

December 22, 2017

The Honorable Thomas V. Mike Miller, Jr. President, Maryland Senate State House, H-107 Annapolis, Maryland 21401-1991

The Honorable Michael E. Busch Speaker, Maryland House of Delegates State House, H-101 Annapolis, Maryland 21401-1991

RE: Maryland Life Sciences Advisory Board Report

Dear President Miller and Speaker Busch:

In accordance with Economic Development Article §3-205 the Maryland Life Sciences Advisory Board, in conjunction with the Department of Commerce is pleased to submit the annual Maryland Life Sciences Advisory Board Report.

We look forward to your review of this report and will be happy to furnish any additional information that is needed. If we can be of further assistance, or if you have any questions regarding this report, please contact Bret Schreiber, Executive Staff to the Maryland Life Science Advisory Board at 410-767-2368.

Sincerely,

Jay A. Perman, MD Chairman, LSAB

Tay A Firman

R. Michael Gill Secretary, Department of Commerce

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Enclosure



MEMORANDUM

TO:

The Honorable Larry Hogan

Governor

FROM:

Jay A. Perman, MD

Chairman, LSAB

R. Michael Gill

Secretary

THRU:

Sean Powell

Deputy Chief of Staff, Governor's Office

DATE:

December 22, 2017

SUBJECT:

Maryland Life Sciences Advisory Board Report

In accordance with Economic Development Article §3-205, the Maryland Life Sciences Advisory Board, in conjunction with the Department of Commerce is pleased to submit the Maryland Life Sciences Advisory Board Report.

We look forward to your review of this report and will be happy to furnish any additional information that is needed. If we can be of further assistance, or if you have any questions regarding this report, please contact Bret Schreiber, Executive Staff to the Maryland Life Science Advisory Board at 410-767-2368.

Attachment



MARYLAND LIFE SCIENCES ADVISORY BOARD

As Required by Economic Development Article

Section 3-205

Respectfully submitted to the General Assembly of Maryland by

R. Michael Gill

Maryland Department of Commerce

401 East Pratt Street

Baltimore, MD 21202

December 2017



Larry Hogan, Governor | Boyd Rutherford, Lt. Governor

Introduction

The Life Sciences Advisory Board (LSAB) was established by Chapter 304, Acts of 2007, for the purpose of maintaining Maryland's preeminence in the life sciences industry. The function of the board is to:

- Develop a comprehensive strategic plan for life sciences in the State of Maryland;
- Promote life sciences research, development, commercialization and manufacturing in Maryland;
- Promote collaboration and coordination among life science organizations in Maryland;
- Promote collaboration and coordination among research institutions of higher education in Maryland;
- Develop a strategy to coordinate state and federal resources to attract private sector investment and job creation in the life sciences;
- Develop a strategy to support federal life sciences facilities located in the state, including support for education, transportation, housing and capital investment needs; and
- Make recommendations to address critical needs in the life sciences, including access to venture capital and capital construction funding.

In performing its duties, the LSAB is to give due consideration to the business, scientific, medical, and ethical aspects of the life sciences industry.

Fiscal Year 2017 Board Composition

The current LSAB was appointed by Governor Larry Hogan on February 13, 2016 to serve a two-year term. The Board consists of the following members:

Chair:

Daniel J. Abdun-Nabi, JD, LLM, President and CEO - Emergent BioSolutions,

Inc.

Vice Chair:

Jay A. Perman, M.D., President - University of Maryland, Baltimore

Christopher P. Austin, M.D., Director, National Center for Advancing

Translational Sciences – U.S. National Institutes of Health

Richard A. Bendis, President and CEO - BioHealth Innovation, Inc.

Jarrod Borkat, Head, External Collaborations, Biotech Hubs and Government Contracting -

MedImmune

Marco A. Chacon, Ph.D., Founder, CEO and President - Paragon Bioservices,

Inc.

Douglas Jon Liu, Senior Vice President, Head of Global Operations – Qiagen Sciences Inc.

Theodore J. Olsen, President and CEO - PathSensors, Inc.

Patrick G. O'Shea, Ph.D., Vice President and Chief Research Officer - University of Maryland (resigned due to move out of state)

Wendy Perrow, MBA, CEO - AsclepiX Therapeutics

Karen L. Proudford, Ph.D., Associate Professor of Management and Director,

Graves Honor Program - Earl G. Graves School of Business & Management

Morgan State University; President, William E. Proudford Sickle Cell Fund, Inc.

Sanjay K. Rai, Ph.D., Chief Academic Officer and Senior Vice President for

Academic Affairs - Montgomery College

David W. Smith, Ph.D., Vice President, Global Business Development, Emerging Technologies – Lonza Walkersville, Inc.

Col. Andrea Stahl, Ph.D., Director, MRMC CBRN Defense Medical Research Coordinating Office and JPC-Radiation Health Effects - U.S. Army Medical Research & Material Command

Frank F. Weichold, M.D., Ph.D., Director, Critical Path and Regulatory Science Initiatives, Office of the Commissioner – U.S. Food and Drug Administration Christy Wyskiel, Senior Advisor to the President and Head of Johns Hopkins Technology Ventures, Johns Hopkins University

Standing:

R. Michael Gill, Secretary – Maryland Department of Commerce John Wasilisin, President and Chief Operating Officer – TEDCO

Summary of Activities

First Meeting

Chairman Dan Abdun-Nabi convened the fiscal year's first meeting of the LSAB on October 31, 2016 at Montgomery College Germantown Campus, 20200 Observation Drive, Germantown, MD. The working groups that had been established during Fiscal Year 2016 presented the results of their analysis and their recommendations. The LSAB agreed that there were four common themes across the seven areas the working groups covered:

<u>Assets</u> Leverage and grow the current ASSET base and accelerate commercialization

Connectivity Increase the CONNECTIVITY among and awareness of Maryland's biohealth assets and resources

Capital Increase the availability and access to CAPITAL at each phase of the biohealth life cycle

<u>Talent</u> Grow the TALENT pool of experienced biohealth entrepreneurs, business leaders, graduates and scientists with commercially relevant experience

The group adopted the acronym, ACCT to frame the recommendations going forward. The original seven Working Groups were reformed into four, one focusing around each of the four areas to prioritize among the recommendations. Working groups were formed with a leader and LSAB members as well as additional representatives from the Maryland biohealth community. The non-LSAB members were chosen based on their relevant experience and expertise in a particular area. The working groups agreed to continue their work through collaborative bi-weekly conference calls.

Second Meeting

The bi-weekly conference calls with working group leaders continued through November and into early December 2016. The final meeting for calendar year 2016 was held at the Institute for Bioscience and Biotechnology Research (IBBR), 9600 Gudelsky Drive, Rockville, MD on December 6, 2016.

At this meeting an updated set of recommendations were presented in each of the four common themes; Assets, Connectivity, Capital, and Talent - with one recommendation from each area with a detailed action plan which could be implemented within fiscal year 2018, and a broader, more comprehensive set of recommendations to be implemented over a longer period of time. This plan was delivered to Commerce Secretary Mike Gill for review and action by the end of December 2016.

Detailed action plans were added to the remaining recommendations. This plan was scheduled to be presented to the entire LSAB in its entirety at the next scheduled meeting on April 10, 2017.

Third Meeting

Chairman Abdun-Nabi convened the first meeting of calendar year on April 10, 2017 at FastForward, Johns Hopkins University, 1812 Ashland Avenue in Baltimore, Maryland 21205. At this meeting, the stated the purpose was to agree on the final set of recommendations for Accelerating the Growth of the BioHealth Industry in Maryland to present to Governor Hogan.

The Chairman reviewed the LSAB's activity of the past year: establishment of the vision for Maryland to be top-3 biohealth ecosystem by 2023, evaluation of Maryland's strengths and gaps, definition of the elements of a thriving ecosystem, and establishment of the framework for attaining the vision.

The teams worked throughout the year to develop recommendations. The working group recommendations were prioritized and organized into four key areas, **Assets**, **Connectivity**, **Capital** and **Talent** to facilitate implementation. The recommendations were presented by each of the working Group leads in these four key areas.

Assets Recommendations

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

Connectivity Recommendations

- A. Develop a 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, and board to focus on industry advocacy; and
- 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.

Capital Working Group Recommendations

- A. Ensure existing State BioHealth funding programs are adequately capitalized;
- B. Establish a State funded Life Sciences Venture Capital (VC) Investment Fund;

- C. Gain private sector (VC / Angel) commitment to match new State life sciences VC Fund;
- D. Establish public-private competition to increase scalable risk capital;
- E. Establish a network of high-net individuals and experienced life sciences investors; and
- F. Establish Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) matching fund as a vehicle for additional early fund, and provide SBIR assistance reimbursement to increase win rate of non-dilutive capital.

Access to Talent Recommendations

- A. Fund commercially relevant experiential learning programs in Biomedical Engineering, Biotech and related disciplines;
 - 1. Establish a State-funded Maryland life sciences VC investment fund;
 - 2. Convene a statewide Training Task Force to leverage existing programs and facilities with four pilot projects:
 - i. Small BioHealth Company Internships;
 - ii. Industry Training Resource;
 - iii. BETC's Pharma; and
 - iv. Growing a commercially relevant talent pool Medtech.
- B. Create an incentive program to attract, retain and support C-level entrepreneurs.

The LSAB voted to approve the recommendations as presented. Secretary Mike Gill thanked the Board members for their work throughout the past year in evaluating the Maryland bio-ecosystem and for developing an actionable set of recommendations for growth.

Appendix 1 - Working Group Composition (Reformed 10/31/16)

Assets

Chair: Jarrod Borkat, MedImmune

Members:

Chris Austin, NCATS	Jason Brooke, Vasoptic Medical
Bert M. Glazer, Ocular Proteonics	Deanne Kasim, Santesys Solutions
Margaret Latimer, Montgomery College	Jim Pannucci, Southern Research
Sam Wang, Astra Zeneca	Martha Schoonmaker, PICMC
Karen Proudford, William E. Proudford Sickle	John Wasilisin, TEDCO
Cell Fund	

Connectivity

Chair: Rich Bendis, BioHealth Innovation (BHI)

Members:

Ethan Byler, BHI	Matt Puglisi, Netrias
Jane Fang, MedImmune	Martin Rosendale, Maryland Tech Council
Chris Ghion, Adventist Healthcare	Michael Thomas, Appian Partners
Sam McCleary, Under Armour	

Capital

Chair: Wendy Perrow, AsclepiX

Members:

Philip Gorlet, Red Abbey Venture Partners	Ali Behbahani, New Enterprise Partners
Sean Denny, Investor / Entrepreneur	Henrik Rasmussen, Rasmussen Pharma
	Consulting
David Rosen, RS&F	Elizabeth Good Mazhari, Transition Health
	Ventures
Jennifer Hammaker, TEDCO	Kyp Sirinakis, Epidarex Capital

Talent

Chair: Sanjay Rai, Montgomery College

Members:

Samir Balala, NIH	Angela Graham, Quality Biological
Jenifer Colvin, MDBio Foundation	Steve Greenfield, Montgomery College
Judy Costello, MD Department of Commerce	Mark Nardone, BioTrac
Curtis Gallagher, University of Maryland	Chioma Obi, Maryland Tech Connection
Ellie Giles, WorkSource Montgomery	Bret Schreiber, MD Department of Commerce
Michael Gove, BioTrain	Michael Smith, Montgomery College

^{*}Names in italics indicate non-LSAB members

Appendix 2 - Meeting Minutes, October 31, 2016

MARYLAND LIFE SCIENCES ADVISORY BOARD (LSAB)

MEETING MINUTES

MEETING DATE:

October 31, 2016

TIME:

12:30-4:15 P.M.

LOCATION:

Montgomery College Germantown Campus, Bioscience Education (BE) Building - Room 151

20200 Observation Drive, Germantown, MD

2087

Welcome

Chair Abdun-Nabi welcomed attendees to the fall meeting and thanked LSAB member Dr. Rai and his colleagues for hosting the meeting. Dr. Rai spoke briefly regarding Montgomery College, the students it serves and its role in the community. He also referenced the classes and mock GMP facility in the Bioscience Education building and its location in the Pinkney Innovation Complex for Science and Technology at Montgomery College (PIC MC). LSAB members were invited to tour the BE facility at the end of the meeting.

Call to Order

Chair Abdun-Nabi convened the meeting, and welcomed members and guests. He mentioned that former LSAB member Pat O'Shea had resigned from the LSAB due to his move to Ireland to become President of University College Cork, and acknowledged IBBR Director Tom Fuerst, Commerce Deputy Director Ben Wu, and MVR President Bob Storey as participants in the meeting. He also thanked members of the public in attendance who had contributed to the LSAB's Working Groups activities and final recommendations.

Chair Abdun-Nabi asked for feedback on the Minutes of the May 7, 2016 LSAB meeting. Hearing none, he asked for a Motion to Approve the Minutes which was made by Ms. Wyskiel and seconded by Mr. Bendis. The May meeting Minutes were approved unanimously.

Update from Commerce

Secretary Gill thanked the LSAB members for their work since May preparing recommendations to accelerate the growth of the BioHealth industry in Maryland and said he looked forward to listening and learning from their presentations today.

Desired Future State

Chair Abdun-Nabi reminded the LSAB members of their decision at the May meeting to make "Top 3 by 2023" the goal and vision statement for the LSAB. He asked members to consider what the desired future state in 2023 might look like. LSAB members discussed different cluster rankings (JLL US Life Sciences Report, Milliken, New York Life Sciences reports) and how Maryland and others fair differently depending upon what activity is measured.

LSAB members discussed:

- a) <u>Elements of a thriving BioHealth ecosystem</u>: Great academic research, capital, talent, lab space/infrastructure, ecosystem leadership, thriving entrepreneurial culture with seasoned entrepreneurs, manufacturing and CRO capabilities.
- b) What Maryland has: Great universities, federal institutions and labs, NIH funding & research, scientific talent, some capital, critical mass of small biohealth companies, some globally recognized brands.
- c) <u>What Maryland could use more of</u>: Early-stage capital/VC, anchor companies, manufacturing/ CRO capabilities, experienced entrepreneurs, space/infrastructure, experienced entrepreneurial talent, better connectivity and collaboration, and more commercial companies.

Chair Abdun-Nabi asked the LSAB members to consider a specific description of how others might describe Maryland if the Top 3 U.S. BioHealth Innovation Hub by 2023 goal is achieved:

- Collaborations are numerous and easily accomplished
- Latest market relevant discoveries flow seamlessly to companies
- Frequent, impromptu interactions among key industry leaders are routine
- Experienced, <u>serial entrepreneurs seek leadership</u> opportunities in Maryland
- Commercially relevant talent <u>recruitment is easy</u>
- Challenging and rewarding career opportunities are abundant
- Capital is readily available to support company growth
- R&D lab space and GMP manufacturing facilities for Phase 1 studies are plentiful
- VC's routinely scout Maryland for investment opportunities
- Large pharma and medical device innovation centers are in Maryland.
- A BioHealth focused organization actively promotes and coordinates industry initiatives

A discussion regarding visits to other innovation centers which have some aspects of the 'desired future state' took place. Mr. Bendis spoke of a recent trip to New York and the Alexandria Properties accelerator next to Bellevue. Ms. Perrow, Mr. Borkat, Ms. Wyskiel and Mr. Austin spoke of the

innovation taking place in Boston and the Cambridge, Massachusetts environment. Ms. Wieskel also spoke regarding Ohio and recent visits to Toronto and Pittsburgh. Mr. Storey spoke of his observations regarding JLABS in Houston. Dr. Austin remarked how academic missions are enhanced by related economic activity, and he and other members spoke about how a strong entrepreneurial ecosystem helps researchers to know their technologies will get advanced. Both Ms. Wieskel and Mr. Bendis recommended focusing on initiatives to grow the ecosystem over work to recruit large corporations stating enabling spin-outs and start-ups can grow and thrive is what will attract the large corporations. Boston was cited as an example of where the innovation and entrepreneurial community was developed before large companies moved to Massachusetts.

Dr. Rai stated Maryland is competing not only with innovation centers through the United States but also globally such as Hyderabad where Alexandria Real Estate also has a campus. Mr. Smith agreed and spoke about activity taking place not only in New Hampshire and Texas but also in Japan, Switzerland, and the UK.

Dr. Weichold suggested a plan focus on specific activities and referenced the opportunity for Maryland to match funding with projects involving the FDA, especially those involving Regulatory Science.

Dr. Fuerst asked that the group remember to include agbio in its industry description.

Mr. Borkat stated that to make a meaningful difference in the BioHealth economy, changes have to be made in more than one aspect of a thriving ecosystem and that a comprehensive plan integrating a variety of initiatives is required. Chair Abdun-Nabi, Mr. Bendis and Ms. Wyskiel stated they agreed.

The Chair then suggested Maryland's industry (public and private sector, NGOs and government) need to "ACCT" together to deliver on a strategy so that Maryland and its residents can reap the rewards of increased tax revenue, increased job growth, global recognition, new companies, greater investment in Maryland, economic growth and reduced dependency on government. Dr. Weichold and Mr. Bendis said they agreed with the statement and would add the academic sector to the description of industry.

Chair Abdun-Nabi acknowledged consensus on the need for a comprehensive plan integrating a variety of initiatives particularly those focused on growing young companies and the entrepreneurial ecosystem. He then invited the Working Group leaders to present their findings so the Board can determine next steps regarding a plan.

Working Group Presentations

Chair Abdun-Nabi thanked all seven Working Group Chairs and their members for the work they have been doing since May and asked them to share their group's top challenges and solutions per topic. He acknowledged non-LSAB member Bob Storey, Principal of the MVR group and thanked him for representing Medtech interests in this initiative. The Chair also reminded the members that these are preliminary working group findings and recommendations being presented for discussion. At this point, they do not represent formal recommendations of the LSAB and the information being shared during the meeting is being shared for background and discussion not as a formal, public report.

(1) Foundational Support Working Group - Mr. Borkat, Chair

Members:

Chris Austin, Director, NCATS

Jason Brooke, CEO, Vasoptic Medical Bert

M. Glaser, CEO, Ocular Proteomics

Deanne Kasim, Founding Partner, Santesys Solutions

Margaret Latimer, VP and Provost, Montgomery College

Jim Pannucci, Director, Southern Research

Karen Proudford, President, William E. Proudford Sickle Cell Fund

Martha Schoonmaker, Executive Director, PICMC

Sam Wang, Associate Director, Astra Zeneca John

Wasilisin, President and COO, TEDCO

<u>Challenge #1</u>: Pockets of BioHealth strength exist in Maryland, but are not well characterized and coordinated

Solutions:

- A. Support the creation of an advocacy group/leader for Maryland's life sciences industry
- B. Develop interactive asset map
- C. Connect patient advocacy groups to local companies

<u>Challenge #2</u>: Limited awareness of Maryland's BioHealth strengths within and outside of Maryland

Solutions:

- A. Promote the BioHealth industry in Maryland through use of a brand
- B. Define and promote areas of current and desired strength
- C. Attract a division of an anchor company

(2) Access to Capital Working Group – Ms. Perrow, Chair

Members:

Sean Denny - Investor/Entrepreneur

Jennifer Hammaker – Director, MII at TEDCO

Henrik Rasmussen, MD, PhD – Chairman, Rasmussen Pharma Consulting Philip

Goelet, PhD - Managing Member, Red Abbey Venture Partners and

CEO and Director, AgriMetis, LLC

David S. Rosen, Esquire, CPA – Director of Tax Services, RS&F Ali

Behbahani, MD, PhD – Partner, New Enterprise Associates

Elizabeth Good Mazhari – President, Transition Health Ventures

Kyp Sirinakis - Managing Partner, Epidarex Capital

<u>Challenge:</u> Lack of enough Funds and a Scalable Fund / Risk Capital located in Maryland that will invest in Early Maryland Life Science Companies
Solutions:

- A. Create a State funded Life Sciences MD Venture Capital Investment Fund which would be the anchor initiative for scalable risk capital targeting early stage life sciences companies in MD through a Public/Private partnership
- B. Create/Identify Private Funds
- C. Increase Funding for Existing Maryland State Funding Programs

<u>Challenge</u>: It is Difficult to Attract and Retain Executive Talent for Life Sciences Start-up Companies in Maryland

Solutions:

- A. Support Entrepreneur in Residence program financially in the Life Sciences MD Venture Capital Investment Fund and Private VC's to build a talent pool to lead life sciences companies in Maryland
- B. Subsidize or match retained search, relocation expenses to bring in C-Level/CEO entrepreneurial top talent or interim management to lead start-up companies
- C. Create incentive program to attract, retain, and support C-Level/CEO Entrepreneurs who will be credible for Venture Capital investment

(3) Convergence of Bio and IT Working Group – Mr. Bendis, Chair

Members:

Ethan Byler – Managing Director of Economic Development, BHI

Jane Fang – R&D Information Head for Clinical Biologics, MedImmune Chris

Ghion – CIO, Adventist Healthcare

Sam McCleery – VP, Commercialization Lab & Open Innovation, Under Armour Matt Puglisi – CEO, Netrias

Martin Rosendale – Interim CEO, Tech Council of Maryland; CEO, Selnova Michael

Thomas – CEO Appian Partners

BHI Analyst Support: Kurt Herzog, Ashwin Kulkarni, Noah Pyles

First Need to Define "Convergence"

Short definition: Convergence is integrating knowledge, resources, tools, and ways of thinking across scientific, commercial, and social disciplines and industries to solve problems.

Full definition: Convergence is an approach to problem solving that intersects disciplinary boundaries, integrating knowledge, tools, and ways of thinking from life and health sciences, physical, mathematical, and computational sciences, engineering disciplines, and beyond to form a comprehensive synthetic framework for tackling scientific, societal, and commercial challenges that exist at the interfaces of multiple fields1, i.e. Nanotechnology, Biotechnology, Cybersecurity, Information Technology and Cognitive Science.2

Convergence of Bio and IT Working Group

<u>Challenge</u>: BioHealth and IT/technology companies have an opportunity to integrate and collaborate; however, no clear pathway exists for their convergence

Solutions:

- A. Define convergence
- B. Support the creation of an asset map for Maryland.
- C. Create a needs and opportunities assessment and road map for those in Maryland to

participate in convergence

D. Policy planning

E. Develop regional promotion and branding for Maryland as convergence leader

(4) Access to Talent Working Group—Dr. Rai, Chair

Members:

Samir Balala, Project Officer and Animal Facility Manager, NIH Jennifer

Colvin, VP of Education, MDBio Foundation

Chris Frew, VP Sales, Breezio and Founder, BioBuzz

Curtis Gallagher, Exec. Dir., MEETSprogram.org

Ellie Giles, CEO, WorkSource Montgomery

Michael Gove, Facilitator, BIOTrain

Angela Graham, President and CEO, Quality Biological, Inc.

Collins Jones, PhD, Biotechnology Coordinator, Montgomery College Laurie

Savona, Academic Affairs Operations Dir., Montgomery College Mark

Nardone, Director, Bio-Trac® Training Programs

Chioma Obi, Bioscience Industry Navigator, MD Tech Connection

James Pannucci, Senior Director, Southern Research

Michael Smith, Biotechnology Program Mgr, Montgomery College

Challenge #1: No central location for workforce information

(job and internship opportunities, training, education, career paths)

Solution:

A. Develop a centralized, labor exchange with support to keep in current and include on it/linked to it all related workforce information: job and internship opportunities, training, education, career paths, etc.

<u>Challenge #2</u>: There is a need for training and support for experiential learning to keep pace with advancing technology

Solutions:

- A. Establishment of Maryland Internship Collaborative (MIC)
- B. Establish matching grants for early stage BioHealth companies hiring interns
- C. Support annual skills gap assessments and relevant training and career path promotion

<u>Challenge</u>: Growing and larger size companies are forced to recruit talent with commercially relevant experience from out of state and convincing recruits to move to Maryland can be a challenge

Solutions:

- A. Support other Working Group proposals to grow ecosystem
- B. Support other proposals of this Working Group

(5) Technology Transfer Working Group – Ms. Wyskiel, Chair

Members:

Chris Austin, M.D., Director, National Center for Advancing Translational Sciences - U.S. NIH

Martha J. Connolly, Director, Mtech Baltimore; Dir, Bio Entrepreneurship Barry Datlof, Director, Medical Tech. Transfer, U.S. Army Medical Research and Materiel Command

Ellen Hemmerly, Executive Director at UMBC Research and Technology Park Joseph Naft, Director, Maryland Industrial Partnerships (MIPS)

Ted Olsen, President and CEO, PathSensors, Inc.

Tom Sadowski, Vice Chancellor for Economic Development, University System of Maryland Peter Sandborn, Director, MD Technology Enterprise Institute

Elizabeth Smyth, Sr. Director Strategic Initiatives,

JHTV Karl Steiner, PhD, VP for Research, UMBC

Challenges:

- Most products developed at federal labs and universities in our state are simply not ready for prime time.
- Many technologies/ideas developed in MD labs are very early stage with only intellectual property protection.
- Most need more development and validation in order attract strategic partners and/or corporate/venture capital investment
- MD lacks a coordinated strategy to grow and sustain an entrepreneurial ecosystem to provide early stage technologies with resources, funding and programs that enable the development of breakthrough products with commercial potential.
- Universities and federal labs don't necessarily support culture of commercialization historically rewarding publishing over patents. There is a misalignment of incentives/outcomes at some institutions.
- MD lacks depth of talent with commercialization experience or potential that other states such as CA and MA have.
- Many promising technologies are receiving funding and leaving the state. <u>Solutions</u>:
- Maryland needs a coordinated strategy to grow and sustain an entrepreneurial ecosystem to provide early stage technologies with resources, funding and programs that enable the development of breakthrough products with commercial potential such as: training programs, funding (from translational grants to VC), mentors, industry partnerships and /collaborations, accelerator programs, regulatory and reimbursement pathways clearly delineated, affordable, flexible and relevant spaces in which to work and grow.
 - A. Funding: Provide robust support for funding for entrepreneurs in and around universities and other federal agencies in collaboration with tech transfer offices.
 - B. Resources: Provide robust support for resources for entrepreneurs in and around universities and other agencies with tech transfer offices.
 - C. Space: Life sciences companies need lab space to grow and thrive. Providing affordable, flexible lab space for companies coming out of "tech transfer" is a foundational need for the ecosystem. There is a need to provide robust support for spaces for entrepreneurs in and around universities and federal agencies in collaboration with tech transfer offices.

- D. Collaborations: Support and augment industry/academic collaborations with catalytic funding.
- E. Stimulate Market Activity at Federal Labs: Empower investigators at federal labs to move technology toward the market by removing barriers and examining incentives.

(6) BioManufacturing Working Group - Dr. Chacon, Chair

Members:

David Smith, VP, Global BD, Emerging Technologies, Lonza Walkersville Bill Bentley, Distinguished Chair of Engineering & Inaugural Director, Robert E. Fischell Inst. for Biomedical Devices

Helen Montag, Sr. Director, BD & Corp. Partnerships, Johns Hopkins Technology Ventures Bob Storey, Managing Director, The MVR Company

<u>Challenge #1</u>: Limited global manufacturing capacity for Viral Vectors, Vaccines, Monoclonal Antibodies and Cell Therapies

Solutions:

- A. Incentivize developers and companies to build and to expand manufacturing facilities in Maryland.
- B. Provide manufacturing companies with an incentive to hire and train new employees
- C. Support for training of a qualified work force for Bioprocess, Manufacturing, Analytics and Regulatory Science will be needed for an industry that is expected to grow in double digits for years to come.
- D. Deploy biomanufacturing educational training centers (BETCs) to develop "manufacturing job-ready" staff.

<u>Challenge #2</u>: Maryland is not recognized for its manufacturing of specialty technologies e.g. Viral Vectors, Vaccines, and Cell Therapies.

Solution:

A. Create a Maryland office and name a strong CEO or Director to represent the State's biotechnology companies, pharmaceutical companies, contract manufacturers, medical device companies, and other health related institutions in the US and abroad. (Activities of the proposed new office will expand on more traditional organizations such as MA Bio, NY Bio, Bay Bio, VA Bio.)

<u>Challenge #3</u>: Lack of Support for Manufacturing Needs at Maryland's academic institutions <u>Solution</u>:

- A. Create a regional GMP Center of Excellence for the manufacture of cell therapies. The proposed COE would be organized as a consortium of academic, public and private sectors
- --including JHU, UMS, NCI, and Maryland Department of Commerce). Support a proposal to create an Advanced Therapy Manufacturing Center of Excellence in Baltimore involving private, public, academic partnership.

(7) Medical Device Manufacturing Working Group - Bob Storey, Chair

Members:

Bill Bentley, University of Maryland Brian Lipford, KeyTech/Cooltech David Wise, Pharos/Abell Steve Falk, GE Healthcare

<u>Challenge</u>: There are no Top 100 public medical device companies HQ'd in Maryland and there is only a limited presence of major firms in the State. That results a lack of experienced medtech management in Maryland to support and retain emerging growth and start-up companies that arise from the State's considerable medical technology resources. This lack of resource is an impediment to both confidence by outside investors and regional retention of emerging growth companies.

Solutions:

- A. Attract Major Device Company involvement in Maryland via recruitment of Innovation & Dev. Centers
- B. Develop Executive Centers targeting major device company liaison offices that would co-locate in conjunction with the Institutional "Corridors of Excellence" around the State's areas of core competence (Regulatory/Reimbursement Science, Target Technology Sectors)
- C. Expand support and investment for entities that develop and support Maryland based CEO/Executives
- D. Provide relocation assistance for companies recruiting out of state senior executives
- E. Fund programs to support experiential programs for biomedical & eng students w/in medical manufacturing
- F. Support manufacturing education and skills development

<u>Challenge</u>: There is a lack of local contract manufacturing and supply chain resources for Medical Device manufacturing in Maryland, and very poor networking among the supply chain that does exist in the State.

Solutions:

- A. Establish co-operative programs with experienced contract manufacturers, allowing importation of management & organizational expertise.
- B. Create incentive programs for medical device specific supply chain businesses to locate and expand in Maryland; targeting supply to both Maryland and surrounding regions.
- C. Organize and update a unique Medtech database that is readily accessible and actively maintained at Commerce.
- D. Create a Medtech specific network and communications community, leveraging the assistance (and proximity in DC) of the largest Medical Device trade organizations (Advamed, MDMA)

Next Steps

Chair Abdun-Nabi thanked the Working Group Chairs for the information they shared and stated that there seem to be four common themes with each of the presentations: Assets, Connectivity, Capital and Talent. He proposed model A C C T to guide the discussion regarding the challenges and solutions presented and next steps:

A Assets

Leverage and grow current ASSET base and accelerate commercialization

C Connectivity

Increase CONNECTIVITY among and awareness of Maryland's Biohealth assets and resources

C Capital

Increase availability and access to CAPITAL at each phase of the BioHealth life cycle.

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

LSAB members discussed the Working Group recommendations using the A C C T themes and agreed to use it as the framework for next steps. The Board agreed that the Working Group Chairs would reconvene and prioritize the solutions outlined in the presentations.

Secretary Gill asked the group prioritize several proposals which he could be implemented relatively easily and make a significant difference with the understanding that he is not certain what budget might be available.

Chair Abdun-Nabi and the Board agreed to prioritize the recommendations and more fully develop their top recommendations for FY18 and present those to the Secretary at the next LSAB meeting scheduled for December 6, 2016.

Adjourn

Т

Chair Abdun-Nabi thanked everyone for participating in the discussion and adjourned the meeting.

Board Members in Attendance:

Chair: Daniel J. Abdun-Nabi, President and CEO -- Emergent BioSolutions

Vice Chair: Jay A. Perman, M.D., President – University of

Maryland, Baltimore

Members: Christopher P. Austin, M.D., Director, NCATS, – U.S. National Institutes of Health

Richard A. Bendis, President and CEO – BioHealth Innovation Inc.

Jarrod Borkat, Head, External Collaborations, Biotech Hubs and Government

Contracting-MedImmune

Marco A. Chacon, Ph.D., Founder and Chairman – Paragon Bioservices, Inc. Douglas

Jon Liu, SVP, Head of Global Operations – Qiagen Sciences Inc.

Theodore (Ted) J. Olsen, President and CEO – PathSensors, Inc. Wendy

Perrow, MBA, CEO – AsclepiX Therapeutics

Karen L. Proudford, Ph.D., President, William E. Proudford Sickle Cell Fund, Inc.;

Associate Prof. of Mgmt. and Dir., Graves Honor Program - Morgan State University Sanjay K. Rai, Ph.D., Senior Vice President for Academic Affairs – Montgomery College

David W. Smith, Ph.D., VP, Global Business Dev., Emerging Tech. – Lonza

Walkersville, Inc.

Frank F. Weichold, M.D., Ph.D., Director, Critical Path and Regulatory Science Initiatives,
Office of the Commissioner – U.S. FDA
Christy Wyskiel, MBA, Senior Advisor to the President and Head of Johns Hopkins

Technology Ventures, Johns Hopkins University
R. Michael Gill, Secretary – Maryland Department of Commerce
John M. Wasilisin, President and Chief Operating Officer – TEDCO

Board Members not in Attendance:

Col. Andrea Stahl, Ph.D., Director, MRMC CBRN Defense Medical Research Coordinating Office and JPC-Radiation Health Effects – USAMRMC

Speakers and Guests in Attendance:

Mary Clapsaddle, Director State Affairs, John Hopkins

Rachel Emeruwa, Administrative Assistant – Maryland Department of Commerce

Brad E. Fackler, Senior Director, BioHealth and Life Sciences, Maryland Department of Commerce Chris Frew, VP — Breezio/ Biobuzz

Thomas R. Fuerst, Director, Institute for Bioscience and Biotechnology Research.

Joyce Fuhrmann, VP Operations and Partnerships – MCEPC

Steve Greenfield, Dean WDCE - Mountgomery College

Brian Gaines, CEO – Maryland Bio Foundation

Steve Pennington, Managing Director, Business and Industry Sector Development – Maryland Department of Commerce

Patrick Roddy, Esq., Rifkin Weiner Livingston LLC

Martha Schoonmaker, Executive Director at Pinkney Innov. Complex – Mountgomery College Bret Schreiber, Director of Education R. Innovation – Maryland Department of Commerce Bob Storey, Principal, MVR Company

Emily Tocknell, Assistant Director of Government Affairs – Maryland Department of Commerce Julie Woepke, Executive Director – Maryland Department of Commerce Benjamin H. Wu, Deputy Secretary, Maryland Department of Commerce

LSAB Staff:

Judy Costello, Director, BioHealth and Life Sciences, Maryland Department of Commerce

Appendix 3 - Meeting Minutes, December 6, 2016

MARYLAND LIFE SCIENCES ADVISORY BOARD (LSAB) MEETING MINUTES

MEETING DATE: December 6, 2016

TIME: 9:00 – 11:30 a.m.

LOCATION: Institute for Bioscience and Biotechnology Research (IBBR) 9600

Gudelsky Drive, Rockville, Maryland 20850

Welcome

Chair Abdun-Nabi welcomed attendees to the winter LSAB meeting and thanked IBBR Director Dr. Tom Fuerst for hosting the meeting. Dr. Fuerst spoke briefly about plans for the Center for BioMolecular Therapeutics, the GMP facility at IBBR, its connections to NIST and UMB, and other capabilities and research taking place at the Institute. LSAB members were invited to tour the IBBR facility at the end of the meeting.

Call to Order

Chair Abdun-Nabi convened the meeting, and welcomed members and guests. Maryland Department of Commerce Deputy Secretary Ben Wu, representing Secretary Mike Gill, explained Secretary Gill wanted to be present but had an unavoidable conflict. Secretary Wu said Commerce leadership recently had met with Governor Hogan's Chief of Staff regarding the LSAB, and that the LSAB's work on the preliminary recommendations was viewed to be important. He thanked the Working Group Co-Leaders, other LSAB members and nonmember Working Group volunteers for their time spent developing the draft recommendations and action plans.

Chair Abdun-Nabi asked for feedback on the Minutes of the October 16, 2016 LSAB meeting. Hearing none, he asked for a Motion to Approve the Minutes which was made by Mr. Bendis and seconded by Dr. Rai. The October meeting Minutes were approved unanimously.

Desired Future State

Chair Abdun-Nabi reminded the LSAB members of their decision at the October meeting to adopt the "ACCT Now" framework for organizing the Working Group recommendations to help Maryland achieve the "Top 3 by 2023" goal and vision statement approved by the LSAB in May:

A Assets Leverage and grow current ASSET base and accelerate

commercialization

B Connectivity

and resources

C Capital

Increase availability and access to CAPITAL at each phase of the

BioHealth life cycle.

T Talent

Grow TALENT pool of experienced BioHealth entrepreneurs, business

Chair Abdun-Nabi also mentioned the discussion at the prior meeting regarding the "Desired Future State" for Maryland BioHealth ecosystem and the board's consensus regarding the need for a comprehensive plan integrating recommendations from each of the ACCT areas.

Working Group Presentations

Chair Abdun-Nabi shared with the members that the Working Group Co-Leaders had continued to meet by phone biweekly since the fall meeting. Based upon Secretary Gill's request at the October meeting, they had prioritized the proposals which they thought might be put forth into the Governor's FY18 budget with an agreement to further develop the remaining top ranked proposals at the beginning of 2017. The Chair stated the purpose of this meeting is to provide feedback on the FY18 proposals, and he then invited Co-Leaders to introduce the FY18 proposals by category:

Assets

Christy Wyskiel explained the FY18 ASSET Proposal "Establish a Task Force to Develop Recommendations to Overcome Barriers to Commercializing Federal Technology." Its objectives are to:

- Stimulate opportunities for leveraging research and expertise at federal labs in Maryland by removing barriers and examining incentives for technology transfer, and access to expertise and resources.
- <u>Leverage taxpayer financed expertise and resources</u> (i.e. high-throughput screening of chemical libraries and MRI and PET equipment available at certain federal labs) by enabling them to be used by businesses developing life changing products.
- Encourage a change in culture to foster entrepreneurship and encourage intramural researchers to focus on value proposition, product development, and the path to a product for an unmet need so that the product ultimately can reach patients.
- Create an entrepreneurial sabbatical program in Federal Government labs that facilitate licensing technologies and establishing collaborations, enabling these federal entrepreneurs to spin out companies or return to the labs after gaining commercially relevant experience.
- Consider developing new granting mechanisms within the Federal labs that would allow for small, immediate proof of principle or micro-grants for academic entrepreneurs and small businesses to further de-risk technologies.

Chris Austin, Frank Winhold, Ben Wu, Rich Bends and Ms. Wyskiel participated in a discussion regarding current challenges, opportunities, and practices in other agencies regarding industry-agency collaborations on research and technology transfer. Following this discussion and a vote regarding the proposal, the Chair stated that there was unanimous approval to move forward with this Task Force recommendation.

Connectivity

Jarrod Borkat described the FYI8 CONNECTIVITY proposal "Develop Comprehensive Maryland BioHealth Asset Map and Interactive Web Site" with the following objectives:

- <u>Inventory and create an asset map</u> of all key BioHealth organizations, resources and opportunities.
- Develop a <u>user friendly, interactive web site</u> to access, augment and promote assets included in map.
- Leverage site and map to <u>promote business</u>, <u>economic development</u>, <u>networking</u>, <u>and</u>
 collaboration <u>opportunities</u> in Maryland and to the global market.
- Use map to identify and <u>promote sectors of strength and new areas of opportunity</u> (i.e. convergence).
- Enable Marylanders and those outside the state to <u>easily find BioHealth resources</u>, contacts, and opportunities.
- Provide an easy to use, <u>comprehensive workforce si</u>te with information regarding job and internship opportunities, training and education programs, career paths, etc.
- Use map and site as pilot and model for other key industries in Maryland.

Dr. Borkat said the development of a database of statewide biohealth assets displayed in an interactive online asset map would be a deliberate process of synthesizing community resources to build upon what's working and address challenges. Bob Storey and Sanjay Rai both stated that enabling professonals to know who is doing what in the industry is important. Mr. Storey said the medtech industry needs the ability to easily find each other and supply chain resources. Dr. Rai said the need to promote, in one place, training resources, job and internship opportunities was the top priority of his working group. Marco Chaco said the biopharma manufacturing working group also has the same needs for network and promotion of assets.

Rich Bendis spoke of his prior experience with asset maps and the potential of finding funds for this work at the U.S. Commerce Economic Development Administration. Dr. Borkat affirmed that the suggestion and need had come from multiple working groups and suggested Commerce could issue an RFP which would encompass all of the goals for the asset map and web site from all of the groups into one project. At the end of the discussion, Chair Abdun- Nabi asked for an expression of interest and declared unanimous approval among the board for moving forward with this proposal.

Capital

Wendy Perrow shared three CAPITAL recommendations for FY18 Budget. The first, "Ensure Existing State BioHealth Funding Programs are Adequately Capitalized," generated unanimous support with its objective to ensure that existing funding is not cut or reallocated if

the other suggested proposals and requests for more funding for the biohealth sector are implemented:

- Maintain or increase MII funding (currently \$4.8M plus \$800K from schools/year)
- Maintain or increase MD Life Sciences Investment Fund at TEDCO (currently \$1M/year)
- Maintain or increase MIPS project funding (currently \$1.1M plus \$300K from TEDCO/year)
- Maintain or increase Biotech Investor Incentive Tax Credit (BIITC) (currently \$12M/year)

The second proposal introduced by Ms. Perrow "Establish State Funded MD Life Sciences VC Investment Fund" generated a lot of discussion:

- Establish a state funded MD Life Sciences Venture Capital Investment Fund, to provide promising start-up BioHealth (therapeutics, biologics, vaccines, devices, software) companies with critically needed gap funding (\$3 – 5M+/company).
- If possible, <u>leverage SB982 legislation focused on increasing the risk capital</u> available to early stage Maryland companies through prudent investments of Maryland State Retirement Agency funds to be a source of this gap funding.
- Use the new fund or the apportioned funds from SB982 allocation as <u>anchor funding to be</u> matched by private sector VC(s).

There was agreement that the SB982 legislation likely would not be able to be leveraged to support biohealth investments due the statute's mandated risk profile for investments. The discussion then was focused on whether or not to recommend a separate VC investment fund or expansion of an existing fund at TEDCO, and what amount should be requested to launch the fund given the potential need and desired impact. The conversation included references to the amount of funds necessary to provide meaningful growth capital to companies with technologies which must go through clinical trials to get to market, and also examples of funding provided by states and others in leading bioclusters.

Ms. Perrow stated that her working group which includes venture capitalists and other finance executives, had recommended that the fund be established at \$25M or above but had lowered the suggested dollar amount in the draft preliminary recommendations to \$3M due to likely currently available budget considerations. The consensus of the board was that any near term solutions for increasing early stage funding might happen by expanding existing funds at TEDCO. However, the preferred solution would be to establish a dedicated state funded VC investment fund for life sciences investments which could be matched by private sector funds and which should be capitalized at a minimum of \$25M.

The board then discussed the proposal to leverage private funding, increase visibility and attraction incentives for the state through the "Establishment of a Public-Private Competition to Increase Scalable Risk Capital:"

- Create a <u>public-private partnership to provide gap funding and resources to BioHealth companies through an annual competition enabling vetting of best technologies.</u>
 Require applicants to be from Maryland and to remain in Maryland for a minimum of two years after award and to be willing to give 5% equity stake to funders. <u>Winners also would receive free incubator laboratory space, mentoring and other support.</u>
- Potentially include funds for <u>business attraction</u> best out of state applicant with same

residency and equity requirements.)

 Enhance awareness of Maryland BioHealth technologies and resources by promoting competition.

The board recommended pursing this competition proposal whether or not the proposed new statefunded life sciences VC investment fund was launched.

Talent

Dr. Sanjay Rai introduce the TALENT recommendation for the FY18 Budget "Fund Commercially Relevant Experiential Learning Programs in Biomedical Engineering, Biotech and Related Disciplines" stating the importance of expanding the workforce with commercially relevant talent at all levels was a need expressed by multiple working groups. He invited Dr. Collins Jones, Biotechnology Industry Coordinator at Montgomery College to share more information regarding the near term objectives of the FY18 proposal:

- Enable students, researchers, and other adults to receive commercially relevant experience.
- Enable companies to vet potential full time employees.
- Help students and others to consider long term career paths in BioHealth in Maryland.
- Enable Maryland to compete with other regions funding internships.
- <u>Expand commercially relevant training capacity</u> of community colleges, universities, and training institutes.
- <u>Leverage existing pharma biomanufacturing infrastructure</u> to formalize BETC resources in Maryland.
- Increase quality and regulatory training for both pharma and medtech manufacturing.
- Lay the groundwork for the development of a <u>future medtech-focused BETC</u>.
- Provide low cost resources to companies.

The board agreed to support this recommendation.

Next Steps

Chair Abdun-Nabi and Vice Chair Perman asked the Working Group Co-Leaders to further develop the proposals listed in the preliminary recommendations as "Due – March 15, 2017:"

ASSETS

- Recruit or co-locate a division or innovation center of a medtech pharma company.
- Provide capital support or operating support for innovation hubs.
- Support development of a regional Center of Excellence for cell therapy manufacturing.
- Incentivize developers and companies to build or expand manufacturing facilities.
- Recruit or co-locate a division or innovation center of a major pharma company. Provide financial incentives to support innovative, translationally focused faculty.

CONNECTIVITY

- Leverage existing organization(s), or create a new organization.
- Brand the BioHealth industry by characterizing a unique and differentiating.

• Ensure comprehensive plan for the sector is embraced by stakeholders.

CAPITAL

- Gain private sector (VC/angel) commitment to match new State life sciences VC fund.
- Establish SBIR/STTR matching fund as new proposal for additional early funding.
- Establish a network of high-net individuals and experienced life sciences investors.
- Expand MIPS 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

- Create incentive program to attract, retain, and support C-Level entrepreneurs.
- Support annual needs assessment of skills required to support innovation and relevant training and career path promotion.
- Support EIR program in the proposed Life Sciences VC investment fund to build a talent pool to lead BioHealth companies in Maryland.
- Support EIRs not only in VC fund but also in universities, federal labs and industry.
- Require in-state residence for executives of companies receiving State funds.

The Chair then asked staff to revise the Capital FY18 Recommendation to request a \$25M fund and discussed the board consensus that to get to a Top 3 by 2023 ranking all of the recommendations put forth are important—even if they can be passed in the first or second year. It was agreed that the revised preliminary recommendations would be forwarded to Secretary Gill by the Chair and Vice Chair prior to the December holiday break so that they could be shared with the Governor and his team.

Adiourn

Chair Abdun-Nabi thanked everyone for participating in the discussion and adjourned the meeting.

Board Members in Attendance:

Chair:

Daniel J. Abdun-Nabi, President and CEO -- Emergent

BioSolutions Vice Chair:

Jay A. Perman, M.D., President -

University of Maryland, Baltimore

Members:

Christopher P. Austin, M.D., Director, NCATS, – U.S. National Institutes of Health Richard A. Bendis, President and CEO – BioHealth Innovation Inc. Jarrod Borkat, Head, External Collaborations, Biotech Hubs and Government

Contracting- MedImmune

Marco A. Chacon, Ph.D., Founder and Chairman – Paragon Bioservices, Inc. Douglas Jon Liu, SVP, Head of Global Operations – Qiagen Sciences Inc.

Theodore (Ted) J. Olsen, President and CEO – PathSensors, Inc.

Wendy Perrow, MBA, CEO – AsclepiX Therapeutics

Karen L. Proudford, Ph.D., President, William E. Proudford Sickle Cell Fund, Inc.; Associate Prof. of Mgmt. and Dir., Graves Honor Program - Morgan State

University

Sanjay K. Rai, Ph.D., SVP for Academic Affairs – Montgomery College Col. Andrea Stahl, Ph.D., Director, MRMC CBRN Defense Medical Research Coordinating Office and JPC-Radiation Health Effects – USAMRMC

Frank F.Weichold, M.D., Ph.D., Director, Critical Path and Regulatory Science Initiatives, Office of the Commissioner – U.S. FDA

Christy Wyskiel, MBA, Senior Advisor to the President and Head of Johns Hopkins Technology Ventures, Johns Hopkins University

John M. Wasilisin, President and Chief Operating Officer – TEDCO

Board Members not in Attendance:

R. Michael Gill, Secretary – Maryland Department of Commerce David W. Smith, Ph.D., VP, Global Business Dev., Emerging Tech. – Lonza Walkersville, Inc.

Speakers and Guests in Attendance:

Virginia Crews, Business Dev. Mgr., BioHealth & Life Sciences, Maryland Dept. of Commerce Rachel Emeruwa, Administrative Assistant – Maryland Department of Commerce Brad E. Fackler, Senior Director, BioHealth & Life Sciences, Maryland Dept. of Commerce Michelle Ferrone, SVP, Marketing and Operations, Tech Council of Maryland Thomas R. Fuerst, Director, Institute for Bioscience and Biotechnology Research.

Jennifer Hammmaker, Director, Maryland Innovation Initiative, TEDCO Collins Jones, Biotechnology Industry Coordinator, Montgomery College Nina Lamba, Business Dev. Mgr., BioHealth & Life Sciences, Maryland Dept. of Commerce Brian Levine, Vice President, Greater Baltimore Committee

Steve Pennington, Managing Director, Business and Industry Sector Development – Maryland Department of Commerce Martin Rosendale, Senior Executive Advisor, Tech Council of Maryland

Martha Schoonmaker, Executive Director at Pinkney Innov. Complex – Mountgomery College Thomas Sadowski, Vice Chancellor, University System of Maryland Bret Schreiber, Director of Education R. Innovation – Maryland Department of Commerce Bob Storey, Principal, MVR Company Emily Tocknell, Assistant Director of Government Affairs – Maryland Department of Commerce Benjamin H. Wu, Deputy Secretary, Maryland Department of Commerce

LSAB Staff:

Judy Costello, Director, BioHealth and Life Sciences, Maryland Department of Commerce

Appendix 4 - Meeting Minutes, April 10, 2017

MARYLAND LIFE SCIENCES ADVISORY BOARD (LSAB) MEETING MINUTES

MEETING DATE: April 10, 2017

TIME: 12:00 – 3:30 PM

LOCATION: FastForward

Johns Hopkins University 1812 Ashland Ave. Suite 110

Baltimore, MD 21205

Welcome

Attendees were welcomed by Christy Wyskiel, Senior Advisor to the President, Johns Hopkins University. Prior to the meeting the entire group toured the newly opened FastForward accelerator located at 1812 Ashland Avenue. FastForward is a coordinated suite of resources designed to move technologies from startup to marketplace that currently supports more than 100 startup companies.

Call to Order

Chair Abdun-Nabi convened the meeting and stated the meeting purpose which was to agree on the final set of recommendations to present to Governor Hogan. The chairman reconfirmed the LSAB's desire to develop not only recommendations, but also strategies for their implementation. Chair Abdun-Nabi requested feedback on the December 6, 2016 LSAB meeting. Hearing none, he asked for a motion to approve the minutes which was made by Mr. Bendis and seconded David Smith. The minutes were approved.

The Chairman reviewed the process that the LSAB had been through in the past year; establishing the vision to be a top-3 biohealth ecosystem by 2023, evaluating Maryland's strengths and gaps, defining the elements of a thriving ecosystem and establishing the framework for attaining that vision.

Working Groups were formed with a leader and members from the LSAB and additional representatives from the Maryland biohealth community. Working Groups were created in the following areas:

- Working Group A Foundational Support
 - Jarrod Borkat, Sr. Director, Partnering and Strategy, MedImmune
- Working Group B Access to Capital
 - Wendy Perrow, MBA, CEO, AsclepiX Therapeutics
- Working Group C Convergence of Bio and IT

Rich Bendis, CEO BioHealth Innovation (BHI)

Working Group D – Access to Talent

 Sanjay Rai, Senior Vice President for Academic Affairs, Montgomery College

Working Group E – Technology Transfer Acceleration

 Christy Wyskiel, MBA, Senior Advisor to the President and Head, Johns Hopkins Technology Ventures – Johns Hopkins University

Working Group F – BioManufacturing

 Marco Chacon, Ph.D, Assistant VP of Industry Alliances – University of Maryland

Working Group G – Medical Device Manufacturing

 Bob Storey, Principal, The MVP Company (invited by LSAB to lead this Working Group)

These teams worked throughout the summer to develop recommendations. The Working Group recommendations were prioritized and organized into four key areas, **Assets**, **Connectivity**, **Capital** and **Talent** to facilitate implementation. The recommendations were presented by each of the working Group leads in these four key areas.

Assets Working Groups

- Technology Transfer, Christy Wyskiel, MBA
- BioManufacturing, Marco Chacon, Ph.D
- Medical Device Manufacturing, Bob Storey

Assets Recommendations

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

Connectivity Working Groups

- Foundational Support, Jarrod Borkat
- Convergence of Bio and Information Technology, Rich Bendis

Connectivity Recommendations

A. Develop a 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, and board to focus on industry advocacy
- 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

Capital Working Group

Capital working Group, Wendy Perrow, MBA

Capital Working Group Recommendations

- A. Ensure existing State BioHealth funding programs are adequately capitalized
- B. Establish a State fund
- C. Gain private sector (VC / angel) commitment to match new State life sciences VC 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/STTR matching fund as a vehicle for additional early fund, and provide SBIR assistance reimbursement to increase win rate of non-dilutive capital

Access to Talent Working Group

Access to Talent Working Group, Sanjay Rai

Access to Talent Recommendations

- A. Fund commercially relevant experiential learning programs in Biomedical Engineering, Biotech and related disciplines
 - 1. Establish a State-funded Maryland life sciences VC investment fund
 - 2. Industry Training Resource
 - 3. BETC's Pharma
 - 4. Growing a commercially relevant talent pool Medtech
- B. Create an incentive program to attract, retain and support C-level entrepreneurs

After questions and discussion, the LSAB voted to approve the recommendations as presented.

Next Steps

A document detailing all the recommendations is to be created and a summary version that will be distributed at Dan Abdun-Nabi's presentation to the BioHealth Capital Region Forum on April 19, 2017.

Secretary Mike Gill thanked the entire LSAB for their work throughout the past year in evaluating the Maryland bio-ecosystem and for developing an actionable set of recommendations for growth. The recommendations will be discussed with the

Governor and his staff in advance of Governor Hogan's address to the BioHealth Capital Region Forum.

Adjourn

Chair Abdun-Nabi thanked everyone for their participation and adjourned the meeting.

Board Members in Attendance

Chair:

Daniel J. Abdun-Nabi, President and CEO -- Emergent BioSolutions Jay A. Perman, M.D., President – University of Maryland, Baltimore

Vice Chair: Members:

Christopher P. Austin, M.D., Director, NCATS, U.S. National Institutes of

Health

Richard A. Bendis, President and CEO – BioHealth Innovation Inc. Jarrod Borkat, Head, External Collaborations, Biotech Hubs and

Government Contracting- MedImmune

Marco A. Chacon, Ph.D., Assistant VP of Industry Alliances - University of

Maryland

Douglas Jon Liu, SVP, Head of Global Operations - Qiagen Sciences Inc.

Theodore (Ted) J. Olsen, President and CEO – PathSensors, Inc.

Wendy Perrow, MBA, CEO - AsclepiX Therapeutics

Karen L. Proudford, Ph.D., President, William E. Proudford Sickle Cell

Fund, Inc.; Associate Prof. of Mgmt. and Dir., Graves Honor Program -

Morgan State University

Sanjay K. Rai, Ph.D., Senior Vice President for Academic Affairs -

Montgomery College

David W. Smith, Ph.D., VP, Global Business Dev., Emerging Tech. -

Lonza Walkersville, Inc.

Col. Andrea Stahl, Ph.D., Director, MRMC CBRN Defense Medical Research Coordinating Office and JPC-Radiation Health Effects –

USAMRMC

Frank F. Weichold, M.D., Ph.D., Director, Critical Path and Regulatory

Science Initiatives, Office of the Commissioner – U.S. FDA

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Hopkins Technology Ventures-- Johns Hopkins University

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LSAB Staff

Judy Costello, Director, BioHealth & Life Sciences, Maryland Department of Commerce

Speakers and Guests in Attendance

Virginia Crews, Business Dev. Mgr, BioHealth & Life Sciences, Maryland Department of Commerce

Brad E. Fackler, Sr Director, BioHealth & Life Sciences, Maryland Department of Commerce

Thomas R. Fuerst, Director, Institute for bioscience and Biotechnology research Nina Lamba, Business Dev. Mgr, BioHealth & Life Sciences, Maryland Department of Commerce

Steve Pennington, Managing Director, Business and Industry Sector Development, Maryland Department of Commerce

Martha Schoonmaker, Exec. Director at Pinkney Innovation Complex, Montgomery College

Bret Schreiber, Director, Education and Innovation, Maryland Department of Commerce Bob Storey, Principal, MVR Company

Britta Vander-Linden, Deputy Chief of Staff, Governor's Office

Benjamin H. Wu, Deputy Secretary, Maryland Department of Commerce