Making an Impact

Assessing the Benefits of Ohio's Investment in Technology-Based Economic Development Programs

Study Background

- The Ohio Third Frontier (OTF) is a major attempt to revitalize Ohio's economy through technology-led growth.
- ODOD engaged SRI International and Georgia Tech to assess the impact of OTF and other technology-based economic development (TBED) programs.

Program Context

TBED Programs

Edison Program
- Incubators
- Technology Centers

Ohio Third Frontier Program
- Wright Centers of Innovation
- Research and Commercialization
- Wright Projects
- Ohio Research Scholars
- Entrepreneurial Signature Program
- Pre-seed and Seed Funds
- Fuel Cell Program
- Advanced Energy Program
- Targeted Industry Attraction
- Innovation Ohio Loan Fund

Ohio Capital Fund/Ohio Venture Capital Authority

Ohio Technology Investment Tax Credit

Program Outcomes

- Expand early-stage capital for technology firms
- Support technology entrepreneurs
- Expand university-industry-nonprofit R&D collaboration
- Create world-class R&D capacity in specific technologies
- Develop and support technology industry clusters
- Improve productivity of small manufacturers

Benefits to Ohio

- Competitive products
- New companies
- Sustainable industries
- High-paying jobs
- Thriving technology clusters
- World-class R&D institutions
- Workforce for the future
- Reinvented companies
- International recognition as a technology leader

TBED Program Conceptual Framework

Technology Commercialization Framework

Ohio Third Frontier

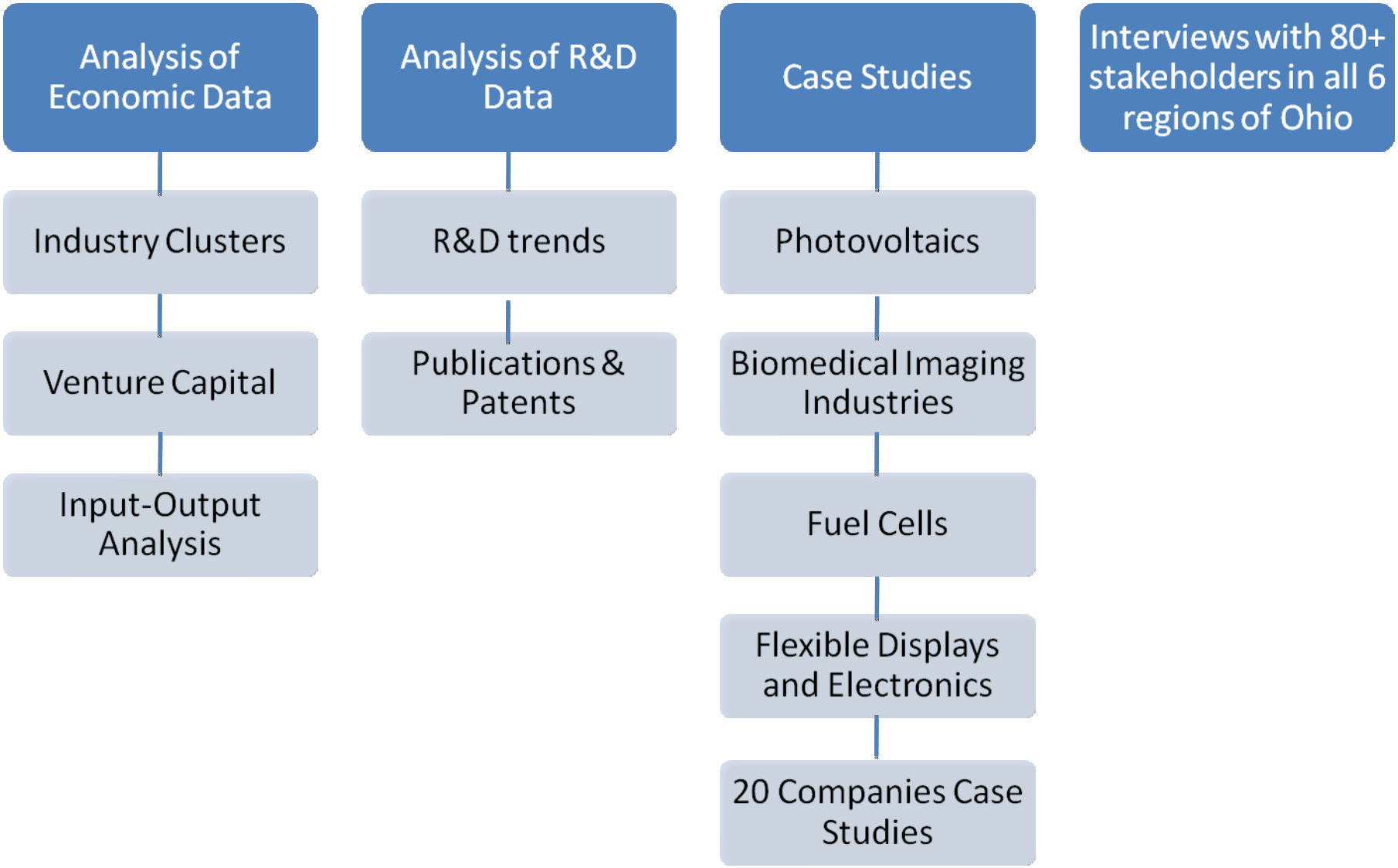
Edison Technology Incubators

Edison Technology Centers

Technology Investment Tax Credit

Ohio Venture Capital Authority

Study Approach



Challenges in Measuring Outcomes

- Still early – new tech clusters takes 10-20 years
- Macro trends (decline of manufacturing) masks many quantitative trends
- Data categories do not match emerging technology industries in existing data sources (e.g. Census, BLS, NSF)
- Broad scope, finite resources and time
- Difficulty in assigning causality
- Approach is weighing of best available evidence

SRI evaluated the impact of Ohio's TBED investments against their objectives:

1. Positive return on OTF investment for the State of Ohio
2. Dramatic increase in early-stage capital for Ohio technology companies
3. Improved environment for technology entrepreneurs
4. Increased R&D collaboration and enhanced the commercial relevance of this R&D activity
5. Catalyzed the emergence of new technology clusters
6. Contributed to the diversification and competitiveness of Ohio's traditional manufacturers
7. Recruitment Companies to Ohio
8. Development of world-class technology clusters

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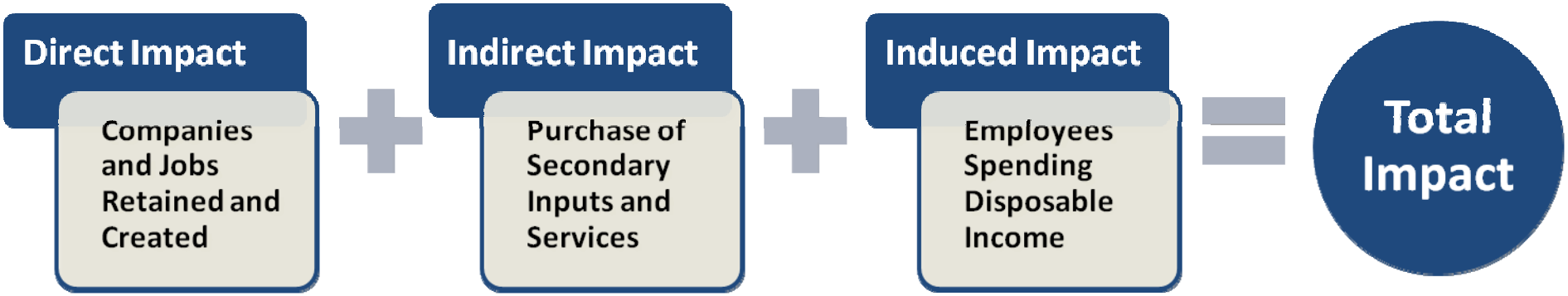
Desired Outcome #1

Generating a positive return on the State of Ohio's investment

#1 Generating a Positive Return on Investment

- From 2003-2008, $681M of State of Ohio expenditures resulting from OTF:
- Input-output model used to estimate the **direct, indirect** and **induced impacts** of these expenditures



#1 Generating a Positive Return on Investment

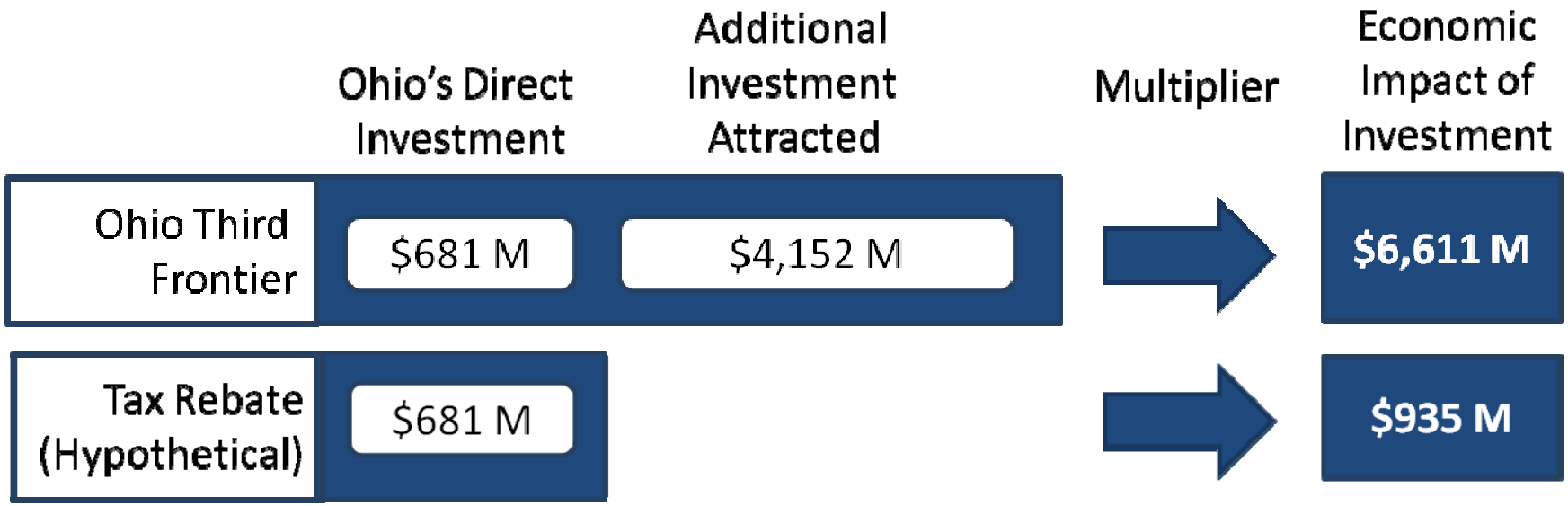
- The $681M of expenditures generated a total economic impact of $6.6Bn of economic activity, 41,300 jobs, and $2.4Bn in employee wages and benefits
- This represents a 10:1 return
- Return made possible because OTF awardees attracted additional investment of $4.2Bn from private, Federal, Foundation and local sources
- Anticipated to generate even larger impacts in years to come

#1 Generating a Positive Return on Investment

- Reasons for larger impact 5-10 years from now:
  - Significant share of OTF funds yet to be awarded and spent
  - Products and processes being commercialized by Ohio companies will be in position of strength during next expansion
  - Many intermediate impacts of OTF long-term in nature (e.g., new products and services resulting from university research and better linkages among university-industry-financial institutions)

#1 Opportunity Cost?

- Analyzed an alternative scenario where the State of Ohio returned $681M to taxpayers as a "tax rebate"
- Estimated impact was $935M of economic activity 6,400 jobs, and $214 M in wages and benefits.
- OTF generated more than 7x the level of economic activity



Source: SRI International

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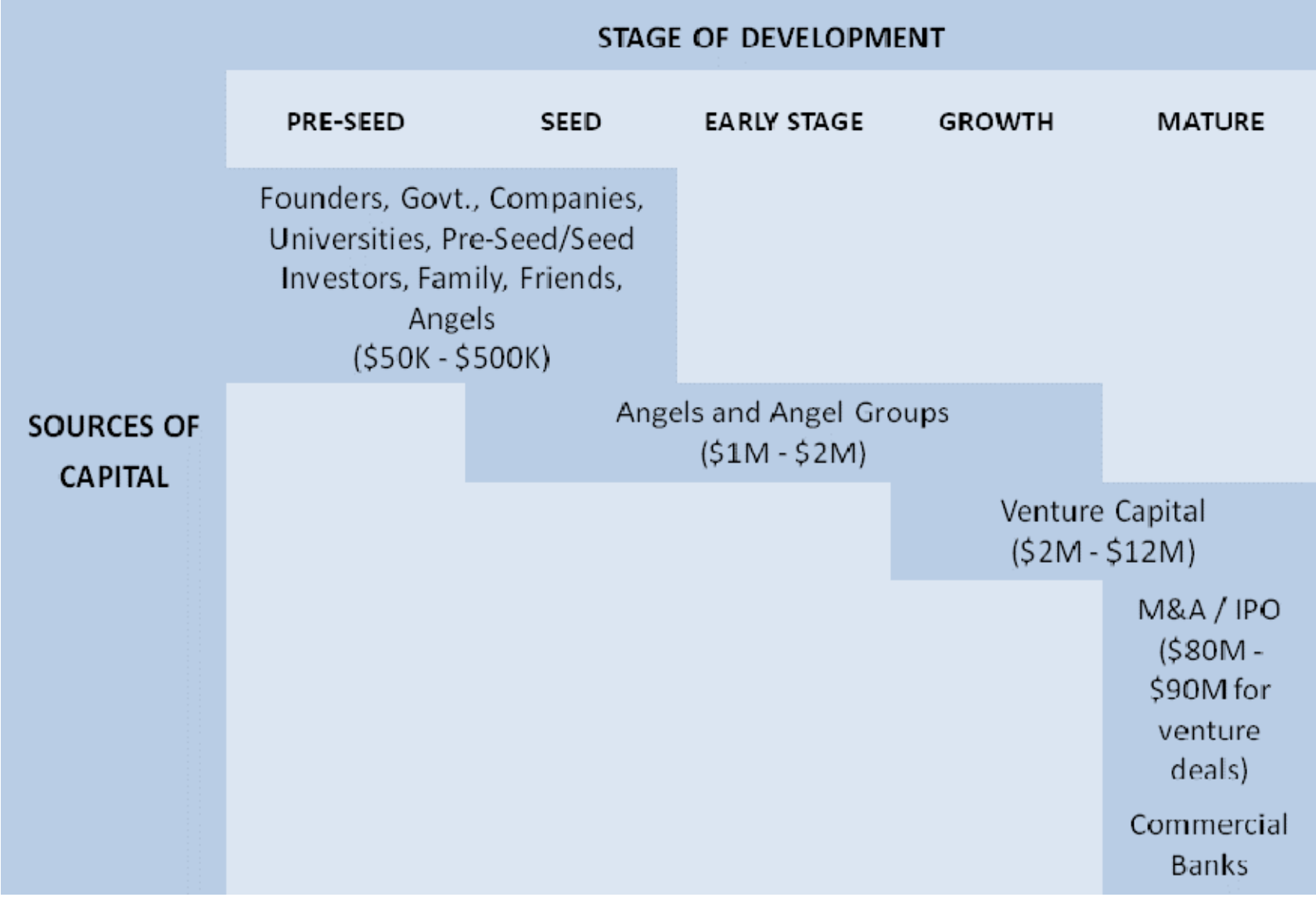
Desired Outcome #2

Increasing the availability of early-stage capital for Ohio technology companies

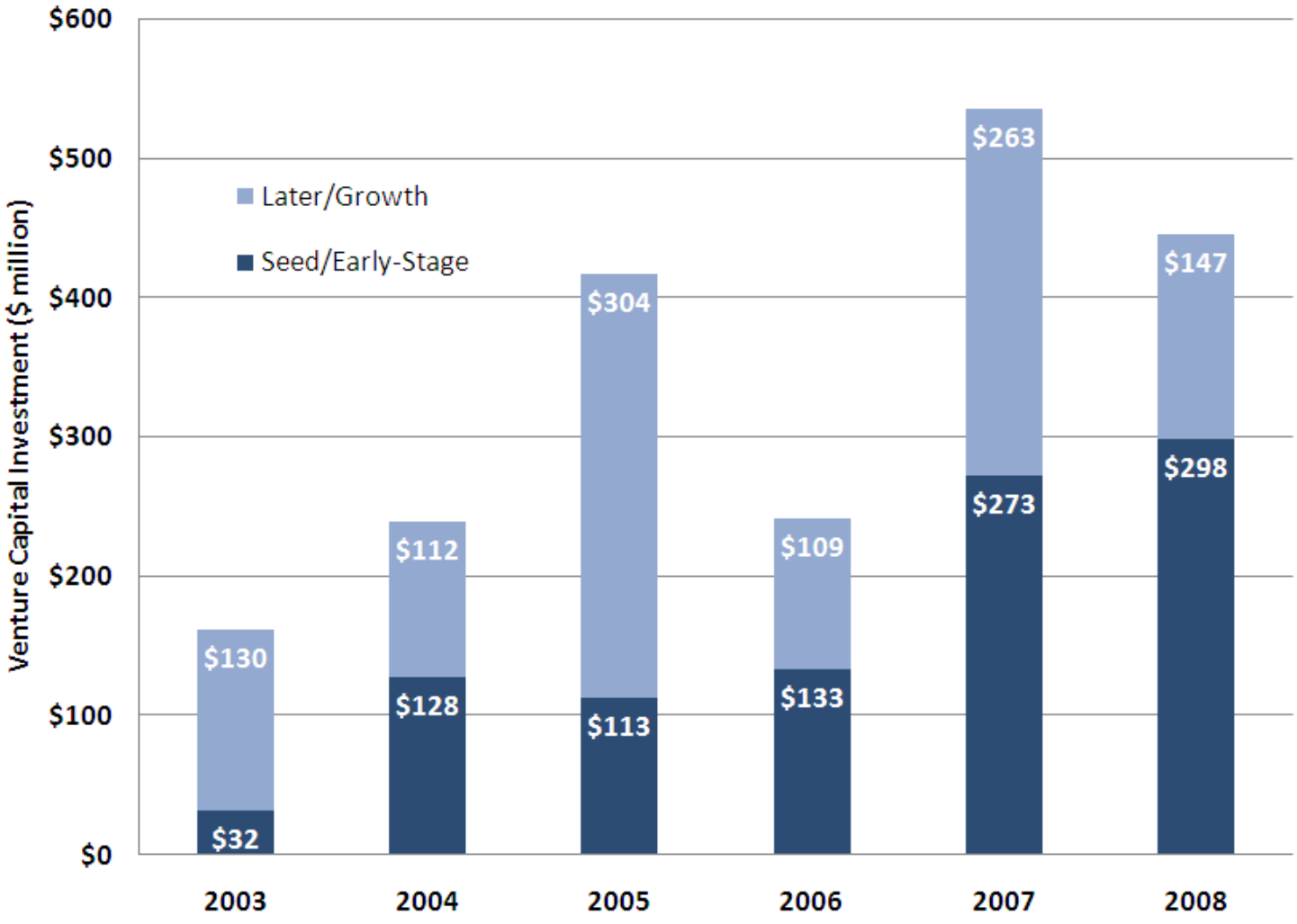
#2 Increasing the Availability of Early-Stage Capital



#2 Increasing the Availability of Early-Stage Capital

- To increase number of big payout companies need to increase the number of startups going into venture capital pipeline
- Several Ohio TBED programs seek to increase availability of capital for startups:
  - OTF Pre-Seed Funds (approximately 46 funds supported)
  - Technology Investment Tax Credit
  - Ohio Capital Fund/Ohio Venture Capital Authority
  - OTF Entrepreneurial Signature Program & Edison Technology Incubators

#2 Increasing the Availability of Early-Stage Capital



Source: Fisher College of Business Center for Entrepreneurship, The Ohio State University

#2 Increasing the Availability of Early-Stage Capital

- Raised first round of financing ($1.65M) led by the Ohio TechAngels Fund, a pre-seed fund capitalized with support from the OTF and leveraging the TITC
- This investment enabled CleveX to complete product design and testing, and to seek FDA approval
- A follow-on $1.65M investment was led by Reservoir Venture Partners, a Columbus-based venture capital fund leveraging the Ohio Capital Fund

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Desired Outcome #3

Improving the Environment for Technology Entrepreneurs

3 Improving the Environment for Technology Entrepreneurs

- Entrepreneurship is a driving force of innovation and economic growth
- OTF-supported ESPs and Edison Incubators provide a range of services to start-up companies to help them succeed
  - Business guidance
  - Access to information, service, and financial networks
  - Pre-seed funding for developing prototypes and conducting market assessments
- Expansion of early stage capital also improves entrepreneurial environment

3 Improving the Environment for Technology Entrepreneurs

6 Entrepreneurial Signature Programs

—Direct business assistance and pre-seed funding to 81 startups

—$145M in product sales, follow-on equity investments, funding

13 Edison Incubators

—Direct business assistance to 270 startups

—$262M in products sales, research grants, other

—$120M in equity investments

- Interviewees generally believe ESPs are highly effective part of program
- Recent SBA study quantifies impact of net startups on GSP: increasing net startups by 5% increases GSP by 0.5%
  - Suggests 450-500 new companies would lead to $2.3B growth in Ohio GSP

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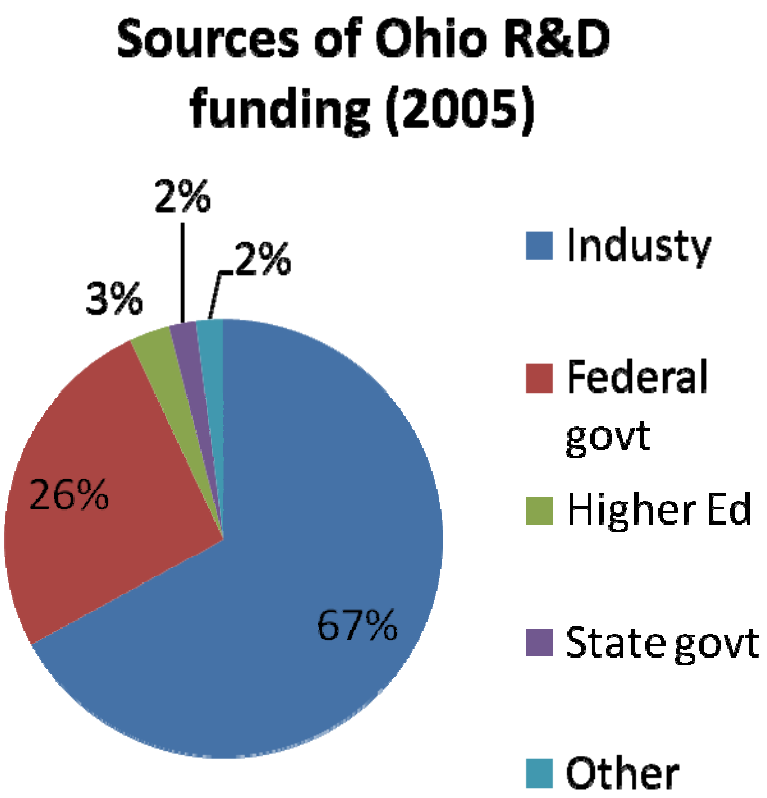
Desired Outcome #4

Improving R&D Collaboration

#4 Improving R&D Collaboration

- A key aspect of effective technology-based economic development is to have a region's research institutions strongly connected to local industry.
  - Silicon Valley, Boston, Research Triangle Park, Austin examples
- To be effective, state funding needs to be:
  - Targeted
  - Used to leverage and connect other R&D



Source: NSF

#4 Improving R&D Collaboration

- Ohio's TBED programs designed to enable or require university-industry collaboration
  - Wright Projects, Wright Centers and Ohio Research Scholars awards target development of university faculty, equipment and projects valued by industry
  - The Wright Projects and Research Commercialization Program support research collaborations and commercialization projects
- Program supports many "bridging institutions" that develop technology strategies, create networks, support collaborative projects, and leverage out-of-state funds
  - Edison centers like BioOhio and PolymerOhio
  - Wright Centers like IDCAST (Institute for the Development and Commercialization of Advanced Sensor Technology) , Ohio BioProducts Innovation Center, Ohio Center for Advanced Power and Propulsion (OCAPP), many others

#4 Improving R&D Collaboration

- Stakeholder interviews and case studies indicate OTF is improving research infrastructure and research collaboration in the state, especially in the targeted technology areas.
  - Patent data indicates Ohio doing well in targeted areas
- Licensing income to Ohio's universities more than doubled from $16.1 M in 2002 to $39.6 M in 2007 and the number of university-based start-ups is increasing.
  - Ohio universities, while improving, can still do better in technology transfer and commercialization

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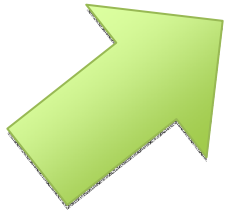
Desired Outcome #5

Increasing Employment Growth in Ohio's Technology Sector



High-tech Employment

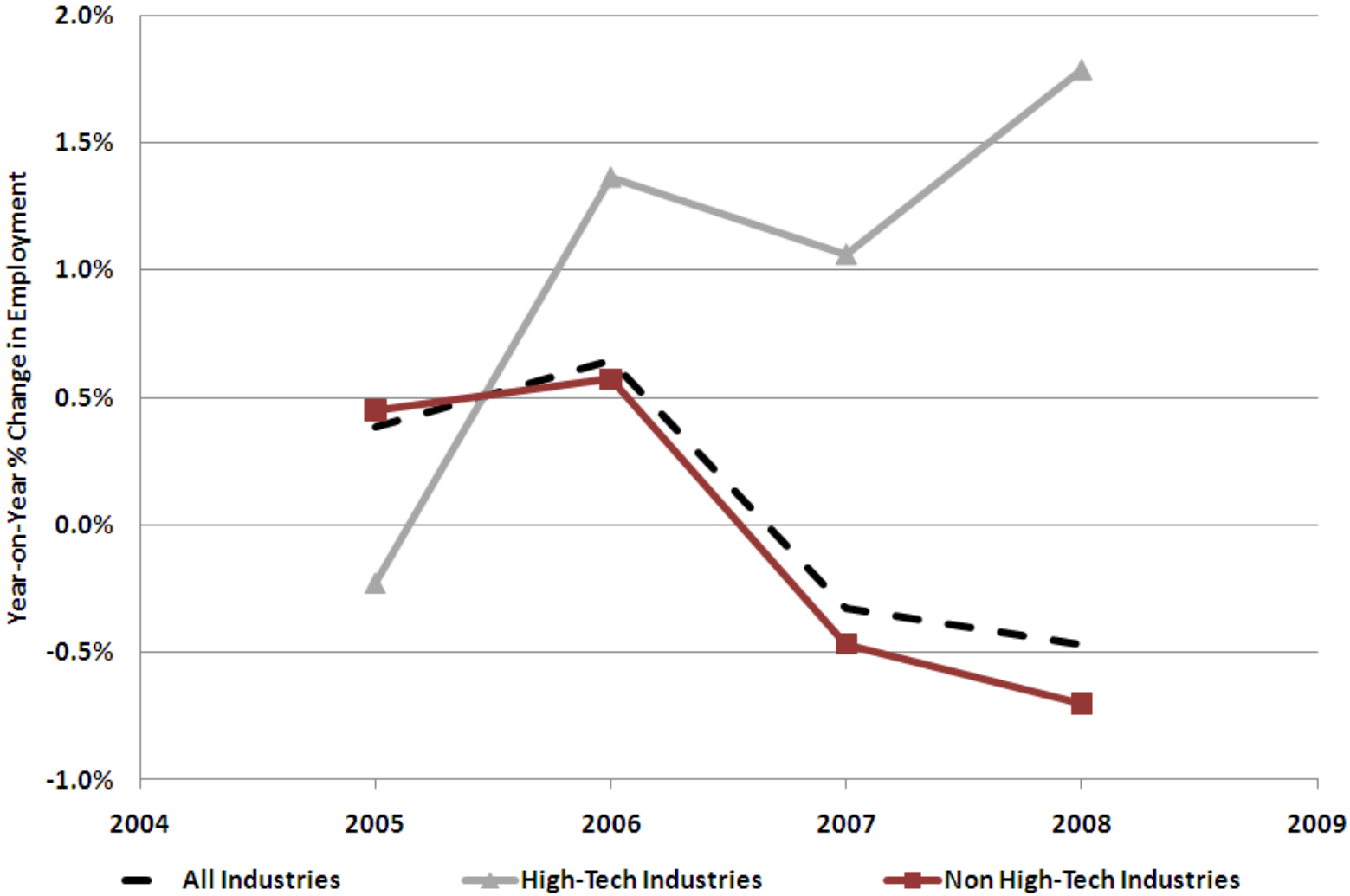
#5 Increasing Employment Growth in Ohio's High-Tech Sector

- Economic data, stakeholder interviews, case studies indicate that several new industry clusters are emerging in Ohio
- SRI team studied four in depth:
  - Biomedical Imaging
  - Flexible Displays and Electronics
  - Fuel Cells
  - Photovoltaics

#5 Increasing Employment Growth in Ohio's High-Tech Sector

ECONOMIC INDICATORS FOR OHIO'S EMERGING TECHNOLOGY CLUSTERS				
EMERGING TECHNOLOGY CLUSTER	# OF OHIO COMPANIES	EMPLOYMENT 2004	EMPLOYMENT 2008	LEVERAGED INDUSTRIES
Biomedical Imaging	91	2,815	5,267	Advanced Materials Biomedical Research Clinical Medicine Software Research and engineering design services
Flexible Displays and Electronics	11	897	1,012	Polymers Photovoltaics Research and engineering design services
Fuel Cells	49	3,506	4,435	Polymers Metals Manufactured components Research and engineering design services
Photovoltaics	25	2,327	3,218	Glass Polymers Metals Research and engineering design services

#5 Increasing Employment Growth in Ohio's High-Tech Sector



Source: NorTech and the Center for Economic Development at Cleveland State University's Maxine Goodman Levin College of Urban Affairs.

#5 Increasing Employment Growth in Ohio's High-Tech Sector

- Between 2004 and 2008:

High-tech Employment

Non-high tech Employment

- Wages:

$76,694

High-tech Jobs

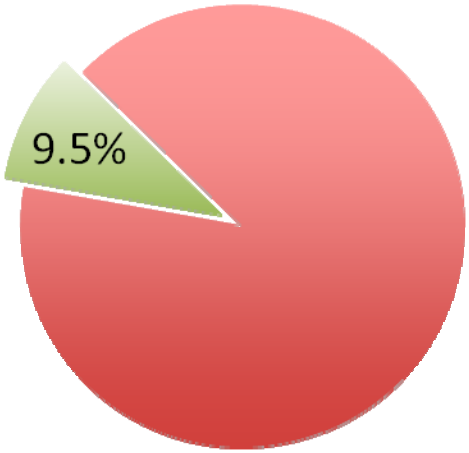
$37,803

Rest of the Economy

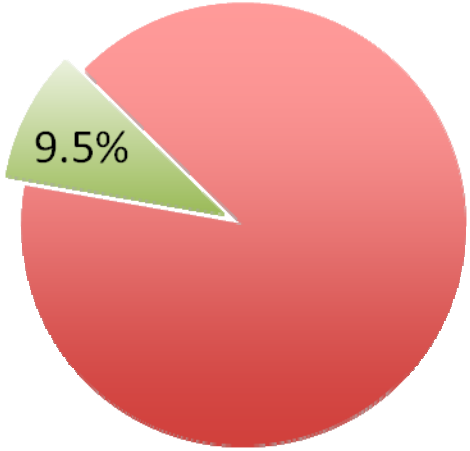
- Employment:

495,088
High-tech Jobs

Ohio



USA



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Desired Outcome #6

Contributing to Diversification and Competitiveness of Ohio Manufacturers

#6 Contributing to Diversification and Competitiveness of Ohio Manufacturers

- New technologies and processes increase the competitiveness of traditional industries.
- Edison Centers
  - provide Ohio manufacturers with technical assistance (leveraging Federal Manufacturing Extension Partnership funding)
  - serve as conduits to expertise in Ohio technology companies, universities and research institutions
- OTF direct investments in Ohio companies are helping traditional manufacturers retool and commercialize new products for new markets

#6 Contributing to Diversification and Competitiveness of Ohio Manufacturers

American Trim

- metal forming and coating company founded as Lima Tool and Die in 1951
- emphasized innovation through R&D as a strategy to meet the challenge of international competition and the need for environmental responsibility
- OTF support enabled development of a new “chrome-like” coating and a novel metal forming technology for fuel cell plates.

Crown Equipment

- leading global manufacturer of forklifts, founded in 1945.
- Using R&D to respond to demand for clean energy technologies and international competition.
- OTF support has enabled Crown to develop and test use of fuel cell-based lift trucks that could provide cost savings for Crown’s customers.
- Positions Crown to take the lead in the fuel-cell-based lift truck market.

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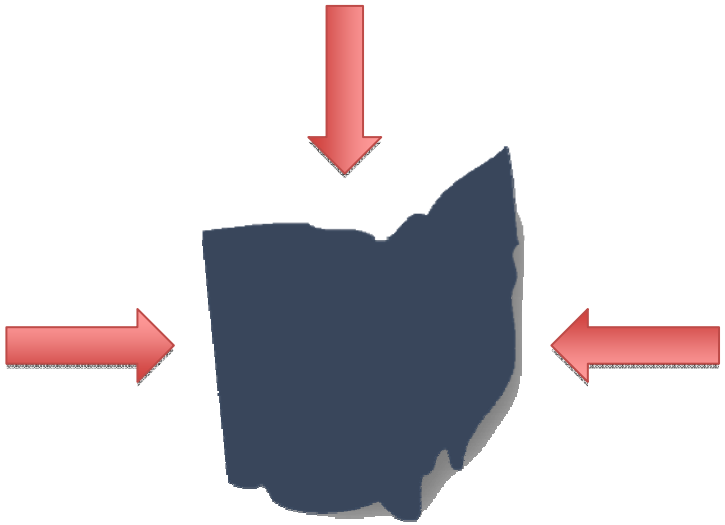
Desired Outcome #7

Recruiting Companies to Ohio



#7 Recruiting Companies to Ohio

- Interviews with fuel cell, advanced materials, biomedical imaging, and other firms confirmed that Ohio TBED programs were important factors in their corporate decisions to locate in Ohio
- Example of firms citing TBED program support in decision to locate in Ohio include:
  - Philips Medical
  - Rolls Royce Fuel Cell Systems
  - Zyvex Performance Materials

- For three straight years, Ohio's attractiveness for business relocation has been recognized by *Site Selection's* prestigious Governor's Cup (503 major investments)

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Desired Outcome #8

Developing World-Class Tech Clusters

#8 Developing World-Class Tech Clusters

- OECD found regions with successful technology clusters shared following attributes:
  - Strong commitment of the public sector
  - Research commercialization
  - Seed capital
  - Critical mass of talent and workforce skills enhancement
  - Strong public-private partnerships and leadership
  - A high quality of life
  - Strong cooperation and social capital

Ohio's TBED Programs contain all the elements associated with world best practices in technology cluster development

OECD (2009). Clusters, Innovation and Entrepreneurship. Paris, France: OECD

Summary of Evidence

Return on Investment	**$6.6Bn → 10:1 Return**
Early Stage Capital	**18.5% Annual Growth**
Entrepreneurial Environment	**350+ startups assisted**
R&D Collaboration	**Many university-industry collaborations and networks created**
New Technology Clusters	**4% high-tech employment growth**
Diversification and Competitiveness	**New products and processes identified**
Recruitment	**Firms cite OTF in location decisions**
World-Class Clusters	**Using international best practices**

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Looking Forward to 2012:

Developing Ohio's Third Frontier

SRI Recommendations

- **Continuity & Renewal**
  - Long-term support is essential for the development of technology clusters
  - Program needs to be adaptive
  - Program is effectively designed, and is managing change appropriately
- **Communication**
  - Few people understand the OTF in its entirety—program simplification needed
  - Ohio needs to develop and communicate its identity as a place of innovation, with great lifestyle and culture

SRI Recommendations

Program Focus

- Funding for designated clusters v. more open solicitations
  - OTF has done a good job of focusing resources on clusters, as well as supporting opportunities outside targeted clusters
  - Consider expanding scope to include more creative industries, using Ohio expertise in consumer products and market intelligence
- Funding for universities v. entrepreneurial support
  - Universities are at core of OTF, to date, and account for significant share of leverage
  - Suggestions to increase “market pull” rather than “technology push”
  - Make modest readjustment to place greater emphasis on entrepreneurial support programs and efforts to attract technology companies in targeted areas

SRI Recommendations

Expanding Networks

- Networks are the key to technology-based economic development
- Stakeholders view: formation of these networks has been one of the most, if not the most, important result of the program
- Networking efforts should continue and expand.
- Areas for improvement:
  - Different regions of the state do not communicate as well as they should
  - Important to continue to work to make the major institutions in Ohio full partners in program (e.g., Battelle, OSU, AFRL)

Thank You

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