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Omaha, Nebraska
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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

INNOVATION MATTERS

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Why Is Innovation Essential?

"INNOVATION DISTINGUISHES BETWEEN A LEADER AND A FOLLOWER."

-STEVE JOBS

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How Leading Nations Responding to the Innovation Imperative?

They are providing four things:

- High-level Focus
- Sustained Support for R&D: Leveraging Public and Private Funds
- Support for Innovative SMEs
- New Innovation Partnerships to bring new products and services to market

Note: Many countries and regions are investing very substantial resources to create, attract and retain industries in leading sectors

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…….

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Public Support

- 84% of Americans believe there will be a “lot more jobs in the future that require math and science skills”
- 88% agrees that students with advanced science and math skills will have an advantage when it comes to college opportunities
- California: 52% to 27% believe that state policymakers are not making technology and innovation enough of a priority
- 78% of Americans think “a national innovation initiative would be effective”

Trends In TBED

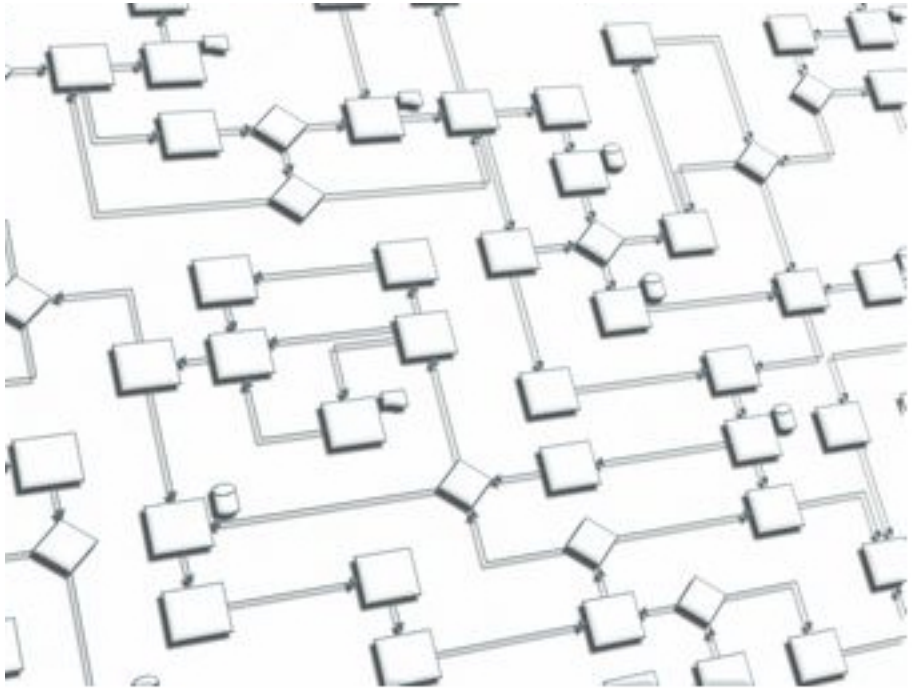
- Cycles of emphasis over the years on different elements; elements continuing on the rise
  - Increasing expectation for community of university research
  - Growth of venture development organizations, private accelerators, and start-up weekends
  - Capital
- Reorganization of economic development efforts
  - Public-private partnerships
  - State TBED orgs merged into state economic development departments
  - Regional emphasis

Challenges

- A changing economy with a different recovery pattern
- Shortage of skilled workers once recovery in full swing
- Different expectations for higher education
- 28 new governors
- Fiscal pressures
- Federal approaches changing slowly

Elements for Tech-based Economy

- Intellectual infrastructure
- Spillovers of knowledge
  - from universities
  - from informal networks
- Physical infrastructure
- Technically skilled workforce
- Capital
- Entrepreneurial culture
- Quality of life



Lessons Learned

- Committed high-level leadership is required that understands:
  - Economic impact further down the road than other approaches
  - Research does not always succeed
  - Significant cultural differences between actors

- Action should be based on:
  - Understanding of needs, capabilities, and gaps
  - Filling gaps to encourage change in private sector behavior

Lessons Learned

- Characteristics of successful TBED programs
  - Three hallmarks for long-term sustainability
    - Do good work
    - Measure whether they're doing good work
    - Telling people they're doing good work
  - Champions from more than one sector (ideally all three)
    - Private sector, university, government (gov or legislature)
  - Effective management and staff
  - Entrepreneurial in approach/responding to change

ASTRA 2010 Nebraska Ranking

Rank	General Demographic & Economic Indicators [3]	Nebraska	Total U.S.
38	Nebraska's Population as of July 1, 2009	1,796,619	304,059,724
36	Nebraska's Civilian labor force, 2009 (thousands)	979.6	153,203
23	Nebraska's Personal income *per capita*, 2008 ($)	$39,150	$40,208
33	High Tech Employment in Nebraska's Workforce, 2008	31,820	5,781,460
37	Gross State Product, 2009 ($ billions)	$80.1	$13,972.3
44	Federal R&D Obligations per Civilian Worker 2007	$196	$764
37	Business R&D in Nebraska 2007 (current $ millions)	$489	$265,919
Rank	**Academic Indicators & Degree Production** [3]		
36	Advanced S&E Degrees Awarded, 2007	742	150,127
36	Bachelor's Degree Holders or Higher Among Individuals 25-44 Yrs. Old in Nebraska, 2007	147,777	24,856,576
37	Federal R&D Expenditures at Universities & Colleges, all sources, FY 2006 ($ thousands)	$149,618	$30,033,156
38	State & Local Govt. R&D Expenditures at Universities & Colleges, FY 2006 ($ thousands)	$10,881	$3,016,240
26	Industry R&D Expenditures at Universities & Colleges, FY 2006 ($ thousands)	$22,814	$2,427,627
20	Institutional R&D Expenditures at Universities & Colleges, FY 2006 ($ thousands)	$151,170	$9,062,058
Rank	**NCES Key Educational Statistics — Public Schools (latest)** [4]		
19	Expenditure per Pupil 2007-2008 School Year	$9,857	$9,154
37	Enrollment in Public Elementary & Secondary Schools 2007-2008	291,244	966,519 (avg.)
37	Number of Full Time Equivalent (FTE) Teachers, 2006 - 2007	21,930	3,181,494
Rank	**Workforce Indicators** [3]		
37	Employment in High-Tech Establishments in Nebraska, 2006	64,779	13,733,632
28	Individuals in S&E Occupations as Share of Workforce in Nebraska, 2008 (percentage)	3.20%	3.75%
38	Employed S&E Doctorate Holders in Workforce in Nebraska, 2006	2,970	618,370
40	Engineers in Workforce in Nebraska, 2008	6,350	1,626,330
29	Life & Physical Scientists as Share of Workforce in Nebraska, 2008 (percentage)	.36%	.40%
Rank	**R&D Spending by Source, R&D Indicators, Awards, & Patents** [3]		
46	SBIR Funding for Nebraska Small Businesses, 2006-2008 (current $ thousands)	$2,438	$1,731,667
45	Avg. Annual Federal SBIR Funding per $1 million of GDP in Nebraska, 2006-2008	$31	$127
34	Academic R&D in Nebraska, 2008 ($ thousands)	$376,092	$51,784,120
37	Patents Awarded per 1,000 indiv. in S&E Occupations in Nebraska in 2008	6.0	13.4
46	Hi-Tech Share of all business establishments in Nebraska, 2006 (percentage)	5.93%	8.35%
Rank	**Venture Capital & Entrepreneurial Indicators** [5, 3]		
50	Number of Deals CY 2009	0	2,802
50	Venture Capital Investments in 2009 (millions of 2009 $)	$0	$17,690.7
32	Net High-Tech Business Formations in Nebraska, 2006	98	14,031

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Growing Jobs, Industries, and Talent:

A Competitive Advantage Assessment and Strategy for Nebraska

Prepared for: Nebraska Department of Economic Development and Nebraska Department of Labor

Prepared by: Battelle Technology Partnership Practice

October 2010

Primary Industry Clusters Driving Nebraska's Economy

- Agricultural Machinery
- Agriculture & Food Processing
- Biosciences
- Business Management & Administrative Services
- Financial Services
- Health Services
- Hospitality & Tourism
- Precision Metals Manufacturing
- Renewable Energy
- Research, Development, & Engineering Services
- Software & Computer Services
- Transportation, Warehousing, & Distribution Logistics

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Key Indicators: Talent

State	Science & Engineering Degrees as Share of Higher Education Degrees, 2007	Science & Engineering Doctorates Awarded, 2008	Population Ages 25+ with Bachelor's Degree or Higher, 2008	Share Employed in Science & Engineering Occupations, 2008
United States	**32.1%**	**37,627**	**27.7%**	**3.8%**
Nebraska	**26.1%**	**192**	**27.1%**	**3.2%**
Iowa	30.7%	607	24.3%	2.8%
Kansas	27.4%	300	29.6%	3.6%
Oklahoma	30.7%	232	22.2%	2.8%
Tennessee	25.3%	578	22.9%	2.4%
Utah	36.6%	418	29.1%	3.8%
Virginia	38.3%	955	33.7%	6.3%
Wisconsin	32.7%	627	25.7%	3.3%

Note: Higher education degrees inclu

Source: National Science Foundation, System database, 2008; U.S. Census E

Key Indicators: Entrepreneurial Activity

State	Avg. Annual Growth in New Business Establishments, 2001–05	Job Creation Rate from New Business Establishments, 2001–05	Inc. 500 Firms 2009
United States	**12.2%**	**6.2%**	**n/a**
Nebraska	**10.7%**	**5.2%**	**3**
Iowa	10.0%	4.7%	1
Kansas	11.1%	5.8%	3
Oklahoma	11.6%	6.1%	4
Tennessee	11.3%	5.8%	3
Utah	15.8%	7.4%	14
Virginia	12.1%	6.1%	35
Wisconsin	10.1%	4.9%	6

Notes: To qualify for the 2009 Inc. 500 list, companies were required to be U.S.-based, privately held, for profit, independent and founded and generating revenue in the first week of 2005. Companies were required to have minimum revenue of $200,000 in 2005 and $2 million in 2008.

Source: U.S. Census of Business Dynamics; Inc. 500.

Key Indicators: R&D Expenditures and Intensity

State	ACADEMIC			INDUSTRY		
	R&D Expenditures, 2007 ($ Thousands)	R&D Expenditures per $1,000 GSP, 2007	Percent Change 2001–07	R&D Expenditures, 2007 ($ Thousands)	R&D Expenditures per $1,000 GSP, 2007	Percent Change 2001–07
United States	**$49,430,767**	**3.60**	**51.1%**	**$269,267,000**	**19.63**	**33.3%**
Nebraska	**$364,842**	**4.54**	**51.0%**	**$489,000**	**6.09**	**59.6%**
Iowa	$586,786	4.52	33.4%	$1,202,000	9.25	47.1%
Kansas	$375,960	3.21	39.9%	$1,304,000	11.15	0.4%
Oklahoma	$298,663	2.19	17.0%	$527,000	3.86	-2.9%
Tennessee	$761,388	3.11	79.9%	$1,638,000	6.68	9.0%
Utah	$412,512	3.91	22.0%	$1,764,000	16.71	50.4%
Virginia	$971,905	2.53	59.1%	$4,840,000	12.60	63.7%
Wisconsin	$1,066,688	4.57	46.4%	$3,411,000	14.61	38.1%

Source: National Science Foundation Survey of R&D Expenditures at Universities and Colleges; U.S. Bureau of Economic Analysis; National Science Foundation/Division of Science Resources Statistics, Survey of Industrial Research and Development.

State	Total Cumulative Venture Capital Invested, 2005–2009 ($ Millions)	SBIR Innovation Grants, Total Funded Projects, FY 2005–09
United States	**$33,419**	**25,373**
Nebraska	**$2,476** ($287 without ConAgra)	**49**
Iowa	$479	79
Kansas	$385	72
Oklahoma	$269	97
Tennessee	$2,777	167
Utah	$1,196	224
Virginia	$6,507	1,542
Wisconsin	$943	296

Source: Thomson Reuters, VentureOne Database; U.S. Small Business Administration, TechNET database.

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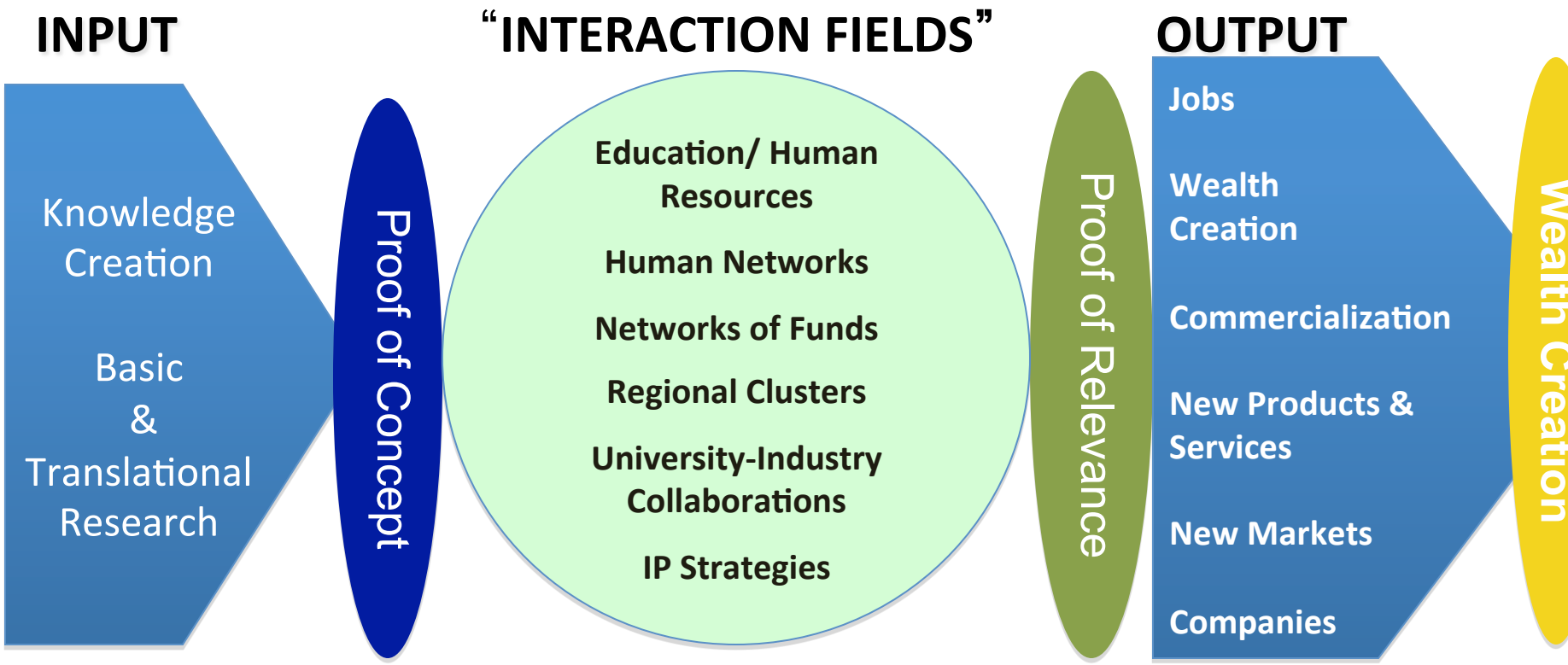
Summary Assessment of Development Position, Growth Niches, and Path for Each of Nebraska's Primary Industry Clusters

INDUSTRY CLUSTER	ECONOMIC PERFORMANCE				Geographic Pattern in Nebraska	TECHNOLOGY POTENTIAL		TALENT BASE		Summary of Development Paths
	Level of Specialization	Job Gains	Competitive Position to U.S.	Relative Economic Output Growth to U.S.		Presence of Core Technology Drivers	Productivity Level Compared to U.S.	National Level of High Skilled Talent Base	Nebraska Position in High Skilled Talent	
Agricultural Machinery	↑	↓	■	↓	Statewide	None Identified	↑	↓	↓	Retention through Modernization, Higher Value Activities and Exports
Agriculture & Food Processing	↑	↓	↓	↑	Statewide	Yes	↑	↓	↓	Retention and Innovation
Biosciences	↑	↑	↑	↑	Statewide	Yes	↓	↑	↓	Innovation and Expansion through Higher Value Activities
Business Management & Administrative Services	↑	↑	↓	↑	Metro	None Identified	↓	↑	↓	Attraction and Expansion through Higher Value Activities
Financial Services	↑	↑	↑	↑	Metro	None Identified	↓	↑	↑	Attraction and Expansion through Higher Value Activities
Health Services	■	↑	↓	↓	Statewide	None Identified	↓	↑	■	Expansion
Hospitality & Tourism	↓	↑	↓	↑	Emerging Statewide	None Identified	↓	↓	■	Expansion through improved venues
Precision Metals Manufacturing	↑	↑	↑	↑	Rural	None Identified	↓	↓	↓	Retention and Expansion through Supply Chain Connections
Research, Development, & Engineering Services	↓	↑	↑	↑	Emerging Metro	Yes	■	↑	↓	Innovation
Software & Computer Services	↑	↓	↓	↓	Metro	Yes	↓	↑	↓	Attraction & Innovation
Transportation, Warehousing, & Distribution Logistics	↑	↑	↑	↑	Statewide	Yes	↑	↓	↓	Expansion & Attraction
Renewable Energy (Biofuels)	↑	↑	↑	n/a	Rural	Yes	n/a	n/a	n/a	Innovation & Deployment

Higher than National Average: ↑ Lower than National Average: ↓ On Par with Nation: ■

Innovation Ecosystem



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.

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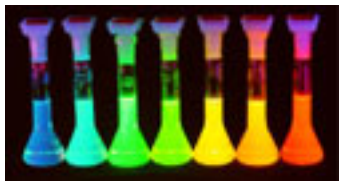
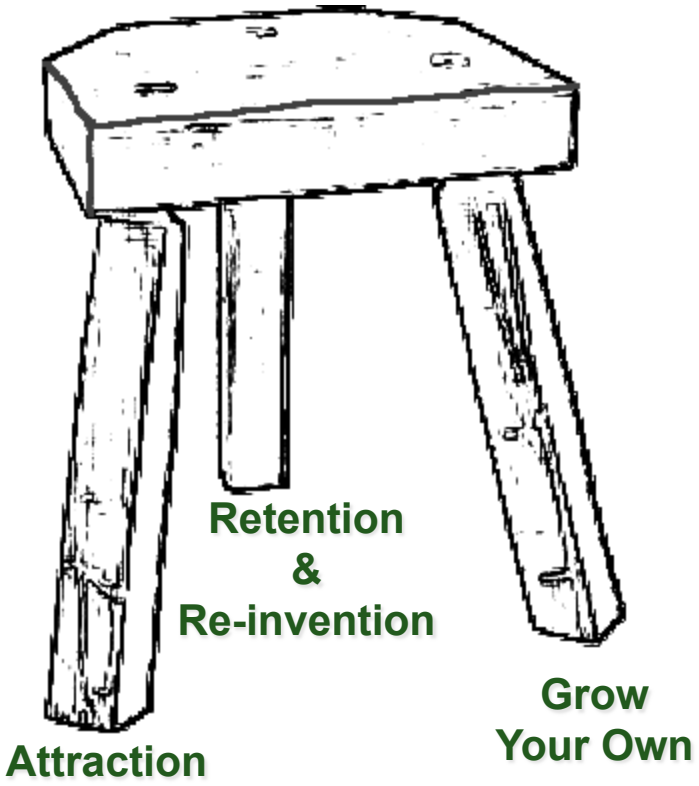
Implementing a New Innovation Paradigm

- 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 TBED to IBED
- **Innovation-Based Economic Development**



Economic Development

- Economic Development is a three-legged stool:
  - **Attraction**
  - **Retention & Re-Invention**
  - **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!



Traditional & Innovation-Based Development

	Traditional	Innovation (Clusters)
• Competitive Basis	Natural resources Highways / Rail Proximity Costs	Specialized talent Networks, information University research / professors Market understanding Global Reach
	i.e. PHYSICAL	i.e. KNOWLEDGE
• Key values / offerings	Business parks Incentives	Access to research Workforce competencies Lifestyle
• Lead Organization	Chambers / EDCs	Economic developers

Innovation Intermediaries

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Triple Helix of Innovation

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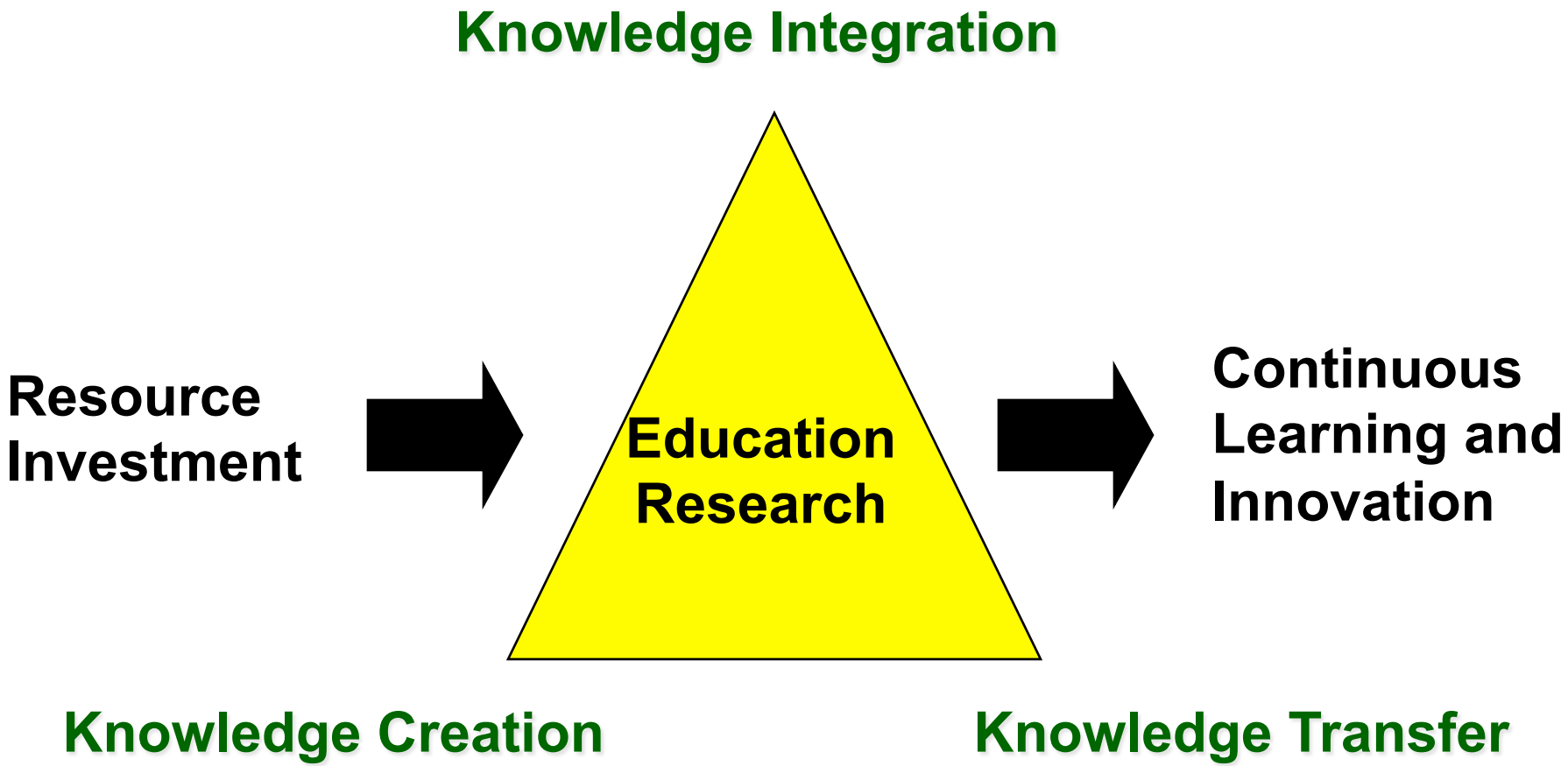
The Role of Education



Innovation Economy: Definitions & Terminology

- Knowledge is the confident understanding of a subject, potentially with the ability to use it for a specific purpose

- Knowledge economy is based on creating, evaluating, and trading knowledge

- **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

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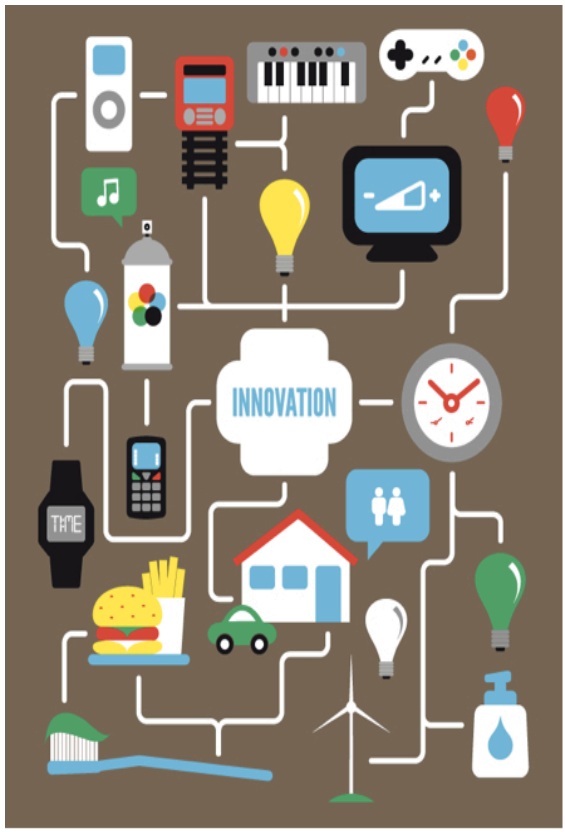
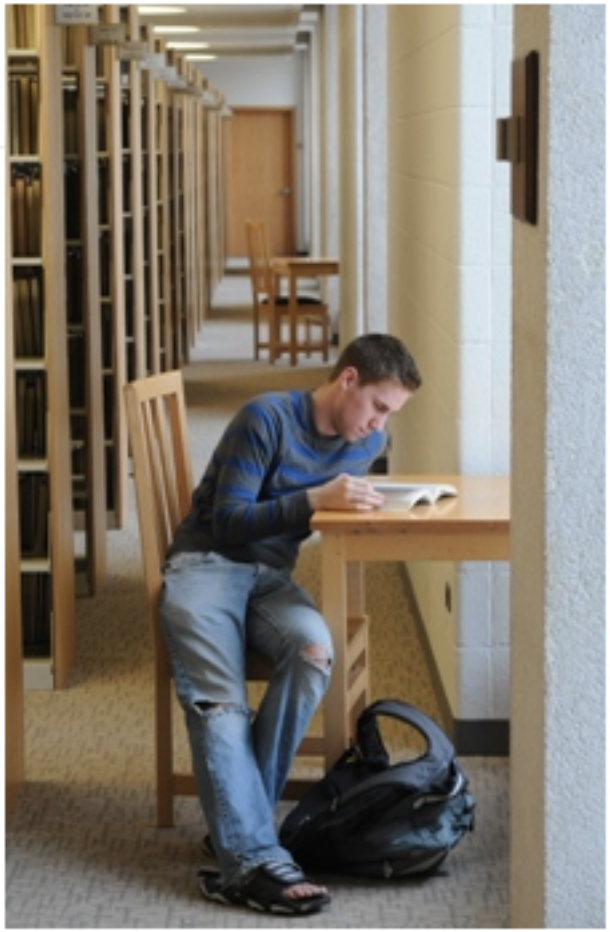
Creating the Knowledge & Innovation Culture

- Knowledge Acquisition and Deepening – to reinforce science and technology teaching and resources at all levels of education
- Knowledge Creation – Develop Research Capability in all priority sectors of the economy
- Knowledge Transfer – to reinforce Science and Technology Capability in all priority sectors of the economy
- Innovation Culture - To encourage Innovation at all levels to help stimulate economic growth



Importance of Major Research Universities



University of Nebraska

University of Nebraska Medical Center

Creighton University

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Importance of Major Research Universities

- The primary driver of the future economy and job creation will be innovation, largely driven by science and engineering (Gathering Storm Report)
- Global economic competitiveness requires the confluence of **scientific discovery** that creates **knowledge** and **technological opportunity, workforce talent**, and access to **enabling resources**.
- Universities can contribute to all of these components; over past decade, NE Ohio has embraced this concept and CWRU and its partners continue to both invest in and produce innovation successes.

Value Creation by University Research Engines

Select contributions of U.S. research institutions to the national economy:

- 2009: >**3,300 patents** issued to universities.
- More than **$40 billion and 270,000** jobs added annually to U.S. economy.
- More than **500 companies formed** annually around university discoveries.
- Impactful products and interventions such as Google and Rituxan

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Guiding Framework For Universities

Relevance

– Utilize all University disciplines

Connectivity

– Link University to community assets and partners

Productivity

– New Metrics

- Value added, not exclusion-based
- Output per unit of input
- Scaled metrics

Challenges for Universities

- Innovation and Entrepreneurship are global and competition will only increase – we must continue to invest in the three key ingredients, people, knowledge and an innovation enabling environment
- Value creation and economic growth through discovery and translation to innovation and commercialization is a complex, non-linear and often lengthy process.
- University support and rewards system for faculty must more effectively support strategies and goals in technology commercialization
- As a key partner, universities must continue to enhance their efficiencies and flexibility in supporting the innovation enterprise

University Commercialization Centers

MIT - BOSTON

DESHPANDE CENTER
FOR TECHNOLOGICAL INNOVATION

UCSD – San Diego

VON LIEBIG CENTER
For Entrepreneurism and Technology Advancement

THE GAP

Academic Research

- Federal Grants
- Corporate Sponsored Research

» Technology risk
» Market risk

Commercial Enterprise

Investors Commercialize
- Angels
- VC's
- Corporations

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The Role of Industry: Wealth Creation

Capitalism is a Process of Creative Transformation

"The interaction of technological innovation with the competitive marketplace is the fundamental driving force in capitalist industrial progress."

Joseph A. Schumpeter, 1942

Government's Role in Innovation

- Long term vision and planning
- Identify gaps and trends in science, technology, innovation and SME development
- **Be a catalyst through long-term strategic investments and partnering**
- Develop a balanced and flexible research and development investment portfolio
- Encourage private sector innovation
- Establish performance-based research and development
- Accelerate the commercial exploitation of creativity and knowledge, through innovation and research, to create wealth, grow the economy, build successful businesses and improve quality of life

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Federal Program Opportunities

I6 Green Proof of Concept Center

- $12 Million
- Proof of Concept Center
- Proof of Commercial Relevance Center

Jobs & Innovation Accelerator Challenge

- $33 million Cluster Program

USDA ARS Programs

- Partnership program with the commercialization of Iowa-based ag-tech companies
- Opportunities for joint research programs (CRADAs)
- Joint research increases the likelihood of success in conducting cooperative research between the USDA and Iowa companies
- These agreements can help strengthen state and national economic development and help U.S. businesses compete globally in the marketplace.
- E-RIC

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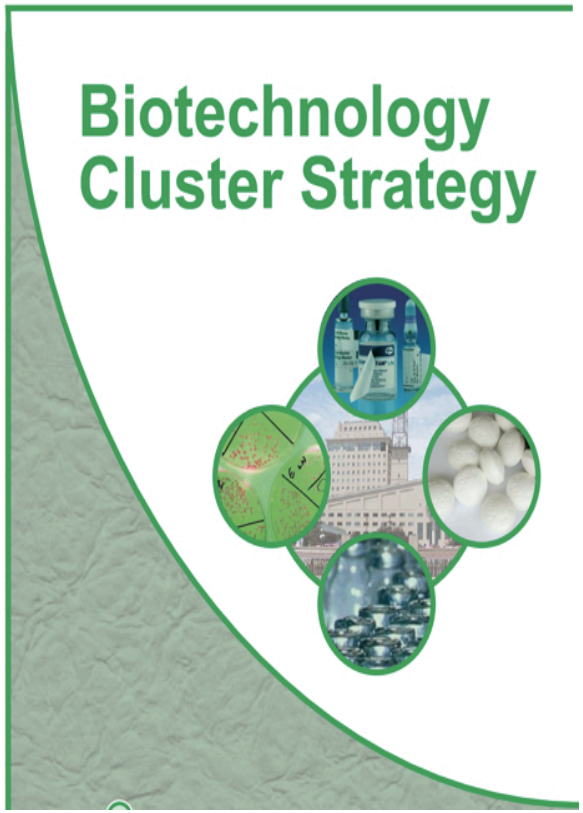
Characteristics of Successful Biotechnology Clusters

- Strong science base
- Entrepreneurial culture
- Growing company base
- Ability to attract key staff
- Availability of financing
- Appropriate premises & R&D infrastructure
- Close proximity of business support services & large companies in related industries
- Skilled workforce
- Effective networks (for example, associations & cluster councils)
- Supportive (national, regional and local) government policies



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Battelle Biosciences Report for Nebraska

Bioscience Performance Metrics

Summary of State Performance in Selected Bioscience-related Metrics

Metrics	Nebraska	United States	Rank*
Bioscience Industry, 2008			
Total Bioscience Industry Employment, 2008	11,350	1,420,324	III
Bioscience Industry Location Quotient, 2008	1.19	n/a	II
Biosciences Industry Establishments, 2008	319	47,593	IV
Academic R&D Expenditures, FY 2008			
Bioscience R&D ($ thousands)	$251,408	$31,818,810	30
Bioscience Share of Total R&D	66.8%	61.3%	14
Bioscience R&D Per Capita	$141.09	$104.54	7
Change in Bioscience R&D, FY 2004–08	9.2%	22.3%	44
NIH Funding, FY 2009			
Total, Including ARRA Funds ($ thousands)	$108,719	$25,837,590	36
Per Capita Funding	$60.51	$84.16	27
Change in Baseline Funding, FY 2004–09**	20.8%	-4.7%	4
Change in Total Funding, FY 2004–09	46.6%	14.6%	5
Clinical Trials, Initiated 2009	244	5,299	32
Higher Education Degrees in Bioscience Fields, AY 2008	1,448	161,811	34
Employment in Bioscience-related Occupations, 2008	4,900	717,510	35
Bioscience Venture Capital Investments, 2004–09 ($ millions)	$50.9	$60,099	36
Bioscience and Related Patents, 2004–09	314	75,593	35

*State ranking figures for bioscience industry employment metrics are calculated as quintiles (I=Top Quintile; V=Bottom Quintile). All other metrics are ranked 1-52.
**Baseline Funding does not include American Recovery and Reinvestment Act (ARRA) funds for 2009.
For source notes, see end of State Profile.

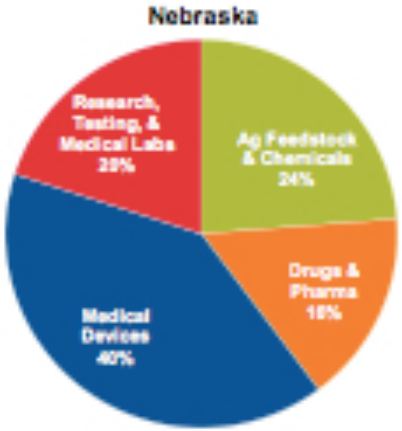
bionebraska
life sciences association

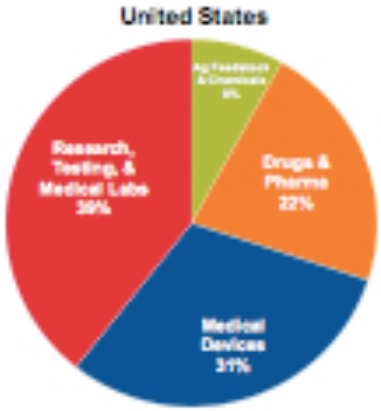
Nebraska Bioscience Roadmap 2010

Prepared by: Bio Nebraska and the Nebraska Legislature Natural Resources Committee

September 2010

Figure ES-3. Employment Composition of the Bioscience Industry in Nebraska and the United States, 2008





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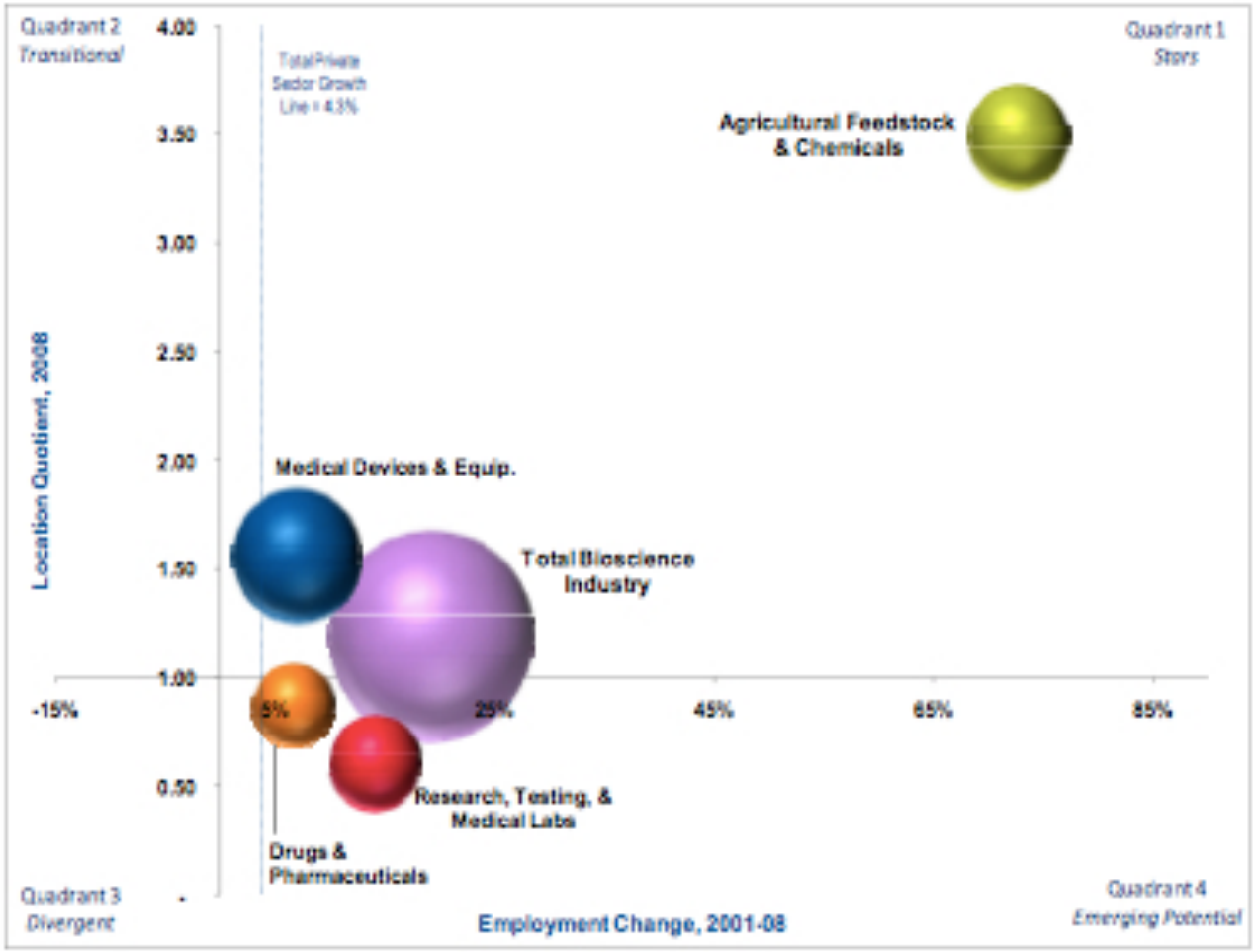
Nebraska Biosciences Location Quotient

Figure 4. Nebraska Major Bioscience Subsectors—Degree of Specialization, Job Growth, and Size, 2008



Source: Battelle calculations based on BLS, QCEW program data from the Minnesota IMPLAN Group.

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Warren Buffet

“Risk comes from not knowing what you're doing.”

“Why not invest your assets in the companies you really like? As Mae West said, "Too much of a good thing can be wonderful".

How Do You Build Biotech Companies?

Follow the "P's":

People

People

Plans

Patents

Products

Platform

Pipeline

Potential

Partners

Price

Promises

Performance

Persistence

Perspiration

Passion

Pfocus

Pfinancial

P-luck

Pfun

BioEnterprise Initiative - Cleveland

Vision

Make region a **nationally recognized** center for **health care innovation and commercialization** (e.g., Minneapolis, Research Triangle)

Mission

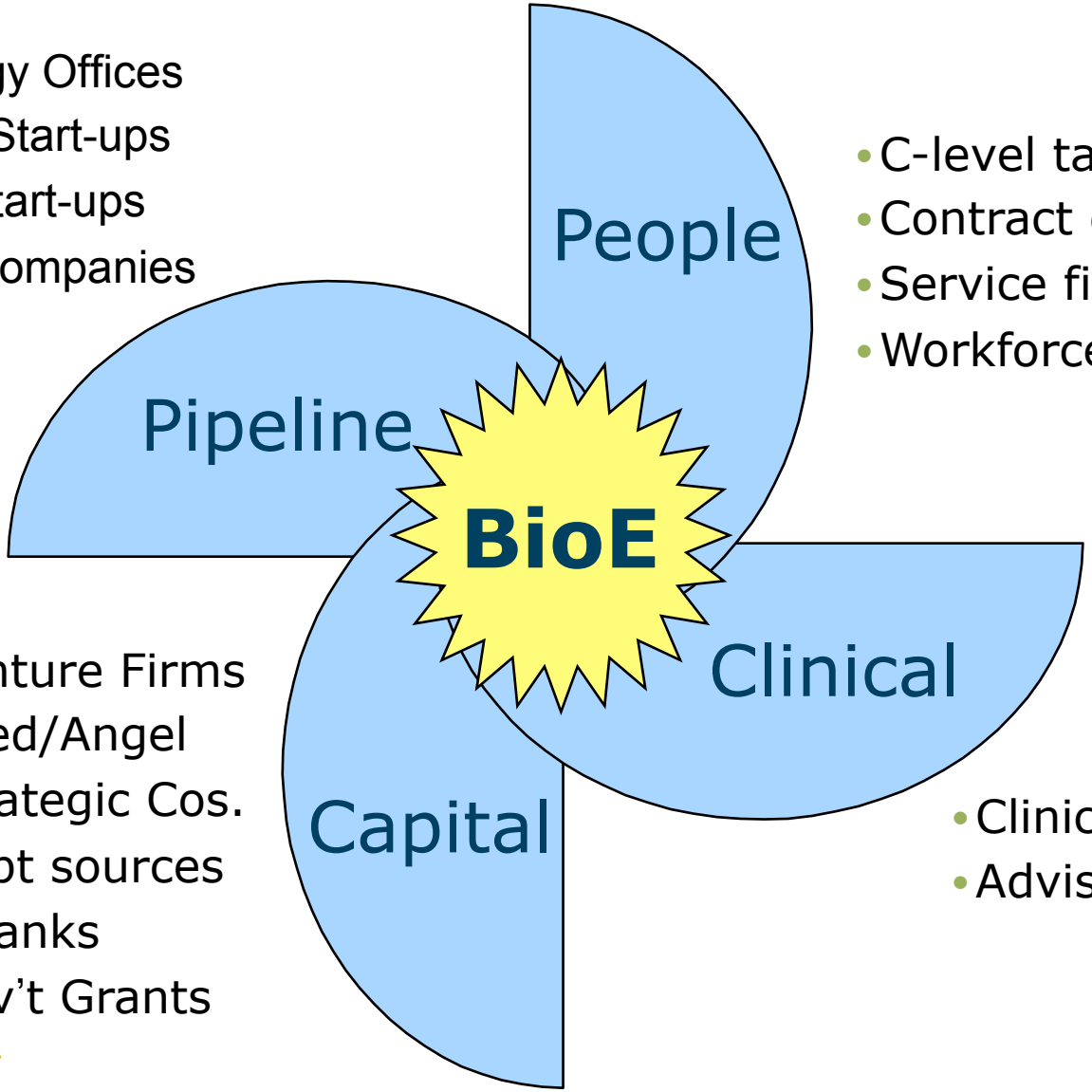
Be the leader in biosciences industry growth focused on recruiting and attracting entrepreneurs, **creating, accelerating, and retaining start-ups**, and **nurturing and promoting a vibrant business environment**

Performance Metric and Target

Capital raised by health care companies in region
>$150 million invested in region annually

Business Acceleration

- Technology Offices
- Regional Start-ups
- Foreign Start-ups
- Existing Companies



- C-level talent
- Contract executives
- Service firms
- Workforce programs

- Venture Firms
- Seed/Angel
- Strategic Cos.
- Debt sources
- I-banks
- Gov't Grants

- Clinical champions
- Advisory boards

Entrepreneurial System

- Entrepreneurial Assistance
  - BioEnterprise Initiative
  - Institutional Technology Offices
    - Cleveland Clinic Innovations
    - Case Western Technology Transfer Office
    - University Hospitals Clinical Research
    - BioInnovation Institute (Akron)
  - JumpStart
- Funding
  - Validation, seed, and angel funds
  - Venture and growth equity funds

Market-Driven Approach

Choose/create opportunities that are fundable…

- Regional entrepreneurs
- Institutions
- Foreign recruitment
- Company creation

…position companies to raise capital…

–Experienced management support

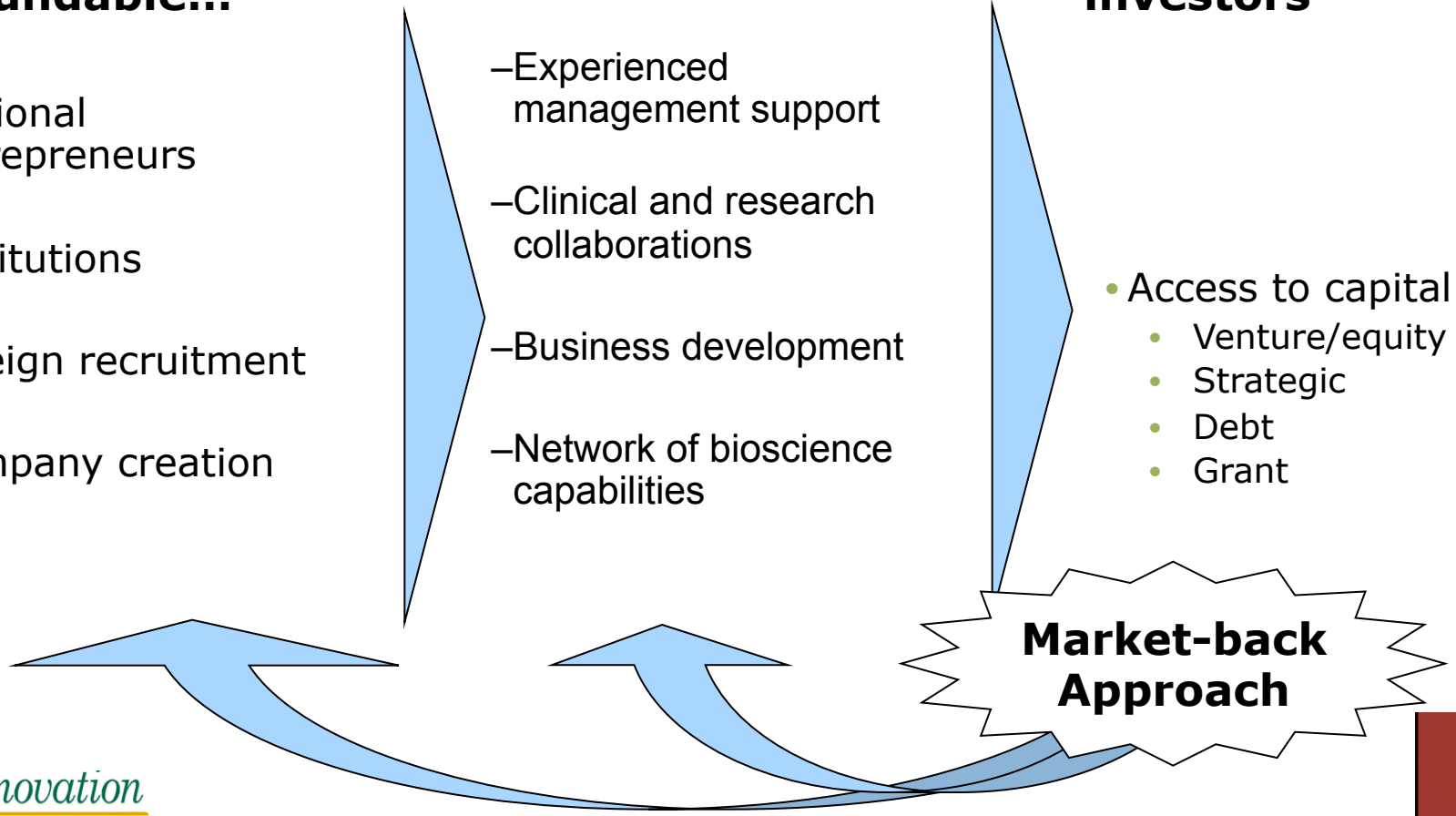
–Clinical and research collaborations

–Business development

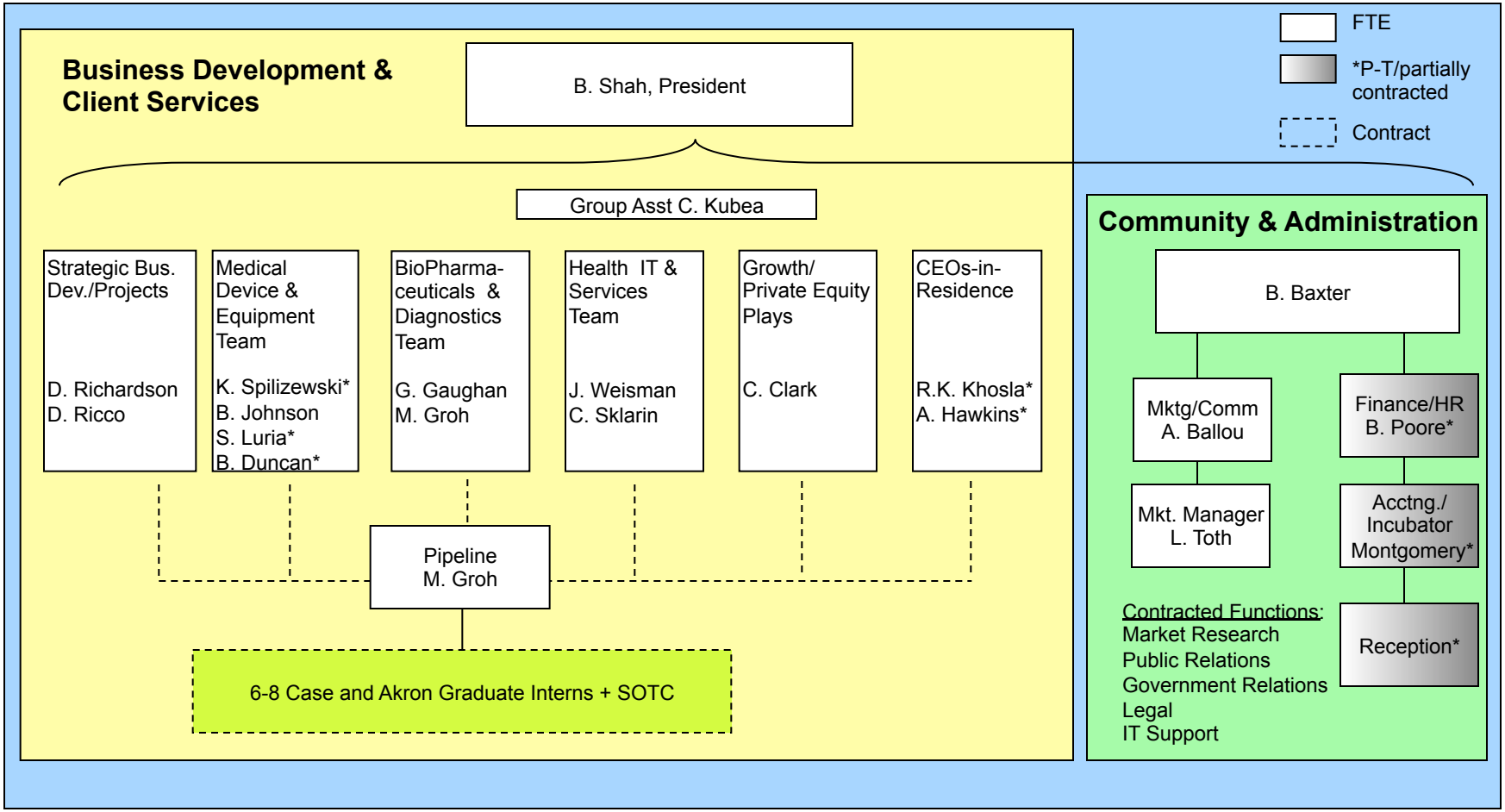
–Network of bioscience capabilities

…from targeted, interested investors

- Access to capital
  - Venture/equity
  - Strategic
  - Debt
  - Grant



BioEnterprise Organization Chart



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BioEnterprise

Results

- Health Care Venture ~ Research Triangle
  - ~$150 million per year over last 6 years
  - 45 Healthcare Funding Sources in Ohio
  - 80% of funding from outside region
- Industry Growth
  - Now at 600 companies
  - Several dozen firms started/attracted each year
  - Over 20,000 employed in industry
  - 29 “Exits”
- National Recognition

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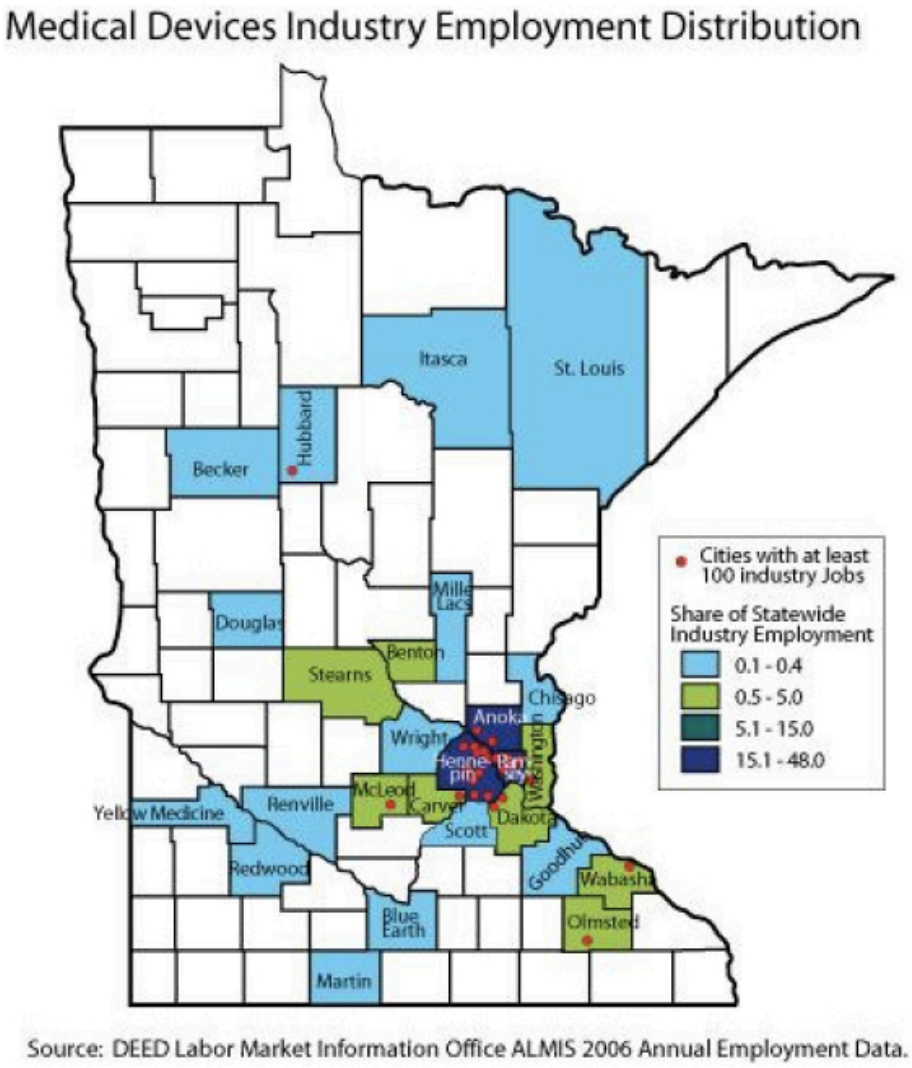
Industry Accelerating Initiatives

- Pipeline
  - Translational research institutes and accelerators
  - Company attraction
  - New funding sources (seed, angel, VC)
- Medical Mart & Convention Center
- Real Estate Development
  - Cleveland Health-Tech Corridor
  - Akron Biomedical District
- Cleveland International Fund

Minnesota Medical Device Industry

- Employment: 29,351 1.4 percent of total
- The five largest medical device firms in Minnesota alone (Medtronic,3M, Boston Scientific, St. Jude Medical, and American Medical Systems) generate more than $22 billion in sales
- Minnesota ranked 2nd in the US people employed in medical device manufacturing, only less than California
- Minnesota based medical device wages paid 8.3% higher than in the U.S.
- Minnesota based surgical appliance manufacturing companies, wages are 40.9 percent higher than in the U.S



Source: DEED Labor Market Information Office ALMIS 2006 Annual Employment Data.

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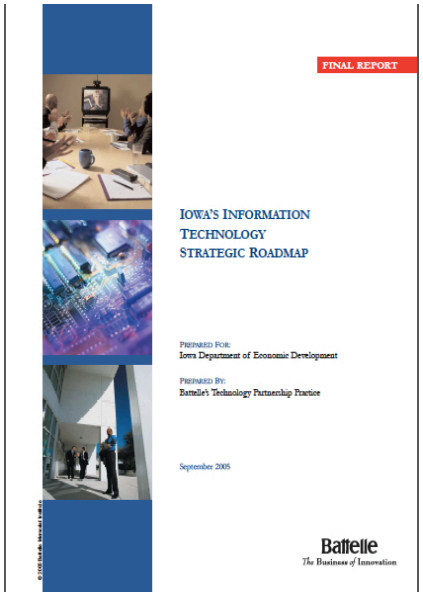
Iowa's Key Clusters



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Iowa Bioscience Report – 2011 Battelle

Prepared for: Innovate Iowa
Prepared by: Battelle Technology Partnership Practice
February 2011

The biosciences is a high-wage industry in Iowa and nationally. The average annual wage paid by the bioscience sector in Iowa was $60,833 in 2008, more than $24,000 or 67 percent above that paid on average in the overall Iowa private sector. Wage premiums in the biosciences reflect a greater degree of value-adding activities relative to other major industries. In addition, a knowledge-based industry like the biosciences requires high-skilled workers whose higher wage requirements reflect the greater value of their education and skills in the labor market. And while this holds true relative to other industries, even within the biosciences, wages across states and regions can vary considerably based on the occupational and industry composition or mix within each.

Table ES-1: Average Annual Wages for Iowa and the U.S., Biosciences vs. Other Major Industries, 2008

Industry	Average Annual Wages, 2008	
	Iowa	United States
Agricultural Feedstock & Chemicals	**$ 68,065**	**$ 72,279**
Management of Companies & Enterprises	$ 66,265	$ 94,842
Total Biosciences	**$ 60,833**	**$ 77,595**
Finance & Insurance	$ 56,653	$ 85,274
Drugs & Pharmaceuticals	**$ 56,288**	**$ 93,378**
Research, Testing, & Medical Labs	**$ 55,678**	**$ 80,785**
Wholesale Trade	$ 49,623	$ 61,847
Professional, Scientific, & Technical Svcs	$ 49,373	$ 74,354
Manufacturing	$ 47,173	$ 54,392
Medical Devices & Equipment	**$ 44,675**	**$ 63,606**
Construction	$ 44,031	$ 49,014
Information	$ 43,234	$ 70,780
Transportation & Warehousing	$ 37,165	$ 42,969
Total Private Sector	**$ 36,359**	**$ 45,229**
Health Care & Social Assistance	$ 35,641	$ 42,150
Real Estate	$ 33,436	$ 43,239
Agriculture, Forestry, Fishing & Hunting	$ 30,157	$ 25,982

Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IMPLAN

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University City Science Center - Philadelphia

About the Science Center

- A private, non-profit, technology-based **economic development** organization
- Oldest and largest **urban research park** in the US - established in 1963
- Our mission is to strengthen the region's **life sciences and tech** sectors
- We work with **academic research institutions** and **companies,** and many organizational partners across the region

The Science Center transcends government and geographic boundaries

Sc science center

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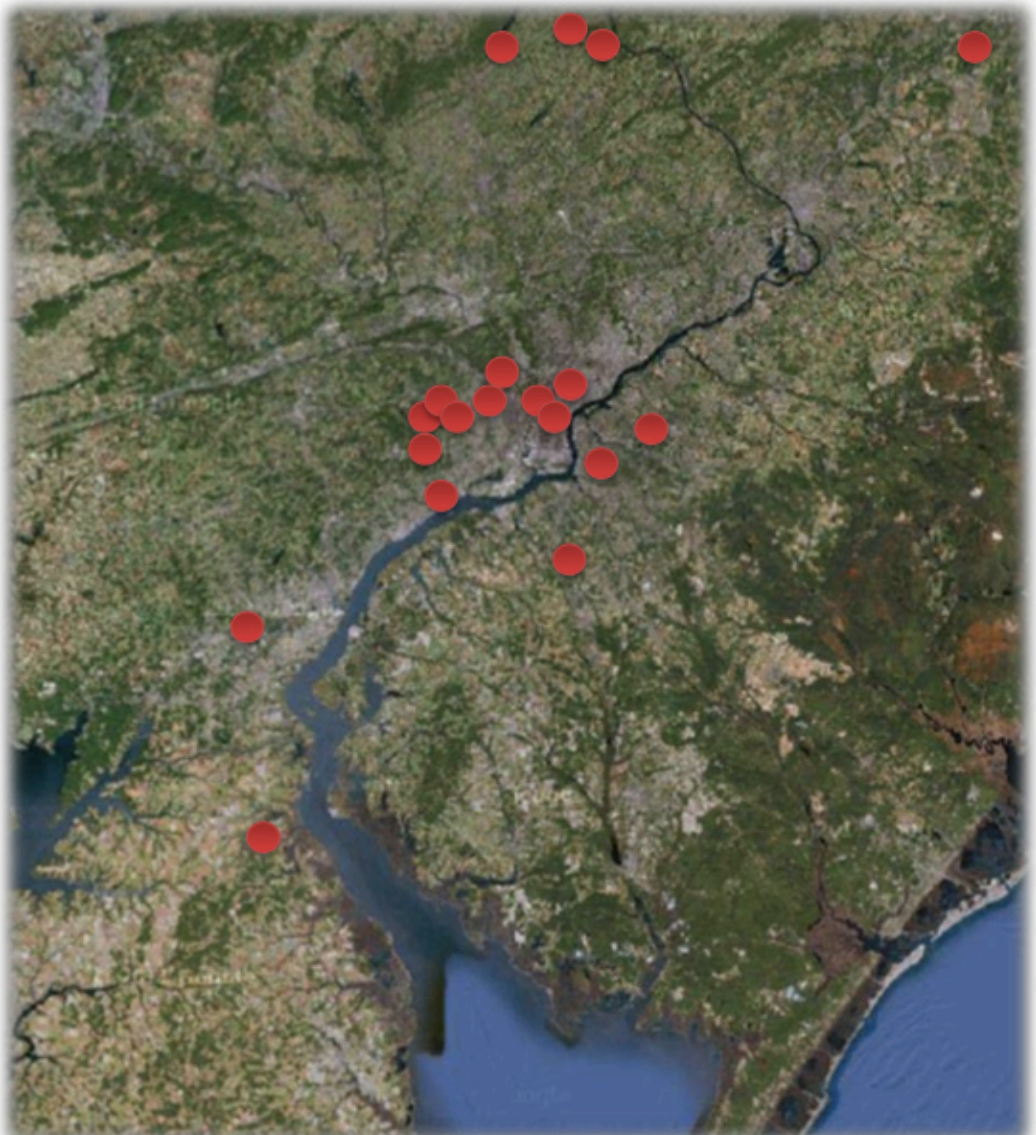
An Independent Nonprofit With 32 Shareholders



The American College

Bryn Athyn College

Delaware State University

BCC Burlington County College — We Can Get You There.

The Children's Hospital of Philadelphia — A pediatric healthcare network

Haverford

ESU — East Stroudsburg University

Drexel University

Lafayette — A National Reputation for Academic Excellence

NUS National University of Singapore

Pennsylvania College of Optometry

PCOM

Philadelphia University

Lehigh University

Rowan University

Rutgers — The State University of New Jersey

Swarthmore

School of Podiatric Medicine — Temple University

Temple University

USP — University of the Sciences in Philadelphia

University of Pennsylvania Health System — Pennsylvania Hospital

University of Delaware

Penn — University of Pennsylvania

Widener University

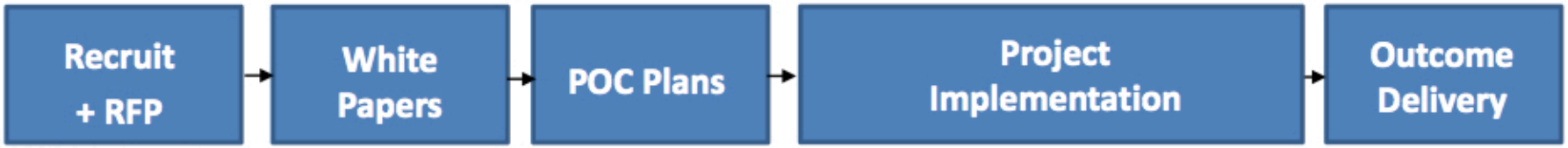
Villanova University

QED Program Overview

The nation's 1st Multi-Institutional Proof-of-Concept Program:

- Support and grow entrepreneurial culture among the region's research institutions.
- Engage researchers and inventors to develop technologies with high potential for new healthcare products.
- Develop a business advisor network and early commercialization resources.
- Create follow-on opportunities for early-stage technologies through market-driven funding.

Funding	Market engagement
Expertise	Project Management



QED QEDProgram

Other Key Science Center Programs and Collaborations

- **Quorum:** The entrepreneur's clubhouse.
- **Breadboard:** Exploring the intersection of art, science and technology.
- **Campus Revitalization Project:** Making our campus greener and safer.

- **Chemical Genomics (Wistar, USP):** A drug discovery-screening-validation collaborative facility
- **Coulter Program (Drexel):** Translational research in biomedical devices
- **Health Innovation Partnership (Drexel, UPenn):** Creating a grass-roots entrepreneurial culture among academic faculty
- **IPART** (BFTP/DCED):assisting Pennsylvania's small businesses compete for Federal SBIR and STTR funding.
- **ITMAT/CTSA** (Penn/CHOP/Wistar):Institute for Translational Medicine and Therapeutics, supported by NIH.
- **Nanotechnology Institute** (Penn, Temple, Drexel, Lehigh): supporting proof-of-concept projects in the field of nanotechnology.
- **UPSTART (UPenn):** Assisting faculty to launch new companies

Federal Programs to Increase Innovation Capital

R&D Tax Credit Reauthorization (Pending)

- US ranks **24th out of 38 countries.**
- Provides **$9B in tax relief** to companies and individual - **$10B of R&D** can be supported by a permanent research tax credit.

National Angel Capital Tax Credit:

- **20+ states** have tax credits for early stage investment ranging **from 10-50%.**
- Senator Mark Pryor (D Arkansas) has proposed legislation talking about an across the board **25% credit.**
- Advantages to having credits includes **Increases the state's risk capital** market & **stimulates investment in new companies &** creates **new jobs** from startups.

Patent Reform Proposal:

- Proposed versions of the Patent Reform would switched U.S. patent priority from the existing **"first-to-invent"** system to a **"first-to-file"** system.

SBIR/STTR Reauthorization:

- Increase from **2.5% to 5%** the amount that each federal agency with an extramural research and development budget
- Increase in Phase I and Phase II awards

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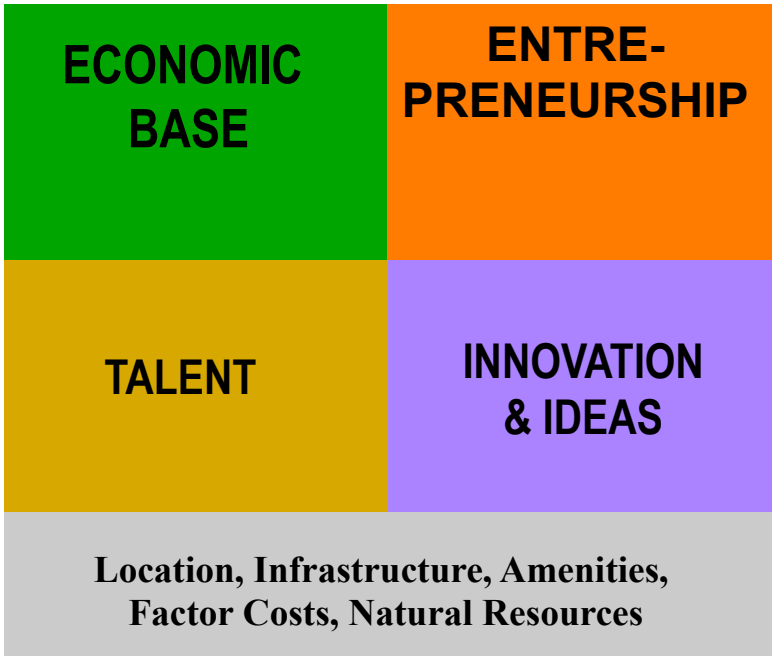
Regional Innovation Clusters

Five Key Components to Consider When Defining Unique Regional Assets

What you make, including your existing & prospective industry clusters

What you do: your workforce skills & human capital base



Your capacity to create companies wholly new or from existing firms

Your capacity to innovate and generate new ideas

The basic conditions defining the economic milieu of the region

Why Do RICs Matter?

- They create a transition path from unemployment or underemployment to high-skill jobs.
- On average, jobs within clusters pay higher wages.
- Regional industries based on inherent place-based advantages are less susceptible to off-shoring.
- Create many new job opportunities for American workers.
- They connect disenfranchised communities to new career and educational opportunities.
- They stabilize communities by re-purposing idle manufacturing assets, engaging underutilized human capital, and contributing to improvements in the quality of life.

Federal Role In RIC Development

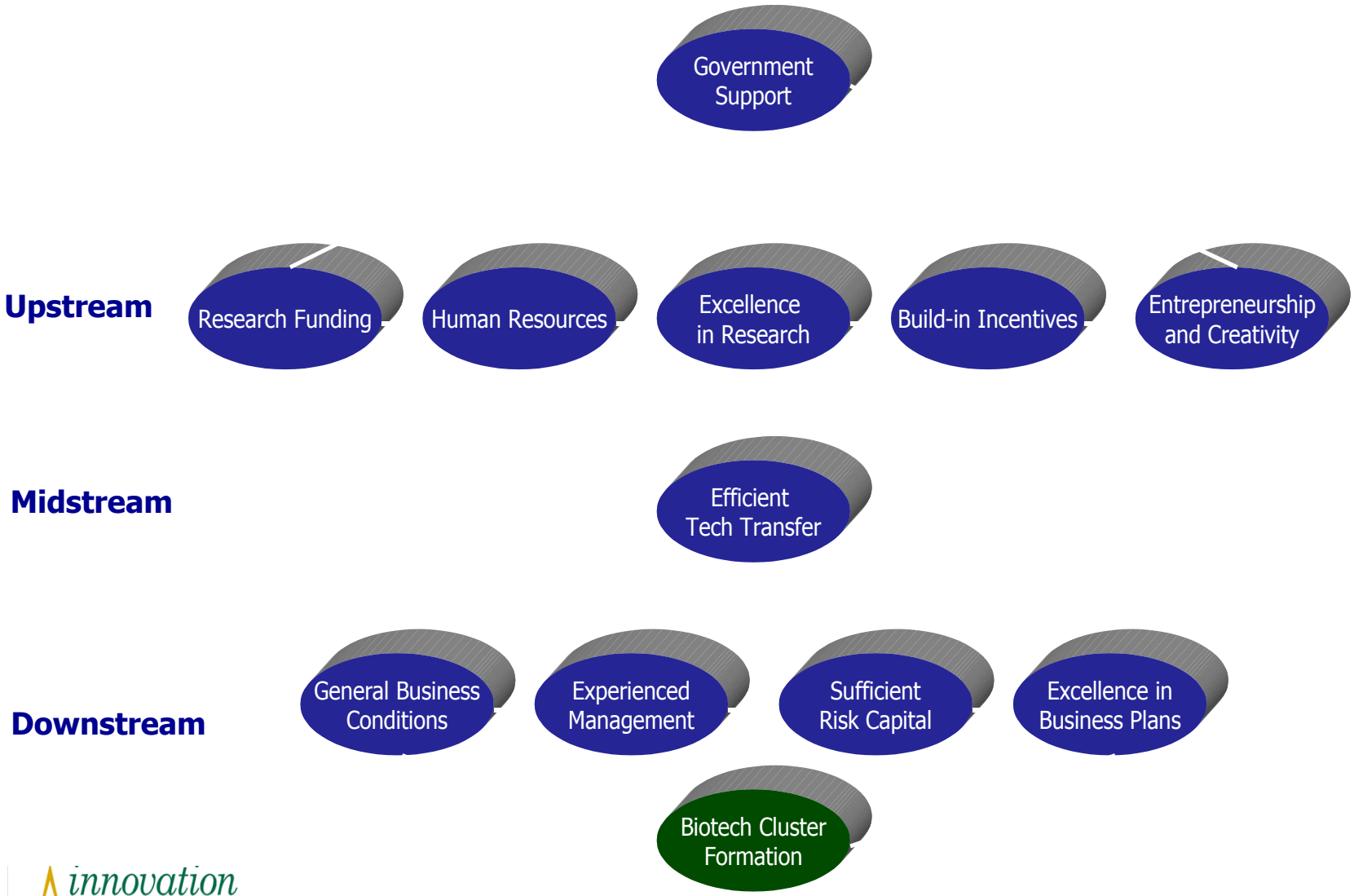
The Federal Government's role is to help self organizing, bottom-up RIC participants become all they can be.

- Identify existing – **NOT** creating new RICs
- Convener of relevant stakeholders
- Creator of overarching framework to support national networks of clusters
- Disseminator of information
- Provider of targeted capital investments

Best Practices in RIC Management

- **Regionally-Led** from existing networks & assets – bottom-up approach
- **Involve partnerships between private and public** at all levels (i.e. local, regional, state, and Federal)
- Unique **strengths of region are built upon** rather than trying to copy other regions (i.e. everyone can't support a biotech cluster)
- **Different strategies are developed for different clusters**
- Well-funded initially and **self-sustaining over the long-term**
- **Linked with relevant external efforts**, including regional economic development partnerships and cluster initiatives in other locations

Basic Conditions for a Biotech Cluster



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Technology Investment

> ready > set > succeed

Biotechnology Commercialization

- Life Science Greenhouses ("LSGs") address critical phase of continuum between university research and funding by professional venture capitalists.
- Effective mechanism for investments in early-stage life sciences companies.
- Attract private investors to exponentially leverage the investment of the Commonwealth

Bio Advance

PITTSBURGH Life Sciences greenhouse

Life Sciences Greenhouse of central PA
www.lsgpa.com

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Pennsylvania's Life Science Greenhouses - Goals

1. Leadership – securing the Commonwealth's position at the top of the life sciences industry in bringing

innovations to the health care needs of Pennsylvanians.

2. Enhanced Commercialization – supporting efforts to introduce new therapies and bring needed

medical products to the marketplace.

3. Increased Employment – developing high-paying life sciences jobs for Pennsylvanians.

pennsylvania
STATE OF INNOVATION

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PA Life Sciences Greenhouse Impact from 2001-2009

Dollars of federal funding attracted to LSG projects or as follow-on to project participants	**$66.1 M**
Number of jobs created as a result of LSG supported projects or Activities	**3,149.5**
Number of jobs retained as a result of LSG supported projects or activities	**2,743.5**
Number of new companies (within their first 3 years) supported as project participants	**134**
Follow on funding	**$1.96B**

Bio Advance

Pittsburgh Life Sciences greenhouse

Life Sciences Greenhouse of central PA
www.lsgpa.com

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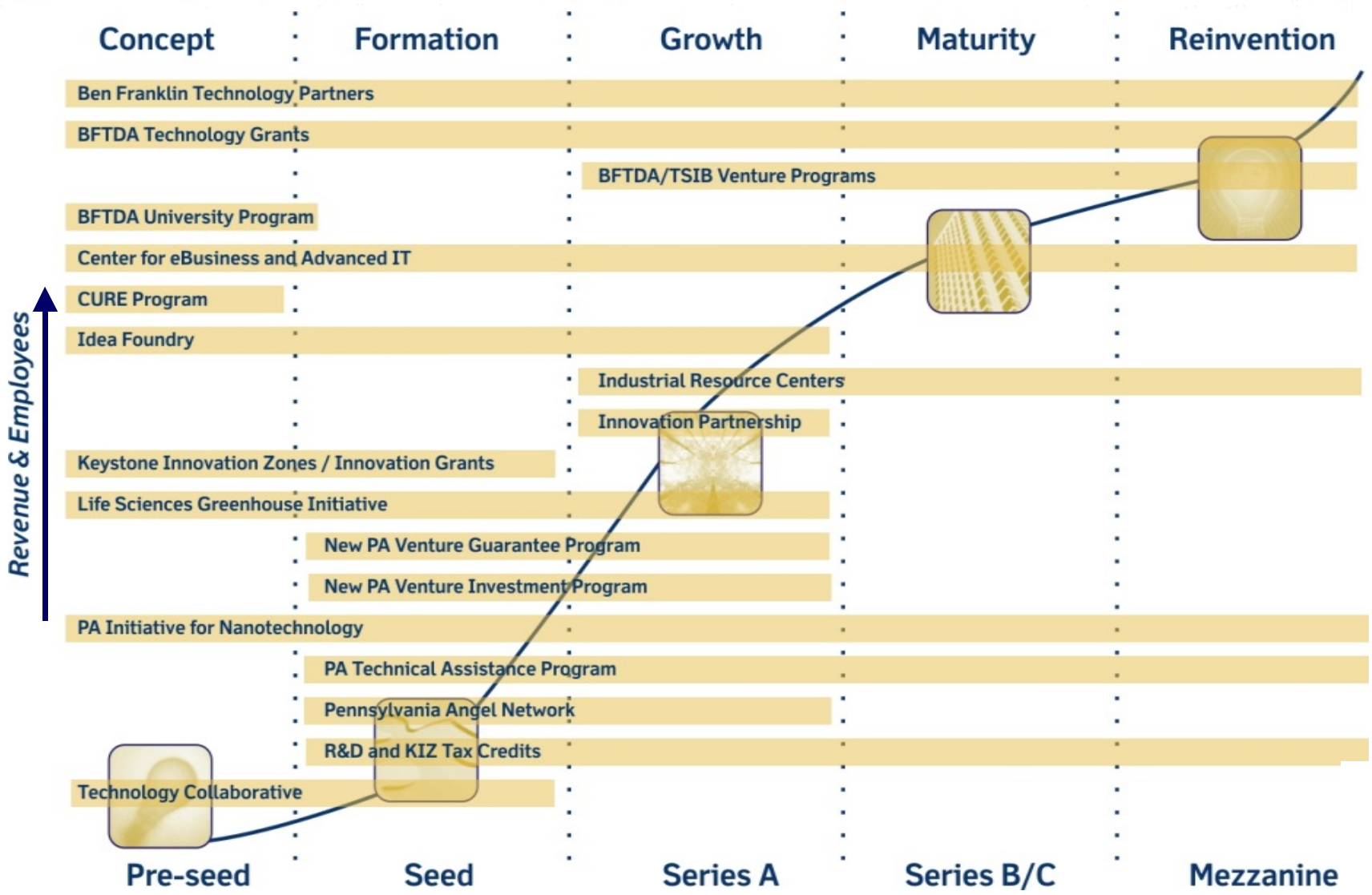
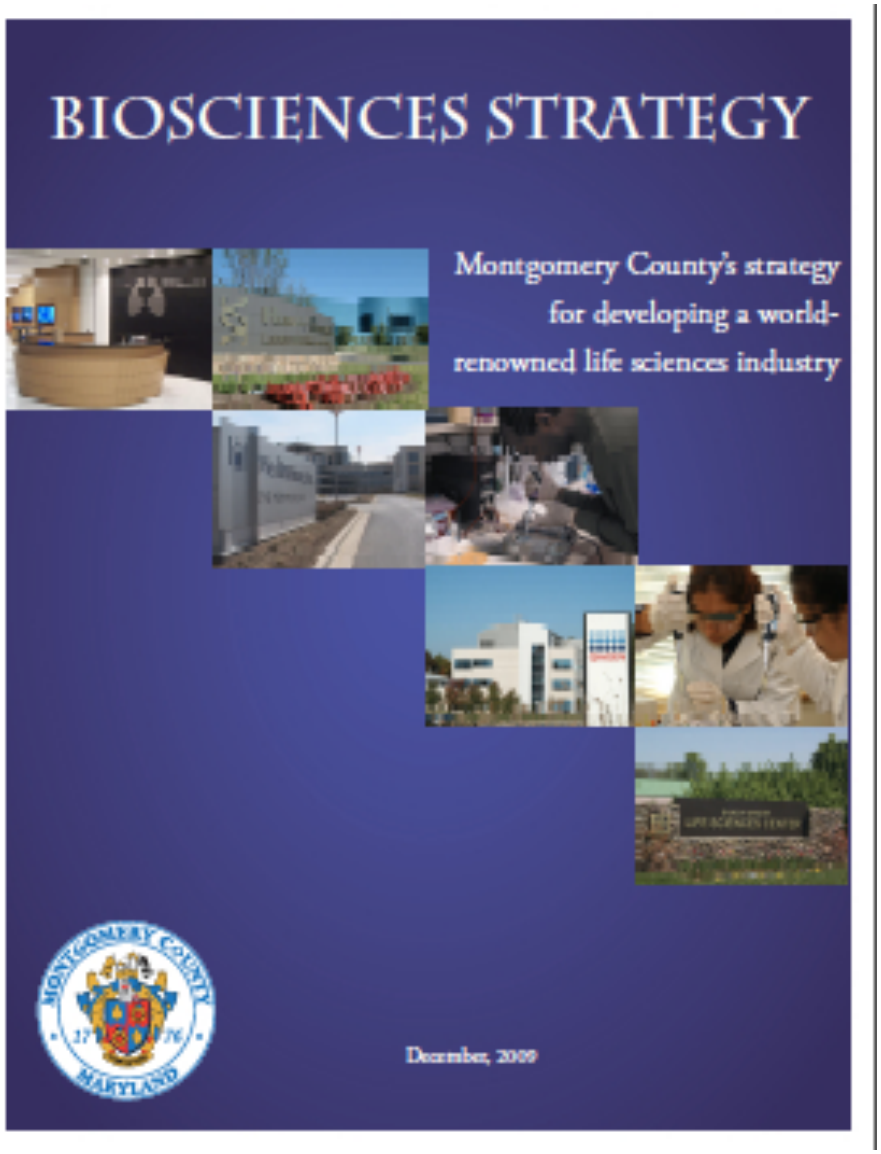
Technology Investment

Technology-based Economic Development Tools Along the Continuum

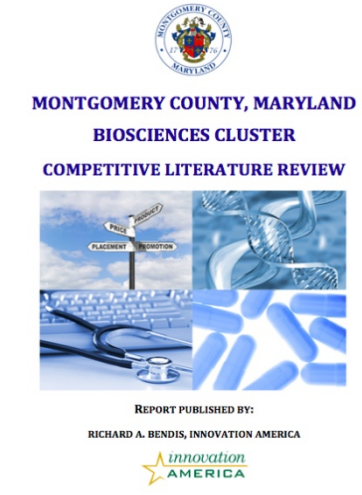
> ready > set > succeed

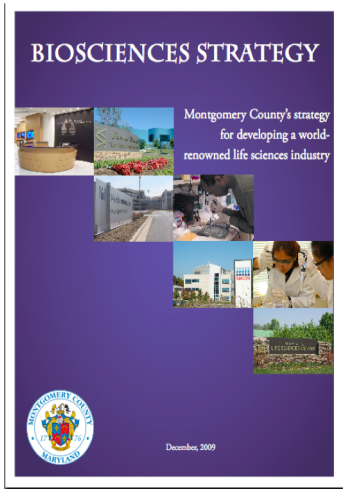


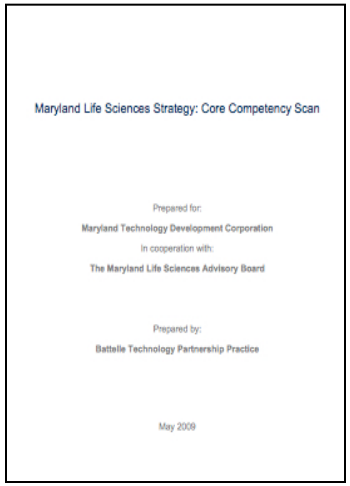
Montgomery County, Maryland Bioscience cluster

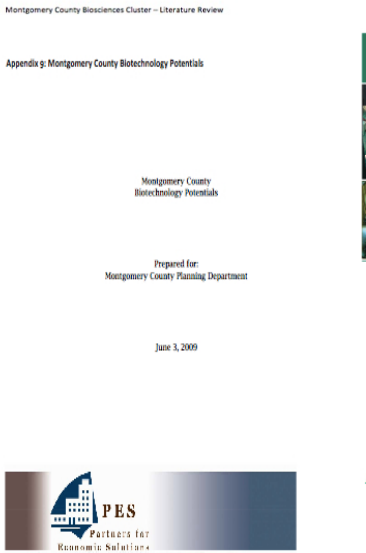


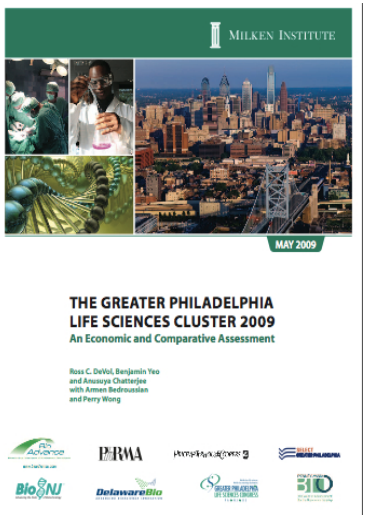
Biosciences Competitive Literature Review

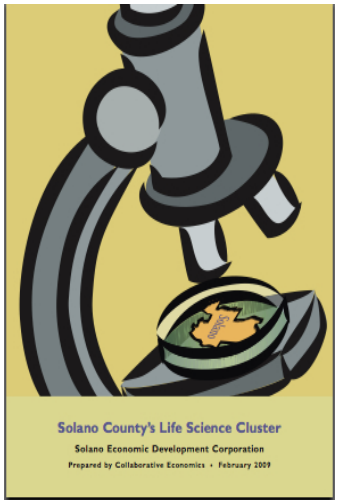


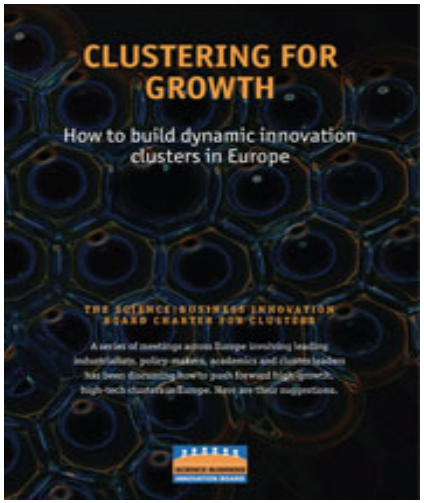


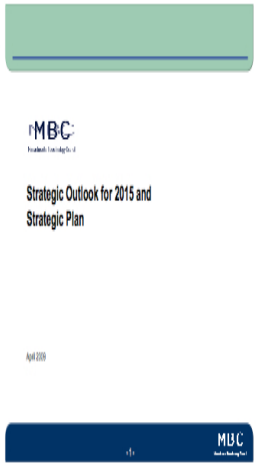












Biosciences Literature Review – Summary of Conclusions

- Establish a Moco Regional Innovation Intermediary
- Support Programs to Train, Mentor and Grow Bioscience Entrepreneurs
- Organize an Early-Stage Access to Capital Strategy for Bioscience Cluster
- Develop A Platform for Exchange of Knowledge Among International Clusters
- Develop a Global Marketing and Branding Strategy to Market and Commercialize the Translational Research Opportunities
- Broaden The County's Cluster Definition of the Bioscience Industry for the Bioscience Strategy and for Measuring Performance (Health IT, Cyber Security, Biomanufacturing)
- Implement and Leverage A Bioscience Talent Identification and Growth Strategy
- Exploit The Significant Presence of Federal Laboratories in Moco Region through Formal Linkages and Partnerships to Generate Greater Business Opportunities in Cluster.
- Create a more Robust Portfolio of Business and Regulatory Programs for New and Existing Companies

Benchmarking Summary of Key Cluster Attributes & Interventions

Subject Area	Maryland / Greater DC Area	Philadelphia	Cleveland	San Diego	San Francisco	Greater Boston	Research Triangle, NC	Medicon Valley – Denmark - Sweden	Oxfordshire England	Switzerland	Victoria, Australia
1. Scientific Workforce Availability	+	+	—	+	+	+	+	+	+	+	+
2. Federal Laboratory Presence	+	—	—	—	—	—	—	N/A	O	N/A	N/A
3. Bioscience Seed Fund	—	+	O	O	O	O	O	O	+	+	—
4. Direct Incentives / Business Costs	O	+	O	—	—	—	O	+	—	+	+
5. Enhanced R&D Tax Credits	O	+	—	—	—	—	+	O	—	+	+
6. Efficient Tech Transfer Policies	—	—	+	+	+	O	O	—	+	+	O
7. SBIR Support Program	—	+	—	O	O	O	+	N/A	N/A	N/A	N/A
8. Early-stage & VC capital availability	—	—	+	+	+	+	—	+	—	+	—
9. Commercialization Institutes	—	—	+	O	O	+	—	O	O	O	—
10. Established Public-Private Partnership (Innovation Intermediary)	—	+	+	+	—	+	O	+	+	+	+

Key: + : Strength — = Weakness O = Neither Strength/Weakness

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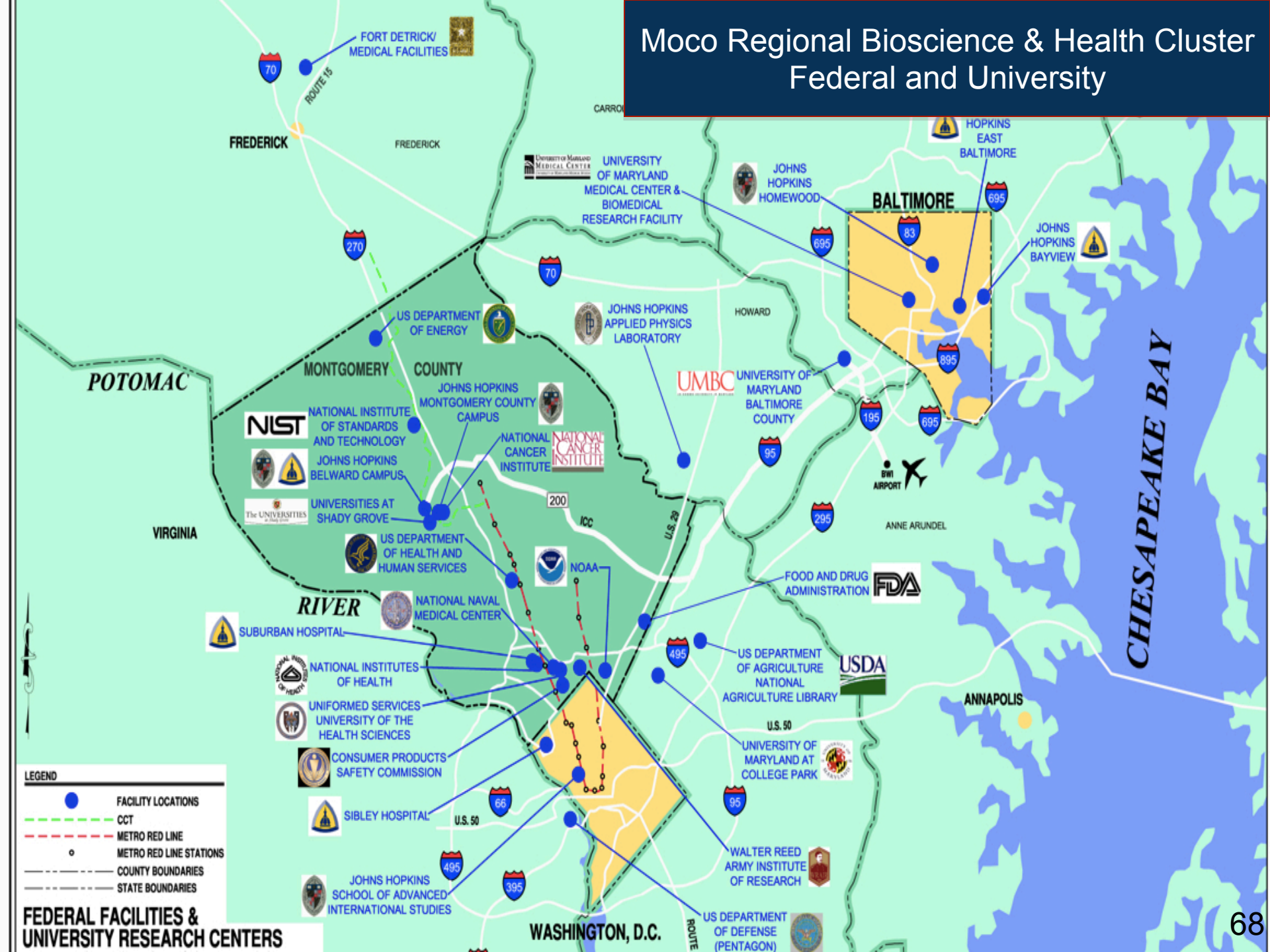
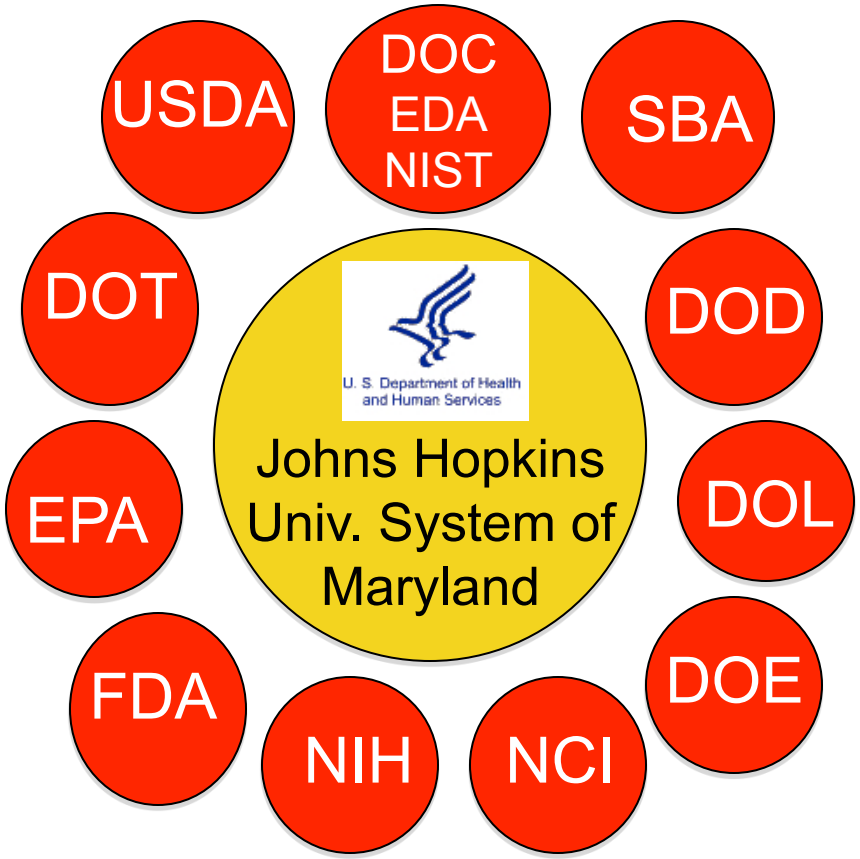
Moco Regional Bioscience & Health Cluster
Federal and University



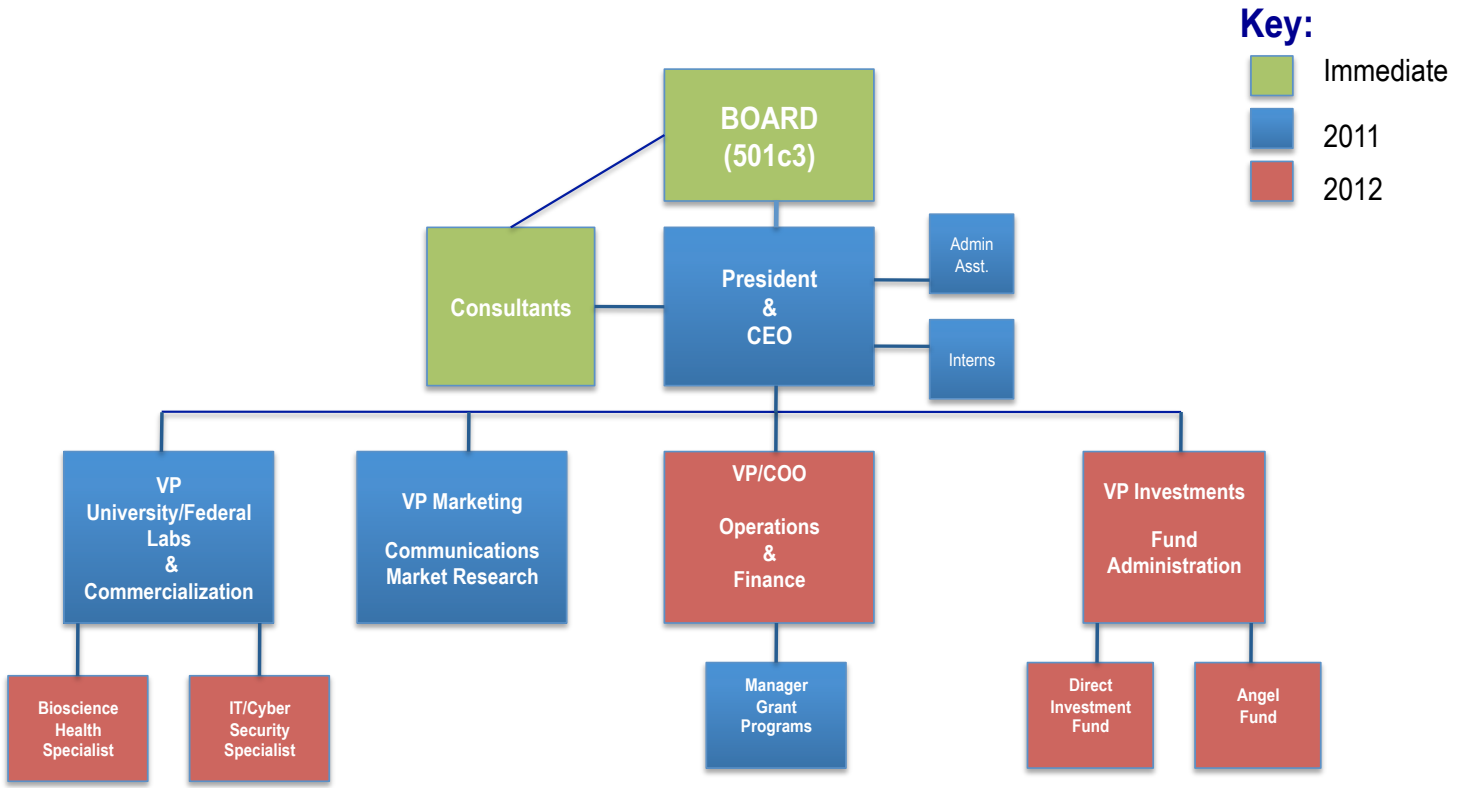
MoCo Bioscience H-RIC



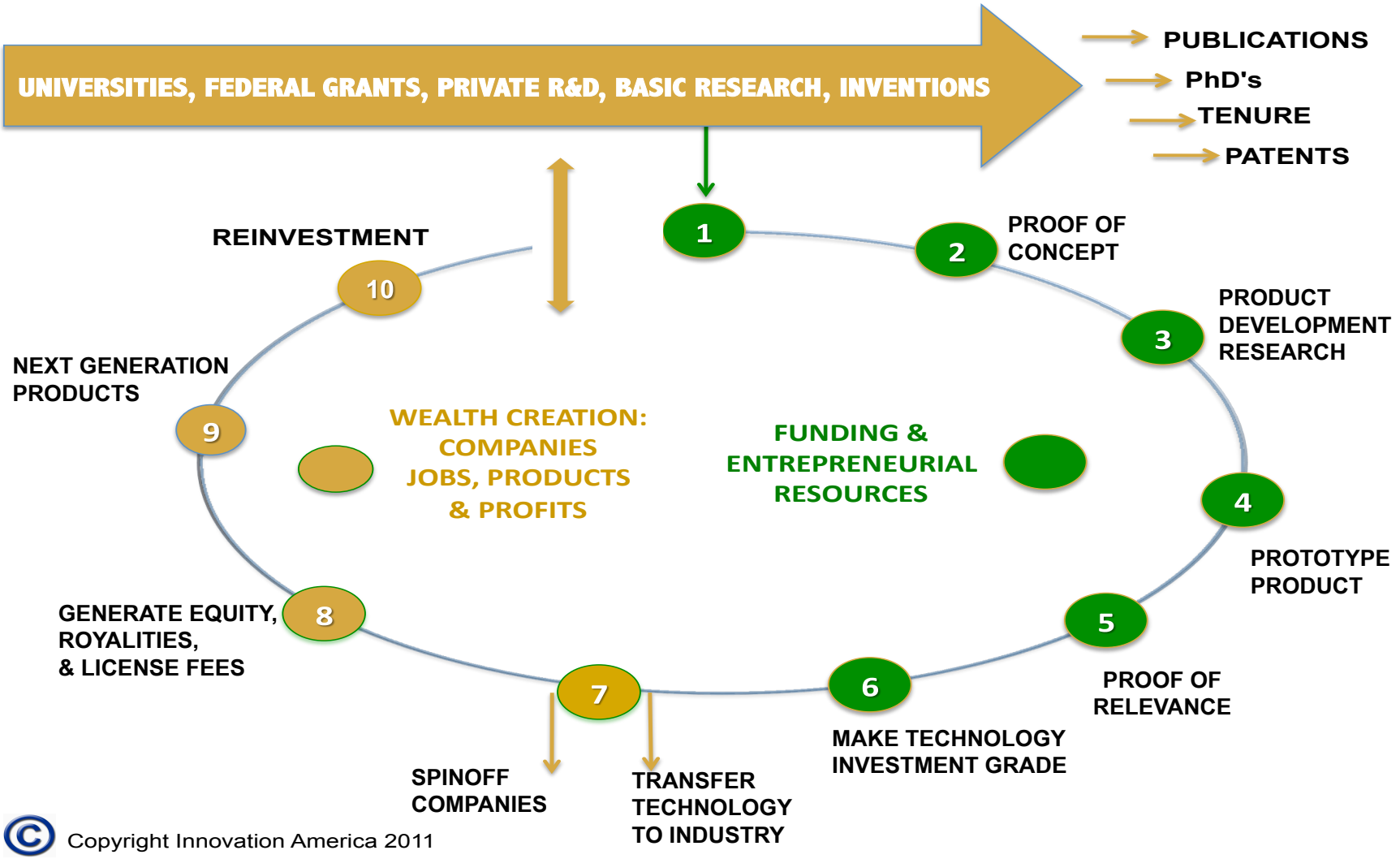
Moco and the state would lead a consortium of key industry, academic, foundation, public and NGOs to support the MoCo Bioscience H-RIC.

Montgomery County, Maryland - Innovation Intermediary

America's Bioscience Intermediary (ABI)



Innovation America Commercialization Model



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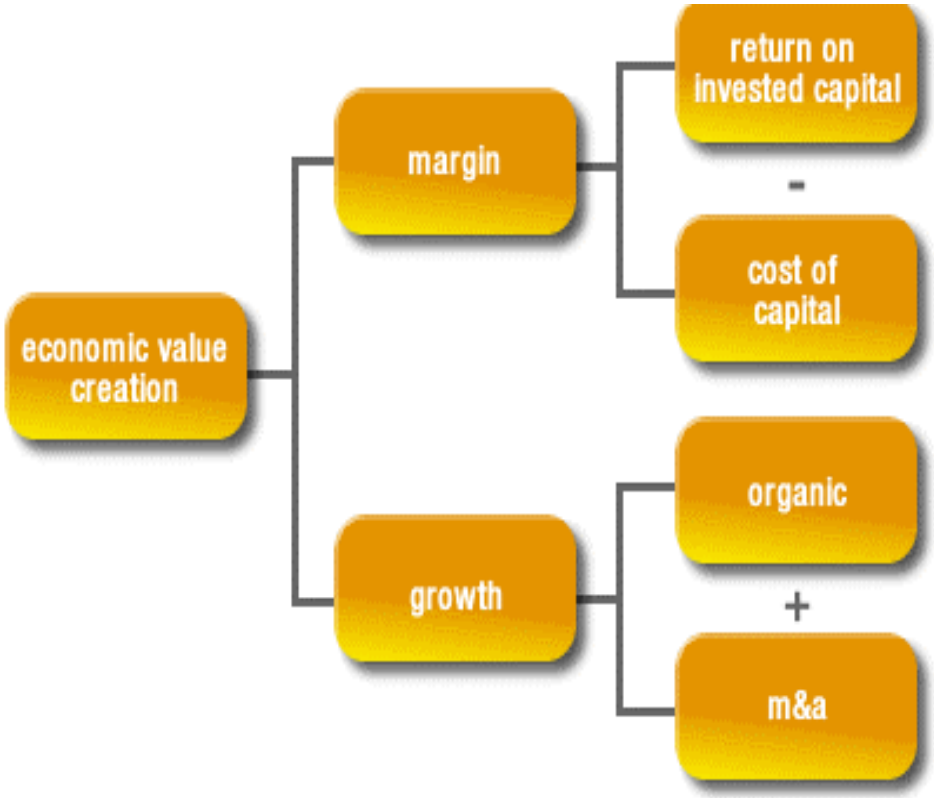
Innovation Paradigm Shift

PROOF OF CONCEPT
(Technological Feasibility)
"It Works!"

PROOF OF RELEVANCE
(Market Pull)
"It Works To Solve A Problem"



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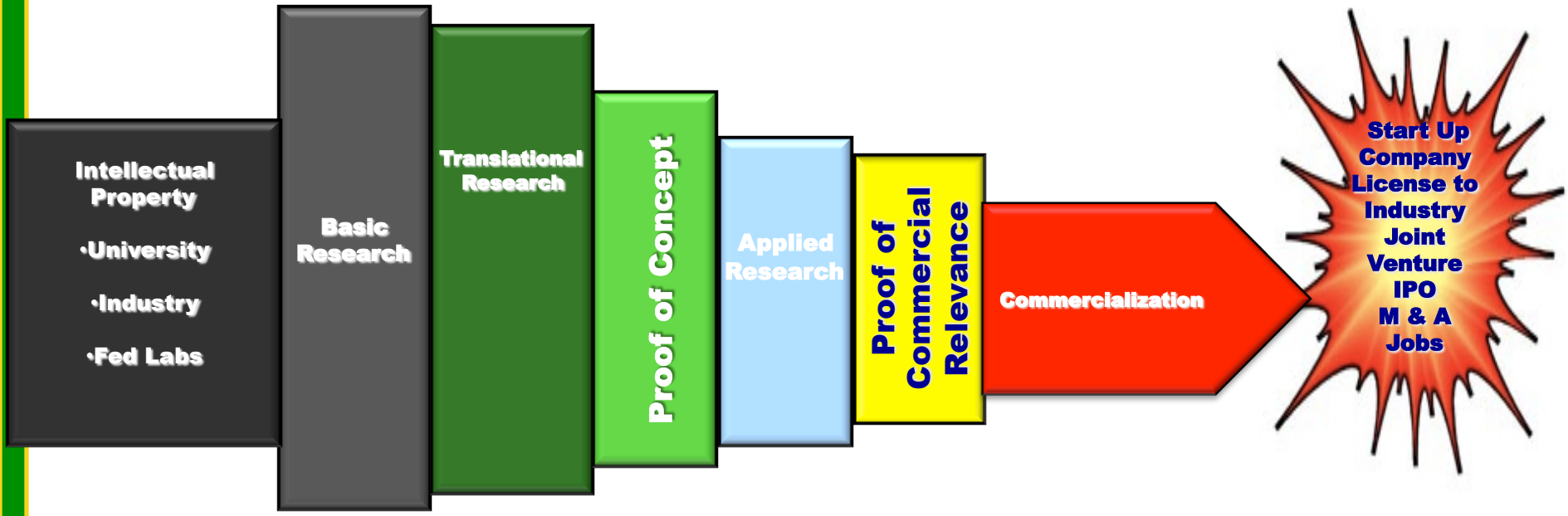
Iowa Integrated Innovation Commercialization Network ™

Knowledge Infrastructure: Interns → MBA's → PhD's → Post Docs → Univ. Research → IIICN → Mentors/Advisors → Industry

Management



State & University Funding: POCC → Demonstration Fund → POCR → State Funds → Iowa Seed Fund

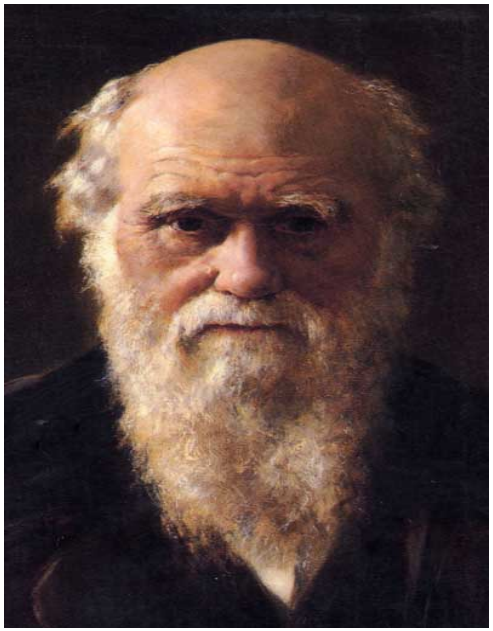
Federal & Public Funding: SBIR/SSTR Phase I&II → TIP → SBIR 2B → I6 Green → E-RIC → Other Public Funds

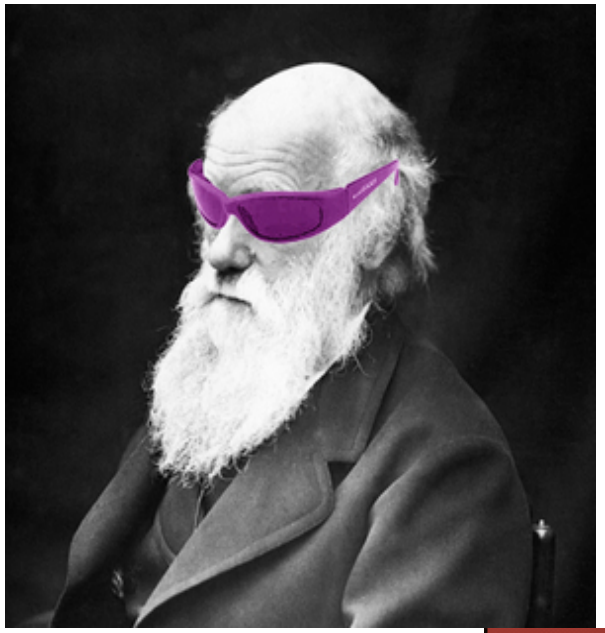
Private Funding: Foundation → Angel → Seed → Venture Capital → Mezzanine → Debt → Bank

Darwin on Collaboration

“ It is the long history of humankind (and animal kind, too) those who learned to collaborate and improvise most effectively have prevailed."

-Charles Darwin

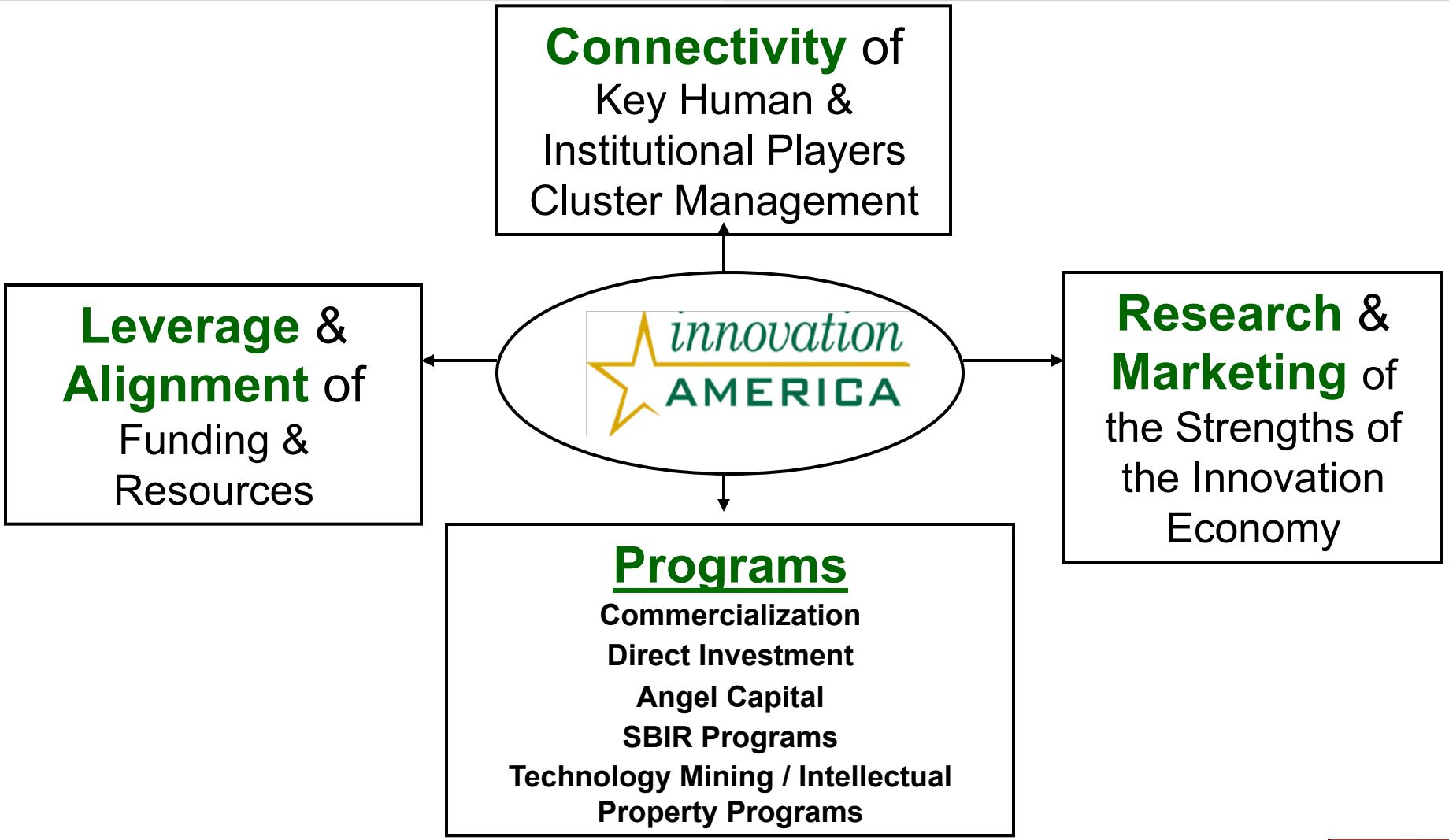




What is a Innovation Intermediary?

An Organization at the Center of the region's, state's or country's efforts to align local technologies, assets and resources to work together on advancing Innovation.

21st Century Innovation Intermediary



Innovation Intermediary Commercialization Structure

Investigation	Technical	Market	Business
Proof of Concept	Technology Concept Analysis	Market Needs Assessment	Venture Assessment
Development Phase			
Feasibility	Technology Feasibility	Market Study	Economic Feasibility
Planning	Engineering Prototype	Strategic Marketing	Strategic Business Plan
Introduction	Pre-Production Prototype	Market Validation	Business Start-Up
Commercial Phase			
Full Scale Production	Production	Sales and Distribution	Business Growth
Maturity	Production Support	Market Diversification	Business Maturity

Intermediary Best Practices

- Longevity
- Bipartisan Support & Champions
- Independent Organizations
- Continuous Reinvention
- PRIVATE SECTOR LEADERSHIP
- Understand Return On Investment
- Sustainability In Funding
- Accountable
- Innovative
- Effective Leadership

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U.S. State Innovation Programs

Successful Funding Models

Ohio Third Frontier
Innovation Creating Opportunity

$700M 5-yearBond Issue
62% Taxpayer vote approving

KANSAS BIOSCIENCE AUTHORITY

$581M 15 year Wage-tax TIF

TNInvestco

TTDC
TENNESSEE TECHNOLOGY DEVELOPMENT CORPORATION

$160M VC Premium insurance
Tax Incentives

POSITIVELY MINNESOTA
Department of Employment and Economic Development

$60 Million
Angel Tax Credits

GPIC Greater Philadelphia Innovation Cluster for Energy Efficient Buildings
A U.S. DOE Energy Innovation HUB

$129M E-RIC Grant

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Utah Science Technology and Research initiative (USTAR)

•Established to generate more technology-based start-up firms, higher paying jobs, and additional business activity leading to a state-wide expansion of the Utah's tax base.

•USTAR is comprised of three program areas:
  - •Research Teams, Research Building Projects, and regional Technology Outreach

•Research Teams: World-class research teams have been recruited to Utah and developed internally within six strategic innovation focus areas:
  - •Energy
  - •Biomedical Technology
  - •Brain Medicine
  - •Nanotechnology
  - •Imaging Technology
  - •Digital Media

USTAR
Turning innovation into industry.

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Innovation 2 Enterprise - Oklahoma

- Private not-for-profit focused on wealth creation by growing OK technology-based entrepreneurial economy
- Works directly with universities, entrepreneurs, researchers and companies to help commercialize technologies, launch and grow new businesses and access capital
- Funding
  - Proof of Concept Fund
  - Seed Capital Fund
  - Angel Network
- Entrepreneurial Development

i2E
INNOVATION TO ENTERPRISE

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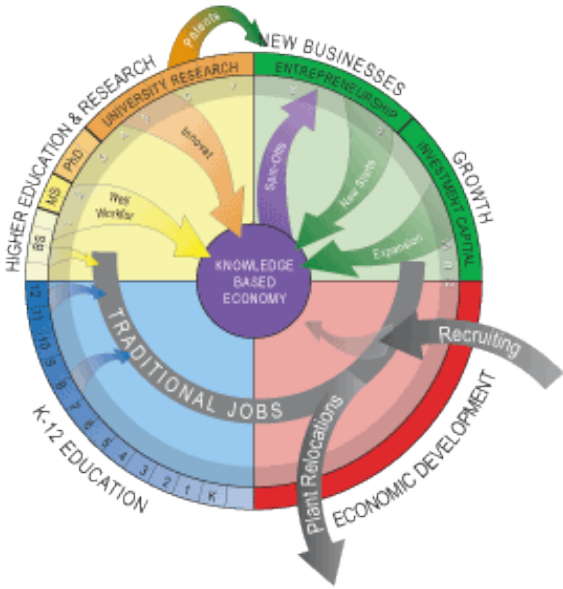
Kansas Bioscience Authority

- $581 million state-funded independent bioscience TBED organization
  - $75.5 million program budget; $3.5 million operating budget
  - 18 employees (8 “deal” people)

- Investment priorities
  - Expand the quantity and quality of bioscience research
  - Focus on the commercialization of bioscience discoveries
  - Foster formation and growth of bioscience companies
  - Position Kansas for international leadership in key clusters

KANSAS BIOSCIENCE AUTHORITY



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Kansas Bioscience Authority – Economic Impact

Through June 2010, KBA investments have helped generate:

- **1,195** new **jobs**
- **$212.6 million in capital expenditures**
- **$86.6 million in new research funding**
- **$48.3 million in equity investments**
- ***Including estimated wages of jobs, that represents a $9.41 return to the state's economy for each $1 invested by the KBA***

KANSAS BIOSCIENCE AUTHORITY

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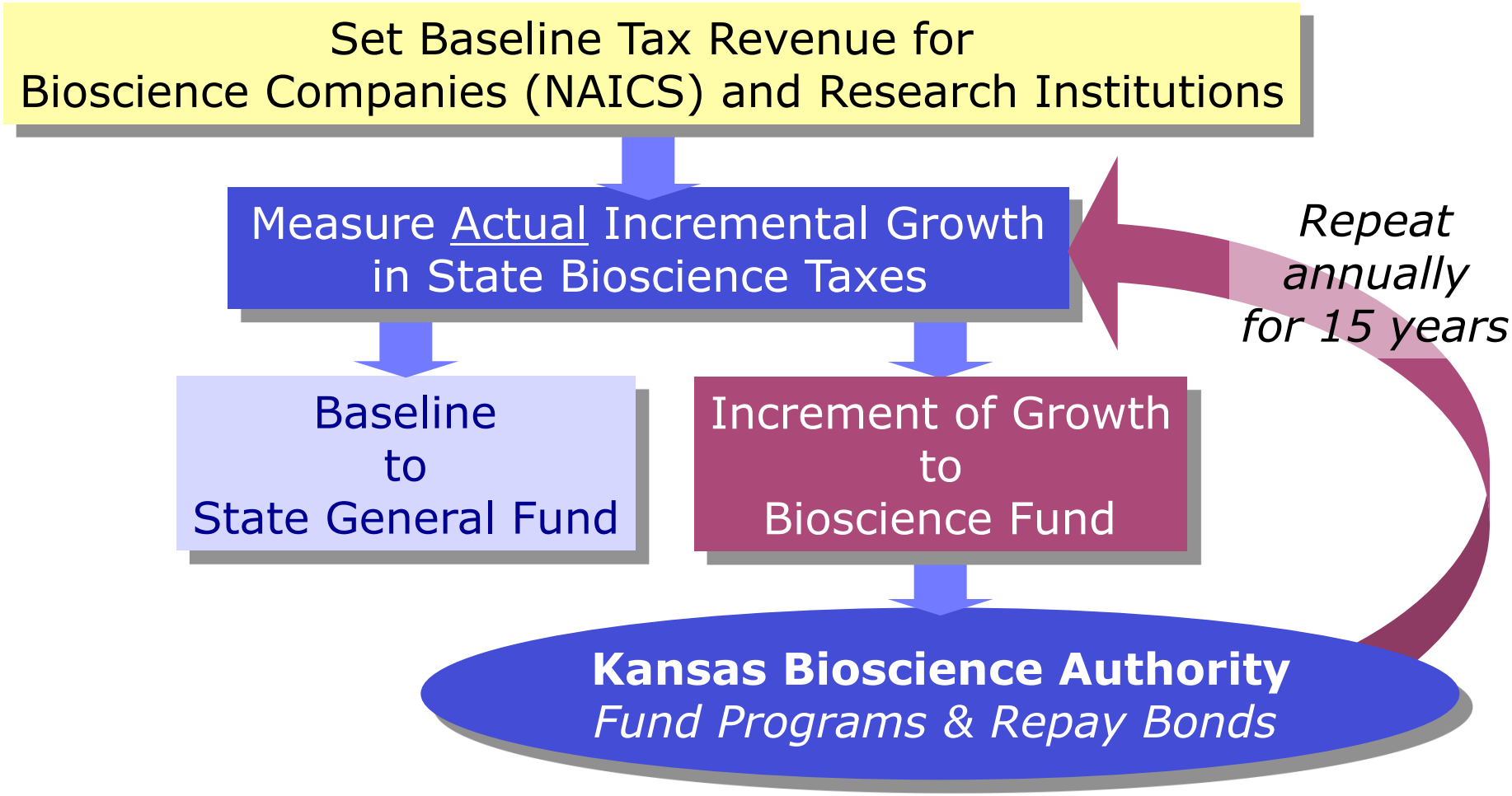
How The Fund Works



Regional IBED Intermediaries

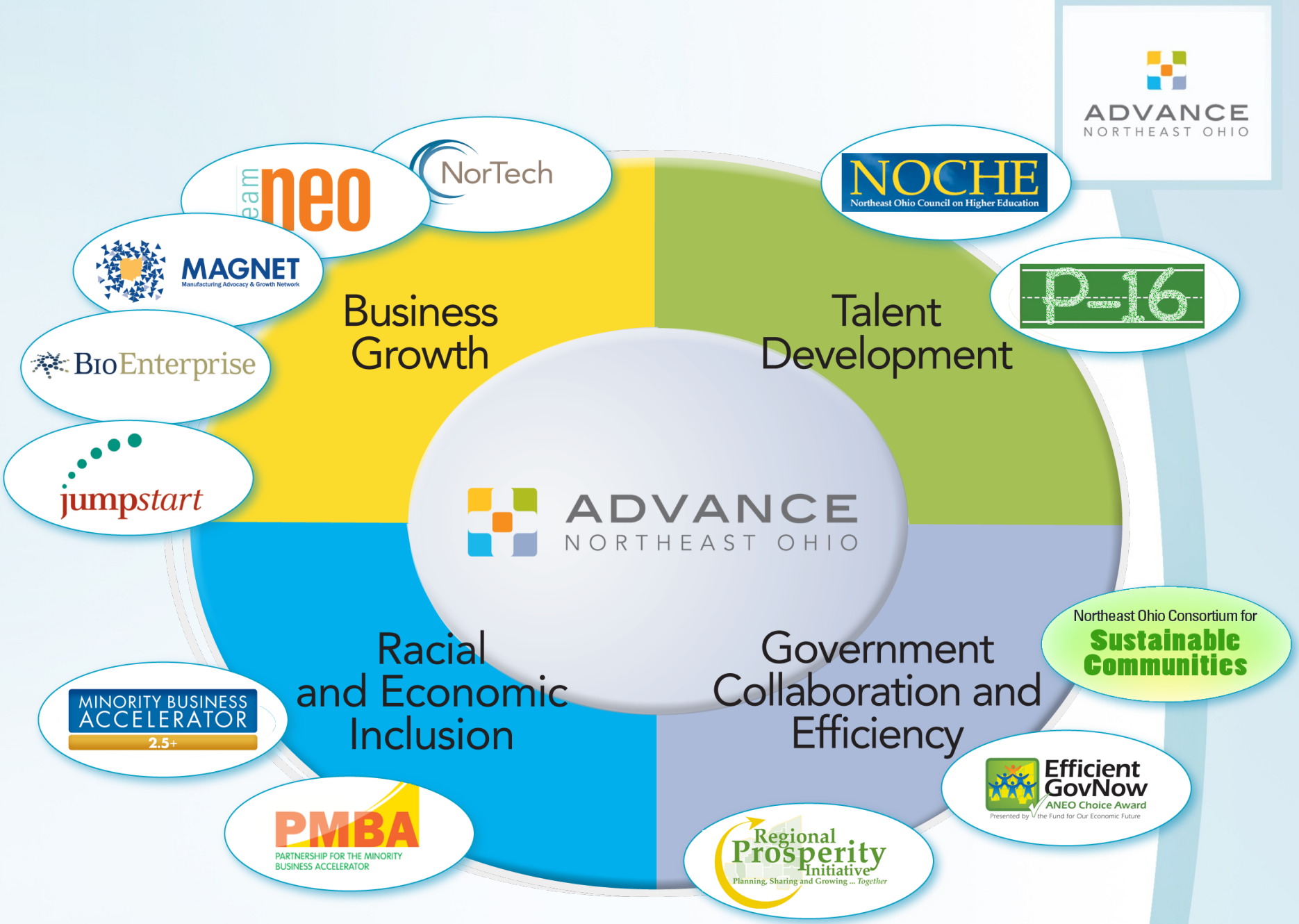
Northeast Ohio IBED Intermediaries

NorTech, (the Northeast Ohio Technology Coalition) is a nonprofit Technology-Based Economic Development (TBED) organization that champions growth in Northeast Ohio's 21 county region. Foundation funded.

JumpStart is creating economic transformation in Northeast Ohio by providing resources to entrepreneurs to grow their high potential, early stage companies.

BioEnterprise is a business formation, recruitment, and acceleration initiative designed to grow health care companies and commercialize bioscience technologies

Team NEO advances Northeast Ohio’s economy by attracting businesses worldwide to the 16-county Cleveland Plus region.


ADVANCE
NORTHEAST OHIO
NorTech
NOCHE
Northeast Ohio Council on Higher Education
MAGNET
Manufacturing Advocacy & Growth Network
P-16
BioEnterprise
jumpstart
Business Growth
Talent Development
ADVANCE
NORTHEAST OHIO
Racial and Economic Inclusion
Government Collaboration and Efficiency
Northeast Ohio Consortium for
Sustainable Communities
MINORITY BUSINESS ACCELERATOR
2.5+
PMBA
PARTNERSHIP FOR THE MINORITY BUSINESS ACCELERATOR
Efficient GovNow
ANEO Choice Award
Presented by the Fund for Our Economic Future
Regional Prosperity Initiative
Planning, Sharing and Growing ... Together

The New Economy Initiative for Southeast Michigan (NEI)

Founded:2008

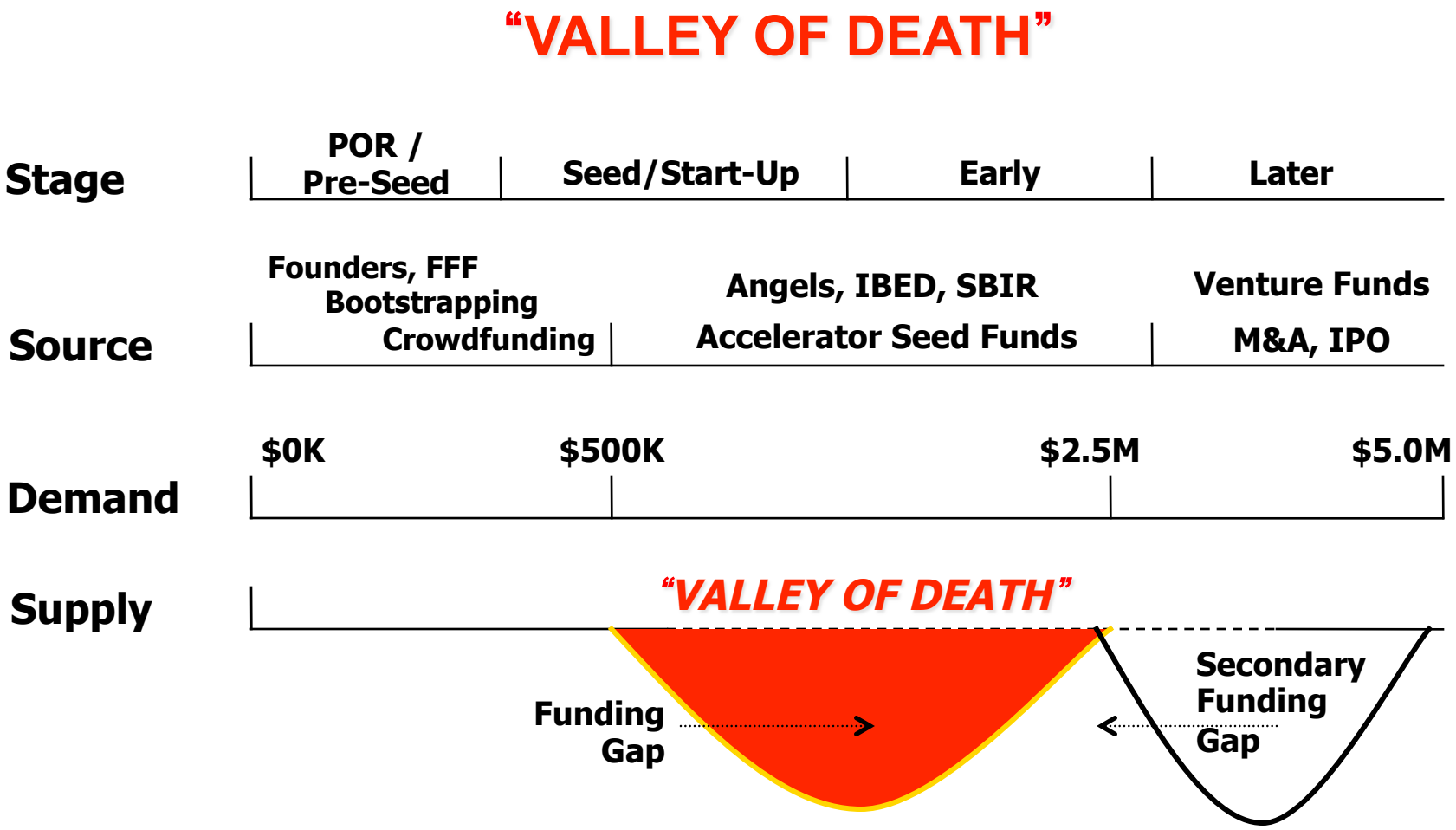
Organizational Mission: Unique philanthropic initiative aimed at helping to restore southeast Michigan to a position of leadership in the new global economy.

Original Funding: $100M – 8 year initiative - 10 national and local foundations

Goal: Accelerate the transition of metro Detroit to an innovation-based economy. Entrepreneurial Eco-System

- •Capitalizing on Existing Assets and Resources
- •Build and employ a more skilled and educated workforce
- •Urban Entrepreneurial Partnership provides assistance to 150 minority automotive suppliers to diversify their customer bases to aerospace, alternative energy, medical devices, military and homeland security.

Innovation Capital Valley of Death



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Nebraska VC Performance 2005-2010

Total US VC and Nebraska VC Dollars Invested

Year	2005	2006	2007	2008	2009	2010	2010 Rank
Total US VC (In Billions)	$23.0	$26.0	$29.0	$28.0	$18.0	$22.0	
Total NE VC	$7.4	$6.5	$0.0	$16.0	$0.0	$11.5	40
# of Deals	3	3	1	3	0	3	40

Source: SSTI & PWC Moneytree 2011

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Funding & Resources for Innovation Capital

Seed

jumpstart

BioEnterprise
A Leader in Growing BioScience Companies

500 STARTUPS

First Round CAPITAL

Delaware Innovation Fund

NYSTAR

IBED

NorTech
Shaping Northeast Ohio's Technology Future

Ohio Third Frontier
Innovation Creating Opportunity

Ben Franklin Technology PArtners

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MICHIGAN
ECONOMIC DEVELOPMENT CORPORATION

Maryland TEDCO
Technology Development Corporation

KANSAS BIOSCIENCE AUTHORITY

edaNJ
NEW JERSEY ECONOMIC DEVELOPMENT AUTHORITY

Federal

SBIR & STTR

TIP
Technology Innovation Program

SBA
U.S. Small Business Administration

SBIC Program

CRADA

PCP

NRC·CNRC Canada
NRC Industrial Research Assistance Program

Angel

ohio TechAngels

MAG
MID-ATLANTIC ANGEL GROUP

TECH COAST ANGELS

JumpStart NEW JERSEY ANGEL NETWORK

LORE ASSOCIATES

RobinHood VENTURES

SouthCoastAngels
"A Member Managed Angel Fund"

New York ANGELS

Entrepreneur

AUSTEN BioInnovation
INSTITUTE IN AKRON

techstars

Y Combinator

seedcamp

PIPELINE
KTEC'S ENTREPRENEURIAL FELLOWSHIP

DREAMIT VENTURES

NASVF
Advancing Innovation Capital

SSTI

Federal Laboratory Consortium
FLC
FOR TECHNOLOGY TRANSFER

ACA
ANGEL CAPITAL ASSOCIATION

nbia

Key Difference Between Incubators and Accelerators

Incubators - incubators allow for slower growth, although they typically have some requirements as to how long companies can remain in the incubators before they graduate.

Accelerators - as their name implies, focus on an intense, boot-camp-like experience to get new businesses up and running in a matter of months.

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2011 Accelerator Rankings

2011 Rankings USA Startup Accelerators

Rank	Program	Location	Website
1	TechStars Boulder	Boulder, CO	techstars.org/boulder
2	Y Combinator	Mountain View, CA	ycombinator.com
3	Excelerate Labs	Chicago, IL	exceleratelabs.com
4	LaunchBox Digital	Durham, NC	launchboxdigitalcom
5	TechStars Boston	Boston, MA	techstars.org/boston
6	Kicklabs	San Francisco, CA	kicklabs.com
7	TechStars Seattle	Seattle, WA	techstars.org/seattle
8	Tech Wildcatter	Dallas, TX	techwildcatters.com
9	DreamIt Ventures	Philadelphia, PA	dreamitventures.com
10	The Brandery	Cincinnati, OH	brandery.org
11	Capital Factory	Austin, TX	capitalfactory.com
12	NYC SeedStart	New York, NY	nycseed.com
13	Betaspring	Providence, RI	betaspring.com
14	BoomStartup	Salt Lake City, UT	boomstartup.com
15	AlphaLab	Pittsburgh, PA	alphalab.org

TechCocktail.com

Best Practices in Innovation Entrepreneurial Support

PIPELINE
KTEC'S ENTREPRENEURIAL FELLOWSHIP

pipeline 2
pipeline
A KTEC INNOVATION INITIATIVE

Ewing Marion
KAUFFMAN
Foundation

The PIPELINE is the nation's premier state-sponsored technology entrepreneur fellowship program. PIPELINE is designed to systematically identify high potential technology entrepreneurs and match them with best-in-class training, resources and mentors to facilitate their dynamic growth in Kansas.

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What Is A Road Map…..Why Is It Needed?

- A roadmap answers the ***question "Where do we want to be and how to we get there?"***
- A cluster roadmap ***provides strategies and action*** plans to best ***achieve a vision of the future shared by a critical mass*** of industry-related organizations.
- The strategies and action plans are developed according to the unique strengths of the cluster and region as compared to a global market opportunity.

Innovation America: Innovation Road Map Process

1. Literature Review of Comparables
2. Key Stakeholder Interviews/Recommendations
3. Asset Mapping/Cluster Analysis
4. GIS Innovation Mapping
5. Innovation Benchmarking/Index (Peer 2 Peer)
6. Innovation and Entrepreneurship Resource Identification (Entrepreneur Resource Guide and Database)
7. Innovation Economic Development Organizational Analysis and Matrix
8. Innovation & Commercialization Gap Analysis (programs & services)
9. Innovation Ecosystem Public Policy Recommendations
10. Develop Strategic Plan
11. Organizational Leadership and Staffing
12. Operations/Implementation Plan and Program Portfolio
13. Branding/Marketing Strategy and Market Research
14. Economic Impact Analysis
15. Celebrate Success

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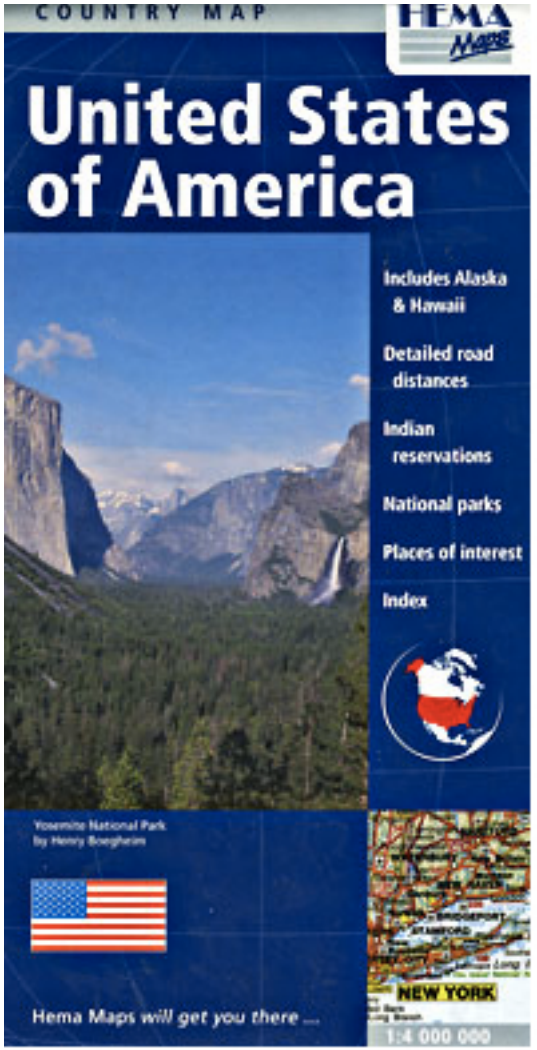
America's Innovation Road Map

- Develop an American Innovation Road Map & implementation strategy
- Create an Early-stage innovative job Fund of Funds (FOF)
- Reauthorization of the SBIR & STTR
- Increase Funding Technology Innovation Program (TIP)
- Create a Federal Angel Capital Investment Tax incentive
- Make permanent the R&D Tax Credit & add transferability provision
- Create the 1st electronic Innovation & Entrepreneurship Clearinghouse



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Bill Gates - Microsoft

"Never before in history has innovation offered promise of so much to so many in so short a time."

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