



BioHealth InnovationSM

Maryland's Commercialization Collaborative

The Region — Central Maryland

- Unrivaled Research Assets -
- Unfulfilled Commercial Promise -



National Institutes
of Health



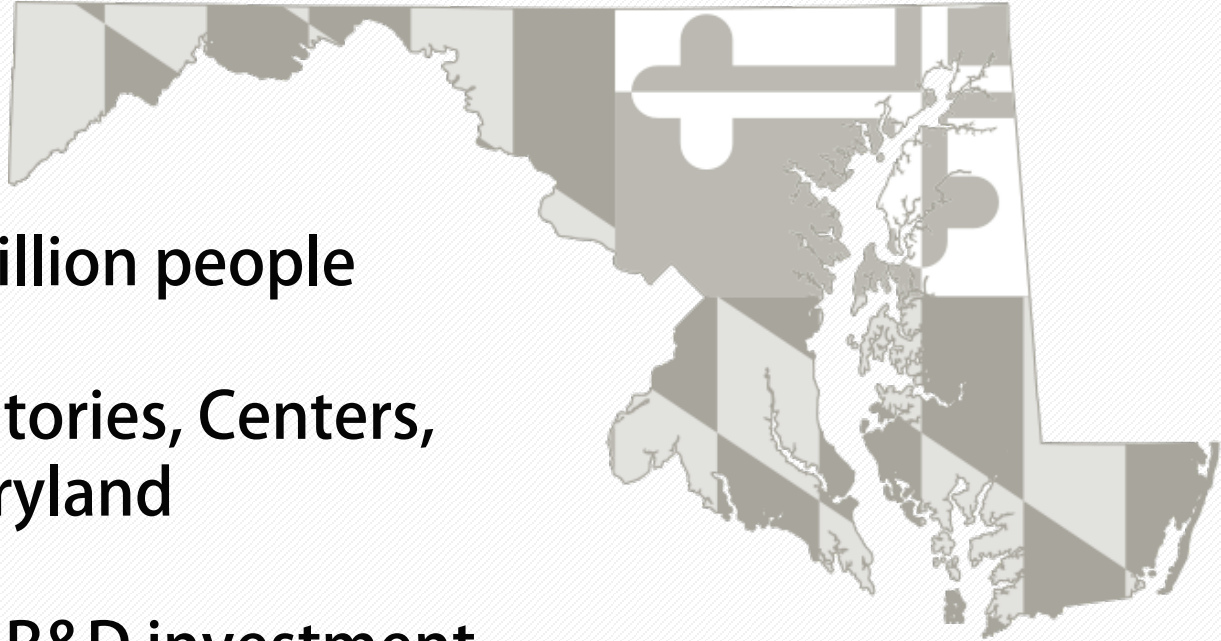
JOHNS HOPKINS
UNIVERSITY



National Heart, Lung,
and Blood Institute



State of Maryland: Federal & University Resources



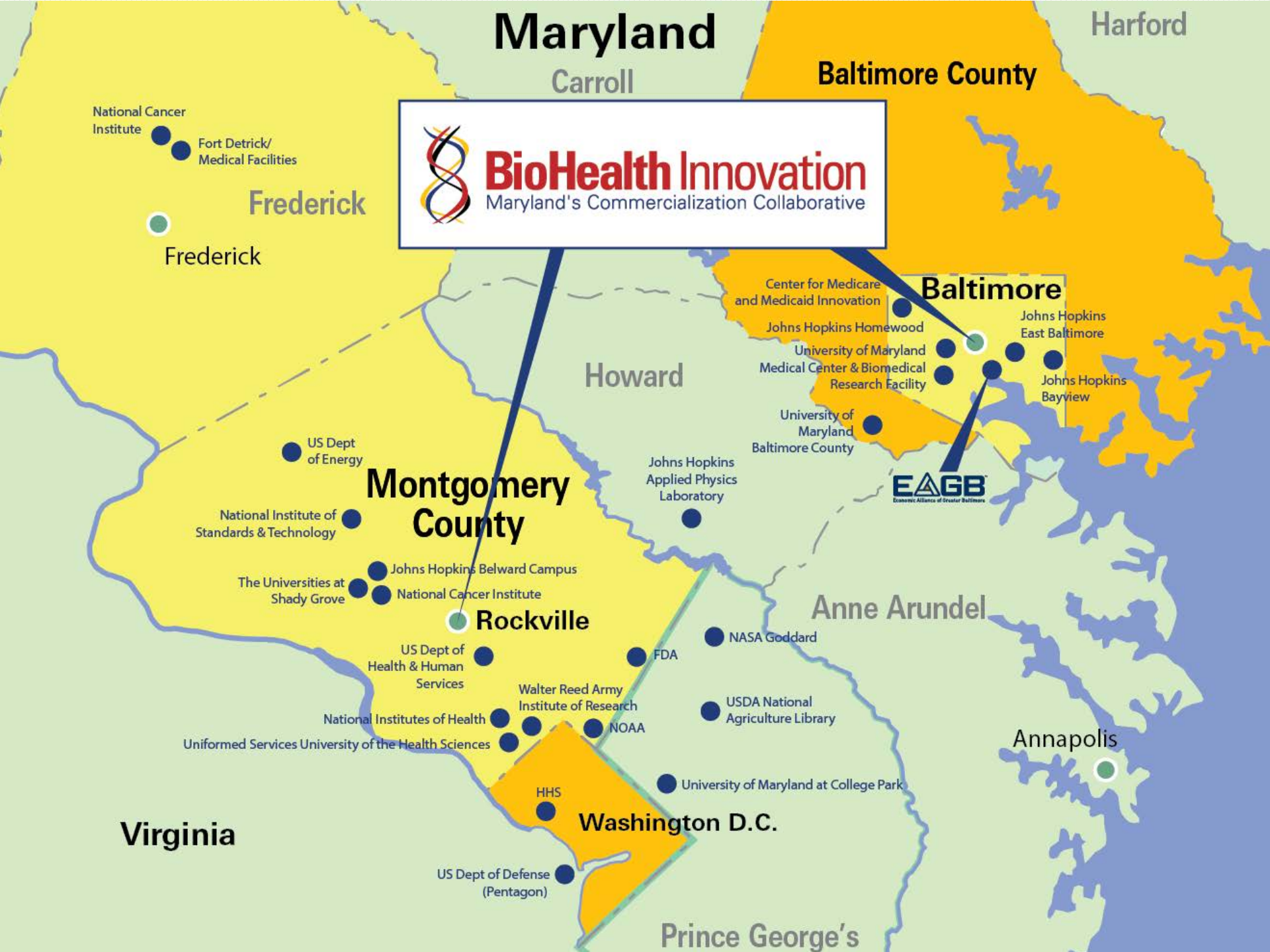
- Population: 5.9 million people
- 59 Federal Laboratories, Centers, & Institutes in Maryland
- Maryland Federal R&D investment exceeding \$12 billion annually

JHU and USM represent another \$3.5 billion in annual R&D



JOHNS HOPKINS
UNIVERSITY





Maryland



BioHealth Innovation
Maryland's Commercialization Collaborative

Frederick

Baltimore County

Baltimore

Montgomery County

Howard

Anne Arundel

Virginia

Washington D.C.

Prince George's

Challenges to Innovation Economy

Lack of connection of innovation resources

Lack of an entrepreneurial culture and C-level executives

Lack of early-stage funding for commercializing technologies

Lack of spin-offs from federal and university R&D

BHI Value Proposition

Connect regional innovation assets

Develop an entrepreneurial talent and support pipeline

Attract funding for technology commercialization

Evaluate commercially relevant federal and university technology

BioHealth Regional Innovation Cluster Assets



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NEA
New Enterprise Associates®

MARYLAND OF OPPORTUNITY. SM

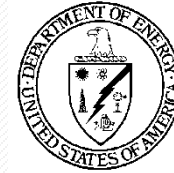
EAGGB™



APL
The Johns Hopkins University
APPLIED PHYSICS LABORATORY

BIO X MARYLAND

MaBio



NATIONAL
CANCER
INSTITUTE®

Montgomery County, Maryland
Montgomery College

NCATS NIST

Center for Medicare & Medicaid
INNOVATION

WALTER REED
ARMY MEDICAL CENTER



Rockville
Economic Development, Inc.
Known for the Companies We Keep

USDA

HHMI
HOWARD HUGHES
MEDICAL INSTITUTE



National Biodefense Analysis
and Countermeasures Center

TIGR
THE INSTITUTE FOR GENOMIC RESEARCH

FDA

USAMRIID
United States Army
Medical Research Institute
of Infectious Diseases
Biodefense solutions to protect our nation

J. Craig Venter™
INSTITUTE



Bio®
BIOTECHNOLOGY
INDUSTRY ORGANIZATION

BioHealth Innovation is an Innovation Intermediary

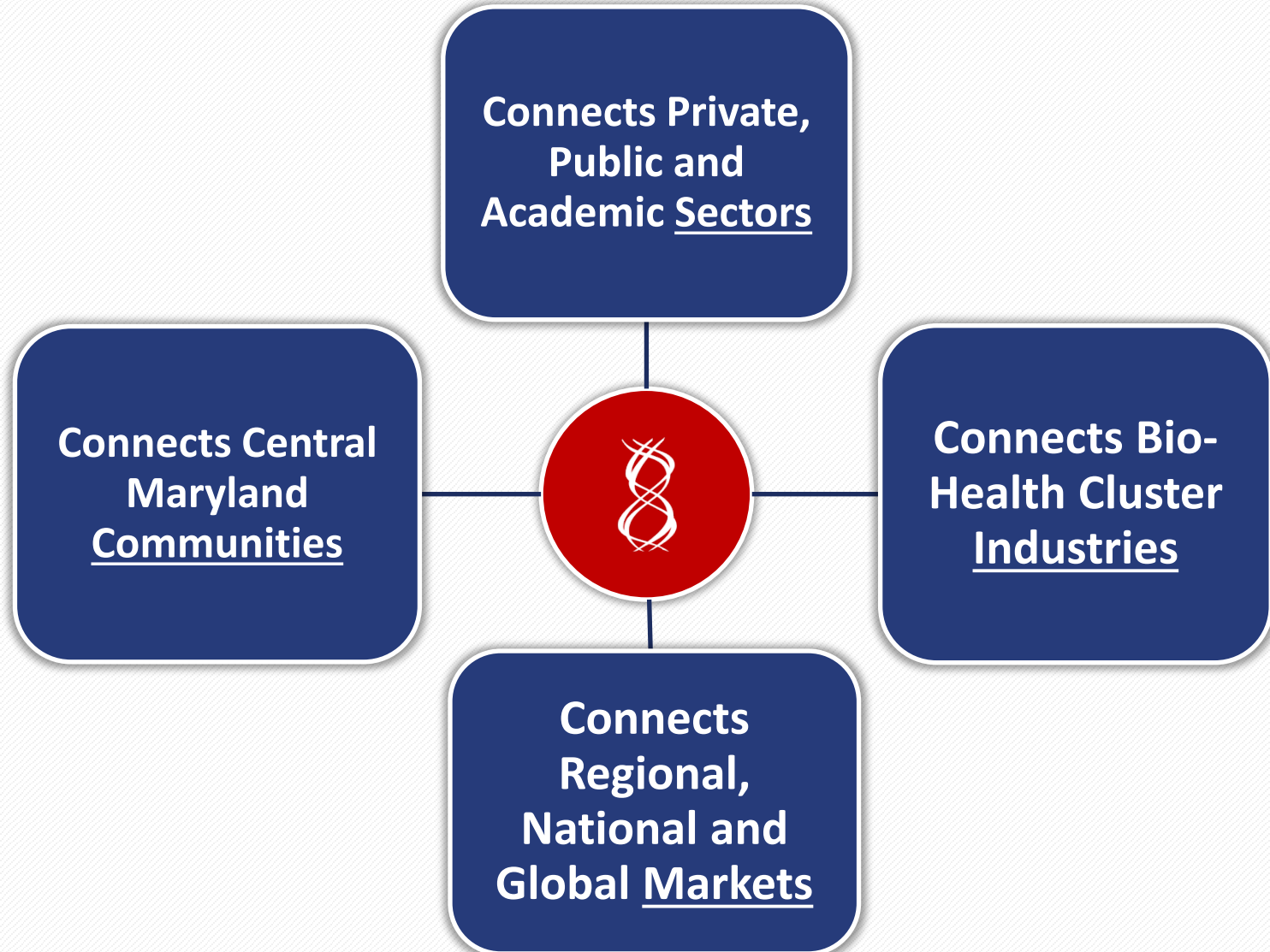
An organization at the center of the Central Maryland region's efforts to:

- Advance local technologies, assets and resources
- Accelerate innovation



- Regionally-oriented
- Private-public partnership, 501(c)(3) nonprofit
- Market-driven, private sector-led and funded
- Neither a government initiative, nor a membership organization

BHI: An Innovation Intermediary that Connects



Regional BioHealth Ecosystem Partners

ACADEMIA

- RESEARCH/T2
- LIFELONG LEARNING
- ECONOMIC DEVELOPMENT

INDUSTRY

- PROFIT
- PROCESS
- PRODUCT

**INSEPARABLE
MISSIONS**

GOVERNMENT

- SUSTAINABILITY
- INFRASTRUCTURE SUPPORT
- ECONOMIC POLICY

FOUNDATIONS

- ECONOMIC GROWTH
- COMMUNITY INVESTMENT
- REGIONAL COLLABORATION

BHI Partners and Sponsors

Private Sector



Government



Academia



Non-Governmental

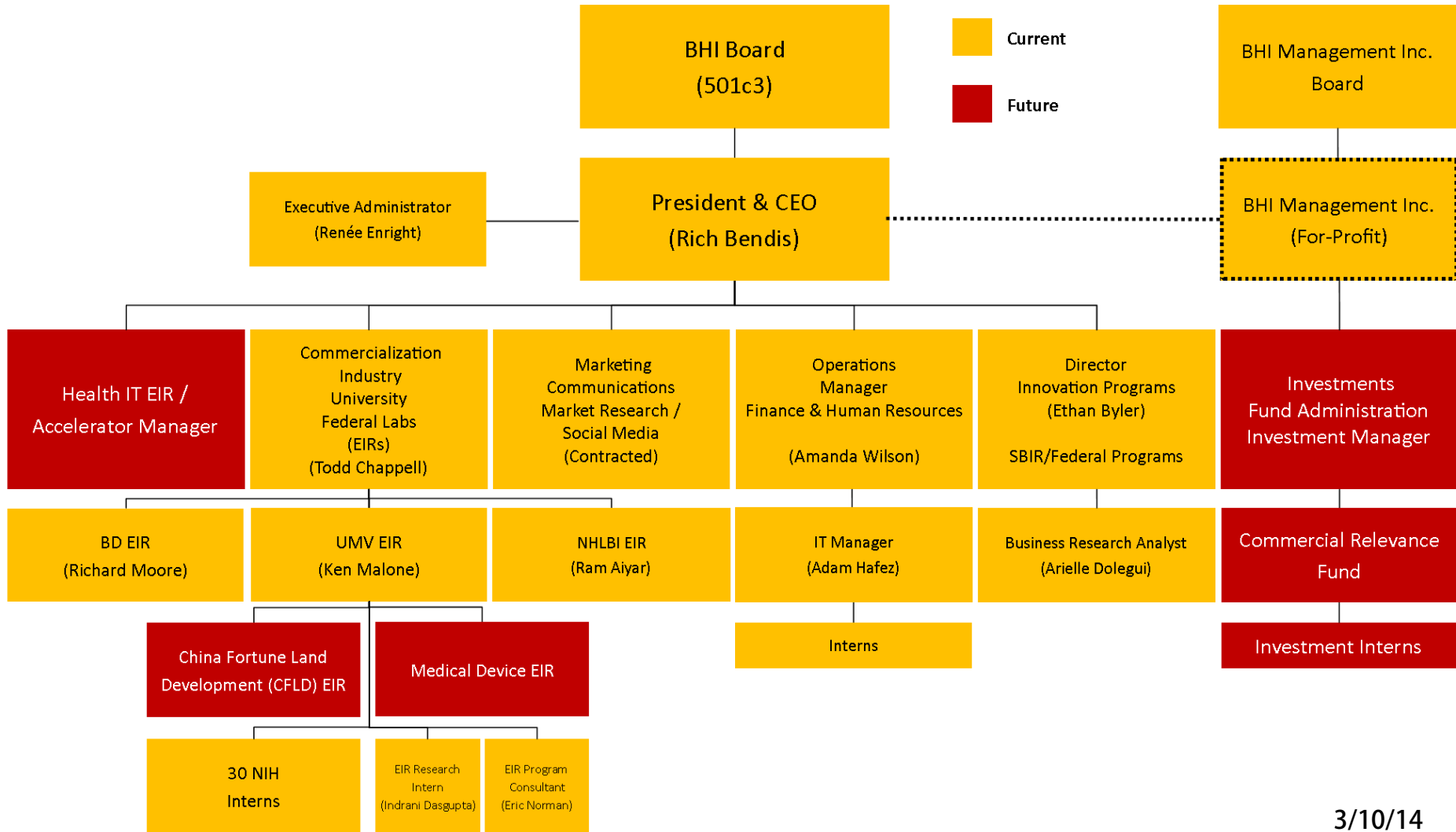


BHI Board of Directors

	Daniel J. Abdun-Nabi CEO, Emergent BioSolutions
	Michael J. Baader, Esq. Managing Director Venable LLP
	Richard A. Bendis President & CEO BioHealth Innovation, Inc.
	Kenneth Carter Chair Noble Life Sciences
	Cynthia L. Collins CEO Clariant, GE Healthcare
	Chris Callaghan Group VP, Healthcare Banking M&T Bank
	Ronald J. Daniels President Johns Hopkins University
	Jens Eckstein President SR One (GSK)
	David M. Gillece (Secretary) Regional Managing Principal Cassidy Turley

	Rick Ivey Vice President R&D BD Diagnostics
	William E. Kirwan Chancellor University System of MD
	Douglas Liu Senior VP of GO Qiagen
	David Mott General Partner New Enterprise Associates
	John A. Sackett President Shady Grove Adventist Hospital
	J. Thomas Sadowski President & CEO EAGB
	Reginald Seeto VP, Partnering and Strategy MedImmune
	Thomas Street ACAO MoCo Government

BHI Organizational Chart

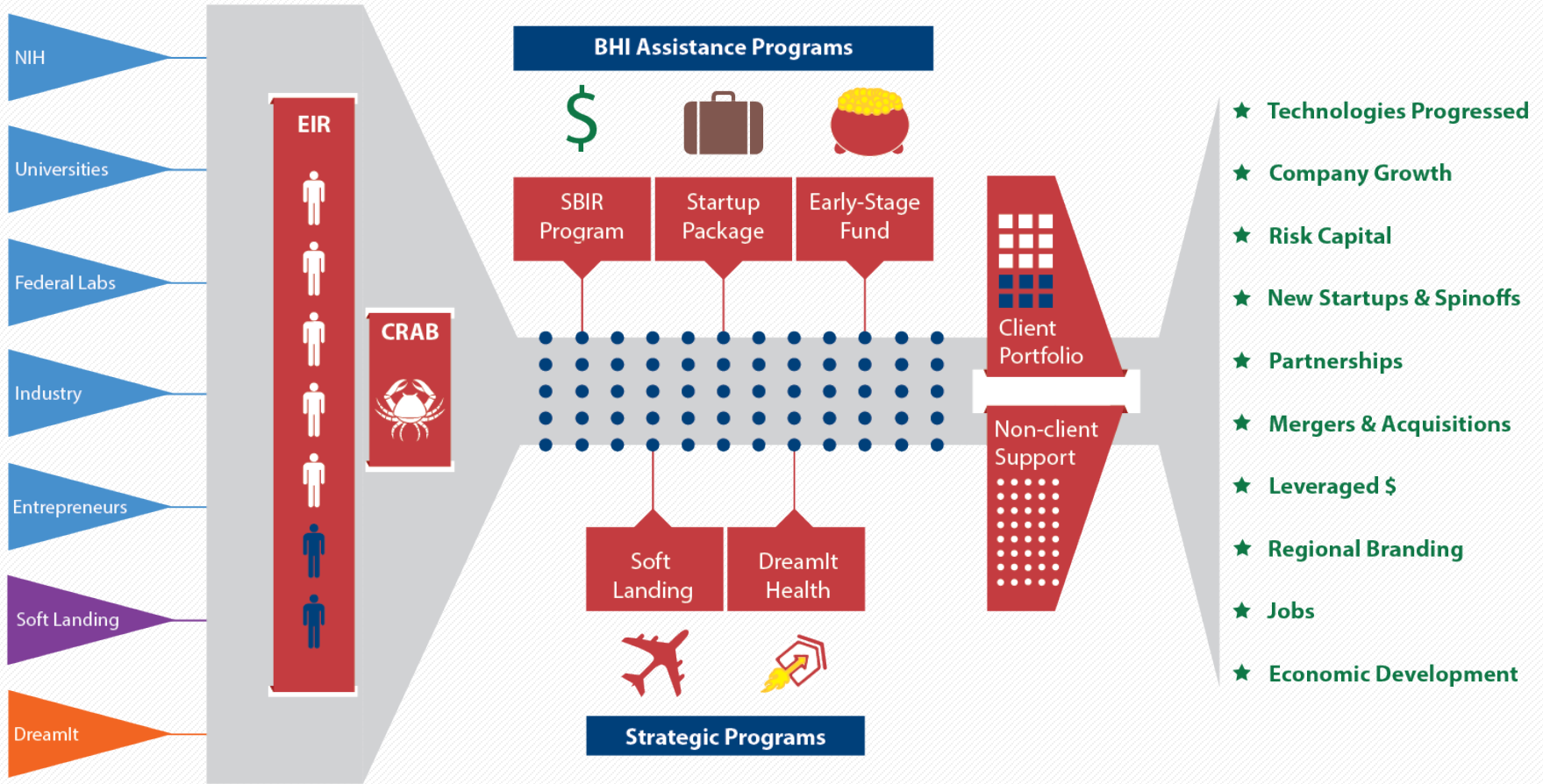


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SOURCES

BHI Program Structure

OUTCOMES

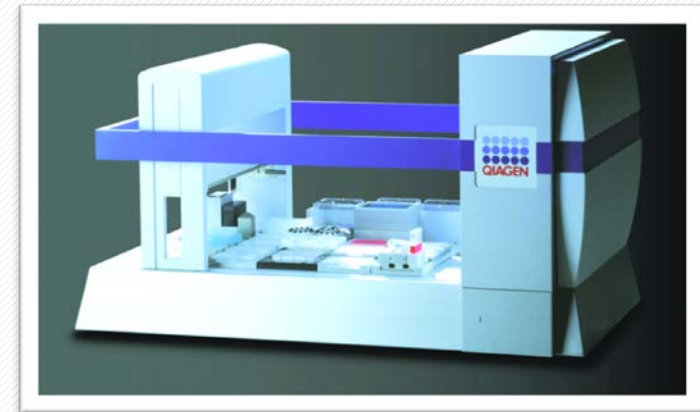
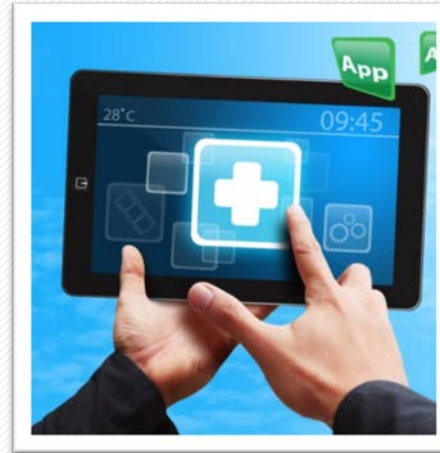


Financial Sponsors



BHI Technology Focus

- Therapeutics
- Diagnostics
- Medical Devices
- Healthcare Services
- E-Health
- Mobile Health
- Electronic Medical Records
- Health Informatics
- BioHealth Cyber Security

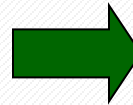
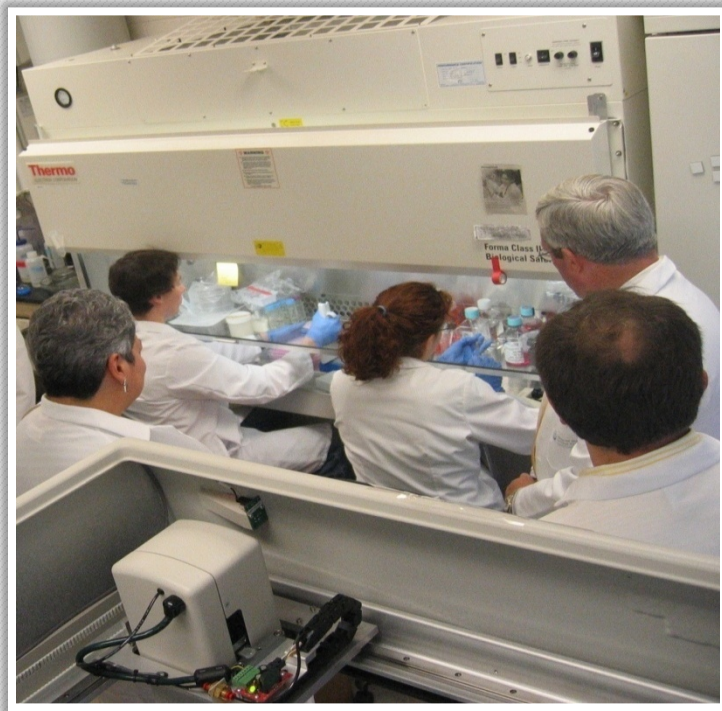


Innovation Paradigm Shift

PROOF OF CONCEPT
(Technological Feasibility)

Laboratory Push

“It Works!”



PROOF OF COMMERCIAL RELEVANCE
(Market Pull)

“It Works To Solve A Problem”

“I’ll Buy It”

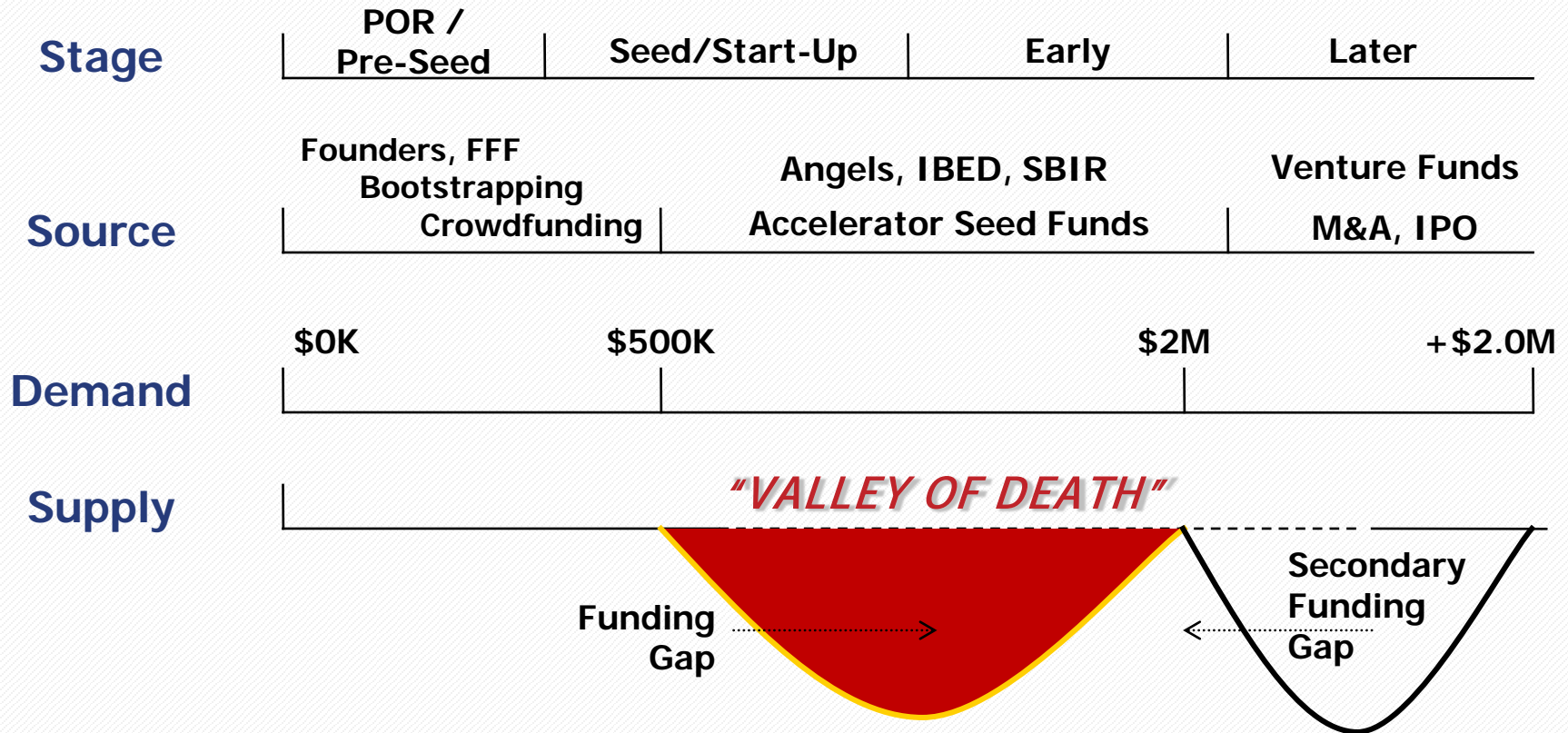


BHI Commercial Relevance Advisory Board



- A pool of experienced biohealth professionals who have agreed to assist BHI in evaluating market-relevant research and product development opportunities
- The CRAB helps determine the commercial applicability of emerging entrepreneurs, companies and their science or technology.

Innovation Capital **Valley of Death**



BHI Innovation Capital Map

Pre-Proof of Concept	Translational Research/ Proof of Concept	Proof of Commercial Relevance/Pre-Seed	Seed/ Start-Up	Early Stage	Later Stage
\$25,000 - \$1,500,000 (over 5 yrs)	\$15,000 - \$750,000 (over 3 yrs)	\$3,000 - \$500,000	\$50,000 - \$1,500,000	\$200,000 - \$2,000,000	\$2,000,000+
<ul style="list-style-type: none"> NIH R01 NIH R03 NIH R21 	<ul style="list-style-type: none"> SBIR/STTR Grant Phase 1 NCATS Cures Acceleration Network (CAN) Maryland Stem Cell Research Fund (MSCRF) - Various TEDCO Technology Validation Program - Proof of Concept TEDCO Maryland Innovation Initiative - Phase 1 JHU - Coulter Translational Research Partnership 	<ul style="list-style-type: none"> Maryland Industrial Partnerships (MIPS @ UMD) TEDCO Maryland Innovation Initiative - Phase 2 Maryland Stem Cell Research Fund (MSCRF) - Pre-Clinical TEDCO Technology Validation Program - Market Assessment ★ BHI SBIR/STTR Federal Funding Assistance Program 	<ul style="list-style-type: none"> Dingman Center Angels (UMD) BioMaryland Biotechnology Dev. Award - Translational Res. TEDCO Patent Assistance Program TEDCO Technology Commercialization Fund TEDCO Maryland Innovation Initiative - Phase 3 SBIR/STTR Phase 2 ★ BHI Commercial Relevance Fund(CRF) 	<ul style="list-style-type: none"> Propel Baltimore Fund TEDCO Veterans' Opportunity Fund Invest Maryland: Maryland Venture Fund BioMaryland Biotechnology Dev. Award - Commercialization Maryland Health Care Product Development Corporation Abell Venture Fund MMG Ventures LLP TDF 	<ul style="list-style-type: none"> Maryland Venture Fund Authority ABS Capital Partners Greenspring Associates Novak Biddle Venture Partners Sterling Venture Partners Harbert Venture Partners JMI Equity New Enterprise Associates

Associations

Association of University Resource Parks (AURP)	Angel Capital Association (ACA)	Mid-Atlantic Venture Association (MAVA)	National Venture Capital Association (NVCA)
Association of University Technology Managers (AUTM)			
Licensing Executive Society (LES)			

Funding Type Key

- Academic
- State of Maryland
- ★ BioHealth Innovation, Inc.
- Federal
- Economic Development
- Private Capital

Tax Credits

- Maryland Biotechnology Investor Tax Credit
- Montgomery County Biotechnology Investor Tax Credit

BHI Commercialization Pipeline

Source and evaluate biohealth intellectual properties (IP)

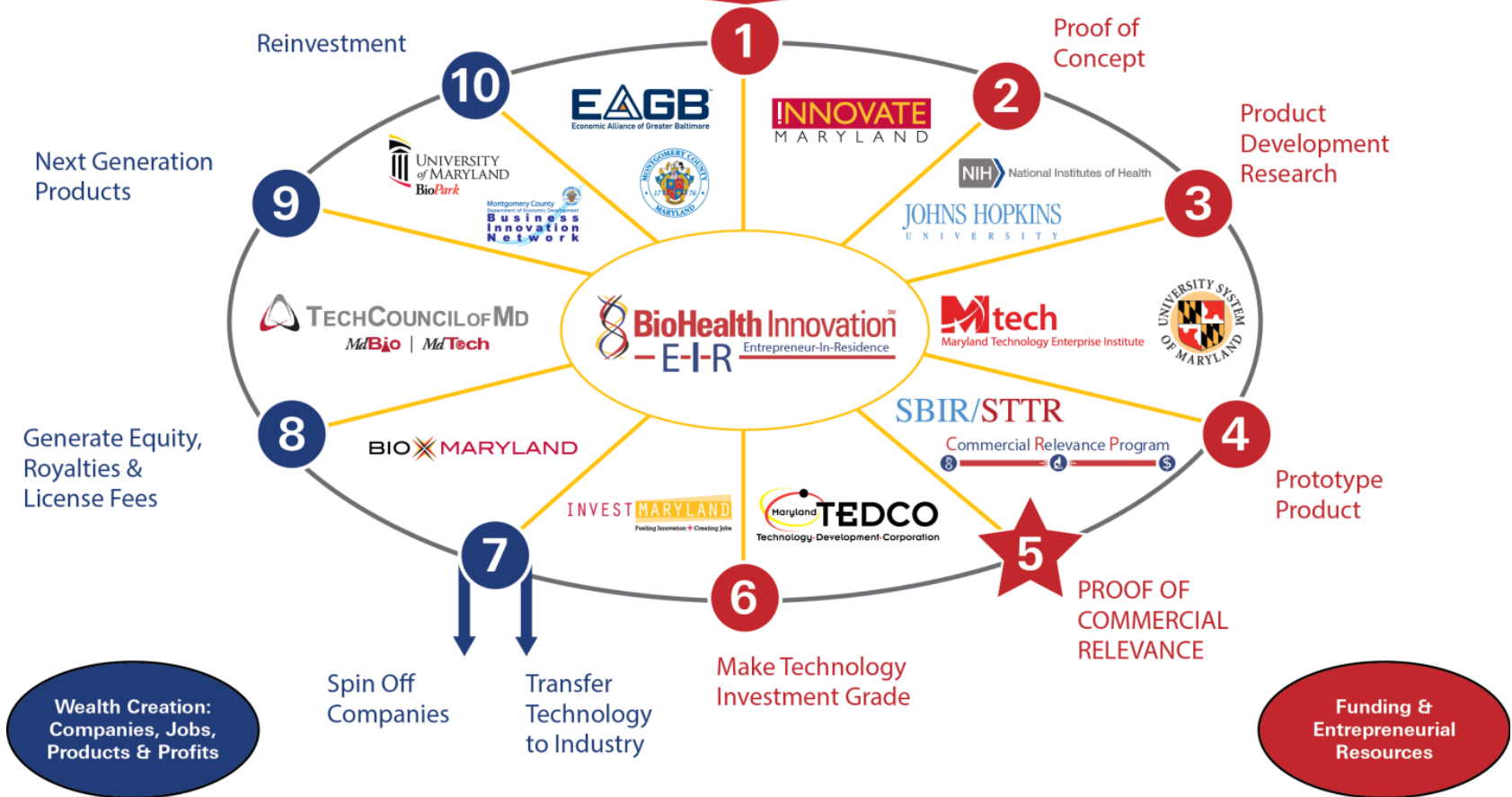
Identify funding for market-relevant IP

Grow and markets businesses and products



BHI Commercialization Model

Inventions patented through Universities, Federal Labs, Private R&D, and Basic Research



Partnership Intermediary Agreements



PIA between BHI and NIH's Office of Technology Transfer (OTT) that supports the 27 NIH institutes' \$3 billion intramural research and the Food and Drug Administration to promote and foster cooperative research and accelerate technology commercialization among NIH/FDA, businesses, and universities.

BHI Entrepreneur-in-Residence Program

A team leader who combines scientific, financial/VC and entrepreneurial management experience to:

- Perform due diligence
- Develop biohealth project-focused companies

Proactively identifies and commercializes market-relevant intellectual properties from:

- Federal labs
- Universities
- Private sector

2013 Status



114 NIH
63 Industry

Technology Reviews
Conducted

4

EIRs



1

EIR MOU

华夏幸福基业
CHINA FORTUNE LAND DEVELOPMENT

9

Current Clients

2

Pending Clients

4

Potential New
Clients

Future

- Add 2 EIRs
- Create 5 spinouts or tech placements
- Develop education programs

BHI Entrepreneurs-in-Residence



Todd Chappell (NIH-OTT)

Todd assists the Office of Technology Transfer (OTT) in the evaluation of existing technologies, provide an entrepreneurial perspective on new licensing proposals from start-up companies, advise on opportunities for new ventures, assist with developmental strategies, and mentor scientists to help ensure their research becomes commercially valuable.



Ken Malone (UM Ventures)

Ken has built his career on creating economic value from science. Whether it was developing new business lines for global corporations or spinning out new ventures from universities, he has engaged in the commercialization of hundreds of new products in advanced materials and life sciences.



Ram Aiyar (NHLBI)

Ram assists the National Heart Lung and Blood Institute (NHLBI) in translating disruptive science into commercially viable technologies. He works with the relevant stakeholders within the NIH to develop commercial plans and/or develop licensing opportunities such that the NIH technologies can be translated into commercially viable entities that will solve unmet medical needs of patients.



Rich Moore (NIH-OTT)

Dr. Moore previously served as the Chief Scientific Officer for OpGen, Inc. In that role, Dr. Moore provided leadership over multiple R&D functions, and led the company's Scientific and Clinical Advisory Boards. Prior to that, he spent 12 years at BD Diagnostics holding various positions, most recently as R&D Director, Systems Integration and Advanced Technology.

China Fortune Land Development (CFLD) EIR

BHI Client Companies



Developing a therapeutic platform that can be adapted to target a wide variety of cancers.

Moco-based Startup



Developing and marketing Organ-on-a-Chip solutions for the pharmaceutical industry.

US-based Subsidiary of Dutch Company



Developing devices for cardiovascular procedures that will solve high unmet needs in the transcatheter valve replacement space.

NHLBI



Developing novel viral clearance kits to be utilized during process development bio therapeutics.

Moco-based Startup



Developing sensors that can detect harmful chemicals mixed in air in very small quantities, such as industrial chemicals, and other pollutants.

Licensee of UMCP and NIST



Developing medical devices related to image-guided, minimally-invasive niche markets.

JHU



Developing a platform vaccine like particle technology that has the potential to be used for various diseases including cancer.

NIH



Speed Biosystems, Inc. is developing novel immunotoxins for the treatment of solid and liquid tumors.

Moco-based Startup



India-based molecular information company with multiple powerful bioinformatics platforms.

India

Small Business Innovation Research (SBIR) Grant

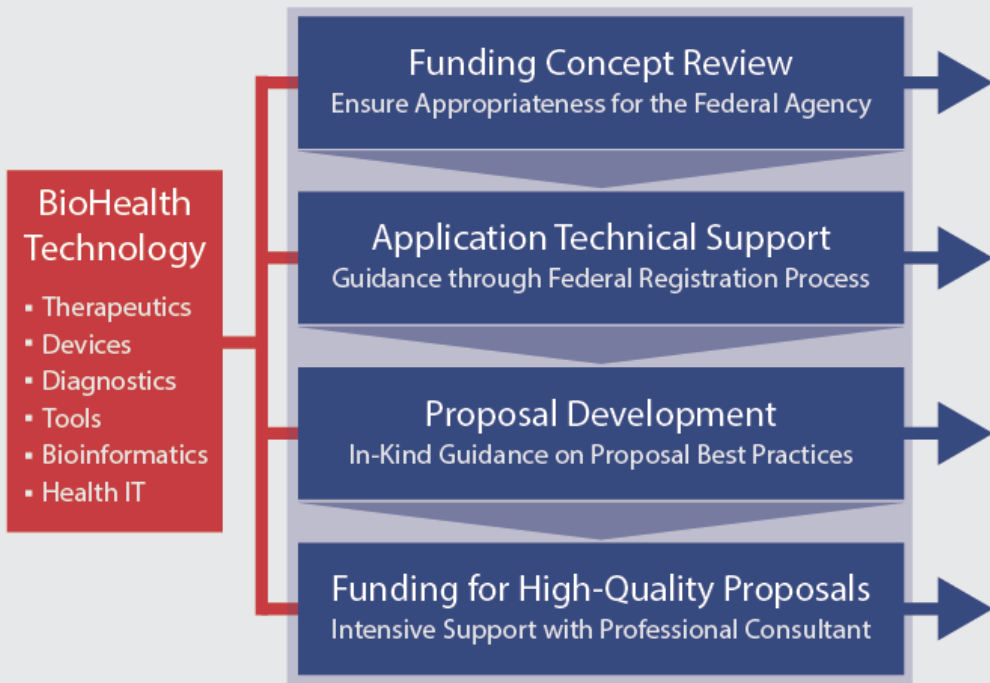
- \$2.5 billion annual United States Government program coordinated by the Small Business Administration
- Administration provides grants or contracts to small businesses to spur technological innovation
- Grants awarded in 3 phases between \$150,000 and \$1 million
- Non-dilutive



BHI Federal Funding Assistance



Value Chain of Assistance



Funding Agencies



BHI Federal Funding Assistance

2013 Performance

55

Total
Number
Reviewed

18

Grant
Proposals
Submitted

13

Not
Yet
Submitted

14

Not Further
Pursued by
Company

10

Flawed:
No Action
Taken

Other Notable Activities

- NHLBI Innovation Conferences – evaluated SBIR companies to present at regional showcases (San Diego; San Francisco)
- NHLBI Centers for Accelerated Innovation – supporting performance metrics & process evaluation for CAIs

BHI Startup Package

Corporate Legal

VENABLE[®] **LLP**

Intellectual Property



Accounting



Laboratory Space



Incubation



Banking



Grant Consulting



ScienceSherpa
Help and Heavy Lifting For Successful Grants and Proposals

Health IT ... Booming

- Increased investments in the mobile and healthcare sectors helped boost the median size of angel and angel group syndicate rounds
- Mobile health technologies projected to be worth \$11.8 billion by 2018

Source: Q3 2013 Halo Report

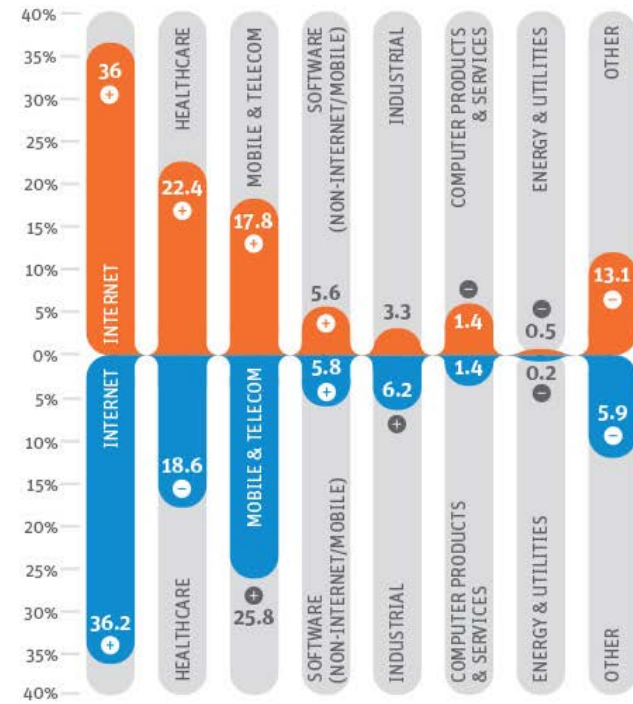
4 Mobile Grabs More Share of Deals and Dollars



in Internet, Healthcare and Mobile



% of deals



\$M invested

+ Indicates an increase over Q3 2012
 - Indicates a decrease from Q3 2012



- A Health IT Accelerator is an intensive 16 week program that admits top-recruited companies and entrepreneurs, provides a curriculum and network of experienced mentors in business, marketing and product development in the Health IT arena to “accelerate” top companies.

- Retain promising high growth HIT entrepreneurs in MD

- **Partners:**

- ❖ BioHealth Innovation, Inc
- ❖ Johns Hopkins University
- ❖ DreamIt Ventures
- ❖ Economic Alliance of Greater Baltimore
- ❖ Northrop Grumman
- ❖ Kaiser Permanente
- ❖ DBED



Participant Overview



Phobious
www.phobious.com



THE
SMARTPHONE
PHYSICAL

Aegle




Avhana⁺



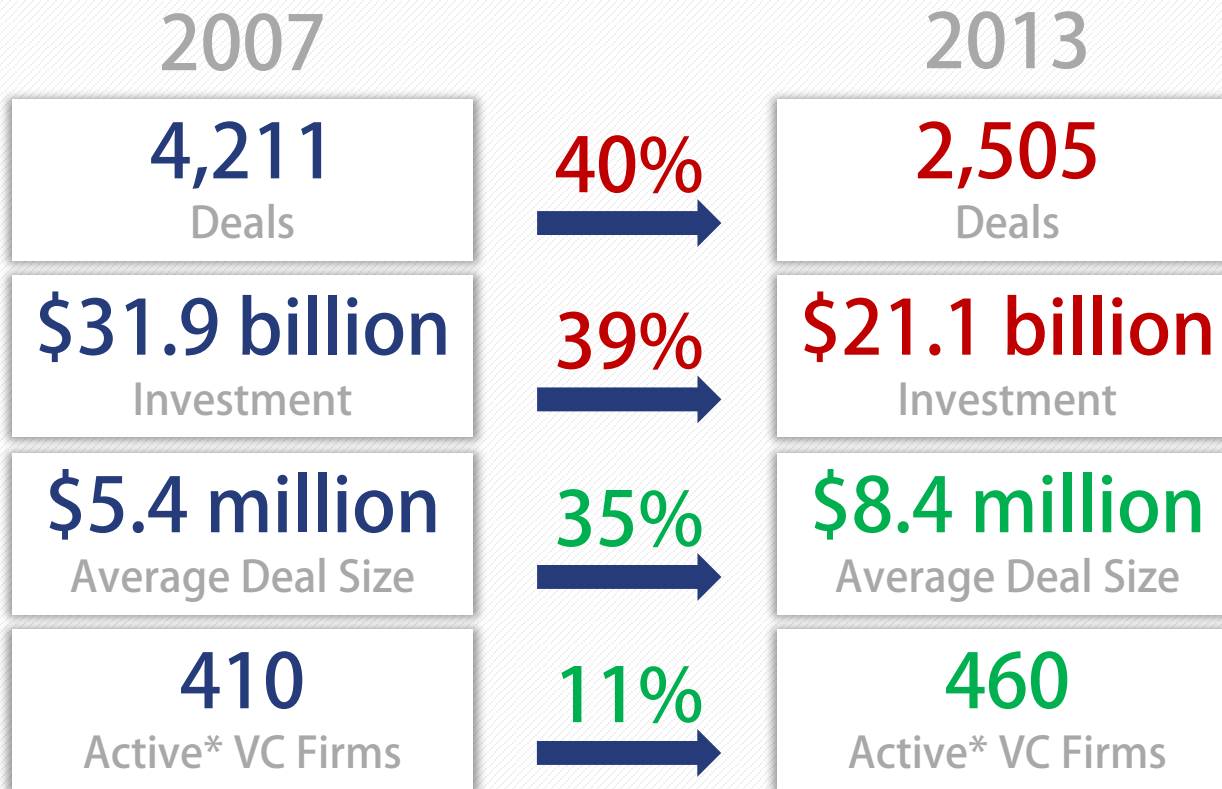
patient feed 
saving time. saving lives.

DreamIt Accelerator Companies

JHU
Affiliated

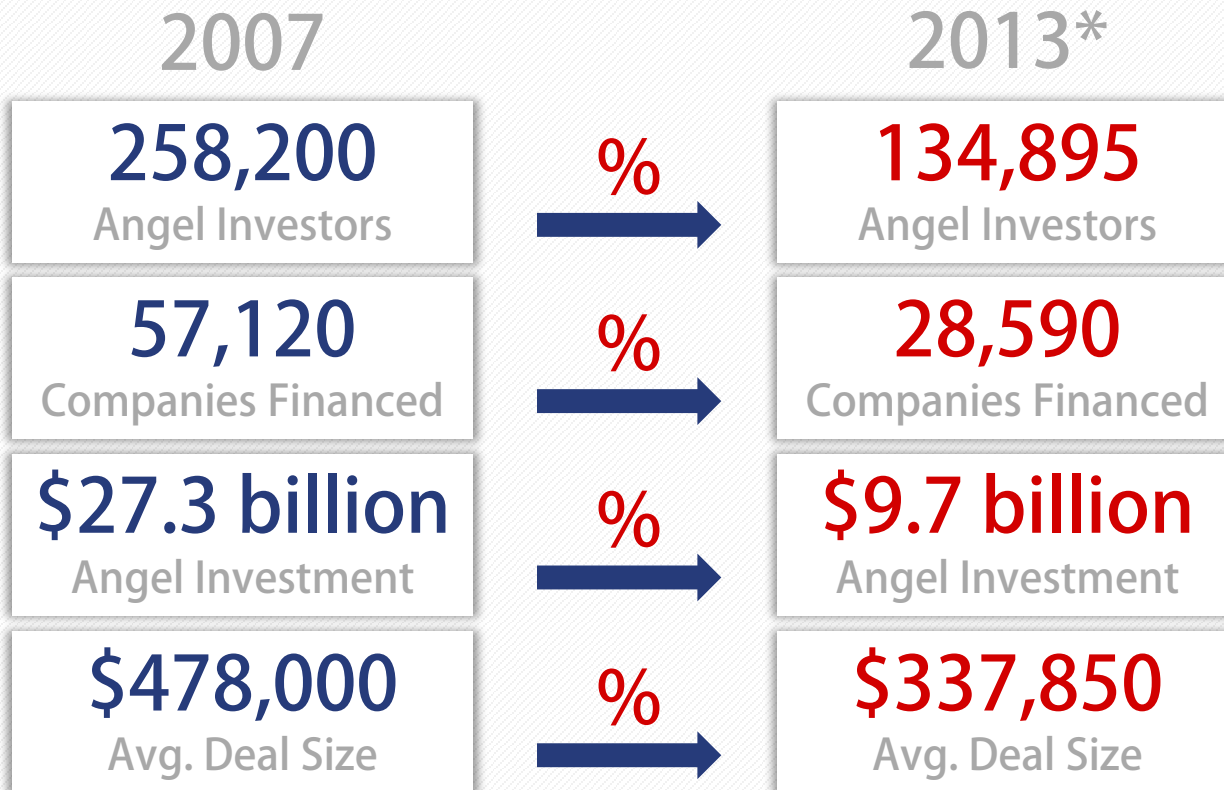
	● Wearable biometric devices	Baltimore, MD	
	● Clinical Decision Support	Baltimore, MD	
	● Mobile Cognitive Rehabilitation	Talinn, Estonia	
	● Mobile Information Platform	Baltimore, MD	
	● Smart Administrative Workflows	Baltimore, MD	
	● Respiratory Medical Device	Athens, Greece	
	● Inpatient Care Collaboration	Pittsburgh, PA	
	● Augmented Reality Treatment	Barcelona, Spain	
	● Digital Workflow Management	Baltimore, MD	

US Venture Capital Investment



*VC firms completing 4 or more deals per year

US Angel Investment



*For Q1&Q2

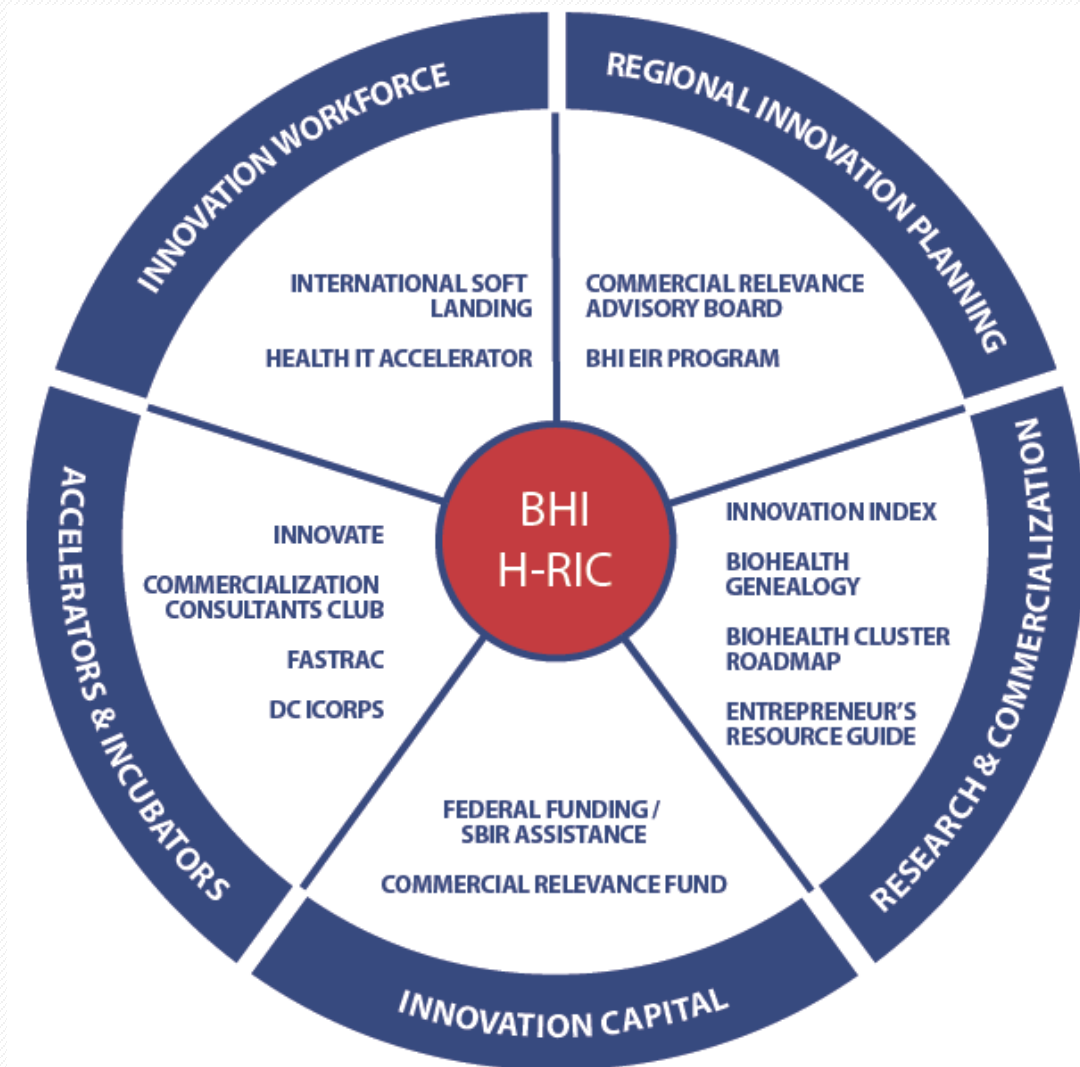
BHI Commercial Relevance Fund

- Will provide direct seed and early-stage equity investments ranging from \$50,000 to \$1,000,000
- Focused on BioHealth companies that fall into the 4 categories: Therapeutics, Medical Devices, Diagnostics, and Health IT
- Goal: Achieve a \$5,000,000 to \$10,000,000 initial fund
- Expectation: 30% of companies generating 10x the original investment
- 2014 — First close

BHI H-RIC Model

Health Regional Innovation Cluster (H-RIC)

- Regional, cluster-based economic development model
- Modeled after the Department of Energy's Regional Innovation Cluster
- Connects innovation assets to related industries
- Advances human health and economic prosperity
- Focuses on proof of commercial relevance



BHI International Soft Landing



MIMETAS
the organ-on-a-chip company
Developing and marketing
Organ-on-a-Chip solutions for
the pharmaceutical industry.

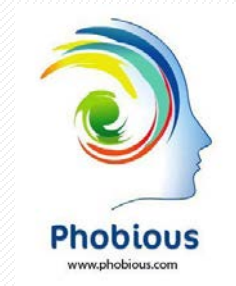


- North America
- Netherlands
- Germany
- China
- Korea
- Portugal
- South America
- Greece
- Spain
- Estonia

BHI offers international companies the perfect starting point to create US based subsidiaries by connecting them with BHI's extensive network.

BHI Global Outreach

- CLFD EIR to serve as a biohealth intermediary between BHI and China.
- 3 International DreamIt Health Accelerator companies
 - Cognuse (Estonia)
 - Respi (Greece)
 - Phobius (Spain)
- BHI Soft Landing Program
 - Mimetas (Netherlands)

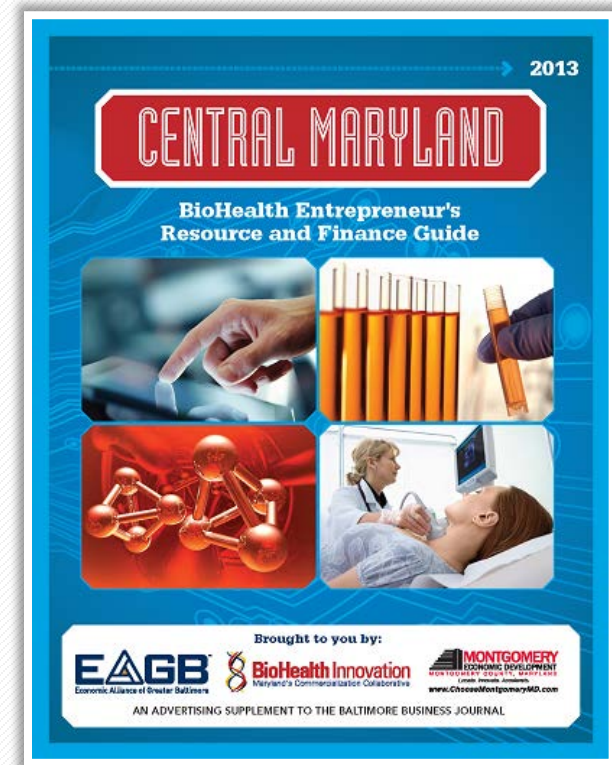


Entrepreneur's Resource and Finance Guide



Financing and Entrepreneurial Resource for Montgomery County and the Greater Baltimore Region

- Entrepreneur and Innovation Resource Network
- Innovator Financing Guide
- The Startup's Guide to Intellectual Property
- Federal Labs Listing



BHI Website and News



BHI Website

The BHI website has news, an events calendar, research publications, regional organization feature stories and resources for the biohealth industry.

<http://www.biohealthinnovation.org>



BHI News

BHI's weekly e-newsletter highlights the Central Maryland region's news articles, national biohealth trends and feature stories.

<http://www.biohealthinnovation.org/news>

Entrepreneur Training Programs



I-CORPS



DC I-corps is a custom commercialization program for biohealth related technologies and startup companies. The six-week program guides teams through a rigorous market assessment and validation process ultimately creating a viable business model.

KAUFFMAN | **FASTTRAC.**
Startup your idea.



The FastTrac program is a practical, hands-on, entrepreneur-learning program designed to help entrepreneurs hone the skills needed to create, manage, and grow a successful business.

INNoVATE™



The INN^oVATE program provides applied training for postdoctoral fellows, research scientists, and other professionals who want to start life science based companies.



National Institutes
of Health



The BHI Commercialization Consulting Club is a place where BHI's EIRs and Commercialization Consultants can discuss all aspects of the technologies being researched and make new networking connections.

BHI: The Triple Bottom Line

Grows high-paying jobs and businesses

A large, hollow, downward-pointing arrow connects the first box to the second box.

Expands tax base; improves economic vitality

A large, hollow, downward-pointing arrow connects the second box to the third box.

...and benefits human health!

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The Wire Hardware store
- BHI's Office Space

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