



RELEASE VERSION

***LEVERAGING THE REVOLUTION IN
LIFE SCIENCES:
GROWING THE RHODE ISLAND
INNOVATION ECOSYSTEM***

***PREPARED BY THE RHODE ISLAND BIOHUB GROUP
SUPPORTED BY RI BIO***

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***NOTE: THIS REPORT WAS FINALIZED FOLLOWING DISCUSSIONS WITH RI COMMERCE
CORPORATION AND WITH INPUT FROM KEY STAKEHOLDER GROUPS***



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EXECUTIVE OVERVIEW

The global economy is entering a “Fourth Industrial Revolution” -- the Digital Revolution – characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres (*Deloitte 2018 Global Health Care Outlook*). The Life Sciences sectors (biotech, pharma, medical devices, medical diagnostics, digital health technologies and data sciences) are at the forefront of this revolution. Rhode Island, often considered the birthplace of the “First Industrial Revolution”, can compete in this new revolution by delivering on a bold vision: ***transforming the state into a globally recognized life sciences innovation hub by coalescing existing life sciences stakeholders, activities and investments and building new capabilities, to create a true “Life Sciences Innovation Ecosystem.”***

Fueled by the remarkable advances in science and technology, life sciences are undoubtedly an attractive growth opportunity, as noted in the 2016 Brookings Report, “Rhode Island Innovates.” Since that time, US healthcare venture fundraising reached a record of \$9.6 billion in 2018, and healthcare investments increased 50 percent, setting a new record (*Silicon Valley Bank, 2019 Annual Report*).

The Rhode Island BioHub Group was commissioned by Governor Raimondo’s Office in the latter half of 2016 to recruit life sciences businesses from our neighboring state of Massachusetts. The group, comprised of Life Sciences executives, living in Rhode Island and working in Massachusetts, held extensive discussions on company recruitment, marketing strategies and initiated targeted outreach to a small number of Cambridge companies and Venture Funds. Simultaneously, RI Commerce hired an experienced life sciences executive as a point of contact for company outreach. We quickly realized that recruitment without an in-depth view of the Rhode Island Life Sciences landscape was short-sighted. Thus, the group evolved to include leaders in the Rhode Island Life Sciences community; aligned with the RI Bio; partnered with Susan Windham-Bannister who shared her deep expertise in ecosystem creation and worked together to perform a deep inventory of existing ecosystem enablers to ensure the foundation was in place to grow, attract and retain companies, both small and large. Through this work, we believe that the future economic prosperity of RI depends on our ability to build and support an integrated Life Sciences Innovation Ecosystem. This will be fueled by the discoveries emerging from our local universities and colleges, the formation of new, innovative venture-backed life science companies, and the attraction of larger established companies to the state seeking our innovation.

This report from the BioHub Group presents focused, concrete recommendations for action steps and investments that will enable our stakeholders to play a leadership role and participate more fully in Life Sciences innovation, with benefits to all citizens of Rhode Island.

Our overarching findings suggest Rhode Island is well positioned to recognize the benefits of a Life Sciences Innovation Ecosystem. However, our resources are often fragmented and uncoordinated leading to significant gaps and points of connectedness being lost. We recommend operating under the RI Bio organization with dedicated staff and financial resources to serve as the major point of accountability of coordination and support for current life science efforts across the state.

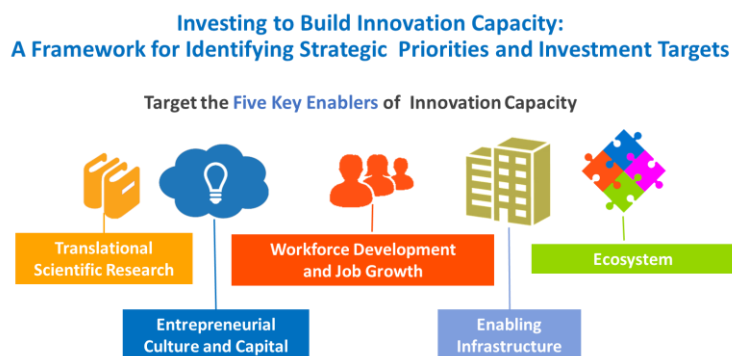
Our recommendations are timely and include high priority, short- and long-term action steps and investments that we believe will be *most impactful in building upon the existing foundation for Rhode Island’s innovation and growth strategy*. Our recommendations leverage the momentum and visibility created by construction of the Wexford Science and Technology Innovation Complex, the substantial investment made by the state of Rhode Island at the University of Rhode Island as well as capital investments at Brown University and the growing translational sciences expertise at the Warren Alpert Medical School. Additionally, growth in Life Sciences in neighboring Massachusetts, including the presence of numerous start-ups and larger pharmaceutical companies, is placing significant pressure on accessibility and affordability of start-up laboratory space in that area forcing companies out of the Cambridge/Boston hub to suburbs as far away as Worcester and Springfield. The accessibility and lower cost of doing business here offers an opportunity to attract some of these early businesses to our state.

In summary, Rhode Island investments to date, combined with our recommendations, support our vision of growing a true *Life Sciences Innovation Ecosystem* and positioning us as a growing player in this “fourth industrial revolution”. We must seize this momentum now to bring us forward for a strong and exciting future for Rhode Island.



ABOUT THIS REPORT

This report provides the background of the BioHub Group's efforts initiated by senior leaders in Life Sciences, evolution of the group over the past 18 months and offers an in-depth view of the current Rhode Island Life Sciences activities which today would be described as a Life Sciences "Cluster". Our desired end goal is to transform our state into a true-Life Sciences "Innovation Ecosystem" and we present the benefits in achieving this desired state. Further, to foster and grow the ecosystem requires continuous innovation capacity. Our recommendations focus on the five key enablers of innovation capacity as laid out by Susan Windham Bannister¹: *Translational Scientific Research, Entrepreneurial Culture and Capital, Workforce Development and Job Growth, Enabling Infrastructure and Ecosystem* which must all be present to support the innovation lifecycle. Deep evaluation of these key enablers identifies those areas which offer the greatest potential impact for our state.



Our fundamental premise is that by continuing investment in building innovation capacity, we promote the goals of innovation acceleration, strengthen the "platform" that supports innovation and all stakeholders across the Life Sciences Innovation Ecosystem within Rhode Island and the region will benefit.

The Economic Impact Today in Rhode Island Life Sciences

Life sciences industry today, including pharmaceutical and biotech manufacturing, medical device and supply development and manufacturing, research, development and diagnostics companies account for approximately 1% of Rhode Island's private sector employment. Adding ongoing employment in the healthcare sector, which is closely aligned with life sciences, adds another approximately 16% of private sector employment. Today, employing some 3,673 life sciences workers (not including healthcare workers) here in Rhode Island, at an average salary of \$85,864, these wages are nearly 70% higher than the average private sector worker at \$50,929 demonstrating the impact that life sciences delivers to the Rhode Island economy *today*. Further the state has recognized this value and incentivized new job growth in the life sciences adding 742 new jobs since 2016. Projections of job growth for the next ten years are approximately 8% yet we know that this number could be exponentially higher if we create the environment in which this industry can thrive. One simply needs to look north of our border to see the life sciences growth moving to Norwood, Watertown and Bedford highlighted recently in the [Boston Business Journal](#). Finally, noted requirements of good public transit, a growing hub of biotech companies and talent located where work and living co-exist – all attributes that Rhode Island can proudly support today.

Developing BioHub Recommendations: Inventory of Strengths and Gaps

The BioHub Group conducted detailed inventories of existing strengths and gaps, as input to developing recommendations for action. These are organized around the five key enablers described above, and can be found on the next two pages. **Importantly, all planks relevant to the Fourth Industrial Revolution are here in Rhode Island.**

(¹Founding President and CEO, Massachusetts Life Sciences Center)



RI STRENGTHS FOR FIVE KEY ENABLERS OF INNOVATION CAPACITY



Translational Scientific Research

- World-class academic institutions increasing their focus on translational sciences/entrepreneurial endeavors
- Increasing recognition of neuroscience (\$100M gift to Brown Institute for Brain Science), Warren Albert Medical School (\$50M Menco Translational Sciences gift)
- Medical devices integrating design including orthopedics and neurology
- Digital technology growth as well as data science and computational sciences



Entrepreneurial Culture and Capital

- University Alumnae hold major entrepreneurial roles across Life Sciences communities
- RI Commerce/STAC initiatives provide modest support for entrepreneurs, SBIR matching funds, interns
- Vibrant and growing network of resources for entrepreneurs: RI Bio, RI Business Plan Competition, RI Mass Challenge
- Recently launched RI Venture Mentoring Services provides support to founders and their companies
- Slater Technology Fund, Cherrystone Angel Group, Biograph Ventures provide capital foundation



Workforce Development

- Nelson Entrepreneurial Center provides excellent programs for Brown students (i.e. Pitch Night)
- Social Enterprise Greenhouse offers Health and Wellness Cohorts
- Academic institutions produce steady stream of talent across broad life sciences disciplines
- Department of Labor and Training actively supports workforce development initiatives



Enabling Infrastructure

- >\$300M invested in Life Sciences infrastructure (RI Innovation Campus Bond (2018), URI's Center for Biotechnology and Life Sciences (2009); College of Pharmacy building (2012); Beaupre Center for Chemistry (2016); and College of Engineering facility (2019), J&W School of Engineering and Design (2016))
- Investments by Brown University creating School of Engineering, Data Sciences
- Nucleus of walkable Hub incorporates Wexford Science and Technology, South Street Landing, J&J, SEG, JWU, Nabsys 2.0, ProThera, Medley Genomics, NEMIC, RI Bio, Brown Medical School
- GMP Facility/Lab Space at URI ready to be operational (Pilot Scale, Training Resource)



Ecosystem

- BioManufacturing has been successful in Rhode Island as evidenced by Amgen world-class facility and planned growth, and the soon to be Rubius Therapeutics' new biomanufacturing facility
- RIQI as a resource for facilitating improvements in health and healthcare throughout the state.
- Number of successful Life Sciences start-ups still independent or acquired
- Proximity to, and increasing contacts with, neighboring and national Life Sciences organization (MassBio, BIO, CT BIO, Mass Challenge, Philips HealthWorks)
- Differentiating aspects of design and innovation uniquely integrated into products and companies



RI GAPS FOR FIVE KEY ENABLERS OF INNOVATION CAPACITY



Translational Scientific Research

- Need better assets and more “at-bats” for growing small businesses (i.e., more products to work with)
- University research historically focused on “basic research”; recent encouraging initiatives to also emphasize Translational Research (e.g., Brown Biomedical Innovations, Inc., Advance CTR or “spin-ins” like MindImmune at Ryan Institute/URI)
- No Life Sciences Anchor Company (e.g., Pfizer, GSK) or consortium of companies (e.g., Mass Neuroscience consortium with Fidelity Bioscience + J+J, Serono, Merck in early days of Mass Life Science evolution)
- Little emphasis on connecting research efforts within the ecosystem



Entrepreneurial Culture and Capital

- Lack of local venture or other funding: Limited capital engines in RI; few early stage investors present; Incubator programs – minor \$\$\$\$. This results in extreme difficulty to take companies from incubators to fully fundable companies (next value inflection pt.) Estimated need for venture \$ in RI: estimated at \$75-100M
- Lack of Executive Talent (“B +C suite”) pool, or little ability to identify these people, with both knowledge of how to move assets to the market and track record of funding success in prior start-ups (providing liquidity for investors)



Workforce Development

- Graduates of life science programs often leave RI due to lack of life science jobs
- Thin pool of experienced middle and senior leadership (B and C suite)



Enabling Infrastructure

- Lack of start-up laboratory space for new companies may have the potential impact of start-up companies locating to neighboring states and thus resulting in lost jobs and revenue.



Ecosystem

- Lack of shared vision for Life Sciences ecosystem results in disparate offerings, little coordination of planning and programming resulting in events for similar stakeholders occurring at the same time
- Need stronger legislative voice advocating for building the life science economy (e.g., life science caucus)
- Key leaders in the field have few forums to meet and share learnings on a regular basis
- No centralization of start-up/innovation spaces



KEY RECOMMENDATIONS

The BioHub Group, in partnership with key stakeholders, continually asked ourselves where Rhode Island should prioritize and target its activities and investments for greatest impact. The resulting recommendations are presented below, first with an **Overarching Recommendation** which will help coordinate and deliver on the recommendations to build our life sciences ecosystem.

OVERARCHING RECOMMENDATION TO TRANSFORM OUR RI LIFE SCIENCES ECOSYSTEM

Central to our recommendations for transforming our current innovation cluster to a true innovation ecosystem with a shared sense of community, is the identification and solidification of a coordinating body for Life Sciences. It is essential that one group be responsible and accountable to the key stakeholders for delivery. This Council must be an independent entity with the financial resources to make things happen. These financial resources would be utilized to support ongoing activities across the ecosystem and help those existing resources better leverage the ecosystem with scientific, technical, financial and political support.

We conceive that Rhode Island Bio, the local affiliate of the international BIO organization serve as the independent entity with staff resources (suggest 3-5 staff members initially) supported in partnership with local industry and RI Commerce Corporation, with an initial annual operating budget of \$500K-1M^{2,3}. RI Bio would have the remit and authority to oversee state-wide alignment of resources and capital investments including investments partnered through the state, matching grants for public/private initiatives overseen by a newly created Scientific Advisory Board consisting of leaders in the Life Sciences scientific community and alignment with the current RI Commerce Science and Technology Advisory Committee and their initiatives as specific examples.

This overarching recommendation will push the state to think more broadly about the future of Life Sciences but the state is at a pivotal and exciting time. Involvement of our community with the Rhode Island legislature is critical and the RI Bio organization now including the RI BioScience Leaders have begun discussions to collectively educate, inform and drive a deeper understanding of our industry with colleagues at the State House. This work has already begun with engagement with Representative Chris Blazejewski and other representatives on how to best inform and educate the RI legislature about the impact of the RI life sciences ecosystem on their constituencies. Importantly the BioHub members represent the Life Sciences community at the highest of levels in their organizations and will continue to support the statewide efforts.

This is the time for our community to come together and embrace the future we all envision to achieve continued economic growth in the Life Sciences **for the citizens of Rhode Island.**

(2): As a benchmark, Indiana [BioCrossroads](#) (the State's Life Science convener and growth catalyst) initiated with Seed Fund I (\$6 M over roughly 5 years) and is now investing from its Seed Fund II (\$8M).

(3): The University of Pittsburgh Office of Economic Partnerships is transitioning ownership of Life Sciences Pittsburgh and Pittsburgh Life Sciences Week to InnovatePGH – a next-generation public-private partnership built to accelerate Pittsburgh's status as a global innovation city.



RECOMMENDATIONS TO BUILD OUR RI LIFE SCIENCES ECOSYSTEM

Our recommendations focus on four key areas which must be strengthened and addressed:

- ***Work on several fronts to promote better and more assets for growing small businesses (i.e., more products to work with). First, enroll university leadership to continue to drive change in university tech transfer/business development offices, with the aim of enabling easier, seamless externalization of assets and IP, and local NewCo formation. Additionally, support programs and academic investments (e.g., Brown Biomedical Innovations Inc, URI Research Foundation) that aim to advance early assets to the next value inflection point.***
- ***Create a forum to bring together high net worth individuals in RI to engage around Life Sciences capital creation with the goal of establishing an initial \$25M Private Capital Fund growing to \$100M as successful ventures launch and grow.***
- ***Support infrastructure for new company creation: for example, the local development of laboratory and research facilities which includes wet lab space (as modeled by the Cambridge BioLabs, Wexford, URI Innovation Bond proposal)***
- ***Foster the connections across research institutions to promote synergies in RI areas of distinct strength and continue to promote regionally.***

These recommendations, and specific actions are detailed on the next two pages. The RI BioHub team, under the leadership of RI Bio, will continue to advocate for these recommendations, and will convene on a regular basis to measure progress.



RECOMMENDATIONS SUPPORTING KEY ENABLERS (1)



Translational Scientific Research: Support Translational Sciences Creating a Deep Asset Pool Leading to New Company Creation

Key Recommendation:

- Enroll university leadership at the highest level, to continue to drive change in university tech transfer/business development offices. The aim is for easier, seamless externalization of assets and IP to create more NewCo's ("we are open for business") based on the guiding principle these assets serve as foundational elements for the ecosystem growth benefiting all parties.

Other Recommendation:

- Support academic investments including, the URI Research Foundation and Brown Biomedical Innovations, Inc., that aim to select the most promising early assets and provide resources to move them to the next value inflection point, including new company creation and licensing.



Entrepreneurial Culture and Capital: Build Capital Fund for New RI Company Creation, Build the Pool of Experienced Entrepreneurs

Key Recommendation:

- >\$25M Capital Fund: Create a forum to bring together high net worth individuals in RI to engage around Life Sciences capital creation. Elevate life sciences investing, even for those not traditionally involved in life sciences/new to the space. Involve leaders in the RI community, both present and past. This would include Pt Judith Capital, Providence Equity Partners, Slater Technology, Biograph Ventures, Cherrystone Angel Group and others.

Other Recommendations:

- Advocate for continuation of STAC funding for SBIR match (STAC funding of \$4M over 4 years is in its last year, current recommendation is to grow to \$2M/year along with increase in SBIR Match to keep pace with growth of SBIR Phase I and Phase II Grant amounts). Increase the size of Internship Funding (*Note: Current legislative session appropriated \$1M annual appropriation*).
- Work closely with [Venture Mentoring Services RI](#) and [Academic Ventures Exchange](#) to ensure Life Science ventures receive the mentoring and experienced leadership they need.
- Implement an Academic Ventures Exchange-like program (to support new ventures outside of Ivy League system) here in Rhode Island.
- Plan a Life Science Entrepreneur in Residence program (like Brown's "Idea to Impact") and place 5-8 entrepreneurs across RI institutions.
- Develop local/regional educational programming for life sciences (e.g., how to move product to market, IP planning, strategy and planning in life science, life science project management).
- Develop and maintain a centralized resource center for Life Sciences entrepreneurs, using this inventory and information from Start-up Central 2018 as sources.
- Develop a life science job posting site (as a parallel example, MassBIO job posting site).



RECOMMENDATIONS SUPPORTING KEY ENABLERS (2)



Enabling Infrastructure: Support New Company Creation

Key Recommendation:

- Support infrastructure for new company creation: Fully advocate for the local development of laboratory and research facilities which includes wet lab space (as modeled by the Cambridge BioLabs, Wexford, URI innovation bond proposal). Today no such facility exists, sending our local startups to neighboring locations in Massachusetts and Connecticut.

Other Recommendations:

- Support and promote infrastructure: Increase awareness and access to use of CORES RI research facilities, services and instrumentation. As an example, in the near future, the URI Research Foundation will become the “one-stop shop” portal for industry to access URI core facility resources, e.g., electron microscopy and DNA sequencing services and access to the INBRE Central Research Core facility (<https://web.uri.edu/inbre-core-facility/>). The Research Foundation will have a standard industry-friendly contract and a common presentation of resource availability with instructions on how to gain access.



Ecosystem: Better Leverage Key Knowledge Areas Through Coordinated Collaboration to Transition from Life Science Cluster to Ecosystem

Key Recommendation:

- Foster the connections *across* research institutions to promote synergies in RI areas of distinct strength. This will include expertise in neuroscience/neurotechnology (research and clinical), computer and data sciences, medical technology and design innovation

Other Recommendations:

- Maintain the RI BioHub (reporting into RI Bio) for measuring Ecosystem progress/metrics (2X Year).
- Continue efforts to secure a large Life Sciences anchor company.
- Ensure the state actively supports the continued growth and development of BioManufacturing in this state, as demonstrated by the RI Commerce Corporation’s efforts to successfully attract Rubius Therapeutics’ new biomanufacturing facility
- For the key areas identified above, build a plan for strengthening cross-institutional networks, increasing partnerships and advancing external initiatives across the broader regional ecosystem.



Appendix A. RI BioHub Participants

Current Members

Daniel Behr, Executive Director, Brown University, Office of Industry Engagement & Commercial Venturing
Edward Bozzi, Ph.D., Professor of Biotechnology and Chemistry, University of Rhode Island
Meredith Curren – Governor Raimondo's Office
Michael Elliott, MD PhD – J&J, Senior Executive - Cambridge
Karen Ferrante, MD – Board Member and Former Cambridge Pharma/Biotech Senior Executive
Richard Horan – Managing Director, Slater Technology Fund
Michael Katz, Ph.D., Associate VP, IP Management & Economic Development
Carol Malysz, Executive Director, RI Bio
Patrice Milos, PhD (Co-Chair) – CEO, Medley Genomics, Former Cambridge Pharma/Biotech Senior Executive
Kate Motte – Founder, CORE Consulting for Pharma/Biotech, Cambridge Clients include Third Rock
Hope Hopkins – VP, Business Development, RI Commerce Corporation
Barbara Rosengren (Co-Chair)– Former Senior Executive, Novartis
Randy Shamblen – Senior Executive, Rhodes Technologies

Founding Members

Renee Cohen – Former Cambridge Pharma/Biotech Senior Executive
Meredith Curren (Co-Chair) – Governor Raimondo's Office
David Donabedian, PhD - Venture Partner, Longwood Fund, Boston
Michael Elliott, MD PhD – J&J, Senior Executive - Cambridge
Hilary Fagan – RI Commerce Corporation
Karen Ferrante MD – Board Member and Former Cambridge Pharma/Biotech Senior Executive
Susan Hager – Senior Executive, Foundation Medicine
Patrice Milos PhD (Co-Chair)– CEO, Medley Genomics, Former Cambridge Pharma/Biotech Senior Executive
Kate Motte (Co-Chair) – Founder, CORE Consulting for Pharma/Biotech – Cambridge Clients include Third Rock Co.
Joe Newell – Senior Executive, Alexion Pharmaceuticals (Left Alexion mid-2017)
Stefan Pryor – RI Commerce
Kayla Rosen – RI Commerce
Randy Shamblen – Senior Executive, Rhodes Technologies
Cissy Young, PhD – Senior Executive, Russell Reynolds, Boston