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# BioHealth Acceleration Initiative

Recommendations for Accelerating  
the Growth of the BioHealth Industry in Maryland  
**2017**

**LSAB**  
MARYLAND  
LIFE SCIENCES ADVISORY BOARD



# BioHealth Acceleration Initiative

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# Maryland BioHealth Acceleration Initiative

## Background

The Maryland Life Sciences Advisory Board (LSAB) appointed by Governor Hogan in 2016 convened a series of working groups to review the current situation regarding the BioHealth industry in Maryland and to make recommendations for accelerating the growth of the industry. The board's analysis of the opportunity for Maryland and its recommendations follow below:

### Opportunity: Leading the Growth Industry of BioHealth

The BioHealth industry<sup>1</sup> is undeniably a hidden gem within Maryland's economy<sup>2</sup> offering the promise of improving the lives of millions of patients and transforming global public health and well-being while simultaneously creating a vibrant, energetic and dynamic ecosystem that transcends the technologies, talent, connections, capital and assets upon which it is based. While the importance of the BioHealth industry in Maryland today is significant, there is a consensus among industry, academic and government leaders that it has not approached its full potential. Given the particularly valuable and demonstrably unique resources within the state's borders, there is little doubt by those in the field that Maryland is distinctively positioned to grow its BioHealth industry into a globally recognized Top 3 U.S. BioHealth Innovation Hub by 2023<sup>3</sup>.

Achieving this status will transform our state in ways not fully appreciated. We must harness the potential that lies in the intersection of researchers who have received competitive federal funding with real world, patient-oriented solutions, led by entrepreneurs in the region. In this way, Maryland will be able to attract additional capital and build and nurture more companies, creating a critical mass of firms poised to lead the 21st century – companies that will attack and cure cancer by using the body's own immune system, companies that will use medical robotics and devices to enhance patient care, and companies that will use our genetic code to identify, diagnose, and cure the most vexing diseases.

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- 1- BioHealth industry is defined as "...the intersection of healthcare, life sciences, biosciences, information technology and manufacturing." Page 9, Central Maryland BioHealth Innovation Index (published by EAGB, BHI and US EDA).
  - 2- In 2010, the private sector (as defined use "life sciences" NAICS codes based on Battelle Tech partnership practice) of Maryland's BioHealth industry alone had accounted for one third of the prior decade's job gains in Maryland, with 33,602 employees in the private sector generating \$3 billion in aggregate wages and salaries. By 2014, private sector employment had grown by 12% to 37,720 persons generating almost \$4 billion (3.92B) in total wages, with an average salary of \$103,860. (These numbers do not include those employed in the industry by federal labs and academic institutions or those with newer occupations not covered by the traditionally used life sciences codes. The April 2016 Central Maryland BioHealth Innovation Index using an expanded definition cites 278,470 BioHealth employees in the Greater Baltimore/Central Maryland region as of 2011).
  - 3- Jones Lang Lasalle and the Central Maryland BioHealth Innovation Index currently rank this region 6th in the nation. (JLL, US Life Sciences Outlook, June 2016; Central Maryland BioHealth Innovation Index, April 2016). Genetic Engineering News (GEN) ranks the region #4 in terms of U.S. Biopharma Clusters based upon an analysis of NIH and VC funding, patents, lab space and jobs (Genetic Engineering News Top 10 U.S. Biopharma Clusters, May 2, 2016).

## Imagine a Maryland BioHealth ecosystem where:

- Collaborations among universities, federal labs, government, and industry located throughout the state are prevalent and easily accomplished;
- Latest market-relevant discoveries and technologies flow seamlessly from federal and university labs to local spinouts and larger companies able to bring products to market;
- Frequent, impromptu interactions among scientists, entrepreneurs, venture capitalists and others drive highly innovative thinking, collaborations and novel products;
- Experienced, serial entrepreneurs start, or seek leadership opportunities with vibrant, cutting edge Maryland companies;
- Recruiting commercially relevant talent for Maryland BioHealth companies is easy;
- Challenging and rewarding career opportunities are in abundance thereby attracting and retaining top talent and newly educated students, post-docs and others;
- Capital is readily available to support company growth from proof of concept to commercialization;
- Modern in-state R&D laboratories and manufacturing facilities are in place to support BioHealth companies of all sizes across the state;
- Venture capitalists and others, viewing Maryland as a hotbed of innovation, routinely scout the state for investment opportunities, and open offices in-state as well;
- Major BioHealth companies feel compelled to establish a significant presence in the state in order to remain relevant and at the cutting edge of BioHealth;
- Maryland has an independent organization solely dedicated to the BioHealth industry and to its promotion, advocacy and growth; and
- **Maryland is ranked as a Top 3 U.S. BioHealth Innovation Hub.**

### Realizing the Vision: Top 3 U.S. BioHealth Innovation Hub

BioHealth is a thriving growth industry, with the U.S. biotech sector revenue estimated to have grown on average >10% each year over the past decade—significantly faster than the rest of the economy<sup>4</sup>. Given the pipeline of new inventions, of advanced therapies, and of dedicated venture funding, BioHealth is expected to be a job-creating catalyst for years to come. In fact, according to "The Roadmap for the Washington Region's Future Economy," biological and health technology services is one of seven key economic clusters that will drive the region's growth over the next decade. With Maryland's broad array of assets including the National Institutes of Health (NIH), Food and Drug Administration (FDA), Centers for Medicare and Medicaid Services (CMS), Walter Reed National Military Medical Center, U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), Johns Hopkins University, and the University of Maryland among others, there is no region better poised than Maryland to take a leading position in this growth industry. It will take a strong coalition of government, academic, industry, startup, investor and foundation partners to make this growth a reality and to ensure that the state is more than just a collection of assets.

Achieving this growth will require an effective strategy that leverages the assets, consolidates and integrates the various efforts, strategically invests resources to catalyze private investment, and commits to a course of action that is bold, visionary, thoughtful, and patient. This strategy, at its core, must enable Maryland to establish an ecosystem of researchers, entrepreneurs, companies and venture capitalists working together and learning from one another to drive toward a common goal. This ecosystem and its workforce of the future - a workforce comprised of GEDs to PhDs - will require state-of-the-art infrastructure including advanced R&D laboratories, small and large scale manufacturing facilities, big data centers, transportation hubs like BWI and rail, as well as vibrant places to live and raise families. With the right

strategic plan, Maryland will be positioned as a go-to place for BioHealth and other industries of the future with the potential to grow, attract, and retain companies and talent seeking to address the most vexing health problems of the modern age.

### Getting from Here to There: Top 3 U.S. BioHealth Innovation Hub by 2023

Maryland is the richest state in the U.S. when it comes to life sciences assets. The NIH, the FDA and CMS are all located in our state. Additionally, top ranked research institutions that attract billions of dollars in competitive federal research funding also are located in the region, as are world-recognized clinical centers affiliated with these institutions such as the University of Maryland Greenebaum Comprehensive Cancer Center and the Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins. The state's vibrant BioHealth community is rife with more than 500 companies large and small, including a number of public companies such as Astra Zeneca/ MedImmune, Becton Dickinson, Glaxo-SmithKline, Intrexon, Lonza, Qiagen, United Therapeutics and Grace. Despite this wealth of riches, Maryland currently ranks 6th in the JLL U.S. 2016 Life Science Outlook<sup>5</sup> report and in the Central Maryland BioHealth Innovation Index<sup>6</sup>. Maryland's challenge then, is to implement an effective strategy which ensures that these assets don't lay fallow, but are put to work in a collective manner.

A strategy that knits together Maryland's institutions which are conducting billions of dollars of research with both industry and federal agencies will buoy growth in the BioHealth industry that is the future of the state's economy for decades to come. Commercializing the new ideas and technologies developed by researchers at these institutions, and in Maryland's federal labs and innovative companies, will expand the state's economy, and bring the benefits of this research more quickly into the lives of people everywhere. An effective strategy should focus on and promote Maryland's distinct regional strengths in BioHealth in areas such as vaccine technologies, immunotherapy, cell

4- Nature Biotech, 10 March 2016. <http://www.nature.com/nbt/journal/v34/n3/full/nbt.3491.html>

5- JLL US Life Sciences Outlook, June 2016;

6- Central Maryland BioHealth Innovation Index, April 2016;

therapy and diagnostics, and also would open doors to new understanding, new applications and new products through essential research in biomedicine, bioengineering, nanotechnologies, and health information technology. Providing support for these novel technologies to be developed by startup companies created and nurtured in Maryland has two-fold impact: Not only does it ensure that novel products move from lab to market, but also it bolsters job growth and opportunity in the state, providing a virtuous circle of activity that fosters a vibrant ecosystem and attracts more researchers, companies, and investors to Maryland.

Once this thriving entrepreneurial ecosystem is built, it will become a self-sustaining model of continued growth.

As this strategy is implemented, stakeholders must tell the story of why Maryland is a great place to work and live in a new and compelling way so that the nation and the world see the state as a leading BioHealth cluster and a leading source of innovation. In doing so, Maryland's stature and standing as a leader in BioHealth, technology and innovation will continue to grow nationally and across the globe.

## Recommendations

As an initial step in developing a comprehensive, effective strategy to achieve the vision of Top 3 BioHealth Innovation Hub by 2023, the Maryland Life Sciences Advisory Board (LSAB) evaluated the entire landscape and came to the conclusion that there are seven areas which warranted study. Working groups were formed to analyze these seven key areas impacting Maryland's BioHealth ecosystem—(A) Foundational Support, (B) Access to Capital, (C) Convergence of Bio and IT, (D) Access to Talent, (E) Technology Transfer, (F) BioManufacturing and (G) Medical Device Manufacturing. The LSAB's analysis revealed common focus areas across these groups which fell into four broad categories: Assets, Connectivity, Capital and Talent.

In order to grow Maryland's BioHealth Industry these areas of focus must be addressed so that assets are readily identified and promoted, and stakeholders can more easily collaborate and find the resources they need (technology, training, funds, talent, facilities). A comprehensive strategy embraced by all stakeholders is required. New partnerships and strategic investments should be explored.

The LSAB working groups set forth the following recommendations (pages 6-8) to achieve the objectives of increased connections, collaboration and promotion; enhanced leveraging of assets, and expansion of capital and talent resources, in order to grow the Maryland BioHealth innovation ecosystem.

## Objective 1: Leverage and grow current ASSET base and accelerate commercialization.

### STRATEGIES

- Identify existing assets and facilitate leveraging these resources for commercialization in Maryland.
- Recruit division/innovation center for top pharma and top medtech company.
- Ensure adequate affordable lab space and manufacturing capability exists near academic and federal labs.
- Ensure adequate funding exists to support technology transfer, in-state manufacturing, and commercialization.
- Ensure state and federal policies support innovation for the BioHealth sector—including new technologies (i.e. convergence) and those developed inside federal labs and academic institutions.

### RECOMMENDATIONS

- A) Establish a Task Force to develop recommendations to overcome barriers to commercializing federal technology.
- B) Create multi-stakeholder Medtech Demonstration Hub to support medical device innovation and investment within Maryland.
- C) Provide support to existing centers of excellence at regional academic institutions for manufacturing of cell therapies for regenerative medicine and cancer indications.
- D) Provide capital support or operating support for innovation hubs to grow a thriving innovation economy.
- E) Incentivize developers and companies to build or expand manufacturing facilities.

## Objective 2: Increase CONNECTIVITY among and awareness of Maryland's BioHealth assets and resources.

### STRATEGIES

- Identify assets, resources, and market differentiators and promote them within and outside Maryland and work to increase connection and collaboration opportunities throughout the state and beyond.
- Promote the BioHealth industry in Maryland and globally through the use of a brand. Emphasize not only the collective assets but also the individual industry subsectors known to be strengths.
- Ensure comprehensive plan for Maryland's BioHealth industry is shared with and embraced by key stakeholders.

### RECOMMENDATIONS:

- A) Develop comprehensive Maryland BioHealth asset map and interactive web site.
- B) Leverage existing organization(s), or create a new organization, with a BioHealth-focused CEO/leader, resources, and board, to focus on industry advocacy, connectivity, and programs.
- C) Promote the BioHealth industry in Maryland and globally through the use of a brand. Emphasize not only the collective assets but also the individual industry subsectors known to be strengths.



## **Objective 3: Increase availability and access to CAPITAL for early through advanced stage BioHealth companies.**

### **STRATEGIES**

- Expand the funds available in Maryland to support the gap (\$3-5M+/company) that exists for BioHealth companies working to advance and de-risk their technologies.
- Ensure existing programs supporting technology transfer and early stage development are adequately funded and are supporting the diverse range of BioHealth companies (pharma to medtech).
- Explore new funding proposals leveraging existing finance tools such as loans and Small Business Innovation Research (SBIR) awards.
- Recruit individuals and groups to invest in Maryland BioHealth.
- Expand the ecosystem so that more Maryland companies will have advanced to later-stages of their business cycle and can readily find later stage investment and/or venture partners.

### **RECOMMENDATIONS:**

- A) Ensure existing Maryland BioHealth funding programs are adequately capitalized.
- B) Establish a state-funded life sciences venture capital investment fund.
- C) Gain private sector (venture capital/angel) commitment to match new state life sciences venture capital investment fund.
- D) Establish public-private competition to increase scalable risk capital.
- E) Establish a network of high-net individuals and experienced life sciences investors.
- F) Establish SBIR matching fund as new vehicle for additional early fund, and provide SBIR assistance reimbursement to increase win rate of non-dilutive revenue.

## **Objective 4: Grow TALENT pool of experienced BioHealth entrepreneurs, business leaders, graduates and scientists with commercially relevant experience.**

### **STRATEGIES**

Take the following steps to strengthen and maintain a robust, relevant, diverse, and easily accessible labor force to support the state's BioHealth industry:

- Centralize all information related to workforce (training, career path, internships and employment opportunities in one easy to access location).
- Leverage existing resources by expanding the opportunities for students, post-docs, federal researchers and others to gain commercially relevant experience in BioHealth; and use existing training programs to provided relevant training and education.
- Encourage C-talent to lead Maryland BioHealth companies through commercialization to move to/remain in Maryland.
- Expand ecosystem through strategies in outlined above to facilitate employee recruitment and retention.

### **RECOMMENDATIONS**

- A) Fund commercially relevant experiential learning programs in Biomedical Engineering, Biotechnology and related disciplines.
- B) Create incentive program to attract, retain, and support C-Level entrepreneurs.

## Additional Recommendations

- Assets** • Recruit or co-locate a division or innovation center of a major pharma or medtech company.
- Capital** • Expand Maryland Industrial Partnerships (MIPS) program to other universities.  
• Provide SBIR assistance reimbursement to increase win rate of non-dilutive revenue.  
• Provide financial incentives to support innovative/translationally focused faculty.
- Talent** • Support annual needs assessment of skills required to support innovation and relevant training and career path promotion.  
• Support Entrepreneur in Residence (EIR) program in the proposed life sciences venture capital investment fund and in universities to build a talent pool to lead BioHealth companies in Maryland.  
• Require in-state residence for executives of companies receiving state funds.

## Conclusion

It is indisputable that Maryland possesses the asset base, the technologies, the proprietary resources, and the institutions that are necessary for it to become a globally recognized Top 3 BioHealth Innovation Hub by 2023. The LSAB has developed this set of recommendations to enable Maryland to achieve this goal.

### Grow **A**ssets, **C**onnectivity, **C**apital and **T**alent

**Assets** Leverage and grow current asset base and accelerate commercialization.

**Connectivity** Increase connectivity among and awareness of Maryland's BioHealth assets and resources.

**Capital** Increase availability and access to capital for early through advanced stage BioHealth companies.

**Talent** Grow talent pool of experienced BioHealth entrepreneurs, business leaders, graduates and scientists with commercially relevant experience.

By ACCTing now and embracing a strategy focused on better Asset leverage, increased Connectivity and promotion, enhanced Capital and expanded Talent resources, Maryland will surely become recognized as a global leader in BioHealth innovation and a Top 3 U.S. BioHealth Innovation Hub by 2023.



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