The Global Innovation Imperative

Richard A. Bendis

Founder & CEO
Innovation America

Publisher
Innovation Daily

(11/13/2012)
The World According to Friedman: Hot, Flat, and Crowded
The Global Innovation Imperative

- Innovation is Key to Growing and Maintaining a Country’s **competitive** Position in the Global Economy and to address Global Challenges
- **Collaboration** among Small and Large Businesses, Universities, and Research Institutes is Essential for Innovation & Commercialization
- **New Institutions and New Incentives**, are increasingly important to support collaboration and foster innovation
- Competitive advantages are increasingly tied to human capital and innovation
- **Economic growth** is closely related to education/workforce, energy, climate change, environmental, natural resource, geopolitical issues & entrepreneurship
Why Is Innovation Essential?

“INNOVATION DISTINGUISHES BETWEEN A LEADER AND A FOLLOWER.”

- STEVE JOBS

INNOVATION is the creation and transformation of knowledge into new products, processes, and services that meet market need.......and interactions, entertainment forms, and ways of communicating and collaborating.
Growth of World Population and the History of Technology

Population (millions)

-9000 -6000 -4000 -3000 -2000 0 1000 2000

Agricultural Revolution
Pottery
Invention of Plow
1st Irrigation
1st Cities
Metallurgy
Writing
Mathematics
Peak of Rome
Peak of Greece
Industrial Revolution
2nd Agricultural Revolution
Genome Project
Man Lands on Moon
High-Speed Computers

Nuclear Energy
DNA Discovered
Penicillin
Automobile
Telephone
Germ Theory
Railroads
Watt Engine
Mobile
Internet
PCs

Source: Milken Institute, Robert Fogel/University of Chicago
Top 10 College Campuses for Tech

1. Pomona College
2. Georgia Tech
3. Colgate University
4. Hamilton College
5. Washington University in St. Louis
6. Carnegie Mellon University
7. Denison University
8. Wake Forest University
9. Harvey Mudd College
10. University of Richmond

Mashable 8/24/2012
The New Locational Competition

**Definition:** The competition for economic activity

Intense and growing competition among nations and regions for well paid jobs and improving living standards........
### States by Innovation Index

- Percentage growth and per capita growth of business establishments
- Business formation rate
- Number of patents per thousand residents
- Income per non-farm proprietor

<table>
<thead>
<tr>
<th>State</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts</td>
<td>3.01</td>
</tr>
<tr>
<td>North Dakota</td>
<td>2.52</td>
</tr>
<tr>
<td>California</td>
<td>2.39</td>
</tr>
<tr>
<td>New York</td>
<td>2.23</td>
</tr>
<tr>
<td>Minnesota</td>
<td>1.79</td>
</tr>
<tr>
<td>Utah</td>
<td>1.07</td>
</tr>
<tr>
<td>Nebraska</td>
<td>0.99</td>
</tr>
<tr>
<td>Hawaii</td>
<td>0.34</td>
</tr>
<tr>
<td>Kentucky</td>
<td>0.30</td>
</tr>
<tr>
<td>Mississippi</td>
<td>0.29</td>
</tr>
<tr>
<td>South Carolina</td>
<td>0.19</td>
</tr>
<tr>
<td>Michigan*</td>
<td>0.10</td>
</tr>
<tr>
<td>Louisiana</td>
<td>0.03</td>
</tr>
</tbody>
</table>

* Weighed down by sharp declines in number of establishments, [...] Michigan (0.10) was No. 49.
Job Creation by Sector since 1939
Consumer Price Indexes
January 1978 to July 2009

Source: BLS

College Tuition
Avg = 7.74%/yr.

Textbooks
Avg = 6.9%

Medical Care
Avg = 6%/yr.

All Items
Avg = 3.9%/yr.
Top 10 Universities for Entrepreneurs

1. Babson
2. Indiana University
3. Pennsylvania State University
4. USC
5. MIT
6. University of Arizona
7. Berkeley
8. Syracuse University
9. University of Texas at Austin
10. University of North Carolina at Chapel Hill
10 U.S. Areas Trying To Recruit New Grads

- New York City, NY
- Niagara Falls, NY
- Pittsburgh, PA
- Baltimore, MD
- Cincinnati, Ohio
- Dayton, Ohio
- Houston, TX
- Michigan
- Omaha, Nebraska
- Rural Kansas
7 Paybacks an Alma Mater can Offer an Entrepreneur

1. Exploring hot ideas
2. Product research and prototype development
3. Business plan assistance
4. Early-stage funding
5. Legal guidance
6. Building a team
7. Connections to a mentor
Colleges build to compete in business school ‘arms race’

Today’s students want a school that embraces technology and helps them get their business going.

- University of Missouri-Kansas City
- Arizona State
- Washington University in St. Louis
- Oklahoma State University
- University of Nebraska
Accelerators Are the New B-school

As more young entrepreneurs find success from their business accelerator contacts, the usefulness of traditional business school is put into question.
Seed Accelerator Model May Be Relevant

- > 130 accelerators exist & spreading rapidly
- Could grow > 400 to 500 in 5 years
- Focus on emerging tech sectors
Student Entrepreneurialism

- When asked the number of patentable or copyrightable student inventions occurring annually, 12% of surveyed schools reported more than 100, 18% reported 26 – 100, 44% reported 6 – 25, and 26% reported five or fewer.

- Ongoing efforts to support student entrepreneurship and/or invention on campus included a variety of programs:
  - Entrepreneurship classes, boot camps or other programs 84%
  - Business plan competitions 72%
  - Incubators for student-owned companies 50%
  - Student entrepreneurship funding 41%
  - NCIIA programs 10%

- 72% of universities and colleges provide resources to help students learn about and navigate intellectual property and commercialization issues.

- 70% have a formal policy and/or guidelines addressing ownership of student inventions.

- 36% have formal procedures for processing student inventions.

- 48% proactively inform faculty and staff about policies or guidelines relating to student ownership rights and how it could impact them.

- 51% proactively inform companies working with students on R&D, or involved in student education in any other way, about policies or guidelines relating to student ownership rights and how it could impact them.
4 Mistakes Young Entrepreneurs Make

1. Spending too much time developing and not enough time selling
2. Being afraid that someone will steal your idea
3. Thinking that you are your customer
4. Trying to monetize ideas rather than monetize sales
Entrepreneurial Lessons Learned from Bob Dylan

- Always have a passion for what you’re doing
- See the big picture at all times and avoid the trap of the quick buck
- Don’t be afraid to rock the boat
- Seek inspiration from others
- Know when to go back to basics

The Wall Street Journal 9/11/2012
Six Distinct Organizational Paths for Entrepreneurs

- Lifestyle Business
- Small Business
- Scalable Startup
- Buyable Startup
- Large Company
- Social Entrepreneur
Small Business Facts

- SME’s employ over 50% of the country’s private sector workforce, hire 40% of high tech workers, such as scientists, engineers, and computer workers.
- The number of women-owned firms continues to grow at twice the rate of all U.S. firms (23% vs. 9%)
- 70% of SME’s say retaining customers cheaper than getting new customers.
- 7 out of 10 new employer firms last about two years and about half survive five years.

Source: SBA
Small Business Biggest Obstacles

- Lack of willingness or ability to take **risks**
- **Time and effort** required
- Raising **capital**
- **Business management** skills
- **Knowledge** about how to start a business
- **Industry and market** knowledge
- **Pressure** to keep a stable job
Keys to Small Business Success

**Courage**
The willingness to take risks

**Perseverence**
The capacity to power through tough times

**Ambition**
The insatiable drive to reach your goal

**Understanding**
The knowledge to make wise business decisions

**Innovation**
The ability to improve on existing ideas
“Treat others as you want to be treated.”

“Share life’s rewards with those who make them possible.”

“Give back to society”

Ewing Marion Kauffman
**Crowdfunding**—as its name implies—aims to reach a funding goal by getting many investors to put in small amounts.
Will Crowdfunding work for University Startups?

- University spinouts often present high risk.
- The more widely crowdfunding is used, the more challenging it will be for high tech, high risk startups to raise capital this way.
- University spinouts could have an advantage using crowdfunding if they tap into alumni networks.
Upstart

Upstart allows a startup to raise capital in exchange for a small portion of future income.

- Investors give money directly to startups in return for a percentage of future income
- Currently 5 universities participating
  - Arizona State University
  - Dartmouth College
  - Rhode Island School of Design
  - University of Michigan at Ann Arbor
  - University of Washington
- Entrepreneurs create profiles on site
- Backers are advisors: Their goal is to make the startup successful
“It is not the strongest of species that survive, nor the most intelligent, but the ones most responsive to change.”

Charles Darwin
Startup Act 2.0/Free Agency

- **1980 Bayh-Dole Act**
  - University control over intellectual property developed through federally funded research

- **Startup Act 2.0**
  - University Professors choose their own agents for technology transfer
  - Capacity-building grants and Accelerator Grants
Credit in tenure and promotion decisions for faculty work that leads to patents and other intellectual property applied in technology transfer.

Texas A&M and approximately 24 other institutions nationally now recognize such activities for tenure.

Maryland System set a tenure goal of creating 325 new companies based on academic research or helped along by university economic development programs.
The University Entrepreneurship Report

VC and Angel Funding by University
($ of Billion of Investment from 2007-2011)

VC and Angel Funding by University
(2007-2011 in $ Billion, excluding Facebook financings)

VC and Angel Deals by University
(# of Deals from 2007-2011)
Where do University alumni set up their companies?

- Stanford: 85% (California: 3%, Massachusetts: 6%, New York: 4%, Pennsylvania: 4%, International: 4%, Other: 27%)
- Harvard: 35% (California: 21%, Massachusetts: 2%, New York: 4%, Pennsylvania: 4%, International: 4%, Other: 21%)
- UC Berkeley: 88% (California: 10%, Massachusetts: 10%, New York: 10%, Pennsylvania: 10%, International: 10%, Other: 10%)
- NYU: 70% (California: 17%, Massachusetts: 17%, New York: 17%, Pennsylvania: 17%, International: 17%, Other: 17%)
- U Penn: 35% (California: 31%, Massachusetts: 31%, New York: 31%, Pennsylvania: 31%, International: 31%, Other: 31%)

Source: CB Insights
University Deal Volume by Sector, 2011

- Stanford: 70% (Tech - Software: 6%)
- Harvard: 69% (Tech - Software: 10%, Tech - Semis, Chips: 4%)
- UC Berkeley: 42% (Tech - Software: 8%, Healthcare: 17%, Other: 25%)
- NYU: 74% (Tech - Software: 14%, Healthcare: 12%, Other: 8%)
- U Penn: 67% (Tech - Software: 33%, Energy / Industrial: 8%, Other: 25%)
- MIT: 42% (Tech - Software: 8%, Healthcare: 8%, Other: 25%)
The Secret Recipe to Building an Innovation Ecosystem

- There is none.
- Key Ingredients: Universities, Governments, NGOs, Incubators, and Startups
- These are nothing compared to: A committed group of people with a high degree of trust, collaboration, sharing, and interdependency
The concept of the **Innovation Ecosystem** stresses that the flow of technology and information among people, enterprises and institutions is key to a vibrant innovation process.
Growing an innovation ecosystem at FIU
NSF Research Alliances

Nearly $6 million Accelerating Innovation Research Awards awarded for 8 emerging projects

Nanoplasmonic Metamaterial Antennae for Efficient Wireless Power Transmission

Industry-Academia Research Partnership for Developing & Implementing Non-Destructive Characterization and Assessment of Pharmaceutical Oral Dosages in Continuous Manufacturing

Advanced SiNWs: Partnerships for Innovative Research in Energy (ASPIRE)

Accelerating Commercialization of the Solid State Transformer through Strategic Partnership

Transitioning Novel Polymeric Membranes for Natural Gas, Air, and Hydrogen Separations

Architectures for the Future Cellular Networks

CREST-I/UCRC-Industry Ecosystem to Pipeline Research

CASA Warning System Innovation Institute
University Economic Development Association (UEDA) 2012 Award of Excellence winners

- Kemper Military School Redevelopment Project
- Sustainable Economies Program
- Kansas Opportunity Innovation Network (KOIN)
- Linking Innovation, Industry and Commercialization (LIINC)
- Developing Analytics & Operations Research Practitioners
Economic Development

- Economic Development is like a 4-legged stool:
  - Attraction
  - Retention
  - REINVENTION
  - Grow Your Own

- IBED requires patience and persistence, continuity and consistency

- Working with early-stage companies takes time

- A balanced portfolio economic development strategy is best!
Implementing a New Innovation Paradigm

- Deviate from traditional perspectives
- Encourage public investment and risk taking
- Develop trust through collaboration
- Ensuring responsiveness to partners’ missions
- Build consensus of all constituents through education, participation, and positive outcomes
- Move from Tech-Based Economic Development (TBED) to...

**Innovation-Based Economic Development (IBED)**
## Convergence of Traditional Eco Devo & IBED

<table>
<thead>
<tr>
<th><strong>Traditional</strong></th>
<th><strong>Innovation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets:</strong></td>
<td><strong>Knowledge</strong></td>
</tr>
<tr>
<td><strong>PHYSICAL</strong></td>
<td>Specialized talent</td>
</tr>
<tr>
<td>Natural resources</td>
<td>Networks, Clusters,</td>
</tr>
<tr>
<td>Highways / Rail</td>
<td>University research</td>
</tr>
<tr>
<td>Proximity</td>
<td>Industry partnerships</td>
</tr>
<tr>
<td>Costs</td>
<td>Commercialization, Market</td>
</tr>
<tr>
<td></td>
<td>Positioning Globalization</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Competitive Basis:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>University Research Parks</td>
</tr>
<tr>
<td>Workforce competencies</td>
</tr>
<tr>
<td>Research Parks</td>
</tr>
<tr>
<td>Lifestyle</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Key values/offering:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>University Research Parks</td>
</tr>
<tr>
<td>Incentives</td>
</tr>
<tr>
<td>Research Parks</td>
</tr>
<tr>
<td>Economic developers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Lead Organization:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chambers / EDCs</td>
</tr>
<tr>
<td><strong>INNOVATION INTERMEDIARIES</strong></td>
</tr>
</tbody>
</table>
What is A Regional Innovation Intermediary?

- An organization at the Center of the region’s, state’s and country’s efforts
  - Align local technologies, assets and resources
  - Advance Innovation
- Regionally-oriented
- Private-public partnership, 501(c)(3) nonprofit
- Market-driven, private sector-led
- Neither a government initiative, nor a membership organization
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
Maryland

Population: 5.828 million people
Alignment of National, State, and Regional Policies

- Link Both State, County & City Strategies to Obama Administration Objectives
- Develop an integrated Regional BioHealth Economic Development and Transit Strategy
- Present the “Regional Job Generating BioHealth and Transit Plan” to the White House & partner with federal agencies and other stakeholder organizations as a “Showcase Model.”
- Develop structure & governance for the regional BioHealth innovation intermediary
- Obtain Priority Federal Funding for Region’s BioHealth Industry-Federal Labs-University Innovation Intermediary Pilot Plan
- Obtain Priority Federal Funding for the region’s Innovative “State of the Art” Comprehensive Rapid Transit Vehicle Plan (CCT et al)
- Develop a pilot BioHealth-Regional Innovation Cluster (H-RIC) program
State of Maryland: Federal & University Resources

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
“The Region” -- Central Maryland

Unrivaled Research Assets
Unfulfilled Commercial Promise
A Region Rich with Research Institutions
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

- Connects regional innovation assets
- Develops an entrepreneurial talent and support pipeline
- Attracts funding for technology commercialization
- Evaluate commercially relevant federal and university technology for new spin-offs
BioHealth Regional Innovation Cluster Assets
BHI: An Innovation Intermediary that Connects Sectors, Industries, Communities, & Markets

Connects Private, Public and Academic Sectors

Connects Central Maryland Communities

Connects Bio-Health Cluster Industries

Connects Regional, National and Global Markets
Regional BioHealth Ecosystem Partners

ACADEMIA
- Research/T2
- Lifelong Learning
- Economic Development

INDUSTRY
- Profit
- Process
- Product

GOVERNMENT
- Sustainability
- Infrastructure Support
- Economic Policy

FOUNDATIONS
- Economic Growth
- Community Investment
- Regional Collaboration

INSEPARABLE MISSIONS
BHI Board of Directors

Michael J. Baader, Esq.
Managing Director, Venable LLP

Richard Bendis
President & CEO, BioHealth Innovation, Inc.

Scott Carmer (Chair)
Executive Vice President of Commercial Operations, MedImmune

Kenneth Carter
Chair, Noble Life Sciences

Scott Dagenais
Senior Vice President, M&T Bank

Ronald J. Daniels
President, Johns Hopkins University

David M. Gillece (Secretary)
Regional Managing Principal, Cassidy Turley

William E. Kirwan
Chancellor, University System of Maryland

Douglas Liu
Senior Vice President of Global Operations, Qiagen

David Mott
General Partner, New Enterprise Associates

Jerry Parrott
Vice President, Corporate Communications and Public Policy, Human Genome Sciences

Jay Ridder
Office Managing Partner, Ernst & Young

William G. Robertson (Treasurer)
President & CEO, Adventist Healthcare

J. Thomas Sadowski
President & CEO, Economic Alliance of Greater Baltimore

Thomas Street
Assistant Chief Administrative Officer, Montgomery County Government

Daniel J. Abdun-Nabi (Pending)
CEO, Emergent BioSolutions
BHI Organizational Chart

BOARD (501c3)

President & CEO (Rich Bendis)

Executive Administrator (Renée Enright)

Intern (Adam Hafez)

Commercialization Industry University Federal Labs (EIRs) (Todd Chappell)

Marketing Communications Market Research / Social Media (Contracted)

Operations Manager Finance & Human Resources (Amanda Wilson)

Operations Manager Finance & Human Resources (Amanda Wilson)

Director Innovation Programs (Ethan Byler)

SBIR/Federal Programs

Investments Fund Administration

Direct Investment Fund

Angel Fund

BHI Intern (Eric Norman)

30 NIH Interns

Bioscience Medical Device/ Health Specialist

Health IT/ Cyber Security E-Health M-Health EMR

Key:

- 2012
- 2013

57
BHI/EIR 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”
# Innovation Capital

"VALLEY OF DEATH"

<table>
<thead>
<tr>
<th>Stage</th>
<th>POR / Pre-Seed</th>
<th>Seed/Start-Up</th>
<th>Early</th>
<th>Later</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Founders, FFF</td>
<td>Angels, IBED, SBIR</td>
<td>Venture Funds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bootstrapping</td>
<td>Accelerator Seed Funds</td>
<td>M&amp;A, IPO</td>
<td></td>
</tr>
<tr>
<td>Demand</td>
<td>$0K</td>
<td>$500K</td>
<td>$2.5M</td>
<td>$5.0M</td>
</tr>
</tbody>
</table>

"VALLEY OF DEATH"
## Central Maryland Innovation Capital Map

### Capital Sources by Investment Stage

<table>
<thead>
<tr>
<th>Pre-Proof of Concept</th>
<th>Translational Research / Proof of Concept</th>
<th>Proof of Commercial Relevance / Pre-Seed</th>
<th>Seed / Start-Up</th>
<th>Early Stage</th>
<th>Later Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$25K - $1.5M (over 5 years)</td>
<td>$15K - $2M</td>
<td>$50K - $500K</td>
<td>$50K - $1M</td>
<td>$250K - $2M</td>
<td>$2M+</td>
</tr>
</tbody>
</table>

- **Pre-Proof of Concept**
  - NIH R01
  - NIH R03
  - NIH R21
  - Small Business Technology Transfer Research Grant (STTR) Phase I
  - Innovate Maryland

- **Translational Research / Proof of Concept**
  - NIH Center for Accelerated Innovations (CAI)
  - NCATS Cures Acceleration Network (CAN)
  - Small Business Innovation Research Grant (SBIR) Phase I
  - Maryland Stem Cell Research Fund (MSCRF)
  - TEDCO University Technology Development Fund (UTDF)
  - TEDCO TechStart
  - Maryland Biotechnology Center's Translational Research Award

- **Proof of Commercial Relevance / Pre-Seed**
  - Maryland Industrial Partnerships (MIPS @ UMD)
  - Maryland Biotechnology Center's Biotechnology Commercialization Awards
  - TEDCO Maryland Technology Transfer and Commercialization Fund (MTTCF)
  - BHI SBIR/STTR Commercial Relevance
  - BHI Commercial Relevance Fund (CRF)

- **Seed / Start-Up**
  - Dingman Center Angels (UMD)
  - TEDCO Johnson & Johnson Joint Investment Program
  - Propel Baltimore Fund
  - SBIR / STTR Phase II
  - BHI Central Maryland Angel Fund

- **Early Stage**
  - Maryland Health Care Product Development Corporation (MHCPDC)
  - Invest Maryland: Maryland Venture Fund

- **Later Stage**
  - Maryland Venture Fund Authority
  - ABS Capital Partners
  - Greenspring Associates
  - Novak Biddle Venture Partners
  - Sterling Venture Partners
  - Harbert Venture Partners
  - JMI Equity
  - National Venture Capital Association (NVCA)

### Funding Type Key
- Academic
- Accelerator
- Federal
- BioHealth Innovation, Inc.
- Innovation-based Economic Development (IBED)

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

### Mid-Atlantic Venture Association (MAVA)
How does BHI work?
Commercialization Pipeline

Sources and evaluates biohealth intellectual properties (IP)

Funds market-relevant IP

Grows and markets businesses and products
BHI Deal Goals

VC Regional History:
Last decade the region: **$79.8 million per year** in biotechnology venture financing (2003-2010).

Goal:

**150 prospective deals annually**

Fund:

**25% or 35 deals per year**

Avg. Investment:

**$4.3 million per start-up**

Targeted VC Annual Investment

**$150,000,000**

*This includes an estimated $57.7 million per year in Montgomery County, and $22.1 million per year in the rest of the state.*
Partnership Intermediary Agreement (PIA)

• PIA between BHI and NIH’s Office of Technology Transfer 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.
Partnership Intermediary Agreements (PIA)

- 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.

- PIA between BHI and the Telemedicine & Advanced Technology Research Center (TATRC) to capture USAMRMC and TATRC research outcomes and promote further research, product development, commercialization, and economic development opportunities.
  - TATRC has funded 241 MD based projects over the last 12 years.
Entrepreneur-in-Residence (EIR)

- 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

Progress (6 months into Program)
- 73 Innovations identified and initially screened
- 7 Progressed to Secondary Analysis (Safety & Efficacy Profiling, IP Diligence, Regulatory & Development Pathways) and 12 to Primary Analysis
- 32 No De-prioritized, 22 still Under Review
- Goal to fund the operation of more EIRs
Entrepreneur-in-Residence (EIR)

- Identify market viable biohealth assets
- Act as liaison among federal labs, academic, industry, venture capital, and non-profit
- Detailed commercial evaluation of most valuable technologies
- Provide early-stage developmental strategies
- Nurture relationships with scientists, mentor to ensure research becomes commercially valuable, and track progress
- Identify creative funding to advance exciting, novel technologies
- Create new BioHealth companies
EIR Criteria

• Senior management in an early stage life sciences startup
  – Entrepreneurial life science start up or spin out activity

• Management in a organization that specializes in startup companies

• Experience in a seed stage venture capital firm

• Served in a business development role in a high performing university or business development organization that successfully formed new ventures

• Served in a business development role, product development role, or other capacities for biotech products or services that enable substantial knowledge of the earliest stages of development for a new technology startup company
EIR Expectations

• Assist OTT in the evaluation of existing technologies
• Provide an entrepreneurial perspective to OTT in its evaluation of new licensing proposals
• Advise OTT on opportunities for new ventures based on NIH/FDA technologies
• Assist with developmental strategies
• Mentor scientists to help ensure their research becomes commercially valuable

• Identify market viable innovations from NIH and other regional institutions
• Act as liaison among regional biohealth stakeholders and NIH
• Primary and secondary commercial analysis of lead technologies
• Develop novel technologies that are at conceptual stage
• Act as catalyst to license most interesting technologies and fund start-up companies
Maryland Innovation Programs

- A new annual $5.8 million state Innovate Maryland program
- Innovation Discovery Program — provides funding that will enable the schools to engage “Site Miners,” who will be tech commercialization experts responsible for identifying promising technologies.
- Innovation Commercialization Program — provides funding to support the commercialization of university technologies:
  - Pre-commercial translational research (Phase I)
  - Commercialization planning (Phase II)
  - Early-stage product development (Phase III).

- Up to $215,000 for a single qualifying university,
- Up to $270,000 will be available to joint applications

Maryland Universities/EIR Interaction

- **$5.8M budget**
- **5 University partners**
- **5 University site miners**
- **40 University pre proof-of-concept technologies funded**
- **$25-$150K funded per technology**

---

- **Regular meetings between BHI/EIR and site miners**
- **BHI identifies most commercially relevant technologies**
- **BHI and INNOVATE MD partnership opportunities**

[INNOVATE]
Maryland’s Innovation Initiative

[BioHealth Innovation]
Maryland’s Commercialization Collaborative

[AUTM]
EIR Integration into NIH System

• Office at the central Office of Technology Transfer (OTT)
  – Volunteer status
  – Report to Director and Deputy Director of centralized OTT
  – Full access to NIH campus and staff

• Active participant in Technology Review Groups at top three institutions
  – Review of patent prosecution decisions for new and existing inventions

• Active participant in Technology Development Coordinator meetings
  – Key decisions on selected technologies

• Access to database (SYNAPSE) detailing invention filings
NIH Overview

• Intramural budget is approximately $3B per year
  – 6,000 scientists
  – 27 institutes and centers (ICs)

• Three largest centers: NCI, NIAID, and NHLBI
  – In aggregate represents more than half of invention filings

• Centralized Office of Technology Transfer
  – Responsible for patenting
  – Technology transfer specialist at each institution
  – ~150 licensing staff members at NIH
Early-Stage Analysis of Commercial Relevance

Selected Criteria for Value Proposition

- Differentiation
- Efficacy Data
- Market Size
- Reimbursement
- Safety Data
- Unmet Medical Need
- Stage of Development
- Industry Interest
- Intellectual Property
- Competitive Landscape
- Advantages for Clinical Development
- Novelty

Identify Key Issues

Primary and secondary analysis

Can key issues be overcome by capital efficient investment?
Key Considerations for Technology Focus

• Clear unmet need that benefits public health
• First-in-class, best-in-class therapies
• Target therapeutic areas that reflect strategic objectives
• Clinical development advantage
• Relevance to strategic needs
What is the Overall Process for Licensing / Creating Company?

Industry Needs
- BHI Board
- Venture Capital
- Regional Pharma / Biotech
- Literature
- Personal Network

Identification
- Scientists
- Tech transfer
- NIH review meetings
- NIH Licensing Managers
- NIH database

Market Analysis
- Primary: Literature
- Secondary: KOLs
- Development strategy
- Scientific/commercial validation with internal and external experts

Funding
- IC (e.g. NCATS)
- SBIR-TT
- CRADA
- TEDCO
- Innovate MD
- Invest MD
- BioHealth Innovation
- Angel funding
- Venture capital
**BHI Approach to Progressing NIH Assets**

---

**EIR...**
1) Identifies NIH Asset
2) Conducts Scientific & Commercial Due Diligence
3) Interacts with Inventor & NIH OTT

**BHI Commercial Relevance Board...**
1) Provides Industry Input & Commercial Expertise
2) Makes recommends on commercial next steps i.e. NewCo formation, capital raising, etc.

**BHI Staff & appropriate Board & other parties...**
1) Assist in building NewCo Management Team, Board of Directors, & Scientific Advisors
2) Provides ongoing commercial strategy and support to the NewCo
3) With BHI support, NewCo files application to license technology with the NIH OTT

---

**BHI Entrepreneur In Residence (EIR)**

**BHI Commercial Relevance Advisory Board Review**

---

**NewCo Formation**

**Licensing Interest**

**License Negotiated between NewCo & NIH OTT**

**Capital Raise**

**Novel Technology but not ready for development**

---

**BHI...**
Continues to track / monitor progress. Additional experimentation likely required
- Creative funding
- NIH programs
- Institution investment

**BHI...**
Works with Regional Companies to scout technologies for their own pipelines. When an asset is identified, companies will perform their own due diligence and investigate a licensing deal

**BHI...**
Is a silent partner to licensing process with NIH OTT. Any exclusive licenses are required to be posted on the Federal Register

**BHI...**
Supports NewCo with capital raise including Angel, Venture Capital, SBIR/STTR and Federal Funding, Foundation Resources, State Funding Programs, TEDCO, Accelerator, etc.

**BHI...**
Assists with finding appropriate laboratory space locally and other local partners appropriate for development

---

**Traditional Biotech Company**

**Project Focused Company**

---

**BHI...**
Assists with referring appropriate development partners, consultants, and virtual services
EIR Value Proposition

The Start-Up Company Spectrum

“True” NewCo
- Conceptual
- No Licensed IP
- 0 FTEs
- No Funds

“Shell” NewCo
- Licensed IP
- 0-1 FTEs: Scientist
- Funds from grants, friends and family

“SBIR” NewCo
- Licensed IP
- 1-10 FTEs: Some business experience
- Funds from SBIR, DoD, friends and family, etc

“Angel” NewCo
- Licensed IP
- 1-30 FTEs: C-level experience
- $1-3M in angel funds +/- grant money

“Series A” NewCo
- Licensed IP
- 5-30 FTEs: C-level experience
- $10-15M Venture Capital round

Orphaned Technologies
- • Conceptual
- • No Licensed IP
- • 0 FTEs
- • No Funds
Different Technologies = Different Strategy

Biomarker  Therapeutic  Mobile Health
Imaging  e-Health  Medical Device
Diagnostic  Research Tools  Personalized Medicine Service
BHI SBIR Commercial Relevance Program

- SBIR/STTR Pre-Application Form submitted by small businesses in Central Maryland
- Scoring and feedback provided on Pre-Application by 3 qualified reviewers from a national pool using an online evaluation system
- BHI Committee reviews and determines whom to work with from a perspective of nurturing commercially relevant startups
- Financial grant considerations offered to assist in preparing full SBIR/STTR submission
BHI SBIR/STTR: Commercial Relevance Program (CRP)

1. Phase I Awardees
2. Pre-Phase I (Phase Zero) – Early Commercial Relevance Indication

Central Maryland SBIR Candidates

Companies Invited by BHI to submit SBIR concept

Scientific Experts
SBIR Consultants
BHI

Reviews, Feedback, Troubleshooting, Strategy

Full Proposal Preparation Assistance
Mentoring $$$
**BHI News & Website**

**BHI Web site**
The BHI Web site 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
“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
BHI Innovation Capital

- **SBIR/STTR Assistance Program** - The BHI SBIR/STTR Assistance Program (in development) will provide assistance to biohealth-driven companies in the Central Maryland region in preparing for high-quality SBIR/STTR grant proposals for submission to federal funding agencies.

- **BHI Angel Fund** - The BHI Angel Fund (in development) will be a member-managed private equity investment fund that bridges the gap between pre-seed investments and institutional venture capital serving the Central Maryland region entrepreneurial needs.

- **BHI Commercial Relevance Investment Fund** - The BHI Commercial Relevance Investment Fund (in development) will be a pre-seed and early-stage, equity-based innovation capital fund to help grow, attract, retain and connect Central Maryland biohealth innovation-based companies that need financing to grow their enterprises.
# How is Success Measured?

## BHI Metrics – First 5 Years

<table>
<thead>
<tr>
<th>Metric</th>
<th>Now</th>
<th>In 5 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>VC Funding for Biotech</td>
<td>$79 Million</td>
<td>$150</td>
</tr>
<tr>
<td>Government Funding for Biotech</td>
<td>Increased SBIR proposals &amp; success</td>
<td>Improve Maryland’s ranking</td>
</tr>
<tr>
<td>Source Prospective Deals Annually</td>
<td>30</td>
<td>150</td>
</tr>
</tbody>
</table>

- **Improve return on R&D investment by leveraging equity investment**
- **Create and retain 1,300 jobs**
- **Recruit entrepreneurs, experienced managers and businesses**
- **Commercialize biohealth technologies and create biohealth companies**
BHI: The Triple Bottom Line

- Grows high-paying jobs and businesses
- Expands tax base; improves economic vitality
  ...and Benefits human health!
Are you pulling alone or...
Are we all pulling together for success?
“Never before in history has innovation offered promise of so much to so many in so short a time.”

Bill Gates
"Coming together is a beginning, staying together is progress, and working together is success."

Henry Ford
Contact Information

Richard A. Bendis
President & CEO
Innovation America
215-593-3333
rbendis@bendisig.com