td>100% 67% 100%</td>
<td>0% 33% 0%</td>
</tr>
<tr>
<td>Scenario B</td>
<td>• Scenario A</td>
<td>• Scenario A</td>
</tr>
<tr>
<td>RU Occ.</td>
<td>• Rutgers Ownership</td>
<td>• Developer Ownership</td>
</tr>
<tr>
<td></td>
<td>• Market Rents</td>
<td>• Feasible Project Rents</td>
</tr>
<tr>
<td>Priv. Occ.</td>
<td>100% 67% 67%</td>
<td>0% 33% 33%</td>
</tr>
<tr>
<td>Scenario C</td>
<td>• Scenario B</td>
<td>• Scenario B</td>
</tr>
<tr>
<td>RU Occ.</td>
<td>• Rutgers Ownership</td>
<td>• Developer Ownership</td>
</tr>
<tr>
<td></td>
<td>• Market Rents</td>
<td>• Feasible Project Rents</td>
</tr>
<tr>
<td>Priv. Occ.</td>
<td>100% 67% 50%</td>
<td>0% 33% 50%</td>
</tr>
<tr>
<td>Scenario D</td>
<td>• Scenario C</td>
<td>• Scenario C</td>
</tr>
<tr>
<td>RU Occ.</td>
<td>• Rutgers Ownership</td>
<td>• Developer Ownership</td>
</tr>
<tr>
<td></td>
<td>• Market Rents</td>
<td>• Feasible Project Rents</td>
</tr>
<tr>
<td>Priv. Occ.</td>
<td>100% 67% N/A</td>
<td>0% 33% N/A</td>
</tr>
<tr>
<td></td>
<td>• No Industry Collaboration Building in Phase 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Market Rents (ACF and FIC only)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Scenario D</td>
<td>• Scenario D</td>
</tr>
<tr>
<td></td>
<td>• Developer Ownership</td>
<td>• Developer Ownership</td>
</tr>
<tr>
<td></td>
<td>• Feasible Project Rents (ACF and FIC only)</td>
<td></td>
</tr>
</tbody>
</table>
$31 per square foot at the Advanced Research Computing Facility.

For the purposes of the financial analysis, both rents and operating expenses are escalated at 3% annually.

As outlined in Table 4, assuming developer owned buildings and market rents, a potential financing gap may be present in all four scenarios (A–D) assuming the developer’s requirement for an 8% return on cost. In Scenario A, where it is assumed that Rutgers leases the entire Industry Collaboration Building, the estimated total potential financing gap is $36 million and this gap only grows as Rutgers’ leased space in this building is reduced and no other credit tenant is leasing space.

In order to eliminate this potential financing gap for the developer, U3 Advisors’ financial analysis backs into a rent that Rutgers or a credit tenant would have to pay in order to make the project financially feasible by guaranteeing the developer an 8% return on cost. This “feasible” rent ranges from $41 per square foot for the Advanced Research Computing Building to $61 per square foot for the Food Innovation Center. If Rutgers were only to occupy 50% of the Industry Collaboration Building, the required rent it would need to pay the developer would be $113 per square foot, unless other credit tenants are identified to occupy the remainder of the space.

Sensitivity Analysis

In evaluating means for mitigating this potential financing gap, U3 Advisors undertook two sensitivity analyses – examining how a variance in developer return thresholds affects the financing gap and considering pre-leasing of the private sector space rather than the relative slow pace of private space lease-up assumed in the financial model.

If the developer’s required return on cost were lowered from 8% to 7%, the developer’s financing gap would decrease from $36.4 million to $28.2 million, or 22.5% in Scenario A, where it is assumed Rutgers is leasing the entire Industry Collaboration Building.

U3 Advisors’ financial model assumed that 9–12% of private space at Innovation Park would be leased annually. If all private space were instead preleased under Scenario A, where Rutgers is also leasing the entire Industry Collaboration Building, then the potential financing gap would decrease from $36.4 million to $32.7 million, or 10%. Under Scenario C, where Rutgers leases only half of the Industry Collaboration Building, if all private space is preleased, then the potential financing gap decreases much more dramatically from $47.7 million to $33.1 million, or 30%.

Table 4: Summary of Potential Financing Gaps

<table>
<thead>
<tr>
<th>Component</th>
<th>Advanced Research Computing Facility</th>
<th>Food Innovation Center</th>
<th>Industry Collaboration Building</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present Value Gap at Market</td>
<td>RU Rent Req’d to Fill Gap</td>
<td>Present Value Gap at Market</td>
<td>RU Rent Req’d to Fill Gap</td>
</tr>
<tr>
<td>ACF: 100% RU, FIC: 67% RU, Collab: 100% RU</td>
<td>($5,265,953)</td>
<td>$41</td>
<td>($13,930,184)</td>
<td>$61</td>
</tr>
<tr>
<td>ACF: 100% RU, FIC: 67% RU, Collab: 67% RU</td>
<td>($5,265,953)</td>
<td>$41</td>
<td>($13,930,184)</td>
<td>$61</td>
</tr>
<tr>
<td>ACF: 100% RU, FIC: 67% RU, Collab: 50% RU</td>
<td>($5,265,953)</td>
<td>$41</td>
<td>($13,930,184)</td>
<td>$61</td>
</tr>
<tr>
<td>ACF: 100% RU, FIC: 67% RU, Collab: 100% RU</td>
<td>($5,265,953)</td>
<td>$41</td>
<td>($13,930,184)</td>
<td>$61</td>
</tr>
</tbody>
</table>

RU: Rent Required is both Lab and Office
Question 2: Owning vs. Leasing

The consultant team also undertook an analysis of total cost for Rutgers to own all three components of Innovation Park vs. the cost of leasing all three components for a 30-year term. In examining the ownership option, the analysis considered the cost for Rutgers to construct each building, including all fit-out costs, the net present value of 30 years of operating expenses, the net present value of auxiliary income received by Rutgers from private users in the Advanced Research Computing Facility and Food Innovation Center, private tenant income, and tenant improvement and leasing commission costs. In addition, the analysis considered the cost savings for Rutgers realized from vacating the current leased Food Innovation Center building in Piscataway.

In examining the leasing option, the analysis considered the net present value of 30 years of lease payments, fit-out costs to Rutgers (offset by tenant improvement allowances from the landlord) and the net present value of 30 years of operating expenses. In addition, the analysis assumed auxiliary income for Rutgers at the Advanced Research Computing Facility and Food Innovation Center, in addition to savings realized from vacating the current leased Food Innovation Center.

A summary of the owning vs. leasing comparison under Scenario C (where Rutgers leases 50% of the Industry Collaboration Building) is provided in Table 5. It should be noted that these costs do not include the terminal value to Rutgers of the improvements in Year 31 of a Rutgers ownership structure.

<table>
<thead>
<tr>
<th>Component</th>
<th>Advanced Research Facility</th>
<th>Food Innovation Center</th>
<th>Industry Collaboration Building</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rutgers Cost to Construct (includes all Fit-Out) Excluding Private Tenant TI's and Leasing Commissions Operating Costs (NPV)</td>
<td>$(43,437,818)</td>
<td>$(20,289,295)</td>
<td>$(32,478,335)</td>
<td>$(96,205,448)</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auxiliary Income (NPV)</td>
<td>$40,352,557</td>
<td>$32,478,335</td>
<td>$0</td>
<td>$(72,830,892)</td>
</tr>
<tr>
<td>Total w/ Auxiliary Income</td>
<td>$(21,091,932)</td>
<td>$(17,096,959)</td>
<td>$(54,825,479)</td>
<td>$(88,250,777)</td>
</tr>
<tr>
<td>Private Tenant TI's and Leasing Commissions Private Tenant Income (NPV)</td>
<td>$0</td>
<td>$(7,537,218)</td>
<td>$7,537,218</td>
<td>$0</td>
</tr>
<tr>
<td>Total w/ Auxiliary Income &amp; Private Tenants</td>
<td>$(21,091,932)</td>
<td>$(17,096,959)</td>
<td>$(54,825,479)</td>
<td>$(88,250,777)</td>
</tr>
<tr>
<td>Savings from Vacating Current Facility (NPV)</td>
<td>$6,477,757</td>
<td>$0</td>
<td>$6,477,757</td>
<td>$6,477,757</td>
</tr>
<tr>
<td>Total Cost to Own w/ Savings from Vacating Current Facility (NPV)</td>
<td>$(14,614,175)</td>
<td>$(17,096,959)</td>
<td>$(48,347,722)</td>
<td>$(88,250,777)</td>
</tr>
</tbody>
</table>

| Leasing |                           |                        |                                |       |
|---------|---------------------------|------------------------|                                |       |
| Lease Payments (NPV) | $(50,324,749) | $(40,104,276) | $(59,727,139) | $(150,156,164) |
| Fit-Out Cost, Less Landlord Provided TI’s (NPV) Operating Expenses (NPV) | $(20,471,723) | $(0) | $(4,514,603) | $(24,986,326) |
| Subtotal | $(70,008,318) | $(40,104,276) | $(59,727,139) | $(150,156,164) |
| Auxiliary Income (NPV) | $40,352,557 | $32,478,335 | $0 | $(72,830,892) |
| Total w/ Auxiliary Income | $(36,655,762) | $(27,569,076) | $(53,740,299) | $(134,965,137) |
| Savings from Vacating Current Facility (NPV) | $6,477,757 | $6,477,757 | $0 | $(117,603,766) |
| Total Cost to Rent w/ Savings from Vacating Current Facility (NPV) | $(21,091,320) | $(20,000) | $(117,603,766) | $(134,965,137) |

TABLE 5. Summary of the Owning vs. Leasing Comparison under Scenario C (Rutgers leases 50% of the Industry Collaboration Building)
In all scenarios, Rutgers ownership is financially preferable to leasing due to three principal factors:

1. Rutgers’ cost of capital is lower than the cost of capital for a private developer.
2. In an ownership structure, Rutgers’ operating costs are significantly lower as the property would be exempt from property taxes.
3. In an ownership structure, Rutgers earns both auxiliary income from the Advanced Research Computing Facility and Food Innovation Center, in addition to private tenant rental income.

However, it should be noted that, while the analysis shows that Rutgers cost of occupancy at the Industry Collaboration Building is less under an ownership structure than a leasing structure, it is unlikely that the university would opt to own this facility. A speculative office building would be a significant risk for Rutgers with likely impacts on the university’s credit and balance sheet.

That being said, all scenarios and ownership structures should be further examined for both credit and balance sheet impacts.

**Question 3: Financial Impact of Rutgers Owning the Advanced Research Computing Facility and Food Innovation Center Only**

As there is risk in developing a private Industry Collaboration Building under current market conditions and it is likely that Rutgers would be required to commit to a significant lease at this facility, the financial analysis also considers the cost to Rutgers of simply owning the Advanced Research Computing Facility and Food Innovation Center. Under this assumption, Rutgers could establish a critical mass of activity at the site while deferring the speculative Industry Collaboration Building until a future phase.

As outlined in Table 2, Rutgers’ cost to construct the Advanced Research Computing Facility, including fit-out, would be approximately $965 per square foot or a total of $43.4 million for a 45,000 square foot facility.

Rutgers’ cost to construct the Food Innovation Center, including fit-out, would be approximately $491 per square foot or $29.5 million for a 60,000 square foot facility.

As shown in Table 5, the net present value cost to Rutgers of owning the Advanced Research Computing Facility over a thirty-year period is $21.6 million. This assumes development costs of $43.4 million and operating expenses of $18.5 million, offset by auxiliary income of $40.4 million.

The net present value cost to Rutgers of owning the Food Innovation Center is $3.3 million. This assumes development costs of $29.3 million and operating expenses of $20.3 million, offset by auxiliary income of $32.5 million, private tenant income of $7.5 million (minus $204,000 for tenant improvements) and the $6.5 million savings realized from vacating the university’s current lease at the existing Food Innovation Center–North in Piscataway.

**Conclusions**

1. Based on the scenario of a developer owning all the buildings and using conservative market rents, the estimated potential “gap” in rent that may need to be filled to provide a developer with its required return on cost could range from $36 million–$48 million. The gap level depends on the amount of space and the rent that can be charged in the Industry Collaboration Building leased to credit tenants. The assumptions used in the analysis for local market rents were $25-$30 per square foot and an 8% developer return-on-cost requirement. If Rutgers were to commit to leasing the entire Industry Collaboration Building at prevailing market rents, the potential financing gap for the developer, assuming an 8% return
on cost threshold, would be $36.4 million. To make the project feasible for a developer, Rutgers and/or other credit tenants would be required to fully lease the Industry Collaboration Building at a minimum rent of $45 per square foot or $3.7 million per year. Based on comparisons with similar facilities in New York City and Philadelphia that are leasing space at much higher rents (over $75 per square foot), further exploration into the feasibility of securing a higher rental rate of $45 per square foot would be worthwhile. Opportunities to reduce the financing gap include pre-leasing more non-Rutgers space in the Industry Collaboration Building, securing higher rent levels, identifying a developer with lower return-on-cost requirements than 8%, or utilizing public incentives. For example, the value of a 15-year payment-in-lieu-of-taxes (PILOT) was estimated at $8.1 million.

2. Assuming that a developer is willing to build Innovation Park, Rutgers could still be financially better off owning the premises itself because of the lower cost of capital, property tax exemption, and benefit from both auxiliary income and private tenant income. However, the risk and exposure resulting from Rutgers’ ownership of the speculative Industry Collaboration Building make it optimal for this building to be owned by a third party, though, as a credit tenant, Rutgers could be required to take a significant initial lease of the building.

3. It may be preferable simply for Rutgers initially to build and own the Advanced Research Computing Facility and Food Innovation Center only. Because of Rutgers’ lower cost of capital and potential revenue opportunities presented by auxiliary income and private tenant rents at these facilities, Rutgers’ cost of occupancy at these buildings over 30 years could be relatively low, particularly at the Food Innovation Center where additional cost savings resulting from vacating the current lease would allow for a net present value occupancy cost of approximately $3.3 million. This option would allow Rutgers to establish a critical mass of activity at the site while deferring the speculative Industry Collaboration Building until a future phase.

4. This financial analysis was a high-level estimation of the costs of ownership under varying scenarios. As a next step, Rutgers should engage with a commercial real estate consultant familiar with the New Jersey regional market, to conduct a more in-depth financial analysis based on actual building plans and assessment of the market and rent levels for the specialized, state-of-the-art space that would be constructed in the Park. In addition, a Request for Information from potential developers would help to inform the range of options that could be available to fit within the financial parameters that Rutgers is willing to commit to.
Chapter 5: Implementation Strategy
Implementation Strategy

1. Organization and Management Approach

A variety of models exist for the ownership, governance and financial structure of research parks and for the relationship between the research park and the sponsoring university. Research parks may be established by a university as non-profit or for-profit entities; other models for research parks include ownership by a non-university entity that includes a contractual or other formal relationship with the university. The most common example of the latter model is a cooperative venture between a research park that is wholly or partly developed by a private developer, with the university as a credit anchor tenant, often taking a significant tenancy in the first phase of privately developed buildings until a robust market for the space is developed. The university may also work with its developer partner to identify other credit anchor tenants, often companies that have strong relationships with the sponsoring university.

In selecting the appropriate model for the proposed Innovation Park, Rutgers must consider several significant matters, including the academic and commercial objectives of the planned facilities, the mission and objectives of the university, the possibility and depth of relationships with Rutgers’ private sector industry partners, the availability of federal, state and local incentives and grants, and the local real estate market.

For the university, the preferred governance structure must facilitate opportunities to promote alliances with key industry sectors, expedite research collaborations, help recruit and retain top research faculty, support the ability to commercialize faculty research, and provide Rutgers students with meaningful employment opportunities, all while fostering a culture of entrepreneurship. For private companies, the Park will provide proximity and access to applied research and Rutgers talent. The preferred governance structure should also ensure that private companies benefit from enduring links to Rutgers through sponsored research and long-term partnerships. For all parties, it is integral that the governance structure provide a strong framework for incremental growth while allowing for the flexibility to respond to changing and often unpredictable market conditions.

In the best practices and benchmarking overview that was outlined in Chapter 1, the consultant team identified four general governance structures that are predominate among leading university research parks. These included:

A. Direct governance by university
B. Governance by private developer
C. Governance by university research foundation
D. Governance by independent university-affiliated entity

In addition, some universities have adopted a hybrid structure that combines two or more of these structures.

A summary of governance structures at research parks at many of Rutgers’ peer institutions is included in Table 1.
In recent years as universities, and particularly public universities such as Rutgers, face constrained financial resources, new governance structures have evolved that leverage private developer partnerships with a focus on financially self-sustaining operations and potential revenue sources for the sponsoring university. These developer partnerships – either with the university itself or with a university-affiliated entity – serve to shift the financial and performance risk from the university to the developer while potentially preserving the university’s debt capacity.

While some of Rutgers’ peer institutions, including the University of Maryland College Park, Cornell University, and North Carolina State, own and manage their respective parks directly, the large majority of institutions transfer land and governance to a separate entity that maintains an affiliation with the university. Three models reviewed as part of the benchmarking exercise have particular relevance when considering a recommended governance structure for Innovation Park.

The University of Illinois, the University of Maryland Baltimore and the University of Nebraska all established separate 501(c)(3) entities very early in the process. Similarly, all three governing entities entered into partnerships with private developers. In the case of the University of Illinois, this has been an exclusive agreement and the developer has invested considerable funds in site preparation and infrastructure. At the University of Maryland Baltimore and the University of Nebraska, these developer agreements have not been exclusive and developer investment is more limited. In all three projects, however, the sponsoring institutions obligated to lease a significant amount of space, often the majority of space, in the initial stages of development.

Alternately, Cornell Tech in New York City, which functions as much as a stand-alone academic campus as it does a locale for university-industry co-location, did not establish a separate governance entity. Instead, the university directly selected, via a competitive solicitation, a private developer partner – Forest City Ratner Companies – to serve as master developer for the campus and developer/owner of the Phase I industry collaboration building. Cornell owns its academic building and will own its planned conference center, though it opted to use its developer for the former, on a fee-basis.

II. Recommended Governance Structure

501(c)(3) Entity

In its 2012 assessment of the proposed Innovation Park@Rutgers, Battelle recommended the establishment of a special purpose entity, a 501(c)(3) non-profit corporation that would be led by a Board of Directors comprised of 9–13 leaders from the university, government, and the business community, and chaired by the university President or the President’s designee. This entity can be wholly owned by the Board of Governors of Rutgers University.

U3 Advisors agrees that governance of the Park by an independent yet university-affiliated entity is optimal to ensure continuity in project management and mission, in addition to enabling better collaboration and coordination with private industry. Such an entity is better able to be wholly committed and directly responsible for the Park development and growth strategy, either independently or with a developer partner. This entity will also, ideally, be buffered from potential volatility and uncertainty that could result from changes in university leadership and direction. Day-to-day management of the Park should be led by an Executive Director, who reports directly to the Board and may serve on the Board in an ex-officio capacity. The role of the Executive Director is described under Staffing.
Similar to Battelle’s findings, it is also recommended that this entity should have the power to accept the transfer of land or long-term land leases from Rutgers, in addition to having the authorization to enter into agreements with developers. As noted, this model exists at many of Rutgers’ Big Ten peers, including the University of Illinois Research Park, which is governed by the University of Illinois Research Park LLC, in partnership with a private developer, Fox/Atkins; and at the University of Nebraska Innovation Campus, which is governed by the Nebraska Campus Development Corporation, in partnership with Tetrad Development. At the University of Maryland BioPark, the university established the UMB Health Science Research Park Corporation, which entered into a partnership with the developer Wexford Science + Technology.

**Board Composition**

Reflecting Battelle’s original recommendation, the management boards of the majority of innovation/research parks at Rutgers’ peer institutions comprise representatives from the university, industry and, depending on the institution, government. Table 2 provides an overview of membership of the boards of the governing entities described above:

The three examples in the table illustrate a continuum of approaches, with the University of Illinois focused on high-level university leadership with only small private sector representation and the University of Maryland Baltimore (UMB) board comprised almost exclusively of members from private industry. UMB has also developed a board whose industry members include a wide spectrum of life sciences companies (the focus of the UMB BioPark), in addition to financial companies and real estate/property management. In comparison, the University of Nebraska has designed a more balanced board for its Nebraska Campus Development Corporation, comprising senior university administrative, academic and research

<table>
<thead>
<tr>
<th>University of Illinois Research Park LLC</th>
<th>Nebraska Campus Development Corporation</th>
<th>UMB Health Science Research Park Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>University Members</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board of Trustees Representative</td>
<td>President of the University</td>
<td>President of Corporation/VP for Enterprise &amp; Economic Development</td>
</tr>
<tr>
<td>Vice Chancellor for Research, Urbana Champaign Campus</td>
<td>Sr. Vice Chancellor for Academic Affairs</td>
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<tr>
<td>Vice Chancellor for Research, Chicago Campus</td>
<td>Vice Chancellor for Research &amp; Economic Development</td>
<td></td>
</tr>
<tr>
<td>Chair, Nutrition &amp; Health (Urbana Champaign)</td>
<td>Chancellor of the Lincoln Campus</td>
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<tr>
<td>Vice Chancellor, Facilities &amp; Capital Projects</td>
<td></td>
<td></td>
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<tr>
<td>Chief Financial Officer (nonvoting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vice President for Research (nonvoting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Industry Members</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEO, The Daly Group</td>
<td>CEO, Waitt Brands</td>
<td>Principal, InternaSource LLC</td>
</tr>
<tr>
<td>CEO, Horizon Hobby</td>
<td>CEO, Assurty Life Insurance</td>
<td>President, Health Resources</td>
</tr>
<tr>
<td>Private Consultant, Healthcare and Medical Device industry</td>
<td>CEO, Ameritas Life Insurance</td>
<td>President, The Shelter Group</td>
</tr>
<tr>
<td>President, Phibro Animal Health</td>
<td>VP of Lending, MECU of Baltimore</td>
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<tr>
<td>CEO, Crete Carrier Corp.</td>
<td>Chairman, Stifel Financial Corp.</td>
<td></td>
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<tr>
<td>CEO, Gothenburg State Bank</td>
<td>EVP, AstraZeneca</td>
<td>President &amp; CEO, GlycoMimetics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>President, BD Diagnostics Systems</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Executive Director (Ex Official)</td>
<td>Former Anne Arundel County Executive</td>
<td></td>
</tr>
<tr>
<td>Faculty Advisory Committee (11 members, nonvoting)</td>
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<td></td>
</tr>
<tr>
<td>Architecture Review Committee (5 members, nonvoting)</td>
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</table>
leadership, in addition to key industry representatives. Unlike UMB, however, which chose to give heavy representation to companies from the biotech and life sciences sector, the University of Nebraska did not place a heavy emphasis on companies from the agriculture and food sciences sector – the primary emphasis of the park – but rather to large Nebraska-based companies, including insurance, marketing and trucking firms, that had strong relationships with the university.

It should also be noted, however, that the Nebraska board includes an 11-member faculty advisory committee, comprised of faculty members with strong research focus in plant science, food science, computer science, mechanical engineering, law, marketing and business.

**Recommended Board Structure and Composition**

Like Battelle, the consultants believe that the composition of the entity’s Board of Directors should include robust representation from both Rutgers and industry. Of the three benchmarking models reviewed above, U3 Advisors would recommend a combination of approaches to board composition that reflects the university membership at the University of Illinois and the University of Nebraska, and the industry representation seen on the board of the UMB BioPark.

**Rutgers Representatives**

To ensure the success of the proposed Innovation Park, it is fundamental that the Park receives direct support, promotion and involvement by top leadership at Rutgers. Therefore, the consultants strongly recommend that the university President and/or a representative of the President be on the board of the Park’s operating entity. Similar to the University of Illinois, Rutgers may also wish to include a representative of the Board of Governors on the board.

Reflecting the mission and objectives of the Park, the consultants also strongly recommend that the board include representation from the university’s research enterprise, particularly the Office of Research and Economic Development.

U3 Advisors also propose that university representatives on the Board include leadership of the Rutgers Discovery Informatics Institute, Office of Advanced Research Computing and the Office of Information Technology as the Advanced Research Computing Facility will be a vital component of the Park in its first phase. The Food Innovation Center is also an important anchor and should be represented as well.

While the University of Nebraska and some other peers have formed non-voting faculty advisory committees that consult with their respective entity boards, the consultants believe that such formal committees can be too unwieldy for effective management. Instead, Rutgers and other board members should be able to consult with appropriate university faculty on an ad hoc and as needed basis.

**Industry Representatives**

The board of the 501(c)(3) entity should include a cohort of industry representatives to be identified initially by Rutgers ORED leadership. This cohort of board members should represent significant New Jersey employers, particularly those companies with which Rutgers has strong established partnerships. The External Advisory Board may be a good source for industry representatives to serve as board members. Following the UMB BioPark example, the consultants also recommend that initially there be representation from those sectors that reflect the Phase
One focus of the Park, particularly food science and advanced computing. Representatives from appropriate trade organizations, such as BioNJ, the New Jersey Business and Industry Association (NJBIA), and venture networks such as Jumpstart NJ, may also be desirable. An NJBIA representative currently serves on the board of directors of the South Jersey Technology Park at Rowan University. As has been done by Rutgers’ peers, the university may also consider board members from real estate and finance.

Government Representatives
Since government agencies are typically precluded from officially participating on boards of directors, the inclusion of representatives from New Jersey State government agencies, such as the Economic Development Authority (EDA) and the Business Action Center (BAC), in an ex-officio capacity would be beneficial to coordinate tenant attraction and public incentives.

III. Proposed Innovation Park Staffing

1. Executive Director
The Park should be managed by an experienced Executive Director, to be identified and hired by the governance entity, who will report directly to the board of the entity and coordinate closely with Rutgers ORED.

The Executive Director would oversee all fiscal and administrative operations at Innovation Park and be responsible for the Park’s strategic direction. The Executive Director would also coordinate with the private developer partner(s) and industry partners, in addition to facilitating collaboration between university and private industry components of the Park. With the private developer partner(s), the Executive Director would also develop company attraction programs that leverage Rutgers’ resources. The Executive Director may also serve as an ex-officio member of the Board of Directors.

While exact staffing structure should be decided by the university leadership and the board, the consultants recommend that, in addition to the Executive Director, the following positions be considered:

2. Associate Director/Director of Operations
The Associate Director would assist the Executive Director in management of the Park, with particular focus on management of the university-owned buildings in the Park. The Associate Director may also assist in coordinating with program directors at the Food Innovation Center, Advanced Research Computing Facility, and potential other university buildings at the Park, including management of any leases to private tenants in these buildings. The Associate Director would also work to arrange extension of and access to university services to all tenant companies in the Park. Note that in the Park’s initial stages, this position may not be necessary as its responsibilities can be assumed by the Executive Director until the size and scope of the Park’s physical plant and operations increase.

3. Director of Marketing and Communications
The person in this position would oversee all marketing, communications, events programming and public relations of the Park. The Director of Marketing and Communications would meet regularly with external stakeholders, prospective partners and tenants, Rutgers technology transfer staff and start-up companies.

4. Finance Manager
The Finance Manager would manage the fiscal operations of the Park, including accounting, budgets, program/rental income, grant oversight, contracts and any potential investment portfolio.

5. Workforce Development Coordinator
The Workforce Development Coordinator would support the growth of the workforce in the Park, by helping Park tenants to hire Rutgers talent, consulting on best practices, and acting as a liaison to Rutgers Career Services.
IV. Proposed Ownership Structure and Ground Lease Terms

Occupying university-owned land adjacent to both the Livingston and Busch campuses, the proposed site of Innovation Park has long-term strategic importance to Rutgers. Therefore, the consultant team recommends that the university retain full ownership and control of the land, though this may be transferred to the 501(c)(3) governance entity, depending on its structure.

Improvements on the ground lease will likely be owned both by the university and private developers, depending on their use, though Rutgers or the special governing entity would own most internal roadways, common open spaces and common site infrastructure.

The consultant team’s financial analysis, reviewed in Chapter 4, clearly determined that ownership by Rutgers of university-related buildings is optimal as these facilities serve the university’s core mission and the university’s long-term cost of occupancy is considerably lower than if it were to lease equivalent newly constructed space from a private owner. That being said, the consultants recognize that Rutgers should further review the impacts of ownership on its balance sheet and credit rating.

Alternately, it does not make sense for Rutgers to own the industry collaboration building in Phase One or future phases, as it is a speculative development. U3 Advisors recommended that this facility should be developed and owned by the university’s developer partner on ground leases from the university. In this manner, the private developer will assume all construction and lease-up risk though, as noted, Rutgers or another credit tenant will likely be required to commit to a significant lease in the first phase of the project.

Ground Lease Terms and Rent

As the Park will likely be built in multiple phases over several years, development sites should be conveyed to private developers via separate unsubordinated ground leases that are set to commence as construction begins on each parcel. The term of each ground lease should be a minimum of 65 years with the respective parcel reverting to Rutgers at the end of the term. The ground lease contract should include a clause ensuring that, should the ground lessee sell or foreclose on its improvement, the terms of the ground lease would convey with the property.

Rutgers may choose not to include provisions for ground lease renewal, or remain silent so that the university and ground lessee can determine to pursue a ground lease renewal if desired.

In addition, Rutgers may wish to include a clause in the ground lease that gives the university final approval over tenant selection though, with current market conditions, flexibility should be a key consideration with Rutgers noting that it would not unreasonably withhold approval. The financial analysis that is reviewed in Chapter 4 shows that, due to current construction costs and relatively low market rents, this project may not be able to support a ground rent that would allow for a private developer to make a feasible return on cost. Rutgers may choose to include a clause in the ground lease that the ground rent structure be revisited after a certain period of time and be marked to market. In addition, Rutgers may include participation clauses in the ground lease, allowing the university to participate in a percentage of net rent above an agreed upon base, in addition to a percentage of proceeds from capital events, such as sale or refinancing of developer-owned improvements.

Risk Management Strategies

The ground lease is an important tool for Rutgers to mitigate risk and may include a number of specific terms that protect the university’s interest. These include:
1. **Operational**: The ground lease should require that the lessee's leasehold, including all buildings and grounds, be maintained at a state of excellence to be outlined in the ground lease. The ground lease can also outline specific “cure rights” that Rutgers has if the lessee fails to maintain its leasehold and improvements as required.

2. **Land Assets**: As noted above, the university's land would be kept in an unsubordinated position in order to mitigate any risk of the university's losing the land due to project foreclosure or failure.

3. **Financing and Construction**: Execution of ground lease should only take place concurrently with all lessee's financing being in place and construction guarantees in hand.

4. **Sale of Assets**: The ground lease should include parameters governing the lessee’s sale of its improvements.

### V. Proposed Implementation Schedule

Implementation of Innovation Park should encompass four tracks of activity, some of which can take place concurrently. These general tracks are:

1. **Site Development Plan**
2. **Development of governance structure and creation of special purpose entity**
3. **Planning and funding for Phase One Rutgers program buildings**
4. **Developer engagement for Phase One Industry Collaboration Building**

The first three tracks can begin immediately, with planning for the Advanced Research Computing Facility and Food Innovation Center integral to the viability of the Park. It is these

<table>
<thead>
<tr>
<th>Table 3: Implementation Schedule</th>
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<tr>
<td>Fall 2016</td>
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<tr>
<td>Site Development Plan</td>
</tr>
<tr>
<td>Governance Structure</td>
</tr>
<tr>
<td>Planning for Phase 1 Rutgers Buildings</td>
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<tr>
<td>Industry Collaboration Building</td>
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</tbody>
</table>
facilities that will create immediate value for the development site by establishing a critical mass of applicable Rutgers research activity at this location and signifying Rutgers’ long-term commitment to this project. By clearly demonstrating a detailed Phase One programmatic and development concept to which the university is fully committed, Rutgers will be in the most advantageous position to solicit strong and viable proposals from private developers for the Industry Collaboration Building.

1. Site Development Plan

Rutgers has already undertaken a comprehensive environmental assessment and infrastructure evaluation of the proposed Innovation Park site, including topographic and boundary surveys, soil testing and a geotechnical assessment, and a wetlands delineation and wetlands map. Through these evaluations, Rutgers has been able to clearly define the developable area of the site for both Phase One and future phases of development. Rutgers has also conducted a preliminary infrastructure assessment of the site, including needs for water, sewer, power and networking for the entire development.

The consultants recommend that Rutgers now initiate the process to develop a comprehensive site development and landscape plan for Innovation Park, with a corresponding cost estimate. As soon as Fall 2016, Rutgers project leadership can issue a solicitation document for an independent planning consultant to develop such a site plan with selection of a consultant and commencement of site planning beginning by Spring 2017. This site plan will identify a feasible site development plan for Phase One, including placement of the Rutgers and industry collaboration building and their relationship to site amenities, open space, pedestrian paths, roadways and other connections.

U3 Advisors believe that the site plan should embrace a design that promotes both connectivity and sustainability while making a strong visual statement. The site plan of Innovation Park should promote collaborative connectivity and flexibility, assuring that academic research and commercialization spaces exist side by side with porous boundaries in between. A successful site plan would encourage its constituents to reach out across industry and academic boundaries and also beyond the perimeter of the Park to the larger Rutgers community. If the site planning consultant is engaged in early 2017, the site plan could be completed in the fall of that year.

2. Development of Governance Structure and Creation of Special Purpose Entity

Concurrently with the initiation of the site planning process, representatives from the university’s Office of the President, Office of Research and Economic Development, and Board of Governors can begin discussions regarding the structure and establishment of a special purpose 501(c)(3) entity to serve as the chief planning and governing body for Innovation Park. It is recommended that the Board of Directors of this entity have the composition as described above and, as such, it will be important to commence outreach to private sector participants, including current members of the External Advisory Board. Ideally, the Board of Governors could approve the articles of incorporation and bylaws for this new entity by the end of 2017. The Board of Directors of the entity could then commence a search for an Executive Director.
3. Planning and Funding of Rutgers Phase One Buildings

The Rutgers Innovation Park Team has already undertaken substantial planning for the proposed advanced computing and food innovation programs that would constitute the large majority of Rutgers’ activities in the first phase of Innovation Park. More detailed program planning and corresponding facilities planning for the buildings can commence immediately. As a robust building program and conceptual design is developed, Rutgers can concurrently commence capital planning for these facilities, including identification of financing sources and capital fundraising. It is anticipated that construction documents and funding may be in place as early as Fall 2018 and that site preparation and construction could begin then, with building location informed by the site development plan.

Should Rutgers decide to establish a special purpose entity for governance of the Park, university leadership can determine the role the entity may have, if any, in the planning and construction of these facilities.

4. Industry Collaboration Building

While planning for the site development and Phase One Rutgers buildings, in addition to creation of a governing entity, can commence immediately, the consultants recommend that any developer solicitation process for the Industry Collaboration Building be deferred for at least one year. By that time, the site development plan and its associated cost analysis will be complete, planning for the Advanced Research Computing and Food Innovation facilities will be well underway, and a special purpose governing entity should be in place. These actions will signal to private developers that Rutgers is committed to the development of Innovation Park, has made programmatic commitments to the site and has a long-term planning strategy. In addition, a description of the site plan and context will be an important part of the developer solicitation document.

U3 Advisors recommend that Rutgers first test the market by issuing a Request for Expressions of Interest (RFEI) to targeted developers that are active in the New Jersey market and/or have experience partnering with universities for these types of projects. National developers that have partnered with academic institutions for research park projects include Wexford Science + Technology, Forest City Enterprises and Forest City Ratner. At some of Rutgers’ Big Ten peers, including the University of Illinois and the University of Nebraska, the university has partnered with local developers who may have connections with the institution and also have a deep understanding of the local market.

If the RFEI were released in the fall of 2017, responses could be received in early 2018. Review of these responses in addition to select interviews will inform Rutgers and the governing entity, providing an important framework for a more detailed Request for Proposals (RFP) that could be issued to a shortlist of respondents by the summer of 2018. If responses to the RFP were received by the end of 2018, negotiations with the preferred developer partner could begin by early 2019, with a ground lease executed by late 2019/early 2020. Design, preleasing and construction could commence during 2020-2021 with completion and occupancy of the building by 2022.
VI. Requirements for Developer Solicitation

The RFEI document should clearly state the project context and goals, Rutgers’ planned programs at the Park and the university’s desired objectives for the Innovation Collaboration Building, in addition to a project timeline, development and ground lease terms, and submission requirements. A proposed outline for the RFEI is as follows:

1. Introduction and Overview
2. Project Context and Goals
   a. Project background
   b. Rutgers University – research profile
   c. Integration of RBHS
   d. Advanced Research Computing Facility
   e. Food Innovation Center
   f. Amenities and Services
   g. Rutgers Office of Corporate Engagement
   h. International Business Attraction
   i. Entrepreneurship Programs
   j. Workforce Development
3. Objectives and Development Concept
   a. Describe how Rutgers envisions the Phase One Industry Collaboration Building (ie, Class A office and lab building, first class levels of service, flexible tenant spaces)
   b. Preliminary tenant profile (based on Rutgers outreach and expressions of interest received, including square footage requirements)
   c. Existing industry partnerships at Rutgers
4. Innovation Park Location, Planning and Design*
   a. Site description and context
   b. Site development plan (perhaps include summary and illustrative site plan as attachment)
   c. Landscape, infrastructure and site work
   d. Proposed Rutgers program and phasing
*note that much of this section will be informed by the site development plan
5. Industry Collaboration Building
   a. Building description and desired square footage
   b. Rutgers’ space commitment and anticipated program (Rutgers may choose to defer specifics about its anticipated uses until Request for Proposals)
   c. Private sector tenancies – note how this program will be formulated by the selected developer though Rutgers would expect to work collaboratively with the developer in identifying potential tenants.
   d. Building site and bulk (informed by site development plan)
   e. Sustainability goals
   f. Parking
g. Design objectives and process – Rutgers should outline the design goals of Innovation Park and may seek to collaborate with the selected developer on the design of the Industry Collaboration Building. Rutgers may also choose to request that respondents identify design teams that they would propose for the building, why they feel these firms or teams are the right choices, and to provide examples of their work.

h. Construction labor requirements
i. Role of the Park governing entity and management of the building

6. Project Timeline
   a. Anticipated release date of Request for Proposals, selection of preferred developer, conveyance of parcel, construction schedule and building opening

7. Development Terms
   a. Rutgers’ preferred option – project that is 100% financed, constructed, owned and operated by a private partner. Rutgers would convey a long-term ground lease to the selected developer and would be open to leasing a to-be-determined amount of square feet of space as a credit tenant.
   b. Land cost – it is assumed that Rutgers would contribute the land, providing considerable cost savings to the developer
   c. Recoupment of Rutgers investment – Rutgers should state that it wishes to recoup its investment in infrastructure, site development and landscape improvements over time as the building becomes successful. This could be accomplished via participation rent, after payment of an agreed-upon return to the developer, or other means to be proposed by respondents.
   d. Real estate taxes – RFEI should have a description of anticipated real estate taxes or, if it is attainable, a PILOT/real estate tax abatement. Rutgers should note that it seeks to preserve its tax-exempt status with respect to space that it may lease or occupy within the building and welcomes feedback from respondents regarding the best means for accomplishing this objective.
   e. Common Area Maintenance (CAM) - Rutgers will expect that all non-Rutgers-owned buildings contribute their pro rata share of the cost of maintaining common area improvements. Rutgers would work with its selected development partner to establish a reasonable budget and allocation method for CAM charges.
   f. Legal Agreements – note that Rutgers anticipates negotiating a detailed Memorandum of Understanding of business terms during the selection process that may potentially include terms for a ground lease, operating agreement, and space lease.

8. RFEI Submission Requirements
   a. Developer contact information
   b. Developer qualifications and history
   c. Proposed development team
   d. Project experience and references
   e. Financial capacity and completion guarantees
   f. Leasing approach
   g. Planning and design approach
   h. Proposed development approach, financing strategy, required rate of return
   i. Preliminary development pro forma and cash flow
   j. Project timeline
In addition to the previous requirements, Rutgers may also ask respondents to provide their thoughts and assessments regarding the target market for the Industry Collaboration Building. How do they view the site location relative to other commercial and lab hubs in New Jersey? What do they see as this building’s value proposition? Who do they see as the best tenant prospects for the new building and why? What would be their strategy for reaching these prospects?

As part of the financing requirements, Rutgers may also state that respondents clearly identify any financing gap and outline their preferred strategy for filling it.

VII. Marketing Strategy

The special purpose governing entity, in collaboration with the Rutgers ORED, should lead a comprehensive marketing and outreach effort for Innovation Park. As noted above, the consultants recommend that the special purpose entity staff include a Director of Marketing and Communications and this person would lead this effort, perhaps in concert with an outside marketing agency. Marketing and outreach activities should be targeted at both industry-specific and general audiences and ORED’s Office of Corporate Engagement can also play an important role here. Current members of the External Advisory Board, (who may also be potential future members of the Board of Directors of the special purpose entity) – including BioNJ, the New Jersey Technology Council, Einstein’s Alley, the New Jersey Chamber of Commerce, the NJBIA, and Scarlet Startups – should also serve as significant resources for building support and conducting industry outreach. New Jersey state entities, such as the EDA and the BAC should also be involved and promote awareness of Innovation Park among state, local and federal officials.

Once a private developer partner is selected for the Industry Collaboration Building, the developer will also be an essential component of Innovation Park’s marketing strategy and should coordinate its leasing efforts with the Park’s larger identity branding initiatives being led by the special purpose entity’s Director of Marketing and Communications.
Appendices

A: Benchmarking/Best Practices Details
B: Program Descriptions
C: NAICS Reports
D: Innovation Park@Rutgers Site Map
COLLABORATE • INNOVATE • TRANSFORM
## Appendix A: Benchmarking/Best Practices Details

### RESEARCH PARK PROFILE

<table>
<thead>
<tr>
<th>University</th>
<th>Name</th>
<th>City</th>
<th>State</th>
<th>Inst.</th>
<th>Award Year</th>
<th>Type of Holdings</th>
<th>Number of Companies</th>
<th>Office Space (SF)</th>
<th>Residence Focus (STAR)</th>
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</thead>
<tbody>
<tr>
<td>University of Wisconsin</td>
<td>Madison</td>
<td>WI</td>
<td>Public</td>
<td>Suburban</td>
<td>1984</td>
<td>600,000 SF</td>
<td>37</td>
<td>University Research Park</td>
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<tr>
<td>University of Pennsylvania</td>
<td>University Park</td>
<td>PA</td>
<td>Private</td>
<td>Suburban</td>
<td>1998</td>
<td>1.4 Million SF</td>
<td>100+</td>
<td>University Research Park</td>
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<td>University of Illinois</td>
<td>Urbana-Champaign</td>
<td>IL</td>
<td>Public</td>
<td>Urban</td>
<td>1999</td>
<td>1.4 Million SF</td>
<td>100+</td>
<td>University Research Park</td>
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<td>University of Michigan</td>
<td>Ann Arbor</td>
<td>MI</td>
<td>Public</td>
<td>Urban</td>
<td>2000</td>
<td>1.4 Million SF</td>
<td>100+</td>
<td>University Research Park</td>
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### SELECT BIG TEN/CIC INSTITUTIONS

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<tr>
<th>Institution</th>
<th>Location</th>
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<tbody>
<tr>
<td>Ohio State University</td>
<td>Columbus</td>
<td>Public</td>
<td>1,8 Million SF</td>
<td>SciTech is an independent, nonprofit organization serving as the lead developer and operator of Innovation Park. SciTech is managed by the Ohio State University, which provides support in the form of a non-cash contribution. It is funded through tenant lease revenue and contributions from state and private partners.</td>
</tr>
<tr>
<td>University of Minnesota</td>
<td>Minneapolis</td>
<td>Public</td>
<td>2 Million SF</td>
<td>University Facilities is the lead developer and operator of the University Research Park. The park is a mixed-use development, including commercial, residential, and hotel uses.</td>
</tr>
<tr>
<td>University of Wisconsin</td>
<td>Madison</td>
<td>Public</td>
<td>1.4 Million SF</td>
<td>University Research Park, Madison (UW-Madison) is a key participant in the Madison Metropolitan Area's high-tech development. It has a long history of university-industry collaboration and is home to several clusters, including Life Sciences, Materials Science, and Information Technology.</td>
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### FINANCING

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<th>Inst.</th>
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<th>Type of Holdings</th>
<th>Number of Companies</th>
<th>Office Space (SF)</th>
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<td>100+</td>
<td>University Research Park</td>
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<td>MI</td>
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<td>100+</td>
<td>University Research Park</td>
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### ADDITIONAL

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### Notes

- University of Wisconsin, Madison (UW-Madison) is a key participant in the Madison Metropolitan Area's high-tech development. It has a long history of university-industry collaboration and is home to several clusters, including Life Sciences, Materials Science, and Information Technology.
- Ohio State University, Columbus (OSU) is a leading university in the Midwest, with a strong emphasis on research and innovation. It has a long history of university-industry collaboration and is home to several clusters, including Life Sciences, Materials Science, and Information Technology.
- University of Minnesota, Minneapolis (UMN) is a leading public university in the U.S., with a strong emphasis on research and innovation. It has a long history of university-industry collaboration and is home to several clusters, including Life Sciences, Materials Science, and Information Technology.
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Note: A single twenty-acre park is also located facilities in park, though they cannot exceed the maximum size of 150 acres. Significant component of project’s mission.

## Other Institutions of Note

### Capital University

**Address:** 2800 Fulbright St, Columbus, OH 43205

**Type:** Public University

**Institutional Characteristics:**
- Located in the heart of Columbus, Ohio
- Offers undergraduate and graduate programs in various fields
- Known for its strong emphasis on research and innovation

**University Presence in Park:**
- University presence
- Anchor tenants
- Research focus

**Research Focus:**
- Sciences
- Engineering
- Business

**Research Park Profile:**
- Established in 2000
- 150 acres
- Includes research facilities and office space

**University's Role:**
- Actively participates in joint projects and collaborations
- Provides access to university resources and expertise

**Ongoing Activities:**
- Hosting scientific conferences and workshops
- Collaborating with local businesses on innovation projects

**Additional Notes:**
- Strong partnerships with local industries
- Emphasis on sustainability and green technologies
Appendix B. Program Descriptions

Program Title: Amenities and Business Services

Amenities and value-added services are critical to making Innovation Park@Rutgers (Innovation Park or Park) a destination that is valued by its internal and external stakeholders. Leaders of several successful research parks and members of the Park External Advisory Board have stressed the necessity of providing amenities and services that will make the Park a place where innovative businesses want to locate, and a place that they are willing to pay a premium for access. Based on interviews and research, the top amenities and services that were identified include:

- Spaces for knowledge transfer – places where people are comfortable meeting and discussing ideas – innovation spaces
- Food as a social connector – restaurants, kitchen spaces, coffee areas; places to gather to eat and meet are critical
- Meeting and conference spaces
- Programs that facilitate interactions with other tenants and university faculty and students

The most critical feature is an environment that facilitates and encourages networking, interactions, collaborations and a high quality of life.

“The majority of university parks are suburban, not at the heart of a downtown district,” says Gregory Napier, director of the Purdue Research Park five-site network. “People are interested in placing their companies right next to a student workforce and university research… As we have grown our parks, we have witnessed a growth of restaurants, retail, service industries, walking and biking trails clustering around the startups, and established companies in our sites.”

A 2012 report by Battelle Technology Partnership Practice that was prepared for Rutgers stated, “This phenomenon of developing the physical places that connect innovation assets to unleash economic growth is part of what is needed to succeed as a leading region in today’s global economy. … In particular, a new wave of strategically planned “mixed-use” campus expansions is taking place across major research universities.”

Plans for Innovation Park include dining, refreshment and quick meal services, as well as collaborative innovation spaces and conference facilities. Realizing how strong an attraction amenities and services are, the Park Team plans to offer and expand many of the services already provided by the university, as well as new amenities that are unique to the Park.

University Administered Amenities/Services

The more services the university can provide to tenants and visitors, the more active the Park will be. In addition to access to university researchers and students, Rutgers size and diversity allows it to offer numerous “soft” benefits such as access to sporting and cultural events. Broadening the range of services available to Park tenants should be relatively simple. Currently, “Guest” ID cards are distributed to consultants and visiting faculty members. Certain items may be automatically included as part of a Park lease and other items may be offered to tenants through the “Guest” ID card process.
Examples of university administered services and amenities that may be made available to Park tenants:

- Access to specialized facilities, labs, equipment, imaging, animal services
- Access to libraries
- Access to supercomputing equipment and support at a reduced rate
- Space outfitted with data services/WiFi
- Access to makerspace/3-D printing and prototyping services and equipment
- Access to university credit union
- Access to recreation facilities and fitness classes
- On-site walking/jogging trails at the adjacent Eco Preserve
- Discounts at Barnes & Noble, Kite-Key Computer Store
- Access to temporary housing
- University rate for RU Student Center reservations
- Access to athletic events (faculty/staff rate), golf course
- Access to art, music and drama shows and exhibitions
- On-site classes/certificate programs
- Seminars and workshops (example: faculty experts speaking on the latest advancements in their fields)
- Access to free university buses
- Rutgers police/24 hour security

Other amenities that have been proposed, including:

- On-site daycare
- ATM on-site
- Separate Park shuttle to and from downtown New Brunswick
- FedEx or other shipping services

**Business Services**

The Industry Collaboration Building will be a one-stop shop for small businesses in the Park and surrounding communities to obtain necessary business services. It will include “visiting office” space for state and government agencies and for local service providers. In addition, the SBDC at Rutgers University-New Brunswick can potentially be relocated from its current site on Livingston campus to the Park. The SBDC has an excellent track record serving small businesses (500 clients in 2015). The following list of services will be offered in conjunction with the SBDC, other agencies, and service providers:

- **Legal Advice**
  Office space will be provided to visiting lawyers one day per week/several days per month. Lawyers can advise tenants on matters such as business formation and intellectual property. In addition, students from Rutgers Law School can host a clinic, similar to a program currently being offered at Rutgers-Newark. Students can assist tenants with their legal needs while gaining real world experience and providing tenants with discounted services.
• **Business Registration**  
  Office space and a conference room will be provided for a visiting NJ Business Action Center (BAC) representative. The BAC has an online business registration portal and a BAC representative can be available several days a month to guide new companies through the portal and to assist them in completing necessary registration forms.

• **Connections to Service Providers such as Banks and Accounting Firms**  
  Office space will be made available to a variety of visiting service providers. In addition to offering services to Park tenants and clients, providers may be interested in becoming program sponsors of the Park, benefitting from access to tenants and the opportunity to market their services. They may also be interested in hosting events, such as seminars on timely topics (example: changes in employee health benefits programs).

• **Introductions to Private Financial Resources (VCs, Angels)**  
  Innovation Park will host pitch events to showcase promising technologies and start-ups to potential investors. Rutgers can partner with other New Jersey universities to attract a broader scope of inventors and investors.

• **Information and Assistance Accessing other Funding Sources, including Grants and Public Financial Resources such as Tax Credit**  
  Innovation Park staff can work with representatives of the BAC and the NJ Economic Development Authority (EDA) to identify incentive programs that may be available to potential tenants (programs should be identified and applied for before a tenant commits to space; this is a requirement of GROW, the state’s primary job creation incentive program). Park staff and visiting experts can help identify federal and other funding sources and provide assistance with writing grants.

• **Information and Introductions to Possible R&D Partners (University Programs, Equipment, Labs)**  
  The Office of Corporate Engagement will be located at the Park and its staff will be available throughout the workweek to provide tenants with information on university resources and introductions to relevant faculty, expertise and departments.

• **Information and Introductions to Possible Manufacturing Partners**  
  The Park staff will maintain a relationship with the New Jersey Business and Industry Association (NJBJA), the nation’s largest statewide employer association. Many of NJBJA’s members are manufacturers and NJBIA staff can assist tenants in identifying companies that have expertise in producing various products and materials. Park staff can develop a database of industry contacts who are interested in potential partnerships with Park tenants (for manufacturing, R&D or other). Some of these companies may be interested in locating their operations at the Park in order to have access to potential clients.
• **Assistance in Accessing and Hiring Talent**
  University Career Services staff will have an office on-site and will connect tenants to student interns and Rutgers graduates. Park staff will introduce tenants to the New Jersey Department of Labor and Workforce for complimentary labor recruitment and assistance applying for training grants, as well as relevant state talent networks. Job fairs and other recruiting events can be held at the Park. Private staffing agencies can utilize visiting office space. Lawyers and accountants can provide advice regarding establishing payroll, negotiating labor contracts, and more.

• **Marketing/PR Assistance**
  Innovation Park staff, with assistance from University Communications and Marketing and the ORED Director of Communications, will publish (with company permission) press releases/announcements/etc. about Park tenants. This may include announcing that a tenant has moved to the Park, or recognizing a tenant’s accomplishments (example: FDA approval for a new product). In addition, staff can distribute tenant communications to local media outlets and relevant contact lists. Staff can also utilize the Park website to spotlight tenant companies and can share information on Innovation Park tenants with the larger Rutgers community via the alumni magazine, etc.

• **Market Research**
  Park tenants can utilize Rutgers library staff to help them identify market data, such as information on emerging sectors that may be potential competitors or customers. In addition, Rutgers staff or student interns can conduct market research for tenant companies.

• **Conference and Event Planning**
  Park staff will be available to help organize and publicize events held on-site. Tasks include booking rooms, assisting with AV, food, and other logistics details. Special welcoming events such as ribbon cutting ceremonies and open houses can also be facilitated. Park staff can also serve as a liaison to university staff or other venues when larger facilities are desired.

• **Centralized Administrative Support Services**
  Park staff will assist tenants in scheduling meetings and organizing events that will be held at the Park. Staff will also handle mail delivery, bookkeeping, photocopying, and other office support functions.

• **Assistance with Sustainability/Energy Efficiency Plans and Strategies**
  Staff and faculty of Rutgers have expertise developing sustainability and energy efficiency plans. These experts can assist Park tenants in developing their own plans. Education programs on topics such as waste management and water conservation can be held at the Park. Experts can be recruited from Rutgers Facilities, Rutgers Center for Green Building, the Rutgers EcoComplex, Continuing Education, and other departments and centers.
Other services that may be offered to companies that are new to New Jersey or new to the U.S. are outlined below:

- **Information on Federal Regulations**
  SelectUSA was created at the federal level to showcase the U.S. as the world’s premier business location and to provide easy access to federal-level programs and services related to business investment. SelectUSA often hosts educational and networking events. SelectUSA can host seminars and events on-site for Park tenants and the larger NJ business community.

- **Introductions to Service Providers that can assist Executives in Finding a New Home**
  - Introductions to real estate agents (residential)
  - Introductions to home service providers such as Comcast, Verizon, etc.
  - Introductions to local school districts

- **Welcome Guide**
  Park staff can prepare a “welcome guide” for new tenants, including information on all of the amenities and resources available to them (with links to websites and contacts at each of the relevant service providers or government agencies). A monthly calendar can include events happening at the Park, and also a schedule for visiting service providers.

- **Tourism Information**
  The Rutgers visitor’s center – which welcomed more than 63,000 people this past year – is an official New Jersey Visitor Information Center. It is the only university visitor center in the state to achieve this distinction. The visitor center displays and distributes state brochures and additional travel and tourism publications. The visitor’s center can prepare a welcome package that includes information on area attractions and amenities, so that new tenants can familiarize themselves with their new neighborhood.

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Endnotes

1. Research Park Redux, Business Officer, NACUBO, April 2016 by Nancy Mann Jackson, page 19.
2. Innovation Park@Rutgers: An Assessment and Development Pathway for a Collaboration and Commercialization Complex at Rutgers–New Brunswick, Prepared for Rutgers, The State University of New Jersey by Battelle Technology Partnership Practice, July 2012.
Program Title: Community Engagement/Neighborhood Investment Initiative

Overview

Rutgers believes that it has a responsibility to be a good neighbor in the towns and surrounding areas where its campuses are located. The university’s relationship and connectivity to communities – in New Jersey and globally – is what is meant by “Jersey Roots, Global Reach.” At Innovation Park@Rutgers the plan is to mirror the broader university strategy of coordinating institutional, academic and student efforts to engage partners, investors and volunteers to assist community members. Community.rutgers.edu demonstrates the many events, programs and services available to the local communities the university serves.

Community engagement will be an integral part of the Innovation Park. In addition to outreach efforts to businesses and educational programs, the Park leadership proposes establishing a community investment program, called RNeighborhood Investment Fund, using a portion of the rent revenues received from Park tenants to support it. It is envisioned that the program will address specific needs, as articulated by the local community. Ultimately, it is hoped that existing partnership programs will be expanded and new ones will be created to facilitate a broader and more meaningful engagement with the community.

Meetings with New Brunswick Tomorrow (a non-profit umbrella organization of over 200 public and private institutions and community organizations that help promote self-sufficiency and economic opportunity for New Brunswick area citizens) and the New Brunswick Office of Innovation (a non-profit organization that connects the governmental, residential, and business communities of New Brunswick to use technology and creativity in order to improve quality of life for residents of New Brunswick) have suggested that there are silos that exist between the New Brunswick Community and the university. These silos can be reduced by creating programs that specifically target perceived barriers and prioritize community needs. A key barrier is that community members feel they cannot come on campus. Community needs identified by New Brunswick Tomorrow include lack of computer/Wi-Fi accessibility for students and adults, problems with childhood obesity and diabetes management for all ages, and many other issues. By investing in local communities and their residents, some of these issues can be alleviated or reduced and stronger relationships between the university and the communities they are located in can be built. The president of New Brunswick Tomorrow is a member of the Innovation Park External Advisory Board.

Programs

Through Innovation Park@Rutgers, three community engagement programs will be established:

- **Business Outreach** – The focus on innovation and entrepreneurship will include programs and training for service entrepreneurs and small businesses such as restaurants, retail establishments etc. These entrepreneurs will be invited to free or reduced costs programs and seminars sponsored by area service providers. The programs will train participants in business skills such as marketing, social media, accounting, and other business basics that are vital to business success. Future plans also including offering an on-site student law clinic, smaller in scale but similar to programs offered at the Camden and Newark campuses to provide free or low-cost legal advice to community businesses, particularly start-up businesses and non-profits.
• **Education Outreach** – Working with a local community college (Middlesex County College), the teacher training initiative will be expanded. Programs held at Innovation Park will focus on experiential and service learning, to help teachers connect students directly to their surroundings. New innovative cross-disciplinary programs converging Food Science, Big Data, and Wellness, among others will allow educators to expand their breath of knowledge.

Educational programs will also be provided to local secondary school students and their families. A current program on the Newark campus, Tech Saturdays, is one example of this type of outreach that will be expanded in the Innovation Park. Sponsored by the Office of University–Community Partnership (OUCP), Tech Saturdays is an engagement initiative designed to bridge the digital divide for youth and their families in the city. The program uses a combination of hands-on computer instruction and access to the Internet to assist the students and family members in becoming computer literate and to gain those skills that will enable them to leverage online informational resources, create documents, and use email. The curriculum also directs participants to online resources for college and career planning. Middle and high school students, along with one of their family members, attend a workshop series on Saturdays, in a computing lab that is staffed by volunteers. Participants receive a certificate and some receive refurbished PCs via a lottery. Internal and external partners help execute this program.

• **RNeighborhood Investment Program** – A key community initiative that will be introduced at Innovation Park is the RNeighborhood Investment Program. The goal of the program is to help bridge the gap between the university and the surrounding communities by funding programs that allow community members to better their lives while engaging with the university. Robust partnerships will be developed between the university community and local groups and organizations, already existing relationships will be expanded, and new partnerships will be established based on community-identified needs. Investments through this program will specifically identify projects that encourage university-community partnerships. This will not be a top-down program, but rather the RNeighborhood Investment Initiative focus areas and projects will be determined in collaboration with a community advisory board to ensure that this program is truly addressing community needs.

The program has the ability to impact both internal and external stakeholders. Internally, it is expected that student volunteers, particularly those in service organizations or those focused on social good, will have new opportunities for providing assistance. Tenants or other university personnel can also volunteer to participate in the program. The primary beneficiaries from the program will be the direct recipients of the funding - at-risk community members.

The Innovation Park Team and U3 Advisors conducted significant benchmarking of other university research parks, particularly those in the Big 10/CIC and those that had been recognized as more successful parks by the AURP. (These included visits to University of Maryland BioPark, phone calls with University of
Illinois, University of Delaware, The Brooklyn Naval Yard, Purdue, etc.) Research Park directors all stressed the positive impact on the local community when they invested in community programs and services. It has been demonstrated that a university park that positively impacts its community is more vibrant and encourages long-term economic development in the region.

According to a recent article by Stephen Blair of Cannon Design, a premier architectural firm that specializes in innovative higher education building design,

*A successful park not only transforms the university, but also the surrounding community. Gone are the days of research parks existing solely for the benefit of the university. There is huge socio-economic value to consider in the larger community context. How can a new park link once disparate places? How can it be a driver of more development in the surrounding area? Universities must begin to think in a broader context and take the community into serious account. The concept of the research park is becoming much broader and more engaging and the research aspects of the park are being considered anchors for innovation districts.*

In addition to park benchmarking, multiple meetings have been held with local non-profits and potential partner organizations. These organizations include New Brunswick Tomorrow, a non-profit dedicated to enriching the lives of New Brunswicks’s residents. The group works with 200 local institutions and community organizations and will be an excellent partner in fostering social change through the Park community development programs. The team also met with the New Brunswick Office of Innovation, a non-profit using technology and creativity to connect residents, business, and government, Rutgers School of Health Related Professions (SHRP) and Rutgers Newark Office of University-Community Partnerships (OUCP). Middlesex County Community College is another partner in this endeavor who is very excited to expand its relationship with Rutgers in this area.

**RNeighborhood Investment Initiative Program Details.** Each year, Innovation Park will publicize the RNeighborhood Investment Initiative with community partners to encourage applications for an RNeighborhood Investment grant. IRS-determined tax exempt entities such as non-profits with a 501(c)3 designation providing charitable or educational services, and student-led projects may be eligible for social investment dollars from the RNeighborhood Investment Initiative. Organizations may submit proposals for funding to create new projects or to fund existing initiatives that benefit the communities surrounding Rutgers and/or their members. Identification of topic and need areas, as well as proposal review, will be conducted in close collaboration with a community advisory board.

Examples of projects in Rutgers core thematic areas may include:

- Child and Youth Development
- Afterschool/summer programs
- Leadership development/mentoring
- Academic achievement/ computer enrichment
- Arts programs
- Programs supporting English language proficiency for children and youth
- Health and Wellness
- Disease prevention and management
• Nutrition and other wellness programs
• Initiatives to encourage fitness and activities
• Support services for the elderly

Specific program examples might be the purchase of new computer equipment and software for a school and/or the library with training on the equipment provided by members of the Rutgers community; or graduate nutrition majors teaching good nutrition habits to elementary school students or educating diabetics on proper diet and disease management.

Initially, a member of the Office of Economic Development will spearhead the program, eventually management will be handled by the Park Program Director. An RNeighborhood Investment Board of Advisors (made up of tenant companies, industry and community leaders, Rutgers personnel and community organizations) will identify topics for funding, solicit proposals, confirm eligibility (location/organization) and appropriate project theme. A review of eligible proposals will be conducted to determine which projects best address the community's priorities AND produce the greatest impact. Projects will be selected for funding each year based on funding availability. Project reports and surveys will be completed at the conclusion of each project to help determine impact.

One of the goals of Innovation Park is to positively impact the surrounding communities and bridge the gap between the university and the community. These programs will allow it to move in this direction by directly impacting the local community. It is hoped real civic engagement will be achieved that is sustainable with long term impacts.

Donors/initial sponsors will be secured to establish the financial foundation for the program. Once Innovation Park space has been leased, funds for the program will come from a portion of each lease payment. The annual amount available for projects each year may change based on rent revenues that have been received, with possible supplemental funding secured through donations.

Currently, the following partners for this program have been identified: Middlesex County College, New Brunswick Tomorrow and Rutgers School of Health Related Professions. Rutgers Newark Office of University-Community Partnerships is an internal group that is available to assist with best practices in community engagement. Industry partners will be identified to participate in the program as well. In addition, all Park tenants can participate in the program – providing expertise, education, equipment and other resources.

References:
Community Investment Fund for Northern Virginia
Lowes Community Investment Program
University of Illinois
University of Minnesota Economic Development
University of Maryland- Baltimore BioPark

Endnote

1 Blair, Stephen. “3 New Ways of Looking at the University Research Park” December 2, 2015.
Program Title: Corporate Engagement

Overview

Rutgers Office of Corporate Engagement facilitates strategic industry outreach and corporate interactions for businesses interested in engaging with the university. The corporate engagement function was established at Rutgers in 2014 by the Senior Vice President for Research and Economic Development. The decision to centralize and build an industry engagement function within the Office of Research and Economic Development (ORED) was driven by:

- A desire to increase industry sponsored research activities and other types of corporate engagement at Rutgers; and
- The importance of creating a “central point of entry” for potential industry partners to enable ease of navigation of Rutgers, its programs, and expertise, which are spread across three major geographic locations (Newark, New Brunswick and Camden) and multitudes of departments and centers.

These two objectives are tightly aligned with the industry engagement objectives of the proposed Innovation Park. Establishing a central point of entry was emphasized in the creation of the Office of Corporate Engagement, as the corporate sector has historically expressed great difficulty in finding the right contact at the university for partnership development. This was cited as a major impediment to establishing industry-university relationships. Thus, the corporate engagement team has focused its efforts on developing competencies and infrastructure to support: i) recruitment of Park tenants; and ii) promotion of Park programs to the regional business community. Emphasis has been placed on:

- Building internal and external networks to support industry outreach and engagement;
- Establishing an intelligence program and a database to track contacts and activity;
- Assessing Rutgers internal research capabilities; and
- Executing a communications plan to message Rutgers areas of strength to industry.

Program Leaders

- Director, Corporate Engagement
- Assistant Director, Corporate Engagement
- Stakeholder Relations Manager, Corporate Engagement
- Corporate Intelligence, Corporate Engagement Researcher
- Director, Communications

Extended team

- Executive Director, University Career Services
- Director, University Career Services
- Director, Research Development
- Executive Director of Strategic Alliances, Research Commercialization
- Rutgers internal scout network
Stakeholders

External: For the purpose of talent recruitment and access to research capabilities, industry outreach is primarily targeted to companies with the following product/service focus:

- Biotechnology
- Chemical
- Computing
- Drug/Pharmaceuticals
- Finance/Insurance
- Food
- Manufacturing
- Medical Devices
- Personal Care
- Telecommunications
- Transportation

Relationships with the following “ally” organizations are critical to Rutgers industry outreach:

- BioNJ
- Choose New Jersey
- HealthCare Institute of New Jersey
- New Jersey Business & Industry Association
- New Jersey Business Action Center
- New Jersey Manufacturing Extension Program
- New Jersey Technology Council

Internal: For the purpose of recruitment and accessing scientific expertise to support externalized company research initiatives, the following Rutgers entities will be key to industry engagement:

- Ernest Mario School of Pharmacy, particularly the department of Pharmacology and Toxicology
- Office of Research and Economic Development, particularly the offices of Research Commercialization and Corporate Contracts
- Office of the Vice President, The Division of Continuing Studies
- New Jersey Center for Biomaterials
- School of Arts and Sciences, particularly the departments of Chemistry and Chemical Biology, Computer Science and Mathematics
- School of Communication and Information
- School of Engineering, all departments;
- School of Environmental and Biological Sciences, particularly the departments of Food Science and Plant Science and Pathology
- Rutgers Business School, particularly the department of Supply Chain Management and the Collaborative for Technology Entrepreneurship and Commercialization
- Rutgers Biomedical and Health Sciences
- Undergraduate Academic Affairs
- University Career Services
- Rutgers Discovery Infomatics Institute
Research

The corporate engagement office was established in 2014 based upon a six-month assessment led by Margaret Brennan-Tonetta, Associate Vice President for Economic Development. A comprehensive assessment of all aspects of corporate engagement including legal considerations, contract development and approval, IP protection, marketing, client tracking, and other key functions were analyzed and recommendations for improvements and streamlining processes were developed. Benchmarking other university industry engagement models and interviews with industry R&D leaders informed the assessment. Program strategies are defined annually by the Director of Corporate Engagement and approved by the Vice President for Research. Many programs and initiatives are developed in consultation with deans and center directors.

Program Components

Central Point of Entry for Industry

Over the past 2 years the Director of Corporate Engagement has focused efforts on building an internal infrastructure at Rutgers to facilitate partnership engagement with the expectation that the program will conceivably transition to the Park, a very recognizable ‘central point of entry’ for all forms of engagement. To underscore Rutgers’ central point of entry concept, the first initiative launched by the Office of Corporate Engagement in late 2014 was the creation of a business portal (https://businessportal.rutgers.edu/) which allows industry to search Rutgers faculty by key words and provides seamless access to the websites of other corporate facing groups at Rutgers, such as Career Services. Key ally organizations within New Jersey–BioNJ and NJBIA–endorsed the point of entry concept and interviews were conducted with anticipated industry users to help define the focus of the portal. Potential users argued for the value of functionality that allowed key word searches and effortless access to faculty research interests, publications and contact information. The search function therefore is prominent on the portal; the site also includes the names and contact information for corporate engagement personnel. The Director of Corporate Engagement worked with a Rutgers communications professional to promote the launch of the portal to internal and external audiences. After the portal launch, the director advanced several additional initiatives described below. These initiatives are regarded as critical to increasing sponsored research and facilitating broader industry engagement across all of Rutgers campuses. The following initiatives will benefit Park tenants and visitors, and will contribute to the Park ecosystem.

Proactive Outreach

Rutgers is a challenging university to navigate due to its geography (several campus locations) and size (academic schools and departments, as well as faculty, staff and student populations). To spark an increase in industry engagements, the Office of Corporate Engagement developed and adopted a more proactive approach to industry outreach. This proactive approach focuses on initiating discussions with industry that are aimed at identifying and understanding the growth strategies and objectives of a company, especially as it relates to research and development needs, talent acquisition and workforce training and development. Corporate engagement is focused on two primary points of contacts at a company: individuals involved in i) human resource activity and ii) innovation. Human resource engagement occurs when a company is not currently working with Rutgers central career service organization. The contact serves to introduce the company to
ways to recruit undergraduate and graduate student talent. The Director of Corporate Engagement also contacts individuals at a company who “scout” external technology or research capabilities to advance internal research and development efforts.

**Facilitating Industry Engagement**

The corporate engagement team responds to industry requests for specific types of research expertise. To facilitate the requisite industry/faculty match, the director has established a network of school-based Rutgers “scouts”. At present, the Rutgers scout network extends from Newark to Camden and numbers more than twenty individuals. Matching may simply involve a conversation with one Rutgers scout or a team of Rutgers scouts about a specific industry project. Recently the Director of Corporate Engagement worked with a team of eight scouts to review and respond to a list of 200+ technology interests submitted by a world-wide chemical company. Alternatively, the director may work with an industry scout to develop a description of a proposed research project and the project summary is circulated via the Rutgers scout network to gauge relevance and interest among Rutgers faculty. Faculty who are interested in any project circulated via the Rutgers scout network respond to the Office of Corporate Engagement and the director facilitates relevant introductions. The corporate engagement team coordinates the execution of relevant contracts—research or service—with Rutgers Office of Corporate Contracts.

**Intelligence**

To support proactive outreach to companies, the director is a member of the Licensing Executive Society and is the Rutgers representative to the University Industry Demonstration Project. Industry publications are reviewed regularly (Food Navigator-USE.com, FIERCE publications, HAPPI, Genetic Engineering & Biotechnology News, others) to enhance and target company outreach. However, these publications typically report on large company research activity. Locally, the director meets with and attends meetings organized by local ally organizations, including but not limited to the New Jersey Technology Council, which has helped broaden outreach to smaller firms. To further broaden the scope of industry outreach, a corporate intelligence program was established to build out lists of potential industry partners. While intelligence remains focused on big companies, the formalized intelligence effort incorporates identification and assessment of small and mid-sized companies as potential engagement partners. To identify potential industry partners—large, mid and small—the corporate engagement team used NAICS codes and filters (eg., numbers of employees, revenues) to search a database (Reference.USA) and compiled lists of “potential partner” companies. For relevant companies, secondary analysis is focused on identifying key decision makers (CEOs, CFOs, CTOs, VPs of R&D, individuals involved in innovation and human resource specialists) at the firm. To support the Innovation Park initiative, a special emphasis was placed on targeting NJ-based companies, but the search extended to a broader mix of companies throughout the mid-Atlantic region. Company information and contact information for key decision makers are recorded to a contact management database (SalesForce) which was launched in early 2015. An escalation in partner outreach is planned for June 2017. This database can be utilized as a marketing tool to reach potential Park tenants.
Communications

From an engagement perspective, a company can “partner” with Rutgers in a variety of ways: a company may externalize a research project, license a technology, hire students or access experts to support staff/professional development – or all of the above. Rutgers capabilities are vast and so it stands to reason that if efforts are made to communicate Rutgers expertise in a manner that highlights areas of relevance it will increase potential opportunities for partnering. Consequently, it is imperative for Rutgers to develop communications strategies that “message” programs and capabilities that are regarded of interest to industry. For obvious reasons, Rutgers websites and print materials focus on student recruitment and scholarly research. The Director of Corporate Engagement is advancing the development of a communication strategy aimed at familiarizing industry with Rutgers research strengths and programs that are relevant to a company’s business objectives. To effectively “message” to key industry contacts identified from intelligence activity, the Director of Corporate Engagement works closely with Rutgers communications professionals and school-based scouts to:

- Identify opportunities to publicize, through media channels, programs that highlight Rutgers research programs (ongoing)
- Support story development for Rutgers quarterly newsletter “Working with Rutgers” (ongoing)
- Create “vignettes” for the business portal on a quarterly basis that focus on industry engagement in the areas of industry sponsored research, licensing, company recruitment of undergrad/graduate students and professional/workforce development initiatives (ongoing)
- Develop marketing materials that highlight Rutgers research capabilities which are relevant to specific industry segments (in process).

Proposed Expansion of Corporate Engagement Services

- Routinely survey companies to understand needs and develop targeted programs;
- Identify external sources of funds to support program development to accelerate, improve and advance industry engagements;
- Develop and execute a communications strategy that focuses on Rutgers research capabilities and programs that will resonate with industry and assure that contacts are captured in the Salesforce database and classified in a way to allow targeted, industry pertinent communications;
- Develop a methodology to aggregate, review and identify events that might be of interest to industry and add events to the business portal; this will address limited reach of current promotional activity which is independently coordinated by schools, centers, and departments;
- Build an outreach program that is “holistic” – any inquiries of company needs should include human resource needs (recruitment, internships and workforce and professional development);
• Work with internal scouts to understand school needs and objectives to assure that discussions with company representatives include references to broader school priorities which can spark a conversation that ultimately explores mutually beneficial—and often—unique and overlooked partnering opportunities;

• Survey internal scouts and schools to identify existing programs that have high levels of industry support and assure that corporate engagement provides levels of support to schools that help advance partnering efforts;

• Create and routinely schedule Rutgers-based events or develop support programs to:
  – Familiarize faculty with all the resources in the Office of Research and Economic Development that can support research commercialization and industry partnering;
  – Familiarize industry with the broad array of resources at Rutgers that can help companies meet business objectives;
  – Introduce faculty to other school-based resources that can improve faculty interactions with companies—for example services at the School of Communication and Information that can help academic scientists communicate research capabilities to an industry audience;
  – Help faculty understand how to engage with industry—the process is very different than applying for federal, state or philanthropic research support.
  – Confirm that faculty understand contractual obligations and if necessary, establish a compliance process to address gaps.

**Needs/Gaps that Program is Addressing**

**Simplicity.** Due to its size and geography, Rutgers can be difficult to navigate. The Office of Corporate Engagement serves as a central point of entry for companies interested in working with Rutgers.

**Awareness.** A communications program has been developed to define Rutgers research strengths and develop messaging that highlight capabilities to specific industries.

**Justification, Benefits and Value Proposition**

Companies need talent. A company recruits talent to support the development and sale of new products or services. Further, a company may need to access external talent to address a short-term “talent gap” or capacity issues within a research and development program. Companies can advance internal innovation by accessing Rutgers research talent, resources and/or its students. The corporate engagement program is structured to facilitate and simplify searches for talent, expertise and technology.
Program Title: Entrepreneurship Programs

Overview

A recent Bloomberg Business article named New Jersey as the fourth most innovative state in the nation. With 22,000 full and part-time faculty and staff, Rutgers has a large talent pool that includes many subject matter experts. As the flagship state university, Rutgers can take advantage of the talent and the opportunities that exist across its campuses and in the region to support entrepreneurial activities for its faculty, staff and students.

Rutgers start-up companies can be assisted by the Rutgers University Office of Research Commercialization which supports faculty and staff members in technology transfer and start-up company formation. Since the late 1980s when the office was formed, Rutgers research has produced over 100 start-ups, with a majority of active start-ups still located within the state. The university generates between 100 and 150 new invention disclosures each year.

Rutgers also targets innovation and entrepreneurship in many of its academic programs.

Offerings include:

- An undergraduate minor in entrepreneurship for non-business students
- An entrepreneurship concentration for business students
- An entrepreneurship concentration for MBA students
- Capstone classes and additional courses and programs in entrepreneurship and innovation offered by various schools and departments
- Hackerspace and makerspace programs and facilities

Rutgers population of student entrepreneurs and innovators is growing, as evidenced by an almost doubling in the number of students choosing to minor in entrepreneurship from 2013 to 2015 and the 2013 rebirth of the Rutgers Entrepreneurial Society, the largest undergraduate student entrepreneurship organization at the university. The number of faculty participating in the NSF I-Corps program has also increased, with three teams entering the program in 2015–2016 and many more faculty members interested in participating.

In 2014, a new breed of entrepreneur emerged on campus as a result of Rutgers integration with the former University of Medicine and Dentistry of New Jersey. The Rutgers Biomedical Entrepreneurship Network (BEN) was formed by innovative medical school students – one of only a handful of such clubs in the nation. In recognition of this new opportunity, the first healthcare challenge event at the university was organized in 2015 by the Rutgers Office of Economic Development and funded by The Nicholson Foundation. A team comprised primarily of BEN members won the first place prize of $50,000 to pilot and test an app for diabetes patients.

Rutgers participates in and/or organizes many entrepreneurship activities and events. It is host to one of the largest hack-a-thon events in the country, with over 900 attendees at the 2016 event. A Rutgers team took first prize in the North America Major League Hacking event held during the fall of 2015. Other recent successes include two Rutgers student groups who qualified as regional finalists for the prestigious $1 million Holt Prize in social entrepreneurship (out of 25,000 entrants), and a Rutgers team that won the $50,000 prize at LaunchR, a student run clean technology innovation contest and start-up accelerator funded by the United States Department of Energy. These successes further demonstrate Rutgers’ entrepreneurial potential.
Entrepreneurship activities within the university community, though numerous and diverse, are decentralized and are found across many departments, schools and campuses. These activities often occur in silos, creating a barrier for sharing of ideas and opportunities from one school to another or one discipline to another. Innovation Park@Rutgers, from a location standpoint, is the ideal spot to bring together these many diverse groups of faculty, staff, students and resources, as the 30-acre site is adjacent to the Rutgers Business School, the newly renovated Livingston campus commons, and borders on Rutgers Busch Campus, the main science campus which houses engineering, life sciences and RBHS units.

The initial strategy to organize and grow entrepreneurship programs and activities at Rutgers will consist of a three-phase approach:

- Phase 1—Creation of a more formalized program of business training and mentoring services, and the establishment of a co-working space/makerspace at the collaboration building
- Phase 2—Introduction of the Rutgers Entrepreneurship & Experiential Learning Lab (REEL) Incubator for start-up companies
- Phase 3—Establishment of a gap funding program

With growing interest and support from alumni and industry sponsors, additional programs and services can be added over time. By offering a variety of exciting programs to nurture innovation and entrepreneurship and leveraging the many assets that exist at Rutgers, faculty, students, alumni and the community at large will have greater opportunities to capitalize on entrepreneurial ideas and ventures. These programs will create more start-ups from the Rutgers technology base, nurture those with existing small businesses, assist those who wish to create a new business, and create economic value in the local community and beyond.

**Purpose – Goals and Objectives**

Currently, entrepreneurship programs and services offered at Rutgers are decentralized, so a primary goal is to move critical programs into the shared collaboration building in Park. This will encourage a more effective network of resources and facilities that can support commercialization of university research into spin-off companies, creation of student start-ups, and help nurture new and existing businesses in the communities surrounding Rutgers and beyond.

Another critical component of entrepreneurship is building relationships with and among entrepreneurs, with the goal of creating a value-added community. No designated space at Rutgers currently exists for this type of networking, and the collaboration building at the Park is ideally suited to serve such a function. The co-working space and makerspace sited in the collaboration building will be utilized by university innovators and members of the community. The R-Lab incubator, to be located within the same building, will primarily serve tech start-up companies. These spaces will bring together start-ups, business leaders, service providers, mentors, university faculty, staff, students, and alumni, as well as community members. Locating these resources and services in one space and offering relevant programming, will stimulate discovery, encourage new business development, and assist existing businesses to grow and thrive. The Park will be a one-stop-shop for business and entrepreneurship services.
Program Leaders
It is anticipated that the following units or their staff will be housed in the collaboration building or support the programs located there, and will be instrumental in expanding current programs and establishing new ones:

The Office of Research Commercialization provides expert guidance, support, and assistance in safeguarding intellectual property, encouraging research, facilitating technology transfer, and promoting start-up company formation from university-owned technology. The university’s many innovations continue to stimulate the local economy, provide valuable products for public use, and help fuel research and entrepreneurial initiatives through inter and intra-university collaborations.

New Jersey Small Business Development Center (SBDC) at Rutgers–New Brunswick is a partnership between the U.S. Small Business Administration and Rutgers. The center links private enterprise, government, higher education and local economic development organizations and assists New Jersey entrepreneurs and small businesses via strategic, growth-focused training, counseling and technical assistance. During 2015, the center’s staff assisted more than 500 clients and was instrumental in the formation of 25 new businesses, which has led to the creation of 150 new jobs.

Office of Economic Development (OED) – The key driver behind Innovation Park, OED develops program and physical infrastructure resources that strengthen and enable university, industry and government collaborations. Its goal is to create an engaged university that is an integral part of the regional economy, local communities and industry attraction/retention efforts in the state.

The Office of Corporate Engagement – This office is comprised of experienced professionals who facilitate relationships with corporate partners and are knowledgeable of Rutgers’ research capabilities, projects and people. The team assists companies in connecting to university resources (faculty, equipment, and facilities), enabling industry-university collaborations in a variety of forms and disciplines.

The Division of Continuing Studies – Among its many functions, the division offers training programs, certificate courses, and non-degree programs in numerous areas including Game Research and Immersive Design. The division also manages Rutgers’ existing makerspace.

Government Agencies and Service Providers – A key reason why companies will want to locate in or utilize the resources of the Park is that they will have access to many resources within a single location. Some of the resources that are most in demand by start-ups are provided by state and federal agencies (such as incentives and grants), yet it is often difficult for a start-up to identify the appropriate agency and to find the time to visit with representatives of that agency. Having a visiting office for government agencies at the Park will further facilitate the one-stop shopping concept, as the agency representatives will come to Innovation Park at scheduled times to meet with starts-up and small businesses. Agency and service provider representatives can easily meet with potential and current Park tenants, SBDC clients, members of the community, or companies that are conducting work at the Park in partnership with Rutgers faculty/staff.

Stakeholders
Internally, stakeholders will be entrepreneurial minded faculty, staff and students across all campuses and disciplines of Rutgers. Some of these stakeholders are already members of the Rutgers Entrepreneurship Coalition, an internal group of leaders across the university who seek to share, support, and synergize entrepreneurship activities. Students in particular will benefit, as they
will finally have a central space to meet other students from different disciplines, turn ideas into companies, access mentorship, expertise, and resources, and attend events. The opportunity for students to build a start-up or to collaborate with tenants of the Park will be an invaluable opportunity for experiential learning as outlined in the Rutgers strategic plan. In addition, the Rutgers Entrepreneurial Society will finally have a home location to hold meetings and events.

Primary external stakeholders include local start-up companies, small businesses and sponsoring service organizations. Outreach to and programming for the New Brunswick and Middlesex County small business and start-up community will be a priority. Working with the SBDC, Rutgers will expand the array of programs offered in order to better engage service entrepreneurs and “Mom and Pop” businesses as well as the technology businesses that arise from the university. Companies that conduct research at the Park or that collaborate with Park tenants, as well as those who attend or host events, will also be impacted.

Other external stakeholders include the New Jersey Collegiate Entrepreneurship Consortium and the New Jersey Business Innovation Network. The Entrepreneurship Consortium held its inaugural UPitch NJ, the first statewide business plan competition, at the Rutgers Business School. The New Jersey Business Innovation Network, a collaborative statewide community of business experts and resource facilities dedicated to enhancing the commercial success of early stage and expansion stage entrepreneurial companies, has expanded its membership to include all programs that offer business assistance, services and/or facilities.

**Entrepreneurship Research**

Benchmarking the entrepreneurship programs at Big Ten/Committee on Institutional Cooperation (CIC) schools’ has been an ongoing effort at Rutgers over the past few years. In addition, literature reviews have been conducted on non-Big Ten schools that are considered to be entrepreneurial leaders, such as Stanford University and MIT. The Park Team interviewed park managers at the University of Illinois, Purdue University, University of Maryland, University of Delaware and University of Michigan in order to gain insight into best practices at successful parks. The Rutgers team reviewed successful models for incubators and co-working spaces, including NYU–Poly, Matchbox Co-working space, the Illinois Foundry, University of Central Florida, and the WeWork franchise. The team also visited and is exploring partnership opportunities with the BellWorks accelerator in Holmdel, New Jersey.

During meetings with deans, department heads and program leaders within Rutgers, the Park Team received tremendous interest from university stakeholders to either create new programs or to assimilate programs that have been successful on other campuses, at the Park. The Park Team will work closely with the SBDC to supplement current industry-focused programs, the Rutgers Business School to expand student academic programs and The Center for Urban Entrepreneurship and Economic Development (CUEED) in Newark to better understand entrepreneurship activities targeted toward economically disadvantaged populations. The Division of Continuing Studies will assist in designing, managing and soliciting outside funding for a makerspace to be located at the Park. All of these partners, and many other potential contacts within the university, will assist in providing support for the Park entrepreneurship program.

**Program Components**

**Phase 1 – Business Assistance, Mentoring, and Programming**

Entrepreneurs tend to be focused on bringing technology to fruition, yet are often unaware of the business elements that are required to successfully take a product to market. A recent BioNJ survey
stresses that training and mentoring are critical components of an entrepreneurial ecosystem and that providing hands-on experience-based learning and guidance is crucial to entrepreneurs as their companies form and launch.iv

Many of the services needed by entrepreneurs can be provided by university groups that will be housed in the collaboration building. Key elements include intellectual property guidance from the Office of Research Commercialization; IP clinics (expansion of existing program offered by law students in Newark and Camden to the Park); grant writing assistance from university experts; market research/data analytics support from trained staff and students; etc.

An Innovation Park mentor network will also be developed. The Park Team will tap into existing networks such as Entrepreneurs in Residence at CCIT, the BioNJ Life Science Talent Network and the University City Science Center mentor network in order to build a vibrant network with the Park as the hub. New Jersey has a rich pool of experienced talent in the life sciences industry that can serve as a source of advice and coaching support to start-up entrepreneurs in that field. Rutgers also has one of the top rated MBA programs in the country. Students will be recruited from this program to provide low-cost assistance to companies in specific business areas. For other disciplines, a rich pool of alumni and adjunct faculty experts will be utilized.

In addition, the Park entrepreneurship program can act as a central venue for programs and events, and maintain a master entrepreneurship event calendar to coordinate these diverse activities. Topics for events may include accessing funding, navigating SBIR/STTR applications, developing a pitch, and I-Corps information sessions. Rutgers faculty can give technology presentations to showcase available university intellectual property. Service providers, including intellectual property attorneys, accounting firms and others are usually eager to sponsor programs and may donate their time to provide advice to start-ups. The local SCORE chapters can also be utilized to provide support in areas such as business plan development. Networking events and meet-ups, including the Rutgers-based Scarlet Startups, can be hosted at the Park to further facilitate collaboration between industry, alumni and the Rutgers community.

To encourage community-student interaction, Rutgers will recruit student organizations to provide technical (computer/IT) and social media assistance to community entrepreneurs and local small businesses. Students will be targeted from groups such as the Rutgers Business Fraternity, Rutgers Mobile App Development Group (RUMAD), Undergraduate Student Alliance of Computer Scientists (USACS), Women in Computer Science, and the Public Relations Student Society of America and Association for Women in Communications (for social media).

**Innovation Spaces – Co-working space**

A vibrant, centrally located co-working space for students and community members will make the Park a center of innovative activity. The space will enable sharing of knowledge and expertise between Rutgers communities and the public. Next generation scientists, engineers, and students from many disciplines will be drawn to the space due to its collaborative and open nature. People working there can get assistance from supporting groups in the building.

Purdue University, University of Maryland and University of Madison-Wisconsin all have successful student-run co-working spaces. These co-working facilities are successful, at least in part, because they are open during extended hours. It will be the first centralized location on campus where students from any department can collaborate and work on projects and business concepts with one another, as well as members of the community. Business experts will be available for
students who have an innovative idea or technology, but need some help forming a business around the idea. The co-working space will allow aspiring entrepreneurs with scalable concepts to take advantage of tools, resources and connections to help launch and grow their new venture.

**Innovation Spaces – Makerspace**

Rutgers’ current makerspace provides a place where students can come to tinker, build, discuss projects and learn how to use equipment, all for free or a modest fee. The facility, bootstrapped in 2012, was featured in a February 2016 New York Times article. The makerspace is housed in the former command headquarters for Camp Kilmer. This lackluster building is not ideal for company tours and existing space cannot accommodate the significant interest from students.

The collaboration building at Innovation Park is the ideal place to house a new, more modern makerspace. Ideally, the new space will be approximately 10,000 square feet with space for dozens of entrepreneurs. Modern amenities and additional equipment will make this spot (which is closer to the business, engineering and computer science schools) highly desirable for capstone class projects, entrepreneurial students, faculty, staff and others. Equipment provided should include 3-D printers, laser cutters, an electronics shop, and other machinery.

Future plans include adding a prototyping/fabrication laboratory. With the correct set of tools, users will be able to create everything from 3D printed food and tissue to innovative materials, autonomous robots, drones etc. Equipment geared toward creating medical device prototypes will greatly enhance innovation related to core sectors that the Park is targeting. Other possible additions include a virtual and augmented reality lab and wearable electronics development area. The developers of the Rutgers makerspace may consider elements from Fab Lab San Diego and/or the Nebraska Innovation Studio, which has “open sight lines, shared collaboration space, and a flexible layout” for its design.

**Phase 2 – Rutgers Entrepreneurship & Experiential Learning Lab (REEL) Incubator**

Rutgers Entrepreneurship and Experiential Learning Lab (REEL) seeks to empower and cultivate the work of a new generation of entrepreneurs and small business owners. REEL will be located in the Park collaboration building and will provide lab and office space, as well as business services to start-ups emerging from the university and surrounding region. Rutgers researchers with an innovation who wish to have space at the lab will participate in a seven to 10 week program based on the lean-launch pad model that connects faculty with an industry mentor. There will also be a five week short course for non-tech companies looking for a more cost effective boot camp-type program.

The educational program will be free (other than materials costs) for university-affiliated groups. Outside groups will pay a fee to participate in the program. Users will be able to lease lab space for a membership or rental fee. The membership/rental fees will help fund operation of the co-working space.

The goal of having the lab is to provide affordable space and to increase student engagement in entrepreneurship. Project teams will focus on the Business Model Canvas and customer discovery in order to validate ideas and products/services. Assistance will be provided in creating a pitch and pitch deck, assisting with further development and prototyping of new technologies, and helping the teams make connections with mentors, advisors, investors, and customers.

**Phase 3 – Gap-funding Program for University Research**

Promising research at Rutgers often faces a funding gap between federal funding for early stage university research and SBIR/STTR funding which may be available to start-ups. Some of the most
exciting technologies are unable to advance as they lack the resources to take them to the next level. One potential solution to this issue is TechAdvance, an evergreen fund which will be overseen by the Office of Research Commercialization.

TechAdvance is a bridge fund that provides financial support and business expertise to early stage Rutgers technologies to advance them along the commercialization path. TechAdvance will be partly funded by proceeds from Rutgers’ commercialization efforts and seeded with philanthropic gifts from individuals and corporations. Funding decisions will be based on input from an independent advisory board.

Benefits of TechAdvance include:

- Increasing engagement of faculty and students in commercialization
- Growing commercialization success rate for technologies funded by bridge funds
- Enhancing financial returns from royalties and new applied and sponsored research dollars
- Attracting follow-on funding from industry and professional investors
- Accelerating economic development through additional licenses and start-ups, that in turn create jobs
- Enhancing Rutgers reputation as a leading source of next generation technologies

TechAdvance is in alignment with Rutgers’ strategic plan as it:

- Promotes public-private partnerships to capitalize on R&D – Advancing research to a commercial proof-of-concept stage will make the technology much more attractive to potential industry partners
- Encourages collaboration between basic researchers and medical professionals – TechAdvance will require qualified physicians to be part of project teams when a technology is a therapeutic, diagnostic, or medical device
- Spurs economic development and jobs – TechAdvance-funded projects will have a greater likelihood of becoming the core technology for innovative start-up companies

Needs/gaps being addressed

The U.S. Small Business Administration estimates that only 44% of small businesses continue to operate after four years. To help nurture companies, business incubators support start-ups by providing an array of resources and services to entrepreneurs. The National Business Incubation Association (NBIA) found that 87% of companies are still in business five years after graduating from an incubator program, and after graduation, about the same percentage remain in the area where they were incubated.

The competition for top students is increasing and more schools are introducing entrepreneurship programs as a benefit. In addition, as an alternative to working at large multinational companies, innovative students are often interested in creating a job for themselves upon graduation. However, students at Rutgers have not had the same level of support for start-up company development as their Big Ten/CIC peers and some have gone elsewhere to develop their companies. Rutgers needs to improve the services available to student entrepreneurs, including the establishment of an accelerator/co-working space which will provide essential expertise and services in one
location. The program will provide a high quality infrastructure to support entrepreneurial activities and will allow for a tremendous increase in interdisciplinary collaborations. Park programs will assist student entrepreneurs and increase the likelihood of their success.

Justification for the Program/Benefits

A 2012 report prepared for Rutgers by Battelle Technology Partnership Practice found, “For those involved with spin-outs, interviewees expressed a need for space that was near the academic partner/funder, 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.”

While it was recognized that some of these services could be found on an ad-hoc basis within a few of the university’s research centers, having a structured environment/system in place that actually affected the culture of the university was deemed to be a highly impactful endeavor.

An incubation program is critical and was a significant feature in all parks benchmarked. Having one location for entrepreneurship programs and services will facilitate both student and faculty recruitment at Rutgers, particularly young and innovative faculty and students. In addition, new companies that are formed or existing companies that are helped to grow will create jobs and additional revenue for the state.

Other benefits include:

- Students will have hands-on experiential learning opportunities
- Potential to attract large grants via industry partnerships
- Companies attending Park programs may expand their relationship with Rutgers by sponsoring research, recruiting student workers or interns, making a donation, etc.
- Opportunities for cross-disciplinary research and interactions among faculty and staff of the Business School, School of Engineering, RBHS, SEBS, School of Arts & Sciences, etc.
- Targeted events will attract industry partners, inform attendees about Rutgers’ research, and connect them to faculty and students

Value proposition of program

Innovation Park@Rutgers Entrepreneurship Program has the ability to serve as a magnet for faculty and students by creating an environment that fosters open innovation. The power of entrepreneurship lies within strong connections. To facilitate and harness these connections, successful support strategies will be implemented to create a vital and successful ecosystem.

Endnotes

i Bloomberg Business – January 7, 2016, Here are the Most Innovative States in America
ii February 2014, "A Strategic Plan for the New Rutgers*
iii UPitch New Jersey – April 15, 2016, New Jersey’s Collegiate Business Model Competition
iv February 16, 2016, A White Paper presented for BIONJ Fueling Entrepreneurship: Advancing Innovation and the Life Sciences Ecosystem
vi The Wall Street Journal - November 3, 2014, What College Can Teach the Aspiring Entrepreneur What to Study, Where to Study—and Other Ways to Use Your Education to be Ready to Start a Business
vii Endeavor Insight – April 15, 2015, How Local and State Governments Can Best Support Entrepreneurship
Program Title: International Business Attraction

Overview

At Rutgers University, diversity is an everyday ingredient of university life and one of the school’s greatest strengths. Rutgers’ diversity reflects the rich array of people who choose New Jersey as the place to build a better future. More than 67,000 students come from every state in the nation and more than 115 countries. The New Brunswick campus is consistently ranked as one of the 30 most diverse student bodies in the nation, while Rutgers University-Newark ranks #1 in student diversity since 1997 (U.S. News & World Report). More than two-thirds of incoming first-year students at Rutgers are immigrants or the children or grandchildren of immigrants.

Diversity at Rutgers embraces the notion that we must be global educators, researchers, students, citizens and partners – transcending boundaries to meet the challenges of a complex and interdependent world. Rutgers trains students to understand cultures, languages, regions and economic influencers beyond their own, in New Jersey and around the world. In addition, numerous programs exist at the university to encourage diversity and to support those who are visiting to study, teach, or conduct research – from all backgrounds and geographies. A small sampling of such programs is listed below:

- *The Bildner Center* brings visiting scholars to Rutgers to teach courses in Jewish studies. The program promotes research and scholarly exchange.
- *The Center for Global Services* coordinates cultural programs and immigration-related services for approximately 6,000 international students, scholars, faculty and their dependents.
- *The Centers for Global Advancement and International Affairs* works toward developing a comprehensive, campus-wide set of international initiatives and services, initiating collaborative projects and strategic partnerships around the world, and expanding students’ opportunities for international study and research.

The university is a recognized leader in attracting international businesses to New Jersey through the designation of two of its incubators as Soft Landings facilities by the International Business Innovation Association (InBIA), the world’s leading organization advancing business incubation and entrepreneurship. The InBIA identified the Rutgers Food Innovation Center and the Rutgers EcoComplex as having specialized programs and/or facilities for helping international companies establish businesses in the U.S. and break into domestic markets. It should be noted that the Rutgers Food Innovation Center is the only food incubator in the world that has received designation as a Soft Landings facility.

Many of Rutgers’ faculty and staff take advantage of the opportunity to travel abroad to teach, conduct research, study, or attend conferences. Faculty and staff have also participated in businesses missions organized to generate interest from foreign investors in Rutgers as a research partner and New Jersey as a business location. In 2015, President Barchi and Dr. Christopher Molloy (Senior Vice President for Research and Economic Development) traveled to Cambridge, England to
participate in a life sciences roundtable hosted by One Nucleus, a life sciences industry association. This roundtable afforded Rutgers the opportunity to speak with business leaders about the resources and facilities available at the university to industry partners. Also in 2015, Lou Cooperhouse (Director of the Rutgers Food Innovation Center) traveled to Israel. During his trip he met with more than 20 start-ups, and several universities, incubators, and government officials. As a result of this trip, Rutgers and Tel-Hai College signed an MOU, agreeing to conduct joint research, exchange students and faculty, and to develop a functional foods cluster in each of their respective regions.

According to the Kauffman Foundation, New Jersey ranks #5 for foreign direct investment (FDI) and is the top state in the U.S. for high-tech companies founded by immigrants. The state is home to more than 1,100 multinational companies representing 40 nations, more than 270 foreign company headquarters, and five foreign trade zones. FDIMarkets reports that between 2013–2015, an average of 103 FDI projects were either completed or announced in New Jersey annually.

At the state level, New Jersey has launched a number of initiatives designed to attract foreign direct investment (FDI). Choose New Jersey (CNJ) was founded in 2010 based on the recommendation of a taskforce created by Governor Christie. A privately funded nonprofit, CNJ’s mission is to encourage and nurture economic growth throughout New Jersey. In the past four years, staff traveled to Taiwan, South Korea, India, Israel, the United Arab Emirates, Germany, Switzerland, the UK, Mexico, and Canada. These trips supplemented more traditional business attraction methods and resulted in the establishment of new business locations in New Jersey by foreign-headquartered companies from Mexico, India, Germany, the UK and elsewhere. International business attraction is such an important component of CNJ’s work that they’ve established a Board committee specifically focused on this topic. CNJ partners with state agencies, including the New Jersey Business Action Center (the state’s first point of contact for businesses), which employs a team of International Business Advocates to assist foreign companies in expanding to New Jersey.

The federal government recognizes the importance of FDI to the U.S. economy (FDI stock in the U.S. rose to over $2.9 trillion at the end of 2014) and President Barack Obama launched a new program, SelectUSA, to assist U.S. states in attracting foreign companies. The program showcases the U.S. as the world’s premier business location and provides easy access to federal-level programs and services related to business investment. SelectUSA highlights specific assets of the U.S. economy, one of those being its university system. According to SelectUSA,

“The United States has the flexibility through the American educational system to fashion training programs for the jobs of today and tomorrow. The United States university system has a strong competitive advantage globally, fostering an innovation ecosystem that hosts and spins off research and development (R&D) programs that contribute to the country’s R&D activities.”

Because of its outstanding university system and a host of other factors, the U.S. has topped the 2015 A.T. Kearney Foreign Direct Investment Confidence Index for the third year in a row. It is also the world’s most attractive market for venture capital and private equity funding according to Ernst & Young and IESE Business School’s 2014 Global Venture Capital and Private Equity Country Attractiveness Index.
**Purpose – Goals and Objectives**

Foreign direct investment is a key economic driver of the U.S. and New Jersey economies. Rutgers has established itself as a global leader in supporting the expansion or relocation of foreign firms to the U.S. (and specifically New Jersey). The university has also established itself as one of the most diverse institutions of higher education in the nation. Innovation Park@Rutgers will leverage the already existing assets and programs at the university, state and federal levels to attract foreign companies to work with and/or locate at the Park.

**Program Leaders**

It is anticipated that the following departments and their staff will be engaged in supporting the international business attraction component of the Park:

*Office of Economic Development (OED)* – The key driver behind Innovation Park, OED develops program and physical infrastructure resources that strengthen and enable university, industry and government collaborations. OED staff will develop relationships with foreign companies and governments, industry associations, universities, research parks and institutes, with the goal of identifying potential tenants for the Park. The OED team will also connect Rutgers staff and faculty to joint research and other collaboration opportunities with industry, and more broadly, market Rutgers in international locations (this can lead to a number of potential benefits, not least of which is an increase in enrollment from abroad).

*Office of Research Commercialization* provides expert guidance, support, and assistance in safeguarding intellectual property, encouraging research, facilitating technology transfer, and promoting start-up company formation from university-owned technology. The university’s many innovations may be of interest to foreign start-up and established businesses. Opportunities for research collaboration and technology licensing will be promoted to targeted international companies.

*The Corporate Engagement team* connects businesses to Rutgers’ research resources. The team will be a vital partner in identifying potential tenants for the Park and assisting foreign companies in establishing research collaborations with Rutgers staff and faculty.

*Centers for Global Advancement and International Affairs (GAIA)* will be an important partner to OED staff and foreign companies by providing the following services:

- To OED Staff – participating in meetings with potential international partners; providing stats and information on Rutgers’ relationship with target markets (# of students from a particular country, existing interinstitutional agreements, etc.)
- To Foreign Companies – connecting executives to student interns that have fluency in a certain language or experience living in or working with a particular market

It is anticipated that the following external partners will be engaged in supporting the international business attraction component of the Park:

*SelectUSA* was created at the federal level to showcase the U.S. as the world’s premier business location. SelectUSA is designed to complement economic development activities at the state level. On a daily basis, its representatives communicate with investors interested in the U.S. While the
representatives cannot promote one location over another, if an investor approaches them and requests information on New Jersey, they can respond with information and they can make referrals to economic development contacts in the state. SelectUSA representatives can inform interested investors about the Park and refer companies seeking to partner with universities to OED staff. These representatives can also assist international tenants of the Park in accessing federal-level programs and services.

*The Partnership for Action (PFA)* is a four-pronged public-private approach to economic development that serves as the starting point for all initiatives, policies and efforts related to growing New Jersey’s economy and creating sustainable jobs. Led by Lt. Governor Guadagno, the PFA includes CNJ, the Business Action Center (BAC), the Economic Development Authority (EDA) (the state’s bank for business) and the Secretary of Higher Education. The staffs of CNJ, BAC, and EDA will be a vital resource to international companies, as they can provide a number of complimentary services that are most needed by foreign businesses new to the U.S., such as:

- Step-by-step instructions for registering a business in New Jersey
- Information and assistance navigating and applying for state incentive and grant programs
- Liaising with state and federal agencies on regulatory matters

*Services Providers* – Foreign companies, especially if they are establishing their first operation in the U.S., will need guidance from legal, accounting, human resource and other experts to understand and navigate the U.S. business climate. Park staff can facilitate introductions between service providers and tenant companies.

*Stakeholders*

Internally, stakeholders will be faculty, staff and students across all campuses and disciplines of Rutgers. Faculty and staff can benefit from opportunities to conduct joint research with international companies, and to establish partnerships that may lead to faculty exchange, sharing of best practices and more. Students will have the opportunity to intern and work for foreign businesses. Employers seek employees with cultural competency, language skills, and experience working or traveling in foreign markets.ii By providing students the chance to interact with foreign business leaders who are located on campus, the Park will:

- Make students more appealing to potential employers
- Provide a pipeline of graduates that possess traits and skills that are desired by employers

In addition, attraction of international companies to the Park will benefit the mission and goal of the Park, generate revenues, and increase the diversity of businesses located there.

Primary external stakeholders include the PFA, SelectUSA, and domestic and international business associations, incubators, trade organizations, chambers, international companies, U.S. companies wishing to expand to other countries, and others that are engaged in attracting FDI or promoting cross border collaborations.
**Research Conducted**

As part of the planning process, OED staff met with internal and external stakeholders to discuss all aspects of the proposed Park, from management structures to funding, and programmatic elements to recruitment of tenants. In conversations with Rutgers Food Innovation Center and Rutgers EcoComplex staff, as well as external partners including CNJ and BAC, it became apparent that Rutgers and New Jersey can offer unique assets and resources that are appealing to international companies.

Rutgers already initiated discussions with several international groups regarding the potential for establishing a formal relationship with the Park. A summary of these discussions is below:

**Consulate General of Belgium – Flanders Investment & Trade**: Staff of Rutgers Office of Research and Economic Development met with the Technology and Life Sciences Attache. The Attache is responsible for stimulating international high-tech research collaborations and business opportunities between the Americas and Belgium-Flanders. New Jersey and Flanders share many of the same industry sectors (nanotechnology and life sciences) and employers (Janssen, Merck). There is potential for the Park to partner with a research park in Leuven; for Rutgers to collaborate with a Belgium life sciences company on R&D, and to eventually attract this same company to locate at the Park.

**Wageningen UR** is a university and research center collaboration between Wageningen University and the DLO Foundation focused on healthy food and the living environment. OED staff were introduced to a professor of food physics and chairman of the Dutch Complexity Platform. This individual is interested in discussing potential opportunities for collaboration with the Park focused at the intersection of food science, health science and big data.

**Taipei Economic and Cultural Representative Office in the U.S. (TECRO)**: OED staff met with representatives of the New York branch of TECRO and discussed several areas of potential collaboration, including establishing a formal relationship between Soft Landings incubators of Taiwan and New Jersey. Taiwan will bring a delegation of food companies to the Fancy Food Show (June 2016) and Rutgers, TECRO and the state of New Jersey will organize a networking event to introduce the Taiwanese companies to New Jersey companies, government agencies, and Rutgers. In addition, TECRO New York staff will identify and recommend one or two universities and/or research parks that may be an ideal partner of the Park. TECRO New York staff will also refer companies to Rutgers that have interest in working with a university.

Rutgers has already formalized one relationship with an international university:

**Tel-Hai College**: Staff of Rutgers and CNJ traveled to Israel in June 2015. While there, they met with senior-level faculty and staff of Tel-Hai College. Upon returning from Israel, a number of meetings were held with Rutgers staff and faculty, as well as follow-up discussions with Tel-Hai College faculty and administrators and government officials in Israel. These meetings and discussions led to the signing of an MOU in September 2015 at a signing ceremony held at Rutgers-New Brunswick. The schools agreed to work together in several areas including joint student projects, faculty and student exchange, start-up exchange (via the Rutgers Food Innovation Center and a food incubator/accelerator to be developed in the Upper Galilee), and toward the development of functional foods clusters in their respective regions. As of May 2016, students of Rutgers and Tel-Hai College
completed a semester-long joint project to develop new food products with commercial applications. A number of Israeli food companies and investors have expressed interest in the partnership and several of these companies and investors traveled to New Jersey to tour Rutgers Food Innovation Center.

**Program Components**

Rutgers will work with internal and external partners to identify and recruit international companies to the Park. Rutgers will offer services specifically designed to ensure that international firms have a smooth transition to the U.S. market. Rutgers will also work with internal and external partners to showcase New Jersey and the Park as an ideal location for conducting business and research, thereby increasing the likelihood of attracting greater numbers of foreign firms to the Park.

**Identify and Recruit International Companies**

Rutgers will work with internal stakeholders to identify and recruit potential tenants of the Park:

- **Office of Corporate Engagement:** The office created a corporate intelligence program designed for assessing companies as potential engagement partners. Over the past several years, the office has connected numerous companies to Rutgers. The office will be able to shortlist companies that have the most potential to locate in the Park.

- **Rutgers Food Innovation Center and Rutgers EcoComplex:** The incubators regularly receive inquiries from international companies interested in locating their business in New Jersey. The incubators can refer companies to the Park.

- **Rutgers faculty/staff:** Faculty and staff have existing relationships with companies located abroad (whether it be through a research collaboration, previous employer, personal contact, or otherwise). Faculty and staff can make their contacts aware of the Park and refer potential tenants.

Rutgers will work with external stakeholders to identify potential tenants of the Park:

- **Partnership for Action:** On a daily basis, members of the Partnership for Action are in contact with foreign firms considering locating in New Jersey. Rutgers will provide marketing material to the Partnership for Action so that they can make potential tenants aware of the Park and refer companies with high potential for locating in New Jersey to Rutgers.

- **BioNJ/HealthCare Institute of New Jersey/New Jersey Tech Council/Others:** Rutgers will work with industry associations in New Jersey aligned with the sectors of focus for the Park. These associations are often in contact with international companies considering New Jersey as a business location. Many of them have international companies as members and at least one (BioNJ) has established formal relationships with international industry associations that can act as referral sources for the Park.

- **New Jersey Business Innovation Network (NJBIN):** NJBIN is a network of incubator and co-working facilities in New Jersey. Most of the incubators that are dedicated to the life sciences are currently at capacity (including the Commercialization Center for Innovative Technologies in North Brunswick and the Institute for Life Science Entrepreneurship in Union). These incubators continue to receive interest from potential tenants and they can refer these inquiries to the Park.
• **Real Estate Professionals/Consultants/Services Providers:** These individuals are regularly conducting outreach to and coming in contact with international firms. Foreign executives often hire them to assess and recommend locations that will best support their operations in the U.S. (by providing ready access to a qualified workforce, as an example). Rutgers will brief these individuals on the Park so that they can recommend it to their clients.

• **Business Executives:** According to Development Counsellors International 2014 *Winning Strategies in Economic Development Marketing* report, the leading source of information influencing executive perceptions of an area’s business climate is dialogue with industry peers. Rutgers has strong, existing relationships with industry and can leverage these relationships by providing information on the Park to companies that may know of other businesses that can benefit from working with Rutgers and/or locating at the Park.

The International Business Attraction Program will aid in the identification and attraction of companies to the Park, while also providing valuable services and resources to foreign entrepreneurs, executives and researchers. This program will be modeled off the Global Access program launched in 2014 by the French-American Chamber of Commerce, Philadelphia Chapter and the Welcoming Center for New Pennsylvanians.

**Visa Assistance**

The J-1 visa option is available to international graduate students, inventors, researchers, entrepreneurs, and early-stage companies. Recipients of the visa can spend up to five years to develop a new business in the U.S. As a requirement of the program, businesses must be located at a university incubator. Rutgers will work with internal and external partners to market the J-1 visa option to potential tenants, to provide guidance throughout the visa application process, and to offer relevant information and resources for entrepreneurs, executives and researchers new to the U.S. This type of program will likely receive great interest, especially considering that New Jersey is one of the top states in the nation for attracting immigrants (more than one in five New Jerseyans is foreign born and in 2012, companies in NJ hired more skilled immigrant workers than companies in any other state) and FDI (#5 state for FDI).

The Rutgers Center for Global Services may be able to act as the Park’s “welcoming center for international visitors.” The services already offered by the Center to visiting students, faculty, and scholars will be of value to foreign entrepreneurs, executives, and researchers. These services include but are not limited to:

- A comprehensive orientation designed to facilitate adjustment to the U.S. and to Rutgers;
- A community-based International Friendship Program which gives students, university, and community residents the opportunity to get to know each other;
- Individual counseling on immigration, cross-cultural, financial, health, and other personal matters; and
- Email notices that provide timely information about immigration-related procedures and deadlines.
These services may be available to all international tenants on J-1 visas. At least a few of these services, such as the comprehensive orientation and the community-based International Friendship Program, can potentially be extended to all international tenants of the Park regardless of visa status. Initially, Rutgers will focus on developing partnerships with bilateral chambers and/or investment and trade promotion agencies that represent markets with which the university already has or plans to have formal relationships, including Israel, the Netherlands, Belgium, France, Italy, England and Taiwan.

**Services Tailored to International Firms**

International firms, especially if they are new to the U.S. market, require assistance above and beyond that required of domestic firms, including but not limited to the following:

- Advice on business structure for complying with local, state, and federal taxes
- Business registration
- Connections to service providers
- Assistance in accessing and hiring talent, including advice on labor contracts and benefits packages
- Branding/marketing that resonates with U.S. consumers
- Identifying markets
- Compliance with state and federal regulations

Additional information regarding the provision of these and other services can be found in the business amenities/services section of this report.

**Showcase New Jersey and the Park as an Ideal Location for Business and Research**

OED staff will develop marketing materials tailored to an international audience, to inform various groups about the opportunities available at the Park. OED staff will conduct research and communicate on a regular basis with New Jersey partners in order to stay abreast of the latest rankings and reports on New Jersey’s business climate and assets, which can be incorporated into existing and new marketing communications. OED will work with internal and external partners as identified above to share marketing material with targeted international businesses, industry associations, and other potential referral sources.

**Needs/Gaps being Addressed and Justification for the Program**

New Jersey averaged 103 completed/announced FDI projects annually between 2013 and 2015. While impressive, competing states recorded a higher average number of projects annually during the same period:

- New York: 365
- Pennsylvania: 129
- Massachusetts: 160

These numbers show that there is significant interest from foreign investors in the U.S. East Coast. The Park will be an attractive new asset that can assist New Jersey in securing a greater share of the investment being made in the East Coast.
The Battelle/Bio State Bioscience Jobs, Investments and Innovation 2014iv report found that New Jersey ranks low (III or V quintile) in measurements related to academic bioscience R&D expenditures, FY 2012. As the state’s largest university, Rutgers can significantly impact this ranking. Rutgers may experience even greater success in securing R&D funding as a result of collaborating with international partners. For example, the National Science Foundation (NSF) provides funding to universities through several programs that were specifically created to encourage and support collaboration between U.S. and foreign institutions.

U.S. institutions of higher education are receiving significant funding for R&D from international partners. According to an article published by the National Council of University Research Administratorsv, U.S. higher education R&D expenditures from foreign sources is on the rise. In 2011, total expenditures from foreign sources totaled $716,301,000, a 10.3% increase over 2010. OED staff conducted research on the benefits to universities of having a research park. One potential benefit is the receipt of funding for R&D from industry partners (domestic or international) located in the park. The universities below have received funding for R&D as a result of collaborations established through their research parks:

- **Clemson University International Center for Automotive Research**
  - In fiscal year 2015, over 80% of research conducted at the Park was sponsored by industry partners.
  - In April 2015, Clemson University received a $1.625 million gift from CoreTech System Co. (Moldex3D) to support education and research (CoreTech is an industry partner of the Park).vi

- **David Johnston Research+Technology Park, University of Waterloo**
  - Survey responses received from 38 companies located in the Park reveal that roughly 22% of respondents fund research at the University of Waterloo.vii

- **Purdue Research Park**
  - Since 1999, Park network companies have provided almost $22 million in sponsored research at Purdue. From 2005 through 2010, this averaged over $2.5 million per year.viii

- **Virginia Tech Corporate Research Center**
  - About $2 million in annual industry-sponsored research at Virginia Tech comes from companies located at the Research Center.ix

Competing states on the East Coast have developed programs and research parks that are specifically targeted to international companies, several of which are managed or supported by universities. A sample listing is below:

- **Virginia-Israel Biosciences Commercialization Center**
- **Maryland International Incubator (collaboration with University of Maryland, College Park)**
University City Science Center Port Business Incubator (supported by Drexel University, University of Pennsylvania, University of the Sciences)

The Park will represent Rutgers’ signature effort to target and attract international businesses to collaborate with the university and to locate in New Jersey.

Benefits/Outcomes of the Program

Expected outcomes of the international business attraction program include:

- An increase in collaboration between Rutgers and foreign businesses, universities, and others
- An increase in R&D expenditures at Rutgers from foreign sources
- Greater ease in securing external funding, especially from NSF and other funding sources that support international collaborations
- An increase in the number of international firms that are located/operating in Central New Jersey and specifically in the greater New Brunswick area
- Enhanced attractiveness of Rutgers students and alum as employees, given their increased levels of cultural competency
- An increase in visiting faculty from abroad
- Greater awareness globally of the Rutgers brand and New Jersey as an ideal business location
- Knowledge transfer between Rutgers and the world

Value Proposition of Program

Innovation Park has the ability to serve as a magnet for foreign investment in the university and the state by creating an environment that fosters and supports international collaborations.

Revenue Opportunities

The International Business Attraction Program will operate on a fee for service basis. A menu of programs will be made available to international firms, who can enter into an agreement with Park to take advantage of these services. In addition, there are a number of existing programs available to support joint research between U.S. and foreign partners. As an example, the BIRD Foundation was established by the U.S. and Israeli governments in 1977 to generate mutually beneficial cooperation between the private sectors of the U.S. and Israeli high tech industries. BIRD provides funding covering up to 50% of project development and product commercialization costs. BIRD supports 20 projects annually, on average. Though they don’t represent a majority, hospitals and universities have been the recipients of BIRD funding. Other organizations who provide similar support will be identified and partnerships will be established to facilitate engagement with park tenants.
Industry Partnerships

The International Business Attraction Program will recruit international firms to locate at the Park and to collaborate with Rutgers in a meaningful way (hiring student interns, conducting joint research, as examples). During 2017-2019, efforts will be significantly ramped up to market the Park to potential tenants and to secure letters of intent from companies to locate at the Park.

Endnotes

i Why Select USA?
ii Cultural Competence Could Be the Key to Your Workplace Success – or Failure; 5 skills employers want that you won’t see in a job ad June 10, 2015; Further your career prospects by studying abroad September 21, 2015
iii Winning Strategies in Economic Development Marketing 2014
iv Battelle/Bio State Bioscience Jobs, Investments and Innovation 2014
v How Building Relationships Can Expand Opportunities for PUIs, December 2013
vi 2015 Annual Report Clemson University International Center for Automotive Research
vii David Johnston Research + Technology Park Impact study, June 2013
viii An Economic Impact Study of the Purdue Research Park Network, May 2011
ix Virginia Tech Corporate Research Center Overview, 2016

Program Title: Institute for Restorative and Regenerative Technologies (IRT@RU)

Overview

With the creation of the Rutgers Biomedical and Health Sciences (RBHS) division of the university, Rutgers’ potential for internal collaboration between technology innovation and health care has burgeoned. Restorative care, encompassing both regenerative and rehabilitative medicine, is a key area where Rutgers and the state of New Jersey can benefit markedly from the integration of the former UMDNJ into Rutgers. The Institute for Restorative & Regenerative Technologies at Rutgers University (IRT@RU) will bring together diverse Rutgers system-wide communities and global collaborators to exploit the rapid discovery and development of new biomaterials, cell-based therapies, devices and drugs, in innovative combinations around a primary integrating theme – Restoration of health, form and function to bones, tissues, and organs impacted by trauma, disease or aging.

Vision: Formation of an Institute for Restorative and Regenerative Technologies, which will be a multidisciplinary institute of excellence and innovation encompassing Rutgers system-wide strengths. The institute’s primary integrating theme – restoration of health, form and function to bones, tissues, and organs impacted by trauma, disease or aging will guide its research.

Mission: IRT@RU will harness Rutgers’ research-rich community to perform strategic, as well as market and application oriented systems research, across broad industry sectors and will foster integration of technologies, expertise and capabilities across the following areas:

- Bio/hybrid/nanomaterials
- Neural engineering
• Imaging/characterization
• Medical manufacturing/biofabrication
• Power sources for implantable devices/robotics
• Data/Predictive Analytics – precision medicine/biostatistics

**Purpose:** IRT@RU will coordinate and align synergistic programs from life sciences, physical sciences, biomedical sciences, engineering and biomaterials, providing common core services to centers/institutes/departments/schools through effective dissemination of resources. Likely candidate participants are in neuroscience, orthopedics, dermatology, oncology, infection/inflammation, and burn/wound healing programs. The institute will also be an effective gateway for collaboration with the Big Ten/CIC institutions.

Realizing the full value of new biomedical technologies requires partnerships with industry, so that new technologies can be commercialized and brought to market. IRT@RU at Innovation Park will facilitate these partnerships by co-locating with collaborative companies. It will facilitate rapid transfer of discoveries from laboratories to marketplace and become a significant contributing partner to economic development in New Jersey.

**Program Leaders**

Dr. Joachim Kohn, Board of Governors Professor of Chemistry and Chemical Biology will be the founding director of the Institute for Restorative and Regenerative Technologies at Rutgers University. Dr. Kohn is also the founding director of the New Jersey Center for Biomaterials (NJCBM). The 25-year track record of the NJCBM positions it to spearhead this new Rutgers initiative in the fast-developing area of restorative technologies. Through its research and development of innovative biomaterials for diverse medical applications, NJCBM’s work has touched upon many clinical challenges such as tissue engineering of musculoskeletal and nerve tissues, cardiovascular stents, anti-infective surgical devices, novel methods of drug delivery, and interfacing devices with the nervous system. Together with clinical and industrial partners, NJCBM has developed innovative restorative technologies and a strong global network of academic and industrial partners. To date, NJCBM has been successful in bringing in more than $100 million in external funding.

Dr. Sangya S. Varma will serve as the co-director of IRT@RU. Dr. Varma holds the rank of Chief Operating Officer (COO) of NJCBM and Associate Research Professor at Rutgers University. She previously served as the Director, Professional Science Master’s – Master of Business and Science (MBS) degree program.

**Stakeholders**

**Internal:** IRT@RU members will be drawn from the Rutgers system-wide community. Faculty from several centers, departments and schools have expressed interest in joining the Institute. They are from the Schools of Arts and Sciences (SAS), Engineering (SOE), Environmental and Biological Sciences (SEBS), Ernest Mario School of Pharmacy (EMSOP), Rutgers School of Dental Medicine (RSDM), New Jersey Center for Biomaterials (NJCBM), Center for Dermal Research (CDR), W.M. Keck Center for Collaborative Neuroscience, Institute of Marine and Coastal Sciences, the Office of Economic Development, and the Office of Research Commercialization. Membership is expected to expand as the institute develops.
External: It is sometimes difficult for external collaborators to navigate through the large and complicated avenues of Rutgers and its many offerings. IRT@RU will be a one-stop connection for those interested in restorative technologies as they relate to the restoration of health, form and function to bones, tissues, and organs impacted by trauma, disease and aging.

Research

Meetings were held with the Chancellor of RBHS, deans, chairs and directors of centers/programs who have indicated that this institute will provide the necessary gateway for collaboration based on synergies between teams inside and outside of Rutgers, particularly for collaboration with the Big Ten/CIC institutions. The leadership of the Office of Economic Development also agrees that such a program aligns well with the strategic planning of the university to create stronger industry-academia partnerships, as well as with the goals of the state economic development plan.

Program Components

IRT@RU will be built as a networked consortium rooted in leading Rutgers research and clinical teams. The consortium will encompass academic and clinical collaborators within the Big Ten/CIC, and from other leading academic, clinical and industrial organizations around the globe. The institute will provide common core services, including but not limited to in-vivo studies, preclinical data accumulation, regulatory services, etc. It will align design and engineering teams with operations and foster cross-functional collaboration. It will facilitate new product development through effective product lifecycle management. IRT@Rutgers will pursue goals in the following areas:

- **Research Partnerships** – Stimulate innovative basic, applied and translational research in biomedical science focused on bone, tissue and organ restoration.
  - Participating centers and faculty will work on developing novel materials, tools and approaches for healing and regenerating complex tissues and organs, controlling inflammation and infection, reversing the effects of aging, and developing targeted delivery of therapeutics.
  - The institute will build research teams and lead the submission of major center/collaboration/partnership proposals.
  - The institute will serve as an R&D partner to industry groups that collaborate with Rutgers faculty via the Park.
  - The institute will form a scientific community around common research interests and funding opportunities, leading to increased synergy across Big Ten/CIC institutions, industry, and select international partners.

- **National Programs Funded by Federal Grants and Contracts** – Coordinate and support biomedical technology programs focused on restorative technologies.
  - The institute will build on NJCBM’s success in obtaining the only NIH Biomedical Research Resource (P41) program to date (2003-present) in New Jersey’s history, as well as the work of the Armed Forces Institute of Regenerative Medicine (2008-present) to develop new federally-funded consortia around core technologies that enable restorative biomedical approaches.
• **Education and Outreach** – Serve as a focal point for biomedical education and professional development that centers on restorative technologies.

  - The institute will expand its multi-institutional National Research Service Award postdoctoral training program (2002-present) to encompass relevant faculty at RBHS and at Big Ten/CIC institutions.

  - The institute will organize and present a series of scientific conferences to build on the success of the 13 New Jersey Symposia held on Biomaterials Science, partnering with Big Ten/CIC institutions and holding annual conferences that rotate among them.

  - The institute will expand the NJCBM International Student Exchange Program to include other Rutgers units and Big Ten/CIC institutions.

• **Technology Transfer and Translation** – The institute will provide additional value to the activities of the Office of Research Commercialization and the Office of Translational Science by participating in the Rutgers innovation ecosystem on behalf of collaborative teams of faculty and industry.

  - The institute will develop and sustain expertise in Regulatory Science, with emphasis on restorative combination devices.

  - The institute will establish and promote interactions with companies and angel investors focused on restorative technologies.

  - The institute will assist in the development of a Faculty Ambassadors program as proposed in the recent NIH REACH project, in which faculty with entrepreneurial expertise provide peer-to-peer mentoring to faculty inventors.

**Needs/Gaps**

IRT@RU will form linkages among Rutgers units – academic, clinical and administrative – for furthering research, development and commercialization in restorative technologies. It will serve to build New Jersey into a strong MedTech hub by catalyzing a bioscience cluster and rapid transfer of discoveries from creative Rutgers laboratories to the marketplace. IRT@RU can be used as a model for other units seeking to develop and build multi-disciplinary, public-private partnerships throughout the innovation process – from basic science to commercialization.

**Justification**

The creation of IRT@RU will spur the formation of a unified, integrated and robust infrastructure that will break down traditional silos and showcase Rutgers combined strengths to create opportunities for advanced research and development in restorative technologies. IRT@RU will also provide a streamlined pathway for corporate engagement.
Benefits/Outcomes

Outcomes for Rutgers

- Increased funding for research through connections between RBHS and the research/engineering divisions of the university
- Greater national & international recognition as a leading biomedical research institution through substantive connections with new partners amongst the Big Ten/CIC institutions and other leading research centers around the world.
- Enhanced intellectual property generation in diverse fields of restorative medicine through close coordination with the Rutgers Office of Research Commercialization (ORC).

Outcomes for Industry

IRT@RU will be able to form teams that will find innovative solutions to real world problems. Corporate partners can co-locate at the Park, be potential sponsors of projects, and provide closer oversight of related activities.

Value Proposition

Multidisciplinary, public-private teams can analyze an opportunity or a problem from an integrated science and business perspective using a systems approach. Utilizing existing resources, there will be no need for investment in permanent assets for IRT@RU activities, thus corporate partners will have the opportunity to address problems/opportunities that might otherwise be too expensive or difficult to pursue on their own. IRT@RU will encourage effective collaboration and contribute to a thriving innovation ecosystem at the Park.

Industry Partnerships

It is anticipated that some corporate collaborators of IRT@RU will co-locate at the Park. Other industry partnerships will be aggressively cultivated.

Program Title: Rutgers Biomedical and Health Sciences

Overview

RBHS Background

Rutgers Biomedical and Health Sciences (RBHS) was officially formed on July 1, 2013 via the New Jersey Medical and Health Science Education Restructuring Act which merged most of the former University of Medicine and Dentistry of New Jersey, a comprehensive, public medical and life sciences university, with Rutgers University, the state’s public land grant university and member of the prestigious Association of American Universities. The merger greatly enhanced opportunities for increased academic collaboration, innovation and commercialization at the expansive new Rutgers organization, and economic development across the region.

RBHS is an academic health center and a member of the Association of Academic Health Centers, a non-profit organization that advances health and well-being. An academic health center is a
university-based system that encompasses medical and health professional schools as well as owned or affiliated partner hospitals. These centers do not function as a regular hospital. An academic health center:

- Provides patients and the community with health care for everyday needs and the most specialized services for complex diseases, illnesses and injuries
- Offers unique care not available anywhere else in the region
- Teaches generations of health care professionals with an eye on training the right mix of providers for tomorrow’s needs
- Develops technology and carries out research that improves lives

Preliminary analyses by RBHS administration and research leadership suggest high value in RBHS utilization of Innovation Park space.

RBHS Geography

RBHS and its hospital partner system span two main campuses (Rutgers–Newark and Rutgers–New Brunswick) located about 30 miles apart, and include the following main schools and major institutes:

Table 1. Geographic Distribution of RBHS Schools and Institutes

<table>
<thead>
<tr>
<th>Newark, NJ</th>
<th>New Brunswick, NJ / Piscataway, NJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain Health Institute^</td>
<td>Cancer Institute of New Jersey</td>
</tr>
<tr>
<td>Graduate School of Biomedical Sciences^</td>
<td>Center for Advanced Biotechnology and Medicine</td>
</tr>
<tr>
<td>New Jersey Dental School</td>
<td>Environmental &amp; Occupational Health Sciences Institute</td>
</tr>
<tr>
<td>New Jersey Medical School</td>
<td>Ernest Mario School of Pharmacy</td>
</tr>
<tr>
<td>School of Health Related Professions</td>
<td>Institute for Health, Health Care Policy and Aging Research</td>
</tr>
<tr>
<td>School of Nursing</td>
<td>Robert Wood Johnson Medical School</td>
</tr>
<tr>
<td>University Hospital (affiliate)</td>
<td>School of Public Health</td>
</tr>
<tr>
<td></td>
<td>Robert Wood Johnson University Hospital (affiliate)</td>
</tr>
</tbody>
</table>

^ note: encompasses both campuses

The New Brunswick and Piscataway-based RBHS biomedical education and research entities and hospital partner in Table 1 are located adjacent to or in very close proximity to the Rutgers University science schools and institutes, facilities and tertiary care hospital in the same cities. The Park will also reside in this same, central New Jersey location on the Rutgers University Livingston campus in Piscataway.

RBHS Synergy

In November 2014, Chancellor Brian Strom (MD, MPH) released the RBHS strategic plan, a comprehensive report which describes key initiatives in academics (research & education), clinical care and the community. First, in the broadest sense, the Park will serve the cited objective to “foster integration and collaboration across RBHS and between RBHS and the university’s non-RBHS programs and build academic strength in health throughout Rutgers.”
Second, specific research advancement goals within the strategic plan were outlined in the context of RBHS signature areas, complementary areas and other enabling structures (Table 2). Signature areas are those of highest strength, notable excellence and potential to be regarded as among the best in the nation within five years. Complementary areas are also strong RBHS programs and important to emphasize and grow, but aren’t yet evolved to reach “nation’s best” stature. Enabling structures include technological capabilities and faculty-friendly programs and policies to promote scholarship, discovery, recruitment and retention. Most, if not all, of the priority development targets in the RBHS strategic plan can be very well-served by specialized space and equipment and interactive RBHS tenancy in the Park.

In particular, related to the ‘Infection and Inflammation’ area, the plan notes “encouraging and rewarding collaboration by moving faculty with common interests to common locations in Newark and New Brunswick/Piscataway” and also “establishing partnerships with pharmaceutical and biotechnology companies.” A similar goal is mentioned for the ‘Neuroscience’ area, which is to “establish stronger liaisons with the biotech and pharmaceutical industry in collaboration with the drug development and clinical research complementary programs.” The Park can act as the catalyst for establishing closer RBHS and biomedical industry ties.

The ‘Drug Discovery and Development’ complementary area is also cited in the plan as follows: “A Rutgers-wide Drug Design Center will be formed to enhance collaborative design and discovery of lead compounds to advance medicine and the understanding of disease” and “promoting joint recruitment of world-class faculty across academic units.” Based on preliminary discussions, the Park could be a logical home for the Rutgers/RBHS Drug Design Center given the nearby RBHS medical schools, cancer institute and large biopharma presence in New Jersey.

In terms of enabling structures, occupancy of Park space can be another win for RBHS in terms of faculty development. The strategic plan cites the general goal to “improve faculty morale and invest in resources that support research, clinical, and teaching activities of current faculty.” Further, the Park can help advance the Rutgers brand as Chancellor Strom intends.

It is clear that the RBHS strategic plan research initiatives fit very well with the vision and goals of the proposed Innovation Park, both in terms of facility planning and important faculty support and development needs in the signature, complementary and enabling structures areas.

Table 2. RBHS Signature Areas, Complementary Areas and Enabling Structures

<table>
<thead>
<tr>
<th>Signature Areas</th>
<th>Complementary Areas</th>
<th>Other Enabling Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer</td>
<td>Clinical Research</td>
<td>Advancing Rutgers Stature and Brand</td>
</tr>
<tr>
<td>Community Health &amp; Systems</td>
<td>Drug Discovery and Development</td>
<td>Faculty Development</td>
</tr>
<tr>
<td>Environment. and Occup. Health</td>
<td>Informatics</td>
<td>Programs and Practices</td>
</tr>
<tr>
<td>Infection and Inflammation</td>
<td>Public/Global Health</td>
<td></td>
</tr>
<tr>
<td>Neuroscience</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Prominent occupancy and involvement of RBHS at the Park may significantly enhance the innovation ecosystem. According to a 2012 survey of North American research parks\(^1\), the highest rated factor in successful innovation was a “good match between the core competency of the affiliated university and the recruited tenants.” Given that Rutgers and RBHS are in the middle of New Jersey’s strong biopharma footprint, Park programs and recruitment efforts will focus on the life sciences industry.

**RBHS Technology Development and Commercialization**

RBHS is rising rapidly as a source of biomedical innovation and making significant contributions to New Jersey’s economic development. New spin-off companies create new jobs, and perhaps most important of all, new companies deliver new advancements to improve the health of individuals and the community, which is also a main objective cited in the strategic plan. Through education, research and technology development, RBHS’s primary goal is to enable and promote better health and provide better healthcare in the community.

**Biomedical Education**

In his strategic plan, Dr. Strom also called for improvements in educational programs. Often the first who come to mind when discussing biomedical education are faculty and students engaged in classroom instruction and learning in the pursuit of professional degrees: medical students, nursing students, future pharmacists, etc. Yet RBHS and all academic health centers also provide education to future academics, industry scientists and those who will pursue other scientific and/or health policy careers. The RBHS Graduate School of Biomedical Sciences on both the Newark and New Brunswick/Piscataway campuses offers programs for master’s and doctoral students who often utilize laboratory space for their own educational pursuits outside of their classrooms. The same goes for post-doctoral staff further along in their careers, but also requiring lab space in order to complete work to earn career advancement.

At RBHS there is a shortage of available, modern space. Access to space at the Park can provide a very valuable educational benefit for individuals and also increase the quality of the programs RBHS offers.

**Summary**

Utilization of space at the Park fits RBHS’s research and educational needs in many ways as noted in the RBHS strategic plan. Dr. Strom and Dr. Scotto (Dean, Graduate School of Biomedical Sciences) are in general agreement that access to the Park will be a great asset to RBHS.

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\(^1\) *Driving Regional Innovation and Growth: Results from the 2012 Survey of North American Research Parks*. The Battelle Technology Partnership Practice. August 2013.
Examples of RBHS programs that align with Innovation Park

Program Title: Rutgers Medical Device Accelerator  
*Program Lead: Tomer Davidov, MD FACS (RWJMS)*

**A. Purpose**

To create a center where physicians and engineers at Rutgers can collaborate and develop novel medical devices that address unmet clinical needs.

**B. Program Leaders**

A sample of the program leaders: Tomer Davidov (Department of Surgery); Martin Yarmush/Mark Pierce (Biomedical Engineering); Tom Nosker/Jennifer Lynch/Laura Fabris (Materials Science); Mehdi Javanmard (Electrical Engineering); Vince Smeraglia/Yair Harel (Tech Transfer Office); George Heinrich/James Golubieski/Mike Wiley (New Jersey Health Foundation); other faculty from RWJMS with interests and experience in innovation and entrepreneurship.

**C. Program Details**

The program will involve weekly brainstorming sessions with Dr. Davidov and the other core program leaders during which clinical faculty from the medical school will be invited to discuss clinical problems and propose solutions. A dedicated multi-disciplinary team of physicians, engineers, scientists, business and legal consultants can collaborate in the development of proposed medical devices and innovations to address these problems. Physicians at RWJMS have deep insight into unmet clinical needs and have great ideas, but do not have the time or resources to develop them on their own. The engineering faculty have cutting edge technologies, but do not necessarily have a deep understanding of genuine clinical needs. Even when individual faculty members take the initiative and submit invention disclosures, it is difficult to license products that are still at a very early stage of development. For this reason, many great inventions (and potential licensing opportunities) at RWJMS never come to fruition.

Below are examples of technologies already suggested by clinicians at RWJMS with potential for development via the medical device innovation center:

- Puncture resistant surgical gloves – Engineering/Materials Science
- Transcutaneous blood tests (for point of care diagnostics) – Biomedical/Electrical Engineering
- Custom bone or cartilage replacement – Biomedical Engineering/3D printing
- Hernia mesh with new antimicrobial – School of Pharmacy
- Diagnostics to better distinguish benign from malignant thyroid nodules – CINJ/DNA Microarray Core Facility
- An app that sends physicians text alerts of critical labs – Computer Science
- Growing liver tissue for transplantation – Biomedical Engineering/Tissue Engineering
• Hand-held articulating robotic/laparoscopic instrument – Biomedical Engineering/Robotics
• Fogless laparoscope – Biomedical Engineering/Optics

By investing in this program, providing a wet lab, a computer lab, and office space, and hiring a few full time employees to help move great ideas developed by RWJMS faculty through the innovation process, the medical school will be far more likely to successfully develop medical devices to a point that competitive federal grant funding (NIH/NSF/DOD/SBIR) may be obtained or the technology may be licensed or commercialized through a start-up. With Rutgers and RWJMS sharing ownership of the intellectual property, these innovative ventures may become a source of future revenue. An example of a successful program and possible model for the center is Stanford’s StartX-Med program.

Program Title: Developing Novel Therapeutics for Neurodegenerative Diseases
Program Lead: M. Maral Mouradian, MD

A. Purpose
The goal of this program is to conduct translational studies to identify therapeutic targets and molecules for two main purposes; to develop improved symptomatic treatments for degenerative disorders of the brain such as Parkinson’s and Alzheimer’s diseases, and to develop novel disease-modifying therapies that will slow down or stop the progression of these devastating disorders. The economic benefits of this effort are clear as these diseases affect millions of individuals in the U.S., costing the country billions of dollars each year in medical care, long term care facilities, and lost productivity.

B. Program Leaders
Led by M. Maral Mouradian, MD, this effort will include scientists from the start-up MentiNova, Inc., faculty and staff from the Department of Neurology, Center for Neurodegenerative and Neuroimmunologic Diseases, and RWJMS, can also be recruited. In addition, it is anticipated that yet-to-be-developed start-ups will join, especially those formed around IP developed by Dr. Mouradian.

C. Details
The program focus on developing novel therapeutics for neurodegenerative diseases is the result of long standing research and development conducted by the program leader and her collaborators. It is also fueled by the start-up MentiNova as well as additional, recently issued IP.

The purpose of the program is to conduct R&D that will lead to the creation of new therapeutics, which will have wide ranging impact both domestically and internationally. This program will also serve as fertile ground for training the next generation of scientists who will have an understanding of how to bridge the gap between academia and industry and how to translate discoveries from the laboratory to the clinic.
Program Title: Snowdon, Inc.
Program Lead: William J. Welsh, PhD

A. Purpose

Snowdon, Inc. is a pharmaceutical company that is focused on three major therapeutic areas with substantial market potential: cancer, pain, and infectious diseases. These medical conditions cause immense suffering, economic hardship, and loss of life among millions of people every day. In each of these therapeutic areas, Snowdon has discovered prospective drug candidates that address the urgent need for safe and effective medicines.

Snowdon’s pipeline extends from new chemical entities (NCEs) to repurposing off-patent drugs for new clinical indications. The company’s preclinical lead compounds have shown exceptional safety and efficacy when administered orally in rodent models as a treatment for neuropathic pain.

In the infectious disease arena, Snowdon is engaged in discovery-stage projects for viruses such as hepatitis C (HCV) and Zika. Snowdon’s infectious disease program has been funded through grants from the NIH, the New Jersey Commission on Science & Technology (NJCST), and the U.S. Department of Defense (DoD).

Snowdon’s technology platform, Avalanche, is built for speed, economy, and maximum success rate. Avalanche is a new ligand-based virtual screening tool under development that incorporates both shape- and attribute-based comparison with 3D alignment between the query molecule and test compounds residing in a chemical database. Avalanche excels at scaffold hopping, since it uniquely matches molecules based on 3D shape and pharmacophoric surface features (donor, acceptor, hydrophobic, +/- charge, etc.) rather than on chemical structure. Avalanche proceeds in two fast, automated steps: Initial shape/attribute based comparison, followed by 3D alignment of the top hits which are scored, re-ranked and presented to the user for further visualization and evaluation.

By seamlessly combining molecular shape and surface features with 3D alignment, Avalanche enhances the chances of success in finding more biologically relevant hits and leads that would be
missed by common substructure-based or fingerprint-based virtual screening methods (J Comput Aided Mol Des, 29(11):1015-24 (2015)). Convenient access to the full capabilities of Avalanche is provided via the web or desktop/laptop. Avalanche is wholly developed and owned by Snowdon, Inc., and can be customized to address diverse applications.

**B. Program Leaders**

William J. Welsh, with support from Snowdon consultants

**Stakeholders:** Snowdon is co-owned by the founder William J. Welsh (60%), the New Jersey Health Foundation (20%), and Rutgers University (20%). Snowdon holds quarterly board meetings convened by founder Dr. Welsh with representatives from the New Jersey Health Foundation and Rutgers University.

**C. Program Details**

Snowdon is a private company with interests drawn from the Rutgers' faculty (i.e., Dr. Welsh), Rutgers University at large, and the New Jersey Health Foundation.

**Justification:** Snowdon will produce multiple benefits and outcomes, most importantly the discovery of novel therapeutic agents for cancer, pain, and infectious diseases, and the development of advanced computational tools that create value by accelerating drug discovery.

**Value Proposition:** The development of novel therapeutic agents for cancer, pain, and infectious diseases, together with the development of advanced computational tools for accelerating drug discovery, will produce valuable IP for the company and its shareholders (Rutgers University and the New Jersey Health Foundation). Licensing of this IP to major pharmaceutical companies will generate industry revenues and create job prospects for talented scientists and managers, leading to economic development gains at the local, regional, and national levels.

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**Program Title: Sustainability Design and Programmatic Concepts**

**Overview**

**Purpose – Goals and Objectives**

The inclusion of sustainability-oriented design and programmatic concepts for Innovation Park is consistent with and enables the overall goal of the project – creation of “communities of innovation” that promote research collaborations, technology commercialization, job creation, university-industry partnerships and community development. The sustainability concepts outlined here add economic, social and environmental value to the project’s bottom line – the so-called “triple net” approach to sustainable development. Design-related sustainability concepts for Innovation Park seek to optimize the performance of ecological systems, energy infrastructure, and buildings. Programmatic-related sustainability concepts have the objective of supporting organizations’ sustainability missions through the provision of collaborative and innovative spaces – instrumented for data capture through which to improve performance – and through in-situ executive sustainability leadership education and rank-and-file workforce development opportunities associated with the implementation of sustainability objectives.
Program Leaders

1) Regarding sustainable design specifications, pre-development leaders/contributors include: Rutgers Facilities, Rutgers Center for Green Building and invited Rutgers faculty/staff. Of particular consideration is the Rutgers EcoPreserve given its adjacency to the Park. Thus the role of the Preserve-Park connection in watershed, wildlife and plant-life species management is key. Rick Lathrop from the Rutgers Center for Remote Sensing and Spatial Analysis has been charged with managing the environmental assets for the Preserve. Rutgers has an opportunity when crafting the developer RFP to establish the basis for sustainable and innovative Park infrastructure, including provisions that go beyond Rutgers’ existing design standards. Rutgers may reserve the right to design and implement certain aspects of Innovation Park directly, either because these are completed prior to an agreement with a developer for subsequent build-out or because Rutgers assumes this role as a part of a negotiated agreement with a developer. To this end, additional partners may include:

- NJ Board of Public Utilities (NJBPU)/PSEG; Alstom (Philadelphia Navy Yard microgrid operator) or other operators of microgrids; and the Microgrid Resources Coalition (MRC), comprised of owners, operators, developers, suppliers and investors who advocate for microgrid policies and regulations supporting their deployment. Periodically, the NJBPU via PSEG, funds the design, construction and operation of microgrids (owned by PSEG). The U.S. Department of Energy also makes funding available for microgrids through competitive research grants. It is imperative that energy master planning that includes the eventuality of a microgrid occur in the early stages of the Innovation Park project. The resulting roadmap will serve to guide future investments in energy infrastructure related to Innovation Park and Livingston campus, and is moreover a strategic point of intersection with the advanced computing infrastructure (ACI) backbone of Innovation Park.

- Delos, a firm that provides “research, consulting, real estate development and innovative solutions for the built environment that nurtures and promotes human health and wellbeing”, and also the creator of the WELL Building Standard (WELL): Delos is seeking a pilot of its office building standard and this represents an opportunity for the Park to act as a showcase model for WELL, and for Rutgers researchers to assess the impact of WELL on the real and perceived quality of place of the Park.

- U.S. Green Building Council (USGBC): While the USGBC is unlikely to be a partner, per se, in drawing upon the Leadership in Energy and Environmental Design (LEED) building standard for the Park RFP, Rutgers may refer to the resources of the USGBC.

2) Regarding sustainability programming, an overlapping and also more extensive set of partners is possible. Leadership will come from a combination of Rutgers personnel and the developer of the Park and any other operating entities (as charged). Contributors are listed by program area below.

Grid operators: Grid operator (if not Rutgers or the developer); the Philadelphia Industrial Development Corporation (PIDC) which has indicated interest in sharing lessons learned; peer
groups at the Association of American Universities (AAU) and Urban Land Institute (ULI) that can share their experience with microgrids and Living Lab advanced energy research programs at their own parks (e.g., AAU Big10 & Friends Sustainability Committee, ULI University Development and Innovation Council); Rutgers Discovery Informatics Institute (RDI2) and associated members and peer groups comprise additional interested parties in terms of addressing computational challenges and solutions for users and other benefactors of “big data”.

Building operations: Park operator and Rutgers Facilities; to the extent that Innovation Park serves as a Living Lab, Rutgers researchers will be involved in Measurement & Verification (M&V) protocols with the opportunity also to extend these activities into workforce training and K-12 education curricula.

Regarding access to building data, it would be wise to include these terms as part of a master lease agreement. Increasingly common are “green leases” that not only specify what material finishes are acceptable and other operating practices for tenants, but also provide a priori access of energy bills and other related data to interested parties. Creating these up-front data protocols is an important step towards making Innovation Park a site for energy efficiency and sustainability education.

Measurement & Verification (M&V): The LEED and WELL building standards, as well as microgrid operations, require M&V to assess actual versus projected performance (for certification) and as a means for continuous improvement in operations. M&V activities are synergistic with Rutgers’ interest in Living Lab and are an example of a use-case for the Park’s ACI. Living Lab hardware, software and survey/interview protocols should be incorporated during the design phase of Innovation Park. The Living Lab concept at the Park will serve as a model for retrofitting other Rutgers campuses based on lessons (to be) learned. Contributors will include the developer/Park operator (if different), tenants, Rutgers Facilities (regarding any aspects of the Park under direct management or occupancy), RDI2, and Rutgers researchers (non-contractual).

Workplace of the Future Living Lab/s: Multiple opportunities to realize the Living Lab objective of Rutgers University’s Strategic Plan are possible at Innovation Park, thereby associating building and infrastructure performance data with excellence in teaching and research. Microgrids, LEED and WELL buildings are themselves laboratories for experimental learning: A Living Lab at Innovation Park can either be thought of as one program with multiple facets or there can be multiple Living Lab initiatives. Some overarching data framework will probably be helpful. A current Living Lab initiative taking place on the New Brunswick campus, funded as a Strategic Plan initiative by Chancellor Dick Edwards, is focused on the “workplace of the future”. This would seem a highly appropriate focus to extend to Innovation Park and in which to incorporate additional researchers.

Sustainability Education: The development of programs in sustainability education can be led/contributed by the Office of Continuing Education, the Rutgers Center for Green Building, select business school colleagues and other interested parties such as the Rutgers University Sustainability Committee members. Opportunities exist for executive-level, continuing education and academic modules.

Stakeholders

Internal and external stakeholders have been described in the previous section. A major partner will be the Rutgers Center for Green Building (faculty/staff) which has extensive experience working with commercial industry partners in the development and post occupancy evaluation of green/
healthy buildings, and in developing sustainability education for various audiences. The center is currently working on the “workplace of the future” Living Lab, and is lead partner (with colleagues from Rutgers Department of Computer Science) on an Internet of Things (IoT) National Institute of Standards and Technologies (NIST)/U.S. Ignite Global City Teams Challenge. This latter project entails development of a crowd-sourced living lab/smart cities platform, which can possibly be adapted to serve Innovation Park (https://www.us-ignite.org/globalcityteams/).

Research

The following is an overview of the research that informs the development of the sustainability plan for Innovation Park:

- Microgrid Resources Coalition: meeting with Joe Sullivan, member
- EcoPreserve/Innovation Park relationship: discussion with Rick Lathrop
- University of Arizona Science and Technology Park: driving tour
  - Innovation at Arizona State University (ASU): in-person discussion with Chuck Redford, Founding Director, ASU School of Sustainability and Julie Ann Wrigley, Global Institute of Sustainability
  - Innovation Districts: participation in DNA of Innovation Districts (APA Session S450) with Thomas Osha, Managing Director, Innovation & Economic Development, Wexford Science + Technology, and Adam Gross, FAIA, Principal, Ayers Saint Gross
- Innovation Parks and Districts, other resources: Brookings Institute, ULI, APA
- Delos: email communication with NYC office
- Green Leases, LEED, Tenant Star: existing knowledge plus updates
- Misc: The Thomas A. Edison Papers Project at Rutgers has expressed an interest in programming connections (future, TBD)

Program Components

Programs and Services

Advanced energy infrastructure: Based on its location at Livingston campus, Innovation Park has access to a new 25MW substation; hot water, water, sewer and other utilities including networking conduits. The Livingston campus solar farm and solar parking canopy are located nearby along with cogeneration and geothermal energy plant infrastructure. These existing assets can be leveraged not only to help satisfy some of the energy demands of Innovation Park and to generate incremental revenue via leasing, demand response and/or participation in other energy programs, but also as the backbone of a microgrid that supports the day-to-day functioning of the ACI, facilitates advanced energy conservation measures in buildings and ensures the resiliency of the ACI system and business continuity functions. Moreover, it is envisioned that the ACI itself may
incorporate a fuel cell, distributed generation, and utilize recycled waste heat. While it requires serious up-front planning, the benefits of a central energy plant and especially a microgrid structure, are numerous.

**Sustainable wastewater infrastructure:** Coordinated sustainable wastewater management in research/innovation park settings has become rather commonplace and is not difficult to achieve according to Wexford Science + Technology. Depending on whether/how Innovation Park will connect to Piscataway Water and Sewer and/or Livingston campus, opportunities to capture wastewater heat from effluent may exist along with other opportunities for greywater recycling, rainwater capture, etc. Increasingly water is a scarce resource and the energy required to deliver and process it is enormous. Therefore, sustainable wastewater infrastructure presents a strong value proposition and a hedge against future water scarcity/increased pricing.

**LEED buildings:** The recommended LEED standard for the Park is gold for non-Rutgers tenants and platinum for any building to be largely tenanted by Rutgers’ programs or willing anchor tenants. Within the LEED rating system is an opportunity to drive designers to emphasize certain point categories over others. It makes sense for Rutgers to establish a template for the developer/tenants that includes emphasized points based on the geographical, topographical and ecological sensitivities of the site, as well as based on a concern for human health and productivity. In practice, this can mean emphasizing sustainable storm water management, energy and atmosphere (reduction of energy use and greenhouse gas emissions), low and no VOCs in interior finishes, daylighting, etc. Moreover, each building/tenant will derive points towards LEED certification from Park-level assets such as a microgrid (renewable energy), location near transit (bus route), watershed and other meta-level ecological services, recycling and other aspects of sustainable waste management, etc. The coordination of LEED Core & Shell with LEED Interiors will occur through the agency of the Park developer/operator and/or Rutgers. It is highly likely that these buildings will additionally qualify for Energy Star certification, in keeping with a Rutgers Facilities emphasis on this designation. The idea here is to assume a master planned approach to LEED to benefit Rutgers, the developer and individual tenants while resulting in a more cost-effective higher performing built environment.

In addition, tenant building-level operations should conform to provisions of a standard green lease. In recent years, usage of so-called green leases has grown exponentially. The largest collection of green leases is found at the Green Lease Library, as maintained by the Institute for Market Transformation (http://www.greenleaselibrary.com/).

**WELL Building Standard:** The WELL Building Standard (WELL) has been advanced as the first building standard focused exclusively on human health and wellness. It was developed by Delos, and is grounded in a body of evolving medical research on the relationship between buildings and the health and wellness of occupants. WELL sets performance standards in seven categories: Air, Water, Nourishment, Light, Fitness, Comfort, and Mind. The WELL Building Standard is third party certified by Green Business Certification Inc. (GBCI), the same organization that administers LEED. The suggested program for Innovation Park is that WELL certification be pursued for at least one building that Rutgers will occupy, with associated intent to monitor the extent to which projected health and wellness outcomes are met. As noted above, there is interest from Delos in pilot projects and thus there may be an opportunity to secure financial and other assistance in this endeavor from WELL and/or vendors and others that may be involved in this project.
**Sustainability education:** There are multiple opportunities for sustainability education at Innovation Park. These include programs aimed at tenant businesses, workforce (industry and university), and K-12 visitors to the Park (and within a daycare setting or magnate school, etc). In each of these cases, the Park serves as a Living Lab, providing an opportunity for experiential learning. There are numerous examples to draw upon. A leading example is Harvard’s Executive Education for Leadership Sustainability Program at its Center for Health and Global Environment. ([http://www.chgeharvard.org/category/executive-education-sustainability-leadership](http://www.chgeharvard.org/category/executive-education-sustainability-leadership)). Also, a number of universities offer online executive sustainability masters courses. A leading example is found at ASU, within its School of Sustainability. ([https://sustainabilitysolutions.asu.edu/programs/executivemasters/](https://sustainabilitysolutions.asu.edu/programs/executivemasters/)). Rutgers can offer a combination of on-line/on-site campus programs in sustainability.

**Living Labs:** Sustainable design and sustainability programming contribute towards the imperative of place-making at Innovation Park. It is important to recognize that “innovation has become almost entirely a social enterprise” and that “creative and productive value of real estate [increasingly is] trumping economics”iii. Health and Wellness design and programming features play an important role in place-making as well, as suggested in the discussion above.

**Benefits/Outcomes of the Program(s)**

There are numerous direct benefits and indirect co-benefits associated with the recommended sustainability concepts in design and programming for Innovation Park. Direct benefits include alignment with Rutgers’ strategic plan objectives – helping to realize excellence in research, teaching and service in areas related to sustainability, health and wellness and Living Labs. Associated outcomes can be measured in terms of research grants and publications, and teaching activities that leverage the sustainability content of Innovation Park, along with best practice transfer activities to tenants, other organizations and jurisdictions, some of which can be directly measured through fee-for-service programs such as sustainability education, or contracted ACI services that tie into a sustainability agenda. Other direct benefits that can be measured as outcomes include energy and water savings (savings over a baseline case). Indirect benefits may include productivity gains due to healthier buildings (typically measured as fewer absences) and overall satisfaction with quality of life at the Park (measured via user surveys and also by HR as employee attraction and retention). Additional indirect benefits include the education of the next generation in matters of sustainability and big data computation, and the value of Rutgers establishing itself as a leader in this space among its peers. Furthermore, increased resiliency of the Park and its ACI as attributable to the installation of a microgrid could be considered as an indirect benefit; the outcome measure is the economic opportunity cost of losing the network during an energy event along with business discontinuity costs against which the Park operator could be held liable.

**Value Proposition**

The sustainability concepts outlined in this report add economic, social and environmental value to the proposed Park. Operational savings are expected from the implementation of water, waste and energy conservation measures. The proposed microgrid additionally conveys a resiliency benefit for the ACI backbone of the Park and for guaranteeing business continuity to tenant operations. Improved quality of life and productivity for users of Park space are expected to accrue as a result...
of healthier and sustainable design, including an extension of environmental conservation measures from Rutgers EcoPreserve into Innovation Park, along with higher quality of life scores as a result of sustainable place-making. Collectively, these attributes add value correlated to success in tenant attraction and retention and helping Rutgers to establish itself as a leader in innovative and sustainable real estate design and programming.

**Industry Partnerships – Next Steps**

Suggested next steps with potential industry partners include:

- Reach out to/meet w/AU peer group with microgrid experience
- Look more deeply at water infrastructure and associated sustainability objectives including review of deployed examples at other research park settings
- Look more closely at EcoPreserve/Park synergies; contact St. Louis downtown Botanical Garden representatives. It is the largest such urban garden in the U.S. and is involved in medicinal foods research.
- Invite Delos to campus. NYC office has offered to send a team of executives to Rutgers to discuss application of the WELL Building Standard.
- Meet with Rutgers Office of Continuing Education on development of executive sustainability education. Discuss best practices with industry peers such as Leith Sharpe at Harvard.
- Begin to canvas possible donors to a Rutgers Office of Sustainability (building and program efforts)

*Other possible next steps not involving an industry partner:* develop LEED master plan program for Innovation Park including prototype green lease. Depending on interest from partner firms, there could be co-location of staff in the Park.

Endnotes

2. A Living Lab for Sustainability. Participants: Clinton Andrews, PhD, Professor, Associate Dean for Planning & New Initiatives, and Director Rutgers Center for Green Building; MaryAnn Sorensen Allacci, PhD, Research Project Coordinator, Rutgers Center for Green Building; Dunbar Birnie, PhD, Professor, Department of Materials Science and Engineering; Jie Gong, PhD, Assistant Professor, Department of Civil/Environmental Engineering; Michael Kornitas, Director of Sustainability & Energy, Rutgers Facilities/Committee for Sustainability.
Program Title: Workforce Development

Overview

Goals: To develop a comprehensive set of programs and services that connects Park tenants with a talented, diverse workforce; that provides opportunities for students, faculty, and community members to achieve their education and career goals; and that maximizes opportunities for all of these groups to interact with and learn from one another in order to promote continuous innovation and collaboration in the Park.

Objectives

- To provide tenant businesses with comprehensive tools, events, and services that allow them ready access to a well-trained workforce at all levels of education.
- To provide the structure and services that ensure Rutgers students and faculty are aware of and have many opportunities to access work experiences and jobs (or consulting opportunities) with Innovation Park tenants.
- To develop training, education, and networking opportunities that create pathways for community residents (especially youth and adults with limited education/skills) to connect with both university programs and jobs at Innovation Park.

Program Leaders

Internal

- Executive Director, University Career Services
- Vice President for Continuing Studies and Distance Education, Department of Continuing Studies
- Department of Engineering, makerspace
- iJOBS Director, RWJMS
- Executive Director, Professional Science Master’s program
- Associate Vice President, Degree Completion Program, Department of Continuing Studies
- Dean, School of Health Related Professions, RWJ Medical School
- Executive Director, Center for Women and Work
- Admissions

Key External Partners

- President, Middlesex County College
- Executive Director, Middlesex County Workforce Investment Board
- New Brunswick Health Sciences Technology High School
**Referral Partners (Likely)**

- New Brunswick Tomorrow
- Elijah’s Promise
- Matt Acalde, Life Science Talent Network/BioNJ
- Dean Paranicas, President and CEO, HealthCare Institute of New Jersey
- Ray Vaccari, Manufacturing Talent Network
- Other Talent Networks, as needed
- Other local non-governmental organizations (NGO’s)

**Stakeholders**

**Internal**

- Rutgers graduate and undergraduate students and postdocs in a wide range of majors will have access to internships and job opportunities, as well as a more coordinated set of career development workshops and events.
- Programs offering career and professional development programming will have access to common space and coordination tools to increase event success.
- Programs offering academic and professional development services will have ready access to new streams of prospective students from Innovation Park tenants and community partnerships.

**External**

- Innovation Park tenants will benefit from coordinated HR services that meet talent sourcing and development needs.
- Community residents will benefit from programs that provide access to and training for Innovation Park jobs and Rutgers academic and professional development programs.
- The New Jersey public workforce system will benefit from improved community partnership opportunities with the state’s flagship university.
- Related industry sectors outside the Park will benefit from the knowledge and workforce overflow from the Park.

**Research**

To develop a workforce plan for Innovation Park, the team conducted web-based research to identify reports on workforce best practices at similar research parks. It was clear from these reports that human resources services are both highly valued by employers, yet are not often provided in research parks. To understand more about how workforce services are provided in some leading research parks, the team conducted telephone interviews with several benchmark parks, including the University of Illinois, Purdue, Cornell, and the University of Maryland to better understand their practices. University of Illinois provides the highest level of attentive workforce services among those we interviewed. Their offerings included providing a workforce coordination staff who act as liaisons between career services, tenant HR, and other related services and programs at
the park. The University of Maryland also has unique partnerships with a local community college to provide entry-level lab staff training that connects residents in the area with jobs at the BioPark.

Meetings with program and department leaders within Rutgers yielded a great deal of interest in participation and collaboration on workforce efforts, but also a need for funding to implement new and expanded programming.

- University Career Services is interested in taking the lead role in all recruitment and screening services offered at the Park, including those for non-Rutgers affiliated individuals, and will also continue to offer workshops for students and employer networking opportunities.

- The Department of Continuing Studies is willing to offer training and professional development programming and to contribute staff to plan and seek outside funding for a potential makerspace at the Park.

- Similarly iJOBS, a joint venture by the Graduate School of Biomedical Sciences and the School of Engineering which is funded by NIH Broadening Experiences in Scientific Training (BEST) initiative, the Professional Science Master’s program, as well as others, expressed an interest in participating and coordinating on events and programs.

All programs, however, expressed that they have limited funding available, so would need financial support to afford space at Innovation Park, as well as to fund the additional staff required to offer more programming.

**Program Components**

The Workforce Development Program at Innovation Park is designed to provide Park business tenants with seamless access to a diverse, skilled workforce from Rutgers and the surrounding community in a way that maximizes professional development opportunities for students, alumni, faculty, Innovation Park workers, and community members and promotes enrollment in Rutgers’ educational programs. The following sections describe key program components.

**Key Program and Services**

There are several service-based components of the comprehensive workforce development plan for the Innovation Park. Some of these services will be traditional human resources functions, such as recruitment and screening, that research park tenants have rated highly in benchmarking reports. Other services that will add value to businesses in the Park and further university goals include: providing professional development education and access to degree programs for workers at Innovation Park; building a system of enhanced and better coordinated workshops and networking events to be held at the Park; building on-campus programs in partnership with other educational institutions to create “pipelines” of education that help better connect community members with Innovation Park jobs and Rutgers educational programs; and providing technical assistance to external partners to assist them in the development of programs that meet the requirements of select Rutgers programs and Innovation Park jobs.
**Human Resources Recruitment and Screening Services**

This program component is designed to provide recruitment and screening services to connect tenants with:

- interns and graduates;
- entry-level workers from the community; and
- senior-level experienced workers from the community and beyond.

Rick Hearin, Executive Director of University Career Services (UCS) will lead this service component. Key duties/services will include:

- setting basic standards for recruitment/screening of applicants for Innovation Park jobs;
- assisting Innovation Park employers to create accounts in the Rutgers Career Services Management System (CSM) in order to access students and alumni;
- providing general services offered to all employers seeking Rutgers students/alumni (Information sessions, job postings, applicant tracking, etc.);
- working with the Office of Information Technology to develop (if needed) an applicant tracking system (ATS) for non-Rutgers affiliated job applicants for Innovation Park jobs (E.G. SCII);
- connecting internal and external ATS systems (e.g. if employers post a job in one, they have the option to have it automatically post in the other); and
- developing and managing an Innovation Park employer human resources hiring committee that will perform initial interviews and resume reviews and recommend select candidates for available jobs in Innovation Park (Note: UCS staff cannot do this, by law, meetings with University Counsel will be needed to ensure the proposed panel is a viable alternative).

To ensure that community residents are actively recruited into the labor pool for Innovation Park tenants, internal and external partners will perform basic requirements screenings and refer applicants to apply for jobs through the non-Rutgers ATS system. Rutgers referral partners will include:

- University Career Services staff & Department Career Services liaisons to recruit and refer internal candidates
- New Start Career Network, Heldrich Center for Workforce Development (refer older, exp. and entry-level workers)

External referral partners will include:

- New Brunswick One Stop (Refer entry-level and exp. workers)
- CBO’s in NB/Piscataway (refer entry-level and exp. workers)
- Talent Networks (information sharing, referrals – e.g. BioNJ)
- Employer hiring committee (Need critical mass of Innovation Park tenants – joint HR screening committee)
Professional Development and Degree Education for Tenant Incumbent Workers

This part of the program will provide workers at Innovation Park businesses with ready access to a wide array of education options – from short on-line courses to Ph.D. programs – that allow them to perform at the cutting edge of innovation. To the extent possible, this aspect of the program will use a “stackable credentials” model, which allows workers to combine individual courses over time to complete the requirements for academic certificates, industry certifications, and degree programs. Currently, this can be done within the Professional Science Master’s program, which allows students to take some non-credit continuing education courses that can later be applied toward a credit-bearing certificate and/or a Master’s degree. Rutgers also has agreements with community colleges that allow students to move from Associate’s degree programs into Bachelor’s level program, as well as an agreement with Thomas Edison College to accept Experiential Learning Credit awarded through that institution. In this way, Innovation Park workers have many options to start, stop, and “stack” their experience and education. If funding allows, Innovation Park will also be outfitted with a makerspace to allow for more freeform professional and technical development for Innovation Park workers and Rutgers affiliates.

The Department of Continuing Studies, led by Rich Novak, will oversee non-credit programs and the makerspace, including the management of a TBD Innovation Park Professional Education Coordinator (or Rutgers Education Ambassador) who will operate across non-credit and for-credit domains.

Duties of the Innovation Park Professional Education Coordinator will include:

- Acting as an ambassador for Innovation Park tenant workers (and others accessing Innovation Park) who seek access to non-credit continuing education, for credit courses, and degree programs, especially those designed for working professionals (PSM, iJOBS eligible bio programs, SHRP, RBS, University College, graduate and undergraduate admissions)

- Connect Innovation Park incumbent workers to internal Rutgers programs and select education options offered by outside partners (e.g. Middlesex County College customized training and other training for entry-level workers).

Enhanced, Coordinated Career Development Workshops, Services, and Networking Events

Over the past several years, Rutgers University Career Services (UCS) has been increasing the number and quality of career development workshops, services, and employer networking events (e.g. information sessions, panels, and career fairs) for all students, including undergraduate, graduate, domestic, and international students. In addition, several departments and centers around the university offer a variety of specialized career development workshops and events that fit with the target industries for Innovation Park. These programs include the Professional Science Master’s Program, iJOBS, the School of Environmental and Biological Sciences, the Center for Women and Work, the New Start Career Center, the Healthcare Talent Network (based at the School of Management and Labor Relations) and others.

This service component will involve coordinating and enhancing these events to provide students around the university – and workers at the Innovation Park – with a comprehensive array of tools.
with which to prepare for or advance their work at Innovation Park and elsewhere. These efforts will include the development of a coordinated event calendar through the new single-point-of-entry Career Services Management System (CMS). The system allows departments and centers to work with University Career Services (UCS) to limit their events to select groups of students, if necessary. However, it will provide students across the university with a universal access point for accessing a more comprehensive list of activities and events that can help them hone their professional skills and make an easy transition into employment at Innovation Park or elsewhere. Employees of Innovation Park tenants will also have access to select workshops and events.

In addition to coordinating existing efforts through a joint calendar system, UCS will work with relevant departments and centers to develop new types of networking events and workshops that address the unique needs of Innovation Park employers. These may include organizing site visits, hosting reverse career fairs or poster sessions where students showcase their work, hosting challenge events (e.g. hackathons), and other events and workshops based on evolving tenant employer needs.

Finally, specially trained UCS counseling staff will be housed in the Park to provide career development counseling to students and Innovation Park workers. Students and workers in the Park will have access to one-on-one appointments with career counselors located on-site to help them plan their education and career pathways, which may involve enrolling in Rutgers programs. These staff will work with the Professional Education Coordinator to help connect workers to programs based on their career development goals. Innovation Park counselors will receive special training to allow them to work well with non-Rutgers affiliated workers at the Innovation Park.

Rick Hearin will oversee these coordination and enhancement efforts, including the management of a TBD Professional Workshops Coordinator. The duties of the TBD Professional Workshops Coordinator will be to

- Assist department and centers not currently in the CSM system to add events to the coordinated calendar or to access accounts in the CSM system
- Assist UCS staff and staff from other departments and centers to book space for workshops and networking events at Innovation Park
- Coordinate site visits with Innovation Park tenants
- Liaise with community groups to book space and tours for professional development workshops
- Organize an annual Innovation Park Career Fair

On-campus “Pipeline” Education Programs for Pre-College Community Members

This service component is designed to facilitate the offering of on-campus programs run by select partners, including Middlesex County College and the Rutgers School of Health Related Professions, that will provide education and training designed to place youth and adults from the surrounding communities directly into entry-level and middle-skills jobs in the Park, including lab positions. These programs will also be designed to offer “stackable credentials”, where possible, that offer college credit and/or preferential status in admissions decisions for academic and professional development programs at Rutgers.

This component may include the development of stand-alone training programs similar to the
one run at the Maryland BioPark that uses community college staff to train workers on the University of Maryland’s BioPark campus. Other programs may include a capstone semester sponsored by Middlesex County College for programs that align with Rutgers majors and Innovation Park specialties. The capstone semester would be designed to expose community college students to campus life and academic programs at Rutgers, as well as to the Innovation Park, which will represent a range of careers students can aspire to achieve with a four-year or graduate degree.

Rutgers staff will also work with partners to help them develop or enhance relationships with key partners, such as high schools (including the New Brunswick Health Sciences High School), the Middlesex County Workforce Investment Board, and other educational and training institutions in the community to ensure that adults and youth, especially those who face barriers to employment, have opportunities to enter into these pipeline programs. Barbara Fiorella, Associate Vice President, Degree Computation Program, Department of Continuing Studies (DOCS) will oversee development of partnerships and applicable articulation agreements with Middlesex County College and other key external education partners. Gwen Mahon, Dean of the School of Health Related Professions, will oversee delivery of SHRP programs to community members and partnerships with New Brunswick Health Sciences High School. It will be determined at a later date whether additional staff are needed to coordinate or administer these programs and partnerships. Assistance in providing technical assistance to external partners can be provided by the TBD Director of Workforce Partnerships, discussed below.

**Technical Assistance for External Partners**

In order to effectively connect community members with Innovation Park jobs and Rutgers academic programs, high schools, non-profit and government workforce organizations, and others need accurate information about the skills and other qualities jobseekers and prospective students must develop to be successful. Too often, these programs create their curricula without access to that information, which often results in program leaders focusing on skills that do not align with what is needed for individuals to move to the next step in their education and career plans.

This component of the program addresses this problem by assigning a TBD Director of Workforce Partnerships to work as a liaison between Innovation Park employers, Rutgers admissions and programs, and community education and training partners. The Director will gather information about the requirements for jobs and academic programs and work with community partners to help ensure that they are building responsive programs that will allow more community residents, especially those who face barriers to employment, to be successful in landing jobs and receiving admission to selective programs at Rutgers. Technical assistance can also be provided to help partners develop programs in a way that facilitates metrics development and evaluation. In addition to ensuring a functional educational pipeline that maximizes the likelihood of success for community members as they move through successive levels of education and training, these forms of capacity building will help Rutgers and external partners to jointly qualify for the growing number of federal grants focused on the development of career pathways that connect multiple levels of education to careers, especially Science Technology Engineering, and Math (STEM) careers. Barbara Fiorella, DOCS, (or the Heldrich Center for Workforce Development) will oversee the development of partnerships with external partners, as well as the TBD, Director of Workforce
Partnerships. Key duties of the TBD, Director of Workforce Partnerships will be to:

- develop knowledge of tenant hiring needs and Rutgers standards for academic and professional development programs and share this with key referral partners;
- offer technical assistance to partners to help identify funding sources and build responsive education programs that prepare people for work at Innovation Park and/or entry into Rutgers programs;
- coordinate/facilitate connections between workforce partners and Rutgers programs to enhance preparations of their constituencies for work and/or higher education (e.g. Site tours, meetups);
- facilitate connections between eligible applicants from partners to Rutgers academic and CE program admissions; and
- assist partners to develop data collection systems and well-designed programs that allow for evaluation and that are well-positioned to receive grant funds.

The director will work with key internal and external partners, including:

**Internal** – University Career Services (consult regarding standards, share of tenant workforce needs with UCS staff) and the Heldrich Center for Workforce Development (TA to partners to help them develop and evaluate research-based programming)

**External (Potential)** – New Brunswick One Stop; New Brunswick Health Sciences High School; CBO’s in New Brunswick/Piscataway (e.g. Elijah’s Promise); New Start Career Network; NJ Manufacturing Extension program

**Phased Implementation of Program Components**

The workforce program components described above can be implemented in a modular fashion. While human resources functions are a critical near-term piece of the programming, other components can be implemented over time as space and demand increases in the Park and additional funding sources are identified. There are three key hiring phases for the Innovation Park for which different workforce services will likely be needed, that can inform the implementation timing. These include:

**Innovation Park Construction Hiring**

In the construction phase(s) of Innovation Park, developers will need to hire a large number of workers. There are currently no local hiring agreements in place with Piscataway or New Brunswick, according to interviews conducted. As part of the negotiations with the developer, Rutgers will explore the possibility of creating local hiring agreements with the developer to ensure that community residents have access to these jobs. If this is successful, a more detailed plan will be developed to assist developers with locating and hiring these local workers, as well as Rutgers students who may be qualified to work on the project, following the plan suggested for the recruitment and screening component discussed above.
Tenant hiring – Phase 1 Early Park Development

In the early stages of adding tenants to the Park, there will be less of a critical mass of demand for robust workforce programs beyond recruitment and screening services and “ambassador” services that connect Innovation Park tenants to credit and non-credit programs for professional development.

Tenant hiring – Phase 2 Mature Park

When the Park acquires a critical mass of tenants, there will be a greater justification for building more robust “pipeline” programs that provide Park employers with access to a larger pool of skilled workers, including those who received specialized training to fill Innovation Park jobs.

Needs/Gaps

The workforce development plan for the Park addresses several key needs related to university and tenant goals, as follows:

• Developer and Innovation Park tenant employer needs for ready access to a diverse set of skilled workers at all levels of education and experience
• Student need for relevant internship opportunities and job placement
• Develops important linkages between the university, industry, government and community through partnerships
• Creates new pipelines of education and training for community residents to access jobs at Innovation Park and programs of all types at Rutgers
• Retains skilled Rutgers graduates (and attracts other skilled workers) to contribute to the local and state economy

Justification for Program

• The program provides services that employers rate as highly valuable – Batelle’s 2012 Report, which benchmarked university research parks in several key areas, noted that HR services were ranked highly by employer tenants, but few parks provided these services.

• Comprehensive programming will attract large grants – Building connections that link different levels of education and enhance professional/workforce development programming will position Rutgers to receive significant federal funding from USDOL, NSF, NIH, foundations and others.

• Internal and external partnership development will foster broad university goals to provide students with internship and employment opportunities, build community connections and improve coordination and efficiency of internal programs.
**Benefits/Outcomes of Program(s)**

- Employers will save money on Human Resources functions, which may provide an incentive for employers to pay higher value rents.
- Higher enrollment in Rutgers programs (DOCS, PSM, MS, PhD, and other degree and non-credit programs connected to Innovation Park)
- Student placement rates for internships and jobs will improve
- Rutgers will be more competitive for federal, state and foundation grants to implement workforce programs

**Value Proposition of Program**

The program will create tremendous value for Rutgers students by creating linkages to opportunities for internships and employment. The comprehensive workforce development plan of the Park will immediately save employers time and money on recruitment and screening costs. Employers can better ensure their workforce stays up-to-date with cutting edge skills needed for innovation by having no-hassle access to a wide array of credit and non-credit programs, as well as access to an on-site makerspace. Over time, as programs are fully implemented, employers will save increasing amounts of money on human resources expenses as the Innovation Park programming works to create an “ecosystem of talent” that will provide a steady stream of skilled talent at multiple levels of education for employers to tap.

**Industry Partnerships**

Efforts will be made to engage industry partners to provide funding for programs, to offer training programs, and/or to be an internship/employment resource for students. Industry partners will likely not be co-located with the program, unless they are providing workforce development programs.
Appendix C: NAICS Reports

Central New Jersey Industry Evaluation

Rutgers University has an opportunity to capitalize on its research strengths, and provide space that builds on and fosters connections between the university and industry.

Rutgers should cater to the growth sectors in Central New Jersey (Middlesex, Mercer, Monmouth and Somerset Counties), while leveraging and building Rutgers-generated business spinoffs. U3 Advisors examined sectors aligned with Rutgers research, training and institute strengths to identify areas of market activity, opportunity and caution.

Tables 1 and 2 use the North American Industry Classification System (NAICS) to identify change in number of business establishments and employees.

Table 1. Central NJ: Change in Number of Establishments from 2005 to 2015

<table>
<thead>
<tr>
<th>Industry Sector (NAICS Code)</th>
<th>Change</th>
<th>Percent Change</th>
<th>Market Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food manufacturing (311)</td>
<td>33</td>
<td>18%</td>
<td>Growth</td>
</tr>
<tr>
<td>Pharmaceutical and medicine manufacturing (3254)</td>
<td>9</td>
<td>10%</td>
<td>Growth</td>
</tr>
<tr>
<td>Data processing, hosting and related services (5182)</td>
<td>11</td>
<td>9%</td>
<td>Growth</td>
</tr>
<tr>
<td>Computer systems design and related services (5415)</td>
<td>283</td>
<td>10%</td>
<td>Growth</td>
</tr>
<tr>
<td>Physical, engineering, and biological research (54171)</td>
<td>13</td>
<td>6%</td>
<td>Growth</td>
</tr>
<tr>
<td>Research and development in biotechnology (541711)*</td>
<td>-9</td>
<td>-8%</td>
<td>Caution</td>
</tr>
</tbody>
</table>

* Change in number of establishments from 2007 to 2015

Table 2. Central NJ: Change in Number of Employees from 2005 to 2015

<table>
<thead>
<tr>
<th>Industry Sector (NAICS Code)</th>
<th>Change</th>
<th>Percent Change</th>
<th>Market Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food manufacturing (311)</td>
<td>617</td>
<td>13%</td>
<td>Growth</td>
</tr>
<tr>
<td>Pharmaceutical and medicine manufacturing (3254)</td>
<td>-3,611</td>
<td>-23%</td>
<td>Caution</td>
</tr>
<tr>
<td>Data processing, hosting and related services (5182)*</td>
<td>923</td>
<td>65%</td>
<td>Growth</td>
</tr>
<tr>
<td>Computer systems design and related services (5415)</td>
<td>7,437</td>
<td>35%</td>
<td>Growth</td>
</tr>
<tr>
<td>Physical, engineering, and biological research (54171)***</td>
<td>-1,959</td>
<td>-12%</td>
<td>Caution</td>
</tr>
<tr>
<td>Research and development in biotechnology (541711)***</td>
<td>-1,491</td>
<td>-26%</td>
<td>Caution</td>
</tr>
</tbody>
</table>

* Change in number of employees from 2007 to 2015
** Change in number of employees from 2008 to 2015
*** Change in number of employees from 2007 to 2015
Food manufacturing; data processing, hosting and related services; and computer systems design and related services have experienced growth in the number of establishments and employees in Central New Jersey between 2005 and 2015. Phase One of Innovation Park will feature a food innovation center and an advanced research computing facility, positioning Rutgers to support the long-term growth of these key sectors in the regional economy.

While pharmaceutical and medicine manufacturing establishments have experienced very modest growth, the number of employees has declined by more than 3,000 individuals, attributable to large firms leaving the state and M&A among this sector.

Physical, engineering, and biological research and research and development in biotechnology have been in decline in terms of employment. However, this may be due to the fact that private companies, especially those in the life sciences, are outsourcing R&D to start-ups, universities, foundations, and others, in an effort to save costs and discover new medical innovations. This shift represents an opportunity for Innovation Park, as companies will have the opportunity to partner with university faculty, staff, and students on research critical to future health, sustainability, and wellbeing.

Endnotes

\(^{i}\)Bureau of Labor Statistics at www.bls.gov
Appendix D: Innovation Park@Rutgers Site Map

Note: Diagram does not reflect actual buildable area. Additional engineering work required to determine buildable area.
Senior Administration Steering Committee

Robert Barchi, President, Rutgers University  
Antonio Calcado, Executive VP University Strategic Planning and Chief Operating Officer  
Richard Edwards, Chancellor, Rutgers New Brunswick  
Michael Gower, Exec. VP, Finance and Administration and University Treasurer  
John Hoffman, Sr. VP and General Counsel  
Barbara Lee, Sr. VP, Academic Affairs  
Kim Manning, VP, University Communications and Marketing  
Peter McDonough, Sr. VP, External Affairs  
Christopher Molloy, Sr. VP, Research and Economic Development  
Michele Norin, Sr. VP, Chief Information Officer  
Brian Strom, Chancellor, RBHS

Internal Advisory Board

Christopher Molloy, Senior Vice President, Research and Economic Development (Chair)  
Richard Aks, VP, Finance and Associate Treasurer  
Clinton Andrews, Professor and Director, Rutgers Center for Green Building  
Ted Baker, Professor and George F. Farris Chair in Entrepreneurship, Rutgers Business School  
Ken Breslauer, Professor; Dean, Biological Sciences; and VP, Health Science Partnerships  
Stephen Burley, Distinguished Professor Chemistry and Chemical Biology; Director, Center for Integrative Proteomics Research  
Leonard C. Feldman, Professor, MSE; Director, Institute for Advanced Materials, Devices and Nanotechnology  
Thomas Farris, Dean, School of Engineering  
David Foran, Professor, RWJ Med School; Exec. Dir. Biomedical Informatics & Computational Imaging, CINJ  
Eric Garfunkel, Distinguished Professor Chemistry and Chemical Biology; VP, International and Global Affairs  
Robert L. Goodman, Dean, School of Environmental and Biological Sciences  
Rick Hearin, Exec. Director, University Career Services  
Bradley Hillman, Professor and Senior Associate Director for Research, NJAES  
James Hughes, Distinguished Professor; Dean, Edward J. Bloustein School of Planning and Public Policy  
David Kimball, Associate VP Translational Science and Research Commercialization, ORED  
Terri Kinzy, Professor, Biochemistry & Molecular Biology; VP of Research, ORED  
Joachim Kohn, Board of Governors Professor of Chemistry; Director, NJ Center for Biomaterials  
Manish Kumar, Associate Dean of Administration & Finance, Rutgers Business School  
Jeff Manalo, Sr Manager, Plant Funds and Prop. Mgmt  
Peter March, Dean, School of Arts and Sciences  
Michael Marion, AVP, Corporate and Foundation Rel.  
Jim Morris, Associate VP, Continuing Education

Rich Novak, Vice President, Continuing Studies and Distance Education  
Reynold Panettieri, Director of Clinical and Translational Science Institute, RBHS  
Manish Parashar, Distinguished Professor, Computer Science; Director, Rutgers Discovery Informatics Inst.  
Jonathan Potter, Dean, School of Communication and Information  
Robert Roesener, Associate General Counsel  
Kathleen Scotto, Dean, Graduate School of Biomedical Sciences, RBHS  
Deborah Silver, Professor, ECE; Director, Professional Science Master’s Program  
Jay Tischfield, Distinguished Professor, Genetics; CEO and Scientific Director, RUCDR Infinite Biologics  
Carl Van Horn, Distinguished Professor of Public Policy; Director, Heldrich Center for Workforce Dev.  
David Weinstein, VP, State Government Affairs  
Joanne Williams, Vice Dean of Administration, School of Arts and Sciences

External Advisory Board

James Barrood, President & CEO, NJITC  
Roseann Bucciarelli, Dean of Continuing Education, Middlesex County College  
Manuel Castañeda, Director, Community Health, New Brunswick Tomorrow  
Lou Cooperhouse, NJ Food Processors Association; President, NJ Business Innovation Network  
Irene Crespo, Business Advocate, NJ Business Action Center (BAC)  
Deborah Hart, President, BioNJ  
Rochelle Hendricks, NJ Secretary of Higher Education  
Katherine Kish, Executive Director, Einstein’s Alley  
Kevin Kurdziel, Middlesex Workforce Investment Board; Director, Middlesex One-Stop Career Center  
Clark Lagemann, Founder, Scarlet Startups  
Joann La Perla-Morales, Pres. Middlesex County College  
Tim Lizura, President & CEO, NJ Economic Development Authority (EDA)  
Lauren Moore, Executive Director, New Jersey BAC  
Todd Nakamura, Founder, Google Developer Group North Jersey  
Katherine O’Neill, Executive Director, JumpStart NJ  
Dean Parancas, Pres. and CEO, Healthcare Inst. of NJ  
Margie Piliere, Chief Econ.Dev. Officer, ChooseNJ  
Thomas Richardson, VP Strategic Initiatives, BioNJ  
Jaynie Santiago, President/CEO, New Brunswick Tomorrow  
Donna Sullivan, Director, Real Estate Dev., NJ EDA  
Mary Ward-Callan, Managing Director Technical Activities, IEEE
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