



# RESEARCH, INNOVATION, AND TALENT

## WORKING GROUP DELIVERABLE

The **Research, Innovation, and Talent Working Group** will focus on creating stronger ties between businesses and higher education by promoting industry-academic partnerships, experiential learning opportunities, and programs to meet market needs. In particular, the group will be charged with:

- ➔ **Identifying strategies and best practices to increase research, development, and commercialization activities by our state's research universities.**
- ➔ **Developing effective industry-academic research and workforce development partnerships that lead to more research and employment opportunities for students.**
- ➔ **Highlighting successful practices that expand the number of students, especially women and underrepresented minorities, who participate in research and obtain STEM degrees.**
- ➔ **Determining effective methods for attracting and supporting diverse faculty and staff.**

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# OVERVIEW

The state plan for higher education, **Where Opportunity Meets Innovation**, emphasizes the importance of cultivating research, innovation, and talent to deepen and recapture our role as a leader in the innovation economy and effectively prepare students for success after college. This is described in more detail in the plan within a vision for a student bill of rights. The fourth element states, “Every student in New Jersey should have the opportunity to work with an employer, conduct meaningful research supervised by a faculty member, or access some other form of experiential learning before graduation.” The eighth element states, “Every student in New Jersey should have high-quality, career-relevant academic programs that will prepare them to succeed in the global economy.” The plan further argues that Colleges and Universities drive innovation, they are centers of research and development for new industry clusters, birthplaces for new ideas and companies, and provide rich environments for start-ups and creativity. “Knowledge creation is a fundamental aspect of colleges and university activity that supports commercialization, drives innovation, and ultimately strengthens the state’s economy as a whole.”

In furtherance of making this vision a reality, the **Research, Innovation, and Talent Working Group** was charged creating stronger ties between businesses and higher education by promoting industry-academic partnerships, experiential learning opportunities, and programs to meet market needs. In particular, the group will be charged with:

1. Identifying strategies and best practices to increase research, development, and commercialization activities by our state’s research universities.
2. Developing effective industry-academic research and workforce development partnerships that lead to more research and employment opportunities for students.
3. Highlighting successful practices that expand the number of students, especially women and underrepresented minorities, who participate in research and obtain STEM degrees.
4. Determining effective methods for attracting and supporting diverse faculty and staff.

The group met six times in person from June 2019 through November 2019, where each meeting lasted for two hours each. Two chairs were appointed by Governor Phil Murphy to lead the working group, and they met regularly with OSHE and EDA staff in between meetings to further the work of the group. The larger working group broke up into four subgroups organized around each of the four charges stated above. Each subgroup met via conference call, in-person, and/or on-line meeting to further the work in between each of the plenary full working group sessions. Each subgroup first identified its final deliverable and created an action plan to reach that deliverable. The group was originally provided with an opening Power Point presentation provided by OSHE staff that provided a set of data/facts around each of the four charges in addition to handing out a full copy of the State Plan document to each member so that all members could have an initial starting point for discussion and deliberation around answering the charges. Each subgroup approached their work slightly differently but all ended up completing narrative deliverables that attempt to provide a resource for institutions and the State on how to further research, innovation, and talent development in the State of New Jersey and more specifically at its colleges and universities

# State and Statewide Institutional Strategies for Accelerating Research and Development, and Commercialization in New Jersey Universities

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## 1. Introduction

This sub-group's charge is to identify strategies and best practices to increase research, development, and commercialization activities in New Jersey universities. Faculty are a key engine of innovation, and support for exploratory research is an important mechanism for ensuring a steady pipeline of new ideas and potentially disruptive technologies. A broad spectrum of universities exists in New Jersey, and partnerships between research-intensive and less research-intensive institutions can be an effective mechanism for encouraging innovation and commercialization activities statewide.

Based on these realities, strategies are proposed for:

- university, industry and state support for research collaborations between faculty at research-intensive and less research-intensive universities;
- lowering barriers to inter-university dual-career hires and joint appointments, facilitated by the state's limited geographical footprint;
- university support for proof-of-concept funding;
- state policy reforms to increase research productivity and encourage commercialization;
- increasing universities' research productivity;
- establishing partnerships between research-intensive and less research-intensive universities;
- establishing state-wide collaboratives for sharing best practices in research administration.

## 2. Statewide Inter-University Research Collaborations

**2.1 Background.** Faculty members are engines of knowledge generation and innovation. Assistant professors at research universities<sup>§</sup> are typically awarded generous startup packages that enable them to jumpstart their research programs, in order for them to successfully earn tenure and promotion after six years. Startup packages usually include some release from teaching, discretionary funds to be used for research activities and support for travel, graduate student research assistant stipends, laboratory equipment and renovations, and summer salary. In the STEM fields, startup packages are very significant and have risen continuously for the past 30 years or so.

Institutions that are not research-intensive, such as predominantly teaching universities, as well as many universities with moderate research activity, are often unable to attract more competitive faculty because they cannot afford the high cost of faculty startup packages and compensation. Furthermore, faculty members in those universities are often expected to achieve significant performance in research, but are not necessarily given the means to succeed, because of high teaching loads, insufficient research infrastructure, as well as the lack of a research ecosystem including available collaborations with colleagues. Faculty research in universities that do not fall

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<sup>§</sup> The six research universities in New Jersey are Montclair State University; New Jersey Institute of Technology (NJIT); Princeton University; Rowan University; Rutgers, The State University; and Stevens Institute of Technology.

within the Very High Research Activity category (according to the [Carnegie classification](#)) frequently takes place in isolation and may not be adequately supported. Finally, assistant professors in research universities, while benefitting from substantive startup packages, rarely collaborate and interact with colleagues at other universities within the state. This represents an opportunity loss for all universities in the State of New Jersey.

In addition to startup packages, assistant professors are eligible for a number of national funding programs (e.g., the NSF CAREER) as well as internal university grants to which mid-career and senior faculty do not have access to. While well-established, senior faculty who are leaders in their fields are typically successful in attracting funds to support their research program, mid-career faculty often experience a comparative lack of funding opportunities. This may result in a lull in funding for them, which sometimes leads to discouragement and disconnection from research, possibly until retirement. Therefore, there is a need for funding opportunities aimed at mid-career faculty.

**2.2 Statewide Collaborative Research Initiative.** We recommend the establishment of a statewide competitive initiative to support junior and mid-career faculty (assistant and associate professors), with a special focus on those institutions that are not research intensive. The program should be aimed at supporting collaborations between at least two New Jersey universities, and each award would require the participation of at least one non-research-intensive university. Research-intensive universities can only participate in collaboration with at least one non-research-intensive institution.

Support for each successful collaborative project should include institutional, industrial and State contributions. Research-intensive institutions and industry will be expected to contribute through cost-sharing.

A good example of inter-university collaboration supported by a state is the [TeCK Fund](#) of the State of Ohio, which focuses on a pipeline of technologies in areas such as medical diagnostics, healthcare solutions, materials science, cybersecurity, and environmental design.

The State should not aim to replicate or duplicate existing federal programs in scope or size. We recommend funding on the order of \$100K-\$200K per grant per year, for a period of two years, which would provide seed funding for collaborative projects that build upon each partner institution's complementary expertise.

The involvement of industry, and its commitment in the form of cost-sharing, would be particularly desirable, and hence a criterion to be taken into account by review panels.

Interdisciplinary projects, which call for the complementary expertise of the partner institutions, would be especially welcome. Example research areas include STEM education, the life sciences and bioengineering, pharmaceutical engineering, artificial intelligence, data science, offshore wind, sustainability science and robotics.

Grant funding would be used by the partner universities to support undergraduate research students, and particularly the exchange of such students among universities; faculty travel and

exchanges; laboratory equipment; and graduate student support. One basic principle should be that the funding must benefit all university partners and the project as a whole rather than one particular university.

We recommend that the State establish and administer a bi-yearly proposal competition according to the above characteristics, and that winning proposals be evaluated and recommended by a state-wide review panel. The competition should have clear requirements, including participation of assistant professors (who should be given priority) as well as associate professors, industrial participation, and the inclusion of non-research-intensive universities in every project. Each grant awarded by the State should be led by one university and should be jointly managed by the partner universities.

In addition to providing research funding, such collaborations would greatly benefit the faculty of non-research-intensive universities, by offering them an outlet for their research in the form of access to laboratories, students, and faculty at research universities, as well as intellectually meaningful interactions.

**2.3 Lowering Barriers to Inter-Institutional Dual-Career Hiring.** Identifying opportunities for faculty spouses and partners who are seeking career avenues both within and outside of academia is an increasingly common challenge facing universities when trying to attract new faculty members. The relatively small geographic size of, and diversity of universities in, New Jersey offer opportunities for addressing this challenge creatively.

Useful resources include the [Higher Education Recruitment Consortium](#) and its [regional collaboratives](#), as well as [researchwithnj.com](#).

Mutual awareness of institutional initiatives, needs and opportunities can greatly facilitate inter-institutional dual career hires. To this end, periodic meetings between career transition advisors from universities across the state should be encouraged.

For dual-career couples working at different institutions, flexible working arrangements (e.g., working remotely from a spouse's or partner's institution on an agreed-upon schedule) should be accommodated whenever job responsibilities permit. Parking, library, and computer account access and privileges should enable such flexible arrangements.

### **3. Proof-of-Concept Funding**

In order for society to benefit fully from research conducted at universities, inventions must be developed into real-world products and applications. Universities should seek innovative ways to address the development gap between the early stage research and attractive, investment- and venture-grade opportunities. Proof-of-concept (or gap) funding aims at fostering and advancing the development of nascent technologies emanating from university labs into commercial development and, ultimately, the global marketplace. Additional proof-of-concept work, data collection, and/or prototyping can yield important information or further development that would make a technology more commercially attractive.

Universities should invest in proof-of-concept funding by providing competitive awards of the order of \$100K for one year to a handful of projects, in response to annual calls for proposals. Proposals should be judged by a committee including faculty and representatives from industry and from the venture capital communities.

We recommend the establishment of a yearly state-wide **Proof-of-Concept Funding Day**, with presentations by recent awardees, emphasizing successful transition from the lab to commercial development.

#### **4. State Policy Reforms to Increase Research Productivity and Encourage Commercialization**

**4.1** The basis for increasing research productivity lies in **leveling the playing field** with no preference shown to any university or researcher. This requires complete transparency within the system, so that every researcher has access to the same information. To do this, it is necessary that the state have a **common portal** similar to [Grants.gov](https://grants.gov), which is a Federal initiative designed to improve government services to the public through an online web site that allows one to find and apply for federal grants. If all RFPs from the state were housed in a common platform, it would make it easier for a researcher at any institution to find the request for proposals. Currently in the state of New Jersey, each state entity has its own portal with no common guidelines for submission of proposals, budgeting or monitoring progress and accounting, resulting in inefficiencies both at the state level and institution level. The state of New York already does this with a common portal for listing of state research solicitations, grants submission and monitoring. New York State has also moved to an electronic system of approvals to minimize the use of paper (<https://grantsmanagement.ny.gov>).

**4.2** It is also imperative that the state agencies move to a completely **electronic format for submission and monitoring of grants** instead of some agencies still requiring varying number of printed paper copies. This creates confusion and results in a waste of resources.

**4.3** The **state procurement process requires revision and modernization** if research productivity is to improve. The state should review and make changes to the state procurement process for research-intensive institutions. The delay associated with the Business Registration Certificate (BRC) process has stifled research productivity and research equipment procurement.

**4.4** **State led programs that are organized around a research focus area** that the state would like to be a leader in can serve as a mechanism to attract outstanding researchers to the state. An example of this is the [California Breast Cancer Research Program](#) (CBCRP), which is run by the Regents of the University of California system. Funding for the program was generated by increasing the tobacco tax by 2 cents per pack, with 45% of the revenue going to CBCRP.

**4.5** If we want to grow research at all our institutions, less-research-intensive institutions **need experienced human resources**. Many institutions do not have a single grants professional who knows how to apply for and manage funding. Often, research administration is managed by a finance professional or even a Dean, which does not allow for much research productivity.

Universities should make an investment in staff at some of the less research-intensive institutions, so that research can be undertaken.

**4.6** State colleges and universities need funds to **maintain state-of-the-art research facilities**, which will in turn attract research funds. New Jersey currently offers four revolving bond programs – Equipment Leasing Funds (ELF), Capital Improvement Fund (CIF), Higher Education Facilities Trust (HEFT) and the Higher Education Technology Infrastructure (HETI)—that may be used to develop and update university equipment and laboratories. As revolving loan programs, these grant programs are not required to go to voter referendum. Once capacity for new grants becomes available, the funds should be made available to these institutions to ensure the state’s colleges and universities have high-quality facilities, this give institutions a competitive edge in attracting world-class faculty to conduct cutting-edge research here in New Jersey.

**4.7** The state should have a **central repository of patents filed at educational institutions**, making it easy for funders to find it. A good model to emulate would be what the state of Massachusetts does through the [Massachusetts Technology Transfer Center portal](#).

**4.8** A means by which the state can attract world-class talent would be through **pitch competitions** similar to [Grand Challenges Canada](#), which funds the best ideas with a sustainability component from around the world. Impact investment should be something the state is serious about, especially with Governor Murphy’s push for a clean economy and tackling global climate change. This would attract the best and the brightest among NJ residents, as well as residents nationwide to relocate to a forward-looking state that is interested in tackling the grand challenges the nation is facing through forward-looking approaches that the younger generation is attracted to.

**4.9** **Continue to encourage student entrepreneurs** at NJ institutions with state-wide convenings and competitions. UPitchNJ was established by the New Jersey Collegiate Entrepreneurship Consortium, a group of entrepreneurship education programs at four-year colleges and universities in New Jersey. Undergraduate student teams share their startup ideas and developments to compete for cash prizes and business services. Other states have similar events such as Maryland’s [Innov8MD](#), which organizes an annual state-wide conference.. Hosting such events and offering student entrepreneurs competitive award grants will not only spur a culture of innovation and creation at our state’s colleges and universities, but create meaningful supports for concepts that turn into thriving business.

**4.10** As we grow our commercialization space, it is also important to keep in mind that not all populations have the same access to funds to startup their businesses. Women and people of color are severely underrepresented in receiving Venture Capital funds. The state should be cognizant of this through funding streams and policies statewide that would level the playing field. It would also be useful to have **additional mentoring and support for people of color and women** similar to Quebec, Canada’s [Femmessor program](#).<sup>1</sup>

## **5. Roadmap for Increasing Universities’ Research Productivity Across the Board**

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<sup>1</sup> <http://femmessor.preprod.ciblesolutions.com/home>

**5.1 Background.** Focusing on research is not a straightforward decision for a university. While the research enterprise can produce significant external revenues, it also generates both infrastructure and recurring costs that are substantial and may even exceed revenues. For instance, it requires recruiting faculty who are scholars in their field and who will earn higher salaries and teach less than faculty at teaching colleges; allocating space and costly equipment to laboratories; and attracting PhD students with expensive fellowships. Developing and sustaining research, becoming *research intensive*, requires a steady and substantive institutional commitment, in a budgetary environment that is subject to many worthy and legitimate needs and pressures.

Though an expensive proposition, being research intensive is a *sine qua non* condition for institutions, especially those with a substantial focus on STEM, to remain at the cutting edge of knowledge, recruit top faculty and therefore attract top graduate and undergraduate students and, in the end, be a leading university. Indeed, many highly ranked institutions with a significant STEM focus earn a substantial part their reputation and prestige from research preeminence. This is why it is so important for all New Jersey universities to develop their research capabilities and grow their research productivity, at least to an extent that is commensurate with their size, resources, and fields of study.

Steps that universities can take to grow their research infrastructure and increase research intensity are discussed below.

**5.2 Recruit and retain research active tenure-stream and non-tenure-stream faculty,** particularly in fields with significant external funding opportunities. The faculty are the bedrock of the research enterprise, and conducting high-quality research requires investing in high-quality faculty.

**5.3 Create a state-of-the-art ecosystem for research and for graduate education** that sets appropriate expectations and culture for faculty.

- Recognize research performance in the career progression of faculty.
- Establish faculty workloads by considering activity in teaching, research, and service.
- Invest in doctoral and research master's fellowships to attract excellent research graduate students, and graduate them on time.
- Ensure the university leadership champions the research and graduate agendas and develops a research culture.

**5.4 Ensure that the proper infrastructure and resources for research are available** to faculty, including for example:

- Ensure a best-in-class sponsored research office to support faculty needs, including the implementation of technology for proposal and award management.
- Allocate, renovate and equip sufficient space for research.
- Develop a doctoral program infrastructure to support research activity.

**5.5 Create incentives** that encourage faculty to effectively manage and grow their research programs, including for example:

- Allocate discretionary funding to faculty in proportion to indirect costs generated by grants.

- Provide cost-sharing for tuition on research grants and/or incentives for graduating Ph.D. students on time.
- Define a cost-sharing policy that incentivizes large-scale grants and contracts
- Provide seed funding for large, multi-PI research projects.
- Create faculty research awards and recognition events

Taken together, these various steps can help shape a research-intensive environment at universities. Clearly, long-established research universities are in the position to make more significant advances in this area than predominantly teaching universities. However, as a whole, the group of New Jersey universities provides a powerful platform for the sharing of best practices and the coordination of research efforts, and the New Jersey universities that are less research-intensive will be important beneficiaries of these efforts.

One way in which predominantly teaching universities can increase their research presence and productivity is the recruitment of clusters of faculty across New Jersey institutions in emerging fields of research with high potential. The State of New Jersey could provide limited funding to support these research clusters: for example, to help cover the costs of research collaborations among institutions including travel and faculty exchanges and mini-sabbaticals, to set up and maintain common experimental laboratories, and to develop an efficient operation for the administration of these research clusters. One other effective way in which the State could boost the research presence of predominantly teaching institutions is the creation of an undergraduate research program, whereby students from teaching institutions intern at research universities during the summer, anchored by collaborating faculty at both types of institutions.

## **6. Partnerships Between Research-Intensive and Less-Research-Intensive Universities as an Effective Mechanism for Obtaining Funding**

**6.1** The state-wide **central research portal** that is proposed in Section 4.1 could have built-in capability by which researchers who are interested in applying for an RFP can indicate that they are willing to collaborate with other institutions to address the research problem. To facilitate the collaboration, the State could provide some incentive funding or view such collaborative proposals more favorably. Unless there are funds tied to the idea, the collaborations will not happen. There could also be an award setup that recognizes outstanding statewide collaboration efforts. Collaborative funding is also discussed in Section 2.

**6.2** A **statewide research day** would be a suitable mechanism for bringing institutions together and celebrating research successes in the State. This could be the venue where research collaborations and research successes are highlighted and celebrated.

**6.3** **Convening meetings of personnel who work in the research office** on different areas such as Compliance, Pre-Awards, Post-Awards, and Purchasing will allow for sharing of best practices and sharing of knowledge. This is discussed in detail in Section 7.

**6.4** **Shared services between institutions that are in the same geographical area** could also be a suitable means of fostering partnership between research-intensive and less research-intensive institutions. This could be through shared human subject services, animal research facilities or

even grant services. It could be done on a fee basis so that the institution providing the services is compensated for the efforts.

**6.5 Joint research facilities** are one of the best mechanisms for fostering collaboration. The joint board building between Rutgers Camden, Rowan University and Cooper Hospital would be an example of several institutions being housed under one roof. It is hoped that this would result in enhanced collaboration between the various independent entities who share a common interest in health outcomes of patients.

## **7. Statewide Collaboration in Research Administration Functions**

**7.1 Background.** Research administration is highly multidimensional, comprising, among other aspects, technology transfer, research development, corporate and foundation relations, human subjects research, animal research, pre- and post-award administration, research development, communications, and environmental health and safety. Given this inherent topical diversity, and the broad range of research intensity to be found across NJ universities, statewide coordination of research administration within a single umbrella organization is not desirable. Furthermore, the regulatory framework in key areas, such as human and animal research, falls within the province of federal agencies, which supersede state regulations.

Nevertheless, there is considerable scope for collaboration among research administrators and their staff from across all New Jersey universities within each of the above areas. Such collaboration could, ideally, take the form of area-specific annual meetings for sharing best practices, formulating consistent messaging, identifying common challenges, and “deep dives” into agreed-upon topics of common interest.

Possible topics for collaboration in major research administration areas are suggested below.

**7.2 Animal Research.** There are several important questions that would benefit from discussions between research administrators in this area:

- Desirability of establishing a single-IACUC of record for multi-institutional collaborations.
- Strategies for ensuring that animals will continue to be available as research subjects.
- State-level regulatory framework for sunshine laws on animal records.
- Appropriateness of current licensing practices for exotic/endangered species for animal research.
- Feasibility of a state-wide retirement sanctuary for non-human primates.
- Electronic management systems.

**7.3 Human Subjects Research.** Important questions that would benefit from discussions between research administrators in this area include:

- Is there a marketable component of social behavioral research? Are there opportunities for connecting social and behavioral researchers with state policy makers, venture capitalists and innovators?
- What are the effects of the NIH definition of “clinical trial” on reporting research results for social/behavioral research?

#### **7.4 Conflict of Interest.**

- Effect of concerns about inappropriate foreign influence on COI forms, disclosure practices and requirements.
- Handling of COI requirements for “key personnel” who are not listed as such on grant proposals.

**7.5 Technology Transfer.** In this particular area, networking, sharing of contacts and knowledge is deemed to be particularly valuable. Specific points of perennial interest include:

- Best practices in technology transfer, commercialization, and licensing.

**7.6 Corporate and Foundation Relations.** Regular meetings already take place involving the corporate and foundation teams at Princeton, Rutgers, NJIT and Rowan. The NJIT-Princeton-Rutgers collaboration in this area includes participation in numerous initiatives, including the New Jersey Big Data Alliance, ResearchWithNJ, the biomedical data science initiative, the New Jersey Academic Drug Discovery Consortium and the NIH funded CTSA grant. Informal information sharing also occurs on:

- Company interest areas and interactions
- Introduction and connections to companies and foundations
- Relationship management tools
- Document templates
- Best practices

Extending this dialogue across the larger possible number of New Jersey universities is to be encouraged.

**7.7 Communications.** There is considerable collaborative scope for communicating the impact of research funding on economic development. Princeton and Rutgers are members of [IRIS](#), and it would be beneficial to develop a state-level message in addition to institutional communications.

**7.8 Miscellaneous.** Connecting and sharing [practices around drone usage/oversight](#)<sup>2</sup>. At present, there is a lack of a strong community. It would be useful to have a conversation around higher education, public and industry usage.

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<sup>2</sup> <https://drones.princeton.edu/>

# **CREATING PARTNERSHIPS FOR THE INNOVATION ECONOMY: SYNERGISTIC COLLABORATION BETWEEN HIGHER EDUCATION, INDUSTRY, AND STATE GOVERNMENT**

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## **Introduction:**

Collaboration between higher education institutions<sup>1</sup> and industry partners drives innovation, fuels the economy, and employs thousands of graduating students. Such a collaboration is successful and sustainable over a long-period only when supported by state government's commitment to research and development, increasing support for commercialization, and investing in training an innovation-ready workforce.<sup>2</sup> New Jersey colleges and universities "are centers of research and development for new industry clusters, birthplaces for ideas and companies, and talent pipelines for start-ups and corporations."<sup>3</sup> The State's research-focused higher education institutions have increased patents issued by 38% since 2010, and have increased by nearly 50% the amount of space dedicated to innovation and incubator space.<sup>4</sup>

Much of this innovation, however, takes place within the silo of each of the State's research universities which form their own industry partnerships, as well as relationship with the State. What is required then is to develop a set of proposed functions to be performed by existing related entities (such as the newly reinstated Commission on Science, Innovation, and Technology) to increase the synergistic collaboration between higher education institutions, industry, and the state. And, to do so with a complementary emphasis on centralization, coordination, and advocacy.

## **Growth through synergistic partnerships between higher education institutions, industry, and the State's government:**

There is a valuable and concrete opportunity for growth through synergistic partnerships driven toward the common goal of fueling the State's economy through research innovation and employing the richly diverse and skilled graduating students from all of the State's higher education institutions (i.e., from community colleges to private or public research universities). Synergistic partnerships should target increasing collaborations between:

- the State's research universities; plus,
- the State's many two- and four-year higher education institutions; plus,
- industry partners (e.g., particularly those which have received tax incentives for locating their sites within the State), plus,
- State government for its unique position to offer three-pronged support: (1) holistic data repository for higher education research and collaboration; (2) the sole ability to meaningfully incentivize businesses within the State (e.g., through tax incentives); and (3) supporting critical resource needs (e.g., start-up funds for collaborative work between the State's research universities and its two- and four-year institutions; as well as providing a structure for on-going partnerships).

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<sup>1</sup> To be understood broadly to include the State's leading research universities, its two- and four-year higher education institutions, whether public or private.

<sup>2</sup> NJ HE State Plan, p. 37.

<sup>3</sup> NJ HE State Plan, p. 10 (<https://www.state.nj.us/highereducation/documents/pdf/StateEducationplan.pdf>)

<sup>4</sup> *Ibid.*

Such a collaboration would maintain the individual relationships of each of the State's universities with their industry partners. These synergistic collaborations would add to or be additional to existing collaborations, but would strongly emphasize a holistic state-wide view of higher education to promote innovation and fuel the economy. The goal is not to duplicate roles yet initiate a formal and active Technology Transfer Consortium. This consortium should represent all universities in New Jersey. In addition this consortium should be formally organized and members should include representatives from all research universities, as well as state representatives (e.g. NJ EDA) *and* private sector.

The consortium would act to:

- Simplify access to current IP technology already present at our universities
- Provide easy access to research and collaboration for the private sector
- Provide tech transfer assistance to institutions that do not have a Technology Transfer Office
- Help the state to identify good areas for collaboration/"centers of excellence"
- Help inform state research & innovation funding allocations
- Provide concise feedback from industry sectors (e.g., pharma), funders, & academia to the state
- Identify, celebrate and promote success in commercialization.

It is time for New Jersey to showcase our current inventions, and celebrate and award our current star inventors. The consortium could organize and coordinate events with already existing trade organizations and focus on specific sectors). A yearly award and technology showcase summit could award the best students, faculty, inventors and companies in several categories.

### **The supportive role of the State's government:**

The State's Higher Education Plan recognizes this need. The Plan calls for the State to "take an active role in fostering connections between higher education and industry to develop partnerships for research commercialization and job and internship opportunities."<sup>5</sup> At the State level, this tripartite partnership is supported through existing state agencies working "to more strategically align higher education and economic development initiatives."<sup>6</sup> Through the work of several higher education institutions and various state actors, there are existing and well situated avenues to build upon:

Three are critical: First, the ChooseNJ and the ResearchwithNJ.com portal serve both an ideal and coordinated outreach effort on behalf of higher education institutions, as well as can provide a target for coordination on such outreach between the various higher education institutions in New Jersey. These portals have laid the foundation for future success and their mission should continue and be supported. The State's role in this can further be developed by continuing the involvement and support of the NJ Economic Development Authority (NJ EDA). The NJ EDA can be a source of information, structuring, and administration for financial support to be expressed through State-supported initiatives (e.g., the NJ Ignite Program which incentivizing

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<sup>5</sup> *Id.*

<sup>6</sup> *Id.*

companies “that establish collaborative research partnerships” with higher education institutions). Such State support should also be aligned with the charges of the other working groups. For example, partnerships with women or minority-owned business enterprises should be incentivized.

### **Models for synergistic partnerships between higher education institutions, industry, and state governments:**

There are several good models for such a synergistic partnership. These models are located in states that are similar to New Jersey in their potential for bridging innovation at higher education institutions with a wide-range of industry. The key dissimilarity, in fact, is that these states began their synergistic collaboration decades earlier than New Jersey, and had steadfast state support. State-supported or state-included models at other states that New Jersey should explore are:

- MassTechCollaborative: <https://masstech.org>. Tripartite focus on innovation, technology, and health; additional support provided for talent development. (e.g., Fiscal Year 18 Report: <https://masstech.org/sites/mtc/files/documents/MassTech/FY18-ImpactReport.pdf>. p.2 of highlights mission and ability to act as state actor to promote innovation).
- The Georgia Research Alliance: <http://gra.org>. Collaboration between business and universities, includes tools such as: talent development, venture fund, and sharing core research facilities between universities. Their mission is best summarized in their own words: “GRA expands research capacity at universities, then seeds and shapes startup companies around inventions and discoveries.”
- California iHubs: <http://www.business.ca.gov/Programs/Innovation-and-Entrepreneurship/iHub-Regions>. Regional alliances between government, industry, and higher education institutions. The CA iHubs were created by state-law but are not housed within state government. Their mission is to “improve[] the state’s national and global competitiveness by stimulating partnerships, economic development, and job creation around specific research clusters throughout the state.” Coordination and state government support is offered through California’s economic development unit, acting in a similar manner as the New Jersey Economic Development Authority.
- California Alliance: <https://www.california-alliance.org/about>. Partnership between four California universities with the purpose to promote diversity by working “to ensure that underrepresented minority (URM) PhD graduate students and postdoctoral scholars from our alliance institutions aspire to and populate the ranks of the postdoctoral population, the faculty at competitive research and teaching institutions, the federally funded national laboratories, and scientific think tanks.”
- NYSTAR: <https://esd.ny.gov/doing-business-ny/innovation-development-support>. Housed out of New York State’s Empire State Development office, NYSTAR offers several programs throughout over 70 funded facilities (located at higher education institutions and industry) to offer “innovation development support resources, including financial incentives, to foster university collaboration, research[,] and innovation.” Some key examples of programs that New Jersey should consider exploring: Faculty

Development & Technology Transfer Incentive Program, Matching Grant Leverage Program, and New York Manufacturing Extension Partnership.

### Resources:

These resources are grounded in scholarship and provide an excellent background and recommendations for developing policy in support of the recommendations of this working group. The resources cover both domestic as well international synergistic collaborations.

- The Triple Helix, University-Industry-Government Innovation and Entrepreneurship. H. Etzkowitz and C. Zhou. (Routledge, 2017)  
(<https://www.taylorfrancis.com/books/9781315620183> (e.g., Chapter 5: “The Optimum Role of Government)).
- Business Higher Education Forum, Creating Purposeful Partnerships (2019), <http://www.bhef.com/publications/creating-purposeful-partnerships> (e.g., p.11, 20 talking about also how these HE to business partnership bridge students to employees in fields demanded by the market (e.g., University of Maryland, College Park, and Northrop Grumman Corp., developing the nation’s first honors program in cybersecurity (a field which employers believed to be the most difficult skill to hire for).
- Special Section on University-Industry Linkages: The Significance of Tacit Knowledge and the Role of Intermediaries. Ed. By F. Kodama, S. Yusuf, and K. Nabeshima. Research Policy (37) 8 (2008). Particularly relevant sections:
  - Building an Innovation Hub: A Case Study of the Transformation of University Roles in Regional Technological and Economic Development. p.1188-1204. J. Youtie and P. Shapira.
  - The Effectiveness of Subsidies Revisited: Accounting for Wage and Employment Effects in Business R&D. p.1403-12. G. Wolff and V. Reinthaler.

