

THE GEORGE  
WASHINGTON  
UNIVERSITY  
WASHINGTON, DC

# 3<sup>rd</sup> Annual Innovation Competition

OFFICE OF  
TECHNOLOGY  
TRANSFER

OFFICE OF THE VICE PRESIDENT FOR RESEARCH

# Technology Commercialization

**Rich Bendis**

President & CEO

BioHealth Innovation, Inc.

3/26/2014

# The Region — Central Maryland

- Unrivaled Research Assets -
- Unfulfilled Commercial Promise -



National Institutes  
of Health



# 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





**BioHealth Innovation**  
Maryland's Commercialization Collaborative

National Cancer Institute  
Fort Detrick/  
Medical Facilities

Frederick

Frederick

Carroll

Baltimore County

Harford

Howard

Baltimore

Center for Medicare  
and Medicaid Innovation

Johns Hopkins Homewood

University of Maryland  
Medical Center & Biomedical  
Research Facility

University of  
Maryland  
Baltimore County

Johns Hopkins  
East Baltimore

Johns Hopkins  
Bayview



US Dept  
of Energy

Montgomery  
County

National Institute of  
Standards & Technology

Johns Hopkins Belward Campus  
The Universities at  
Shady Grove

National Cancer Institute

Rockville

US Dept of  
Health & Human  
Services

National Institutes of Health

Uniformed Services University of the Health Sciences

Walter Reed Army  
Institute of Research

NOAA

FDA

NASA Goddard

USDA National  
Agriculture Library

Anne Arundel

Annapolis

University of Maryland at College Park

HHS

Washington D.C.

US Dept of Defense  
(Pentagon)

Virginia

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



JOHNS HOPKINS  
UNIVERSITY



NEA  
New Enterprise Associates\*

MARYLAND OF OPPORTUNITY. SM

EAGGB™



APL  
The Johns Hopkins University  
APPLIED PHYSICS LABORATORY

BIO X MARYLAND

MaBio



NATIONAL  
CANCER  
INSTITUTE



NCATS NIST



National Biodefense Analysis  
and Countermeasures Center



J. Craig Venter  
INSTITUTE



Bio  
BIOTECHNOLOGY  
INDUSTRY ORGANIZATION

# BioHealth Innovation is an Innovation Intermediary

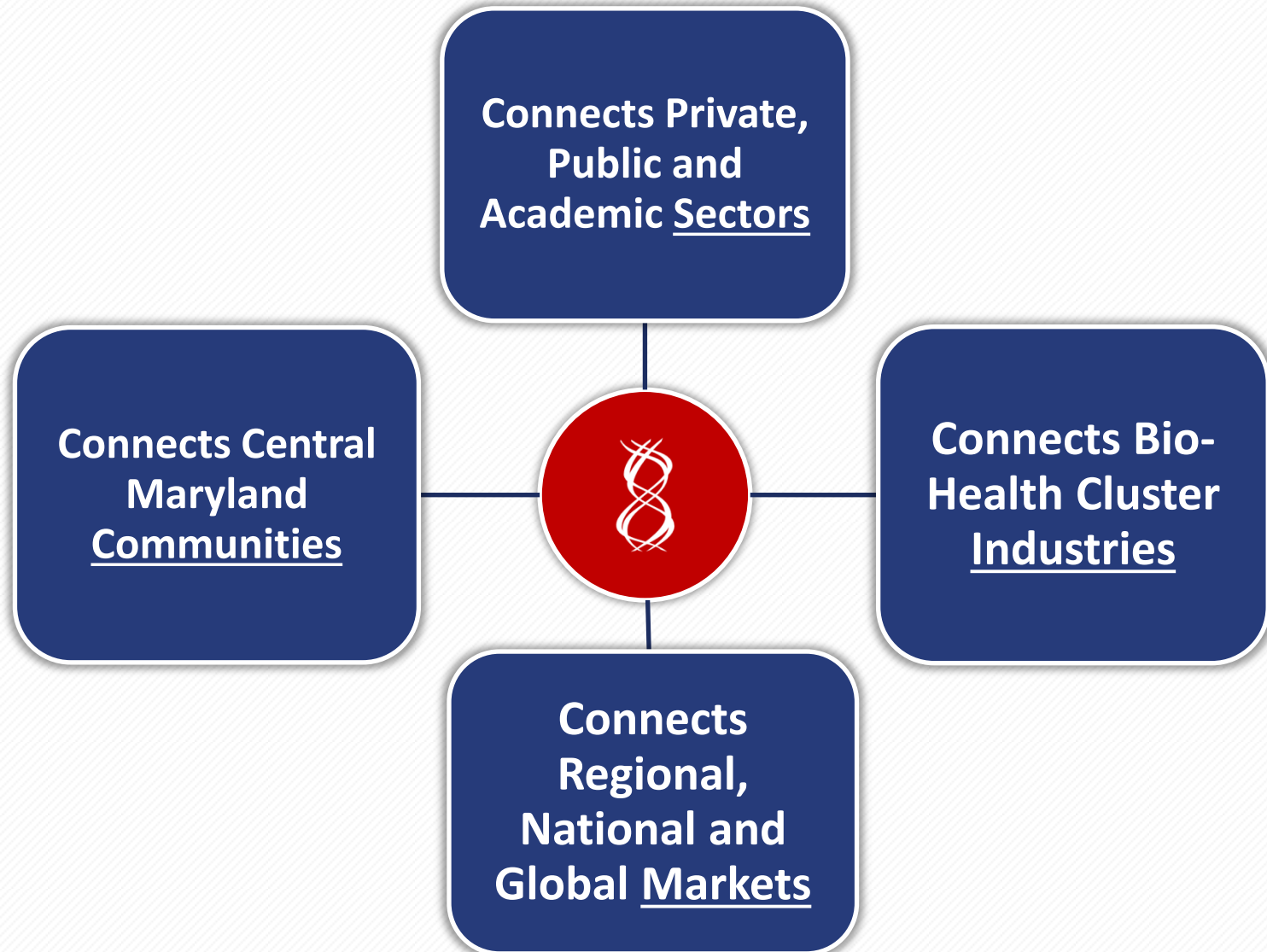
An organization at the center of the Central Maryland region's efforts to:

- 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

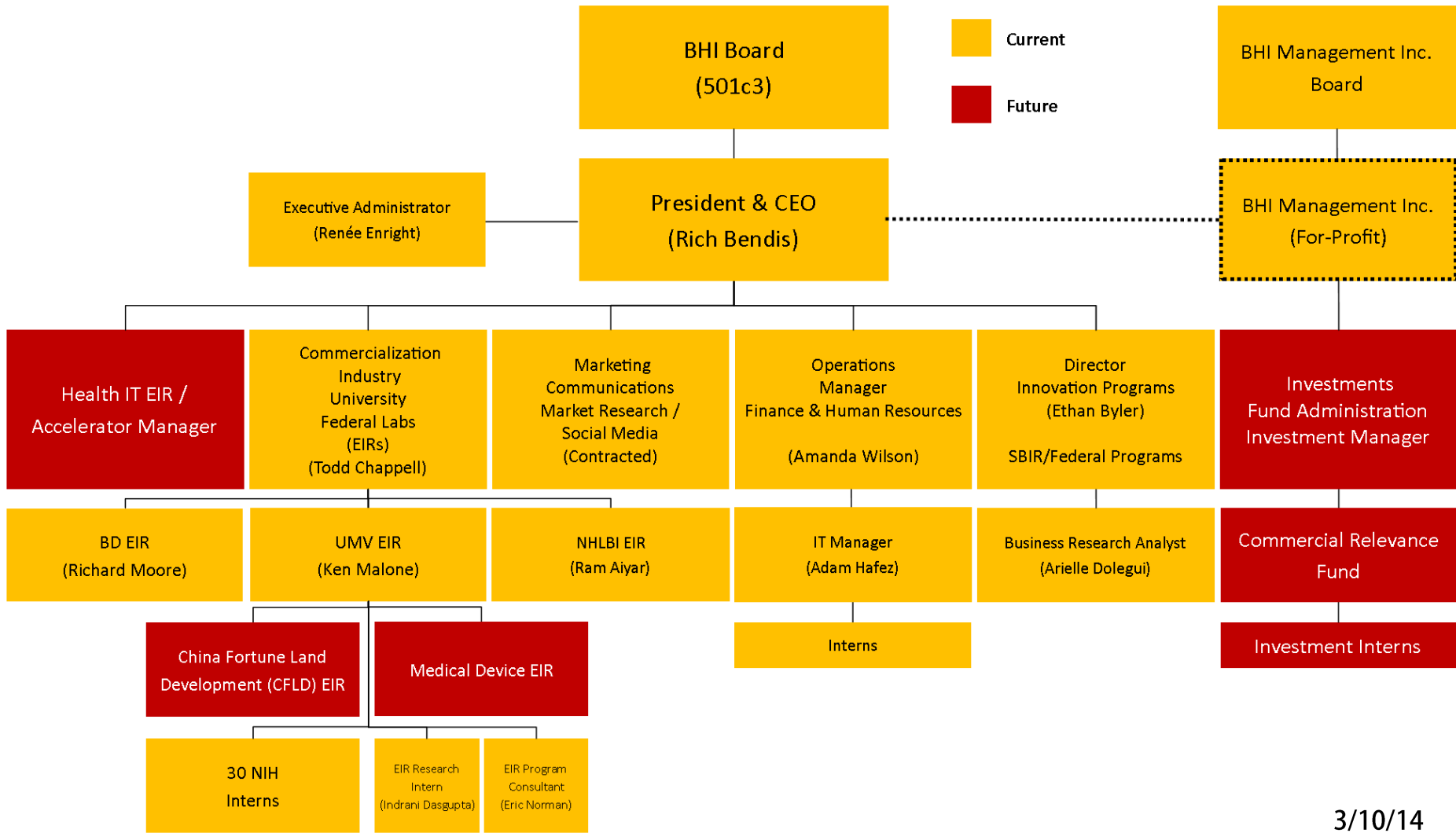


# BHI Board of Directors

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

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

# BHI Organizational Chart

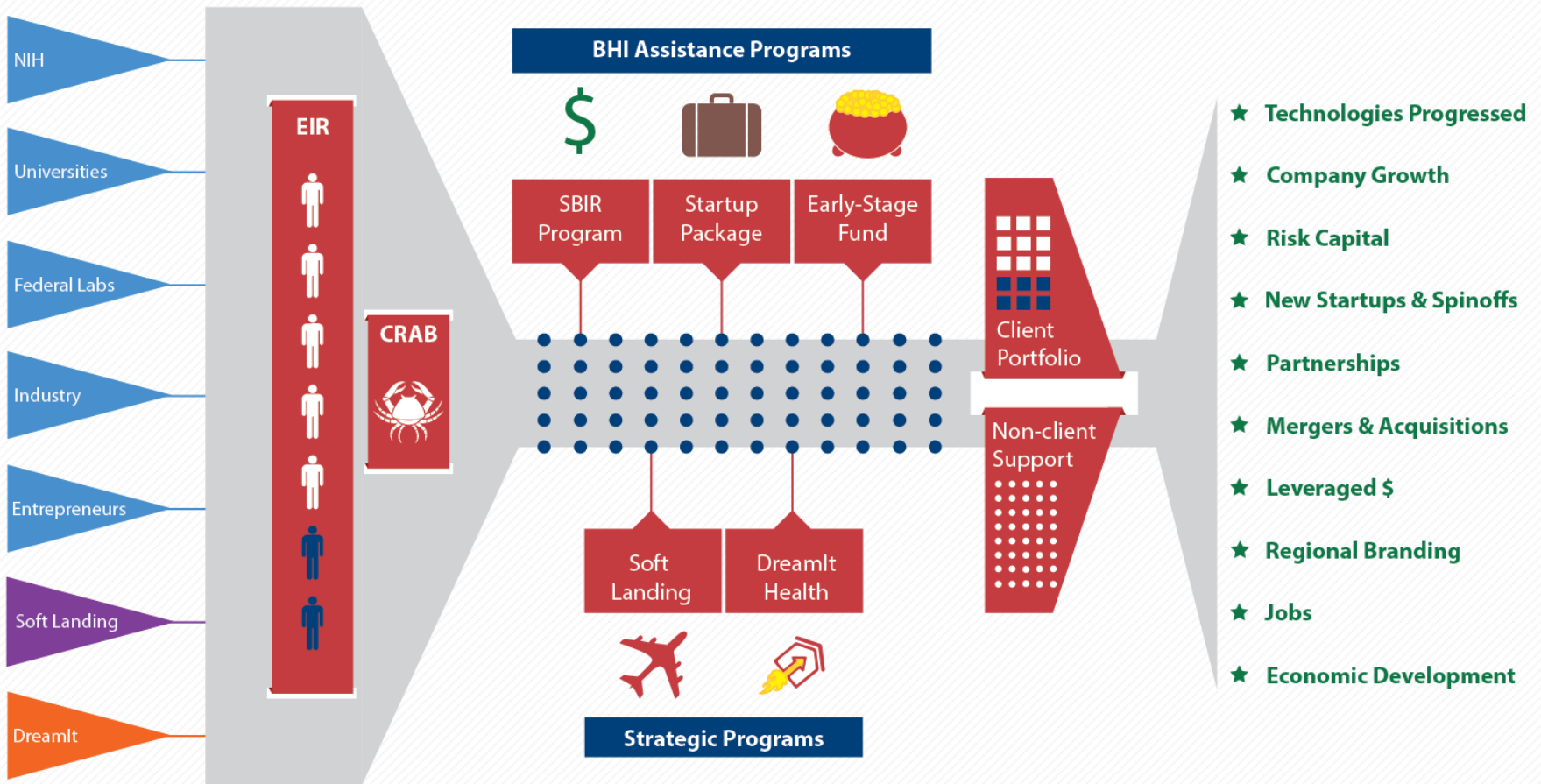


3/10/14

# SOURCES

# BHI Program Structure

# OUTCOMES

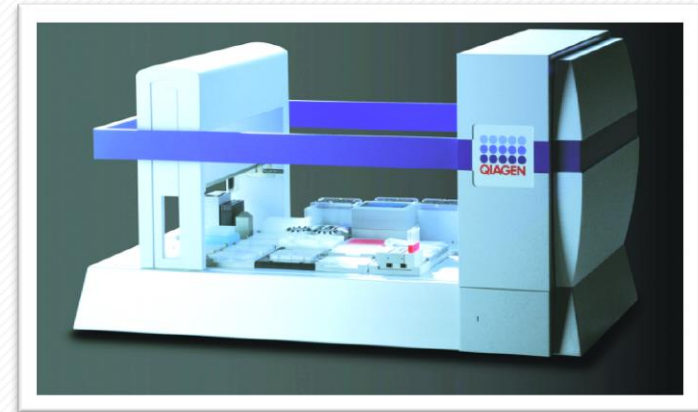
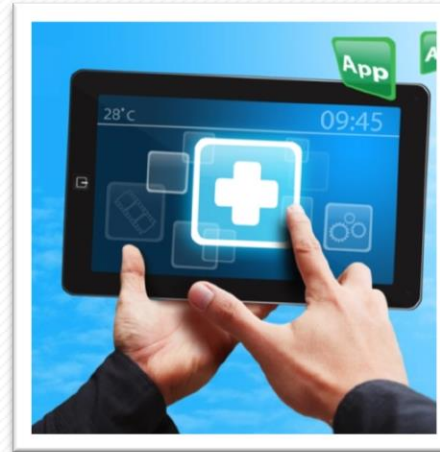


## Financial Sponsors



# BHI Technology Focus

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

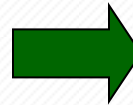
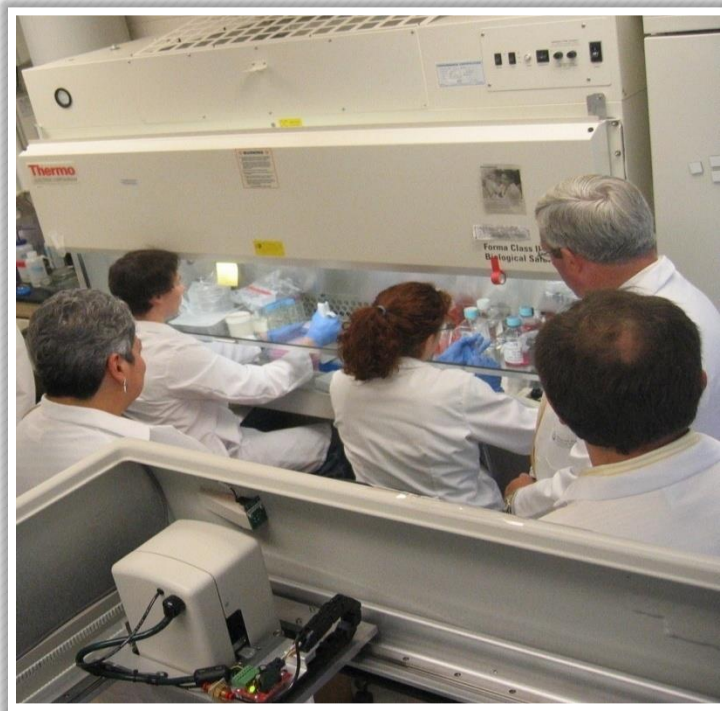


# Innovation Paradigm Shift

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”**



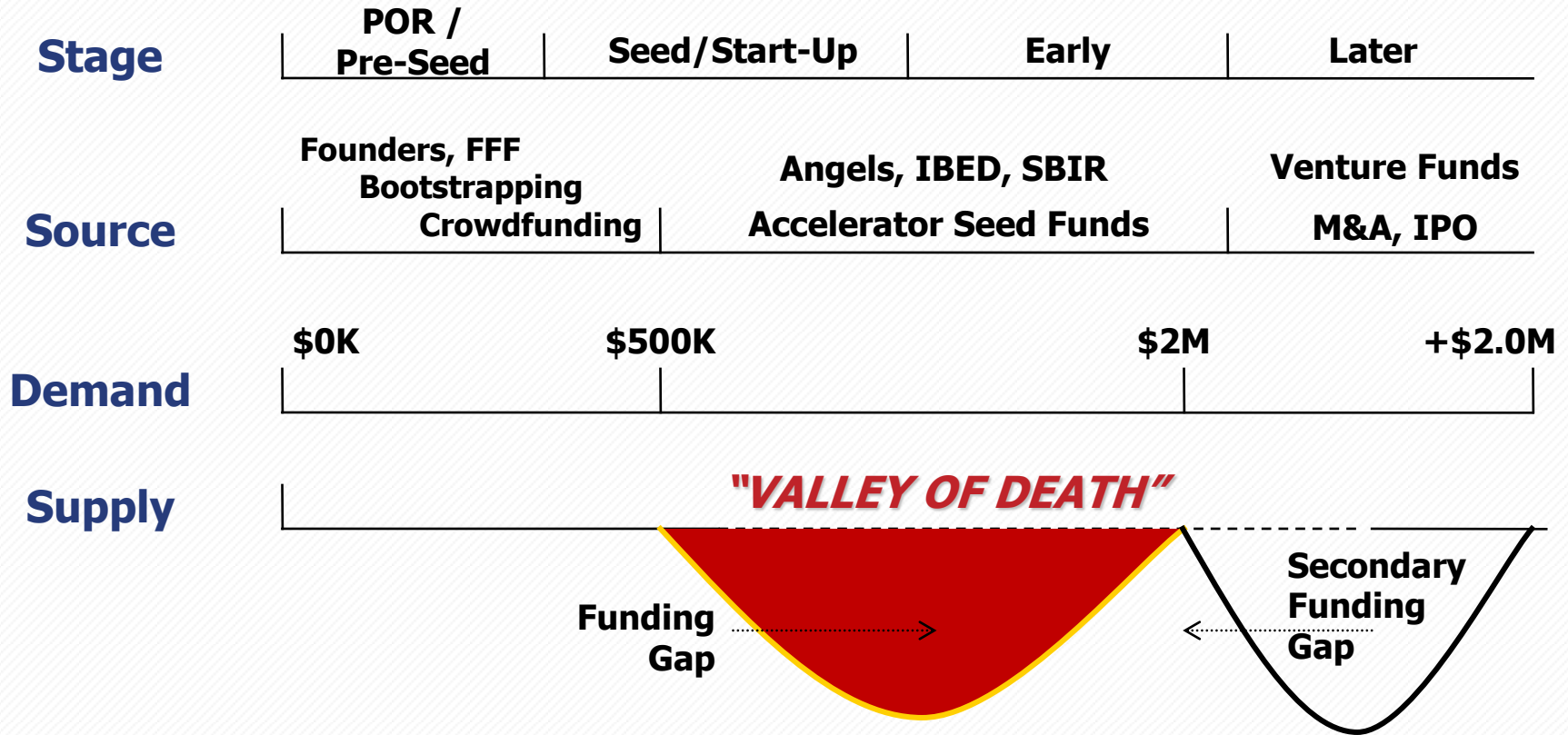
# BHI Commercial Relevance Advisory Board



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

## 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)

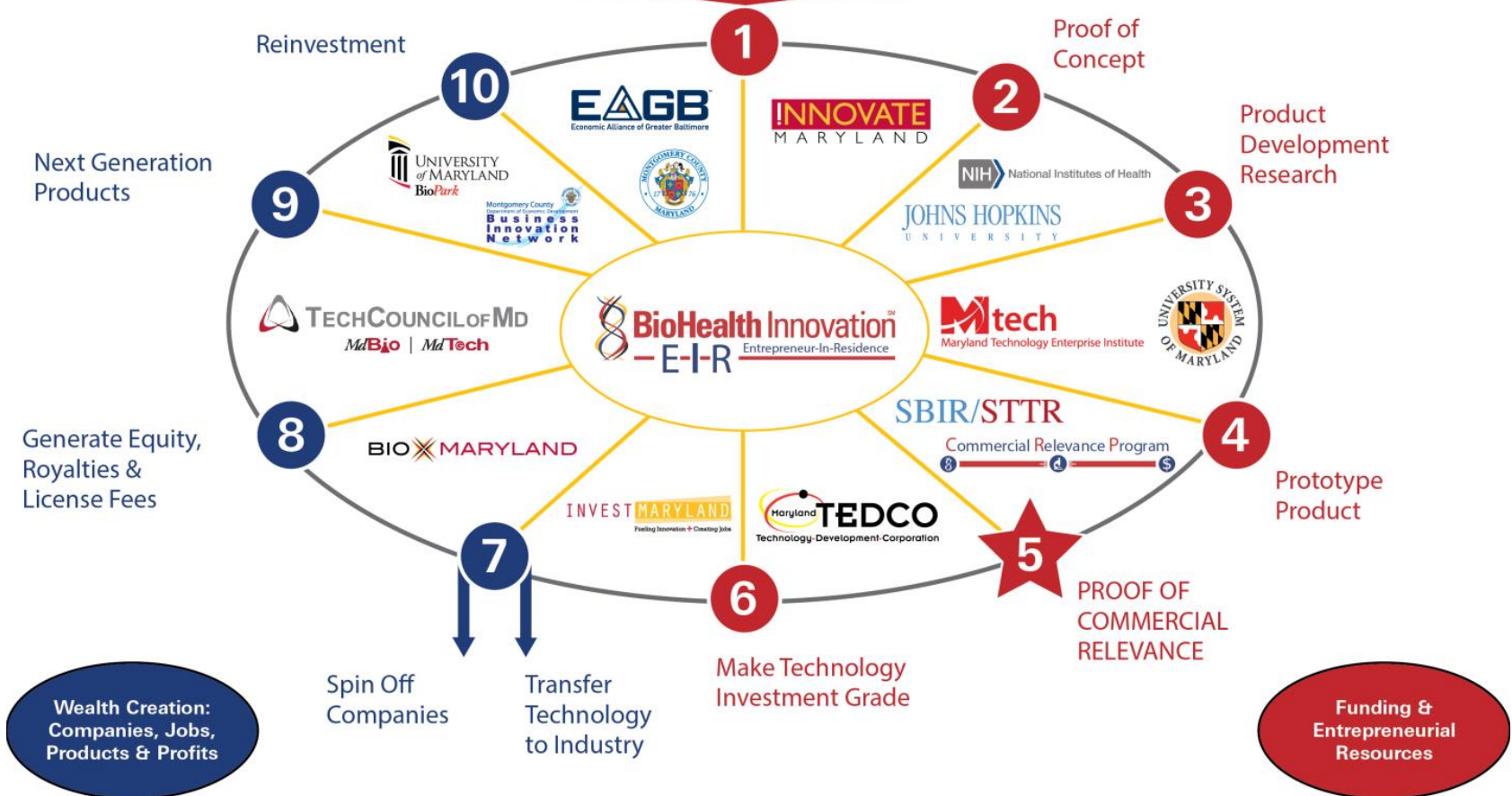
**Identify** funding for market-relevant IP

**Grow** and markets businesses and products



# BHI Commercialization Model

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



# Partnership Intermediary Agreement



**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



**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

**BeneVir**

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

**MIMETAS**  
the organ-on-a-chip company

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

**Mehr Medical**

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

**MockV**

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

 **N5 Sensors, Inc.**  
Smart Sensors for a Safer World

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

 **PERCEPTIVE  
NAVIGATION**

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

 **VLP Therapeutics**

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

 **speed**  
BioSystems

- Recently licensed a monoclonal antibody targeting ROR1 from the NIH. ROR1 is an emerging target that may be relevant for triple negative breast cancer (TNBC) and other solid tumors

 **Strand  
Life Sciences**  
Algorithms for Life

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



# Small Business Innovation Research (SBIR) Grant

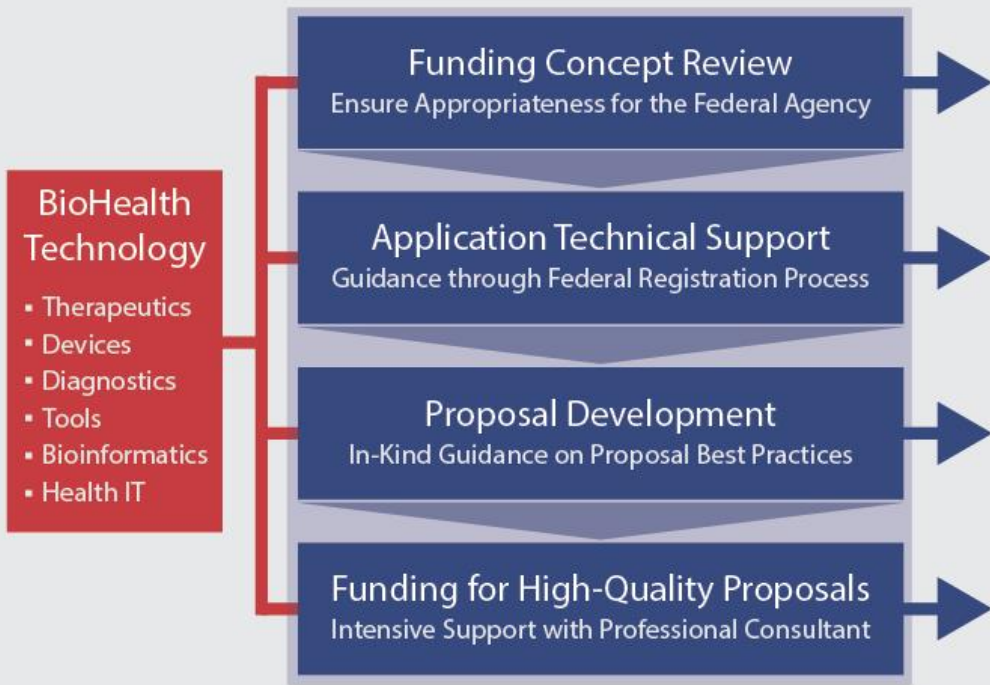
- \$2.5 billion annual United States Government program coordinated by the Small Business Administration
- Administration provides grants or contracts to small businesses to spur technological innovation
- Grants awarded in 3 phases between \$750,000 and \$1 million
- Non-dilutive



# BHI Federal Funding Assistance



## Value Chain of Assistance



## Funding Agencies

**NSF**  
National Science Foundation

**NIH**  
National Institutes of Health

**NATIONAL CANCER INSTITUTE**

**NIH**  
National Center for Advancing Translational Sciences

**DEFENSE SCIENCE & ENGINEERING**  
UNITED STATES OF AMERICA

**EMERGING CHEMICAL BIOLOGICAL CAPABILITIES**  
U.S. ARMY MEDICAL RESEARCH INSTITUTE

**BARD**  
BIOLOGICAL ADVANCED RESEARCH AND DEVELOPMENT ACTIVITY

**DARPA**  
Defense Advanced Research Projects Agency

**BILL & MELINDA GATES foundation**

**USAID**  
FROM THE AMERICAN PEOPLE

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

**NIH** National Heart, Lung, and Blood Institute

**CDMRP**  
Congressional Directed Medical Research Programs  
Department of Defense

# 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**<sup>®</sup>  
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

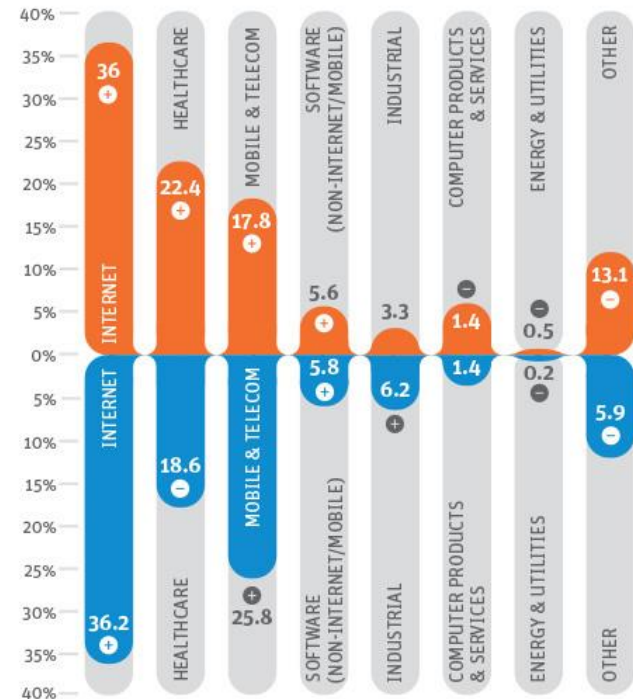
## 4 Mobile Grabs More Share of Deals and Dollars



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<sup>+</sup>



patient feed   
saving time. saving lives.

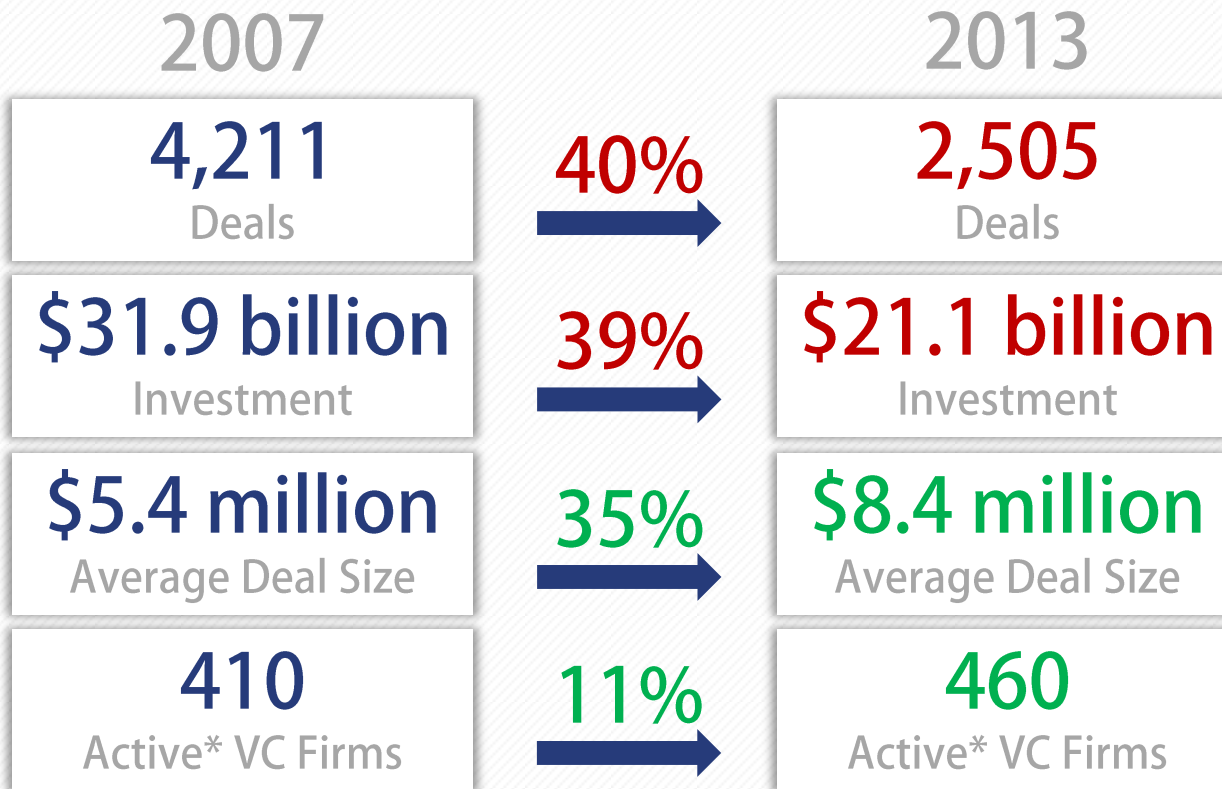
# DreamIt Accelerator Companies

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	
	● Augmented Reality Treatment	Athens, Greece	
	● Inpatient Care Collaboration	Pittsburgh, PA	
	● Augmented Reality Treatment	Barcelona, Spain	
	● Digital Workflow Management	Baltimore, MD	

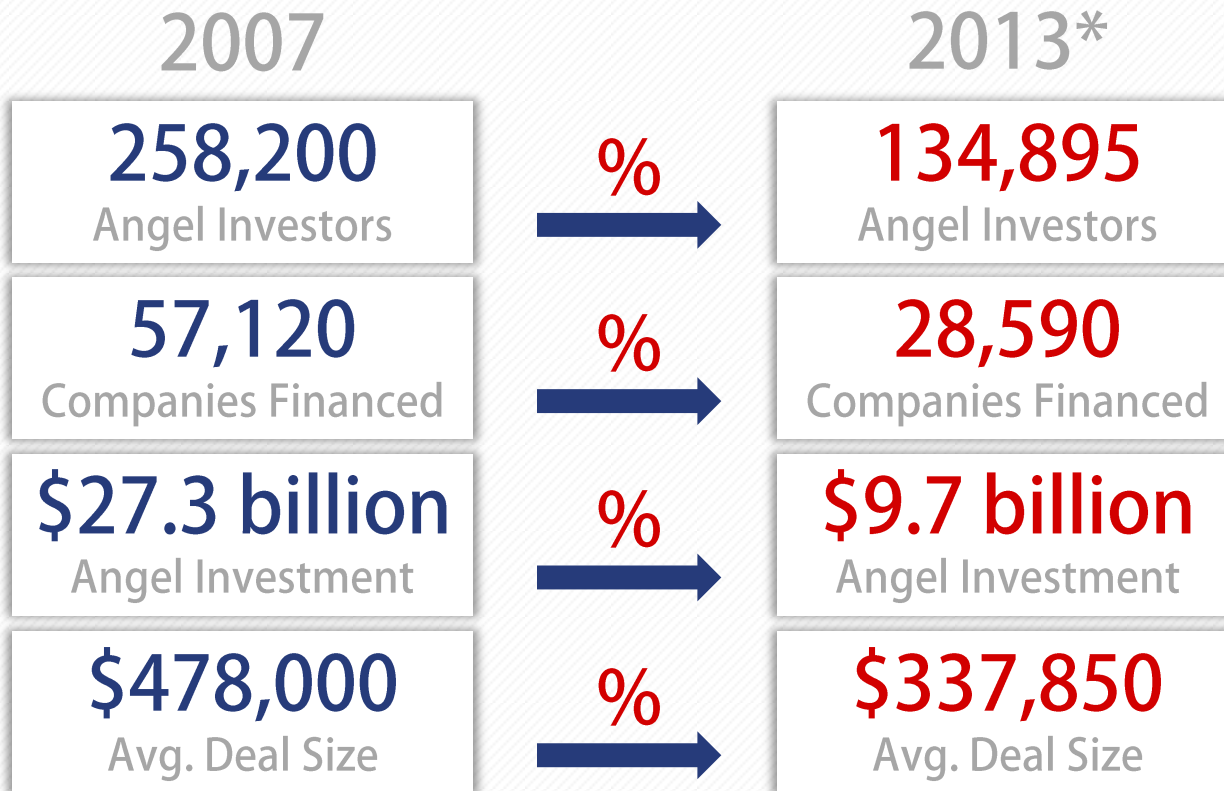


# US Venture Capital Investment



\*VC firms completing 4 or more deals per year

# US Angel Investment



\*For Q1&Q2

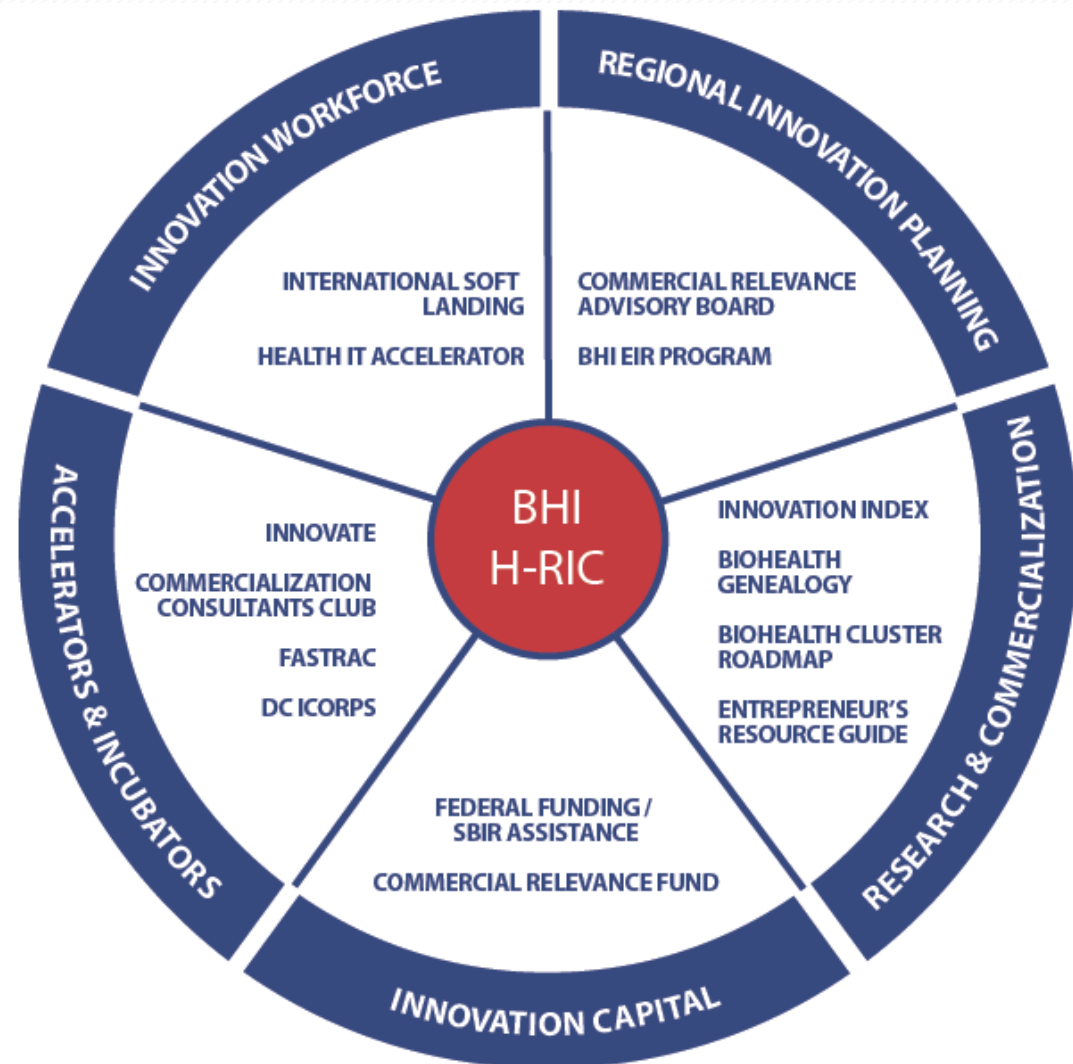
# BHI Commercial Relevance Fund

- 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

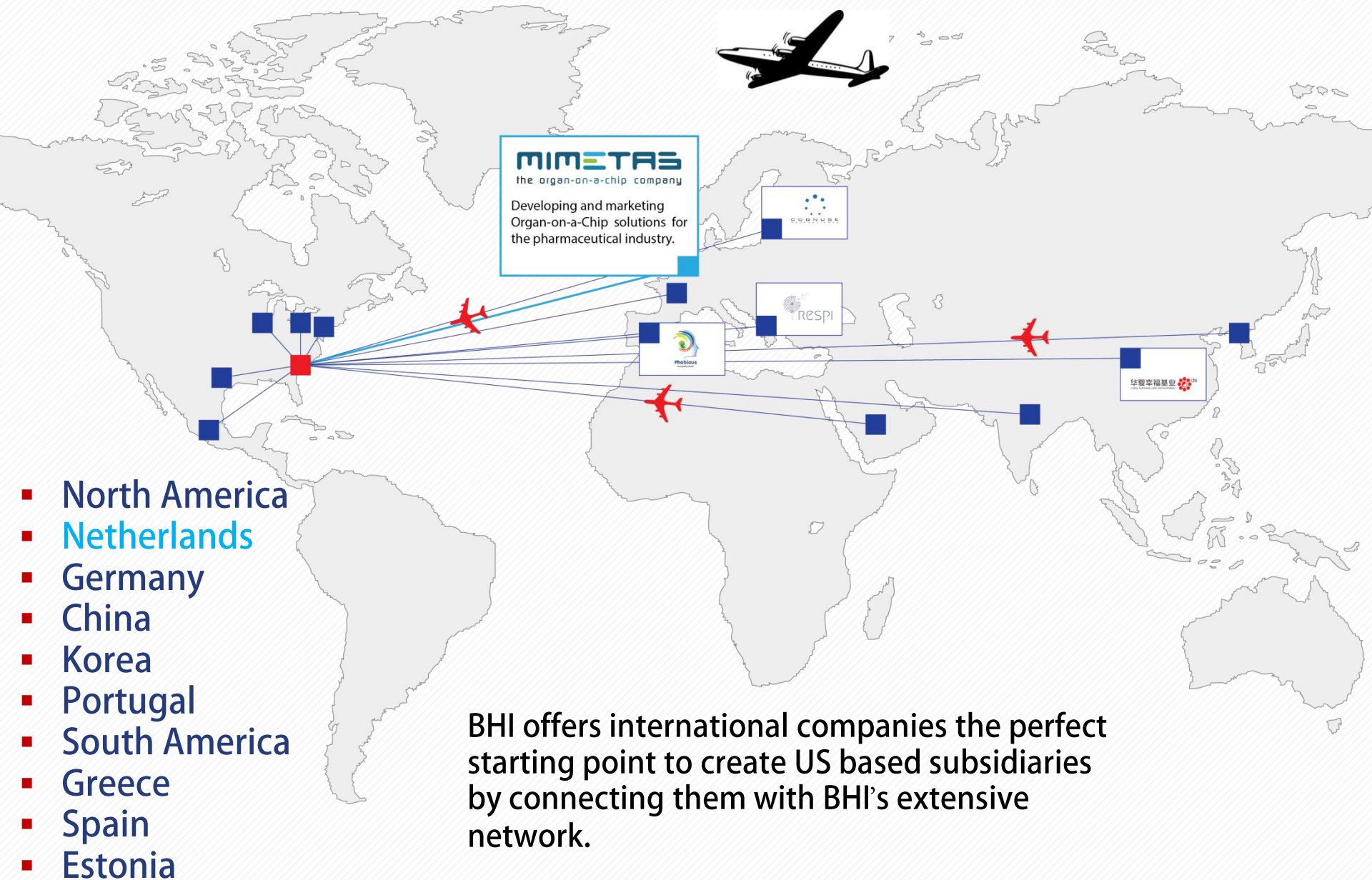
# BHI H-RIC Model

## 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

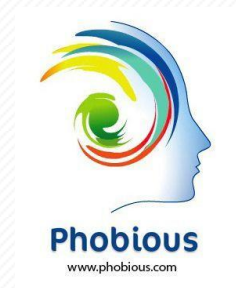


# BHI International Soft Landing



# 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)

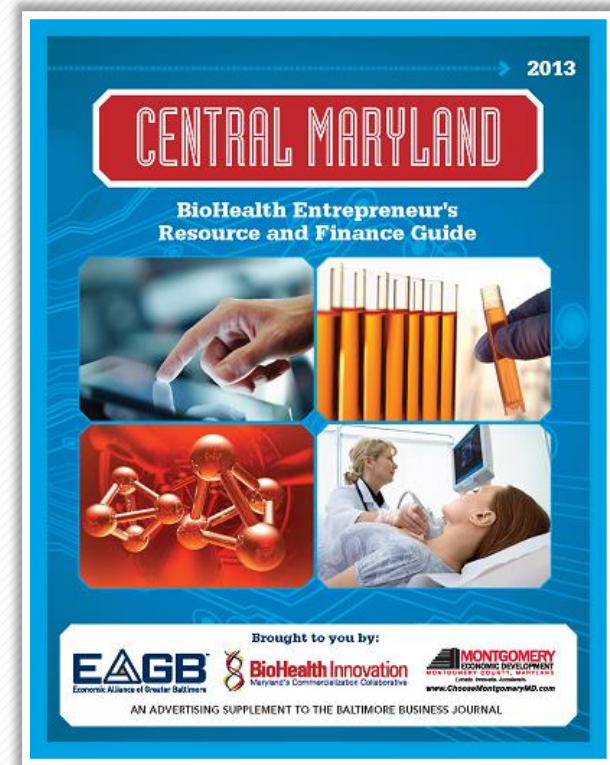


# Entrepreneur's Resource and Finance Guide



## *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.

**INN**oVATE™



The INN<sup>o</sup>VATE 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 with a thin black outline, centered between the first and second text boxes.

**Expands tax base; improves economic vitality**

A large, hollow, downward-pointing arrow with a thin black outline, centered between the second and third text boxes.

**...and benefits human health!**

# BHI Key Staff

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- BHI's Office Space

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