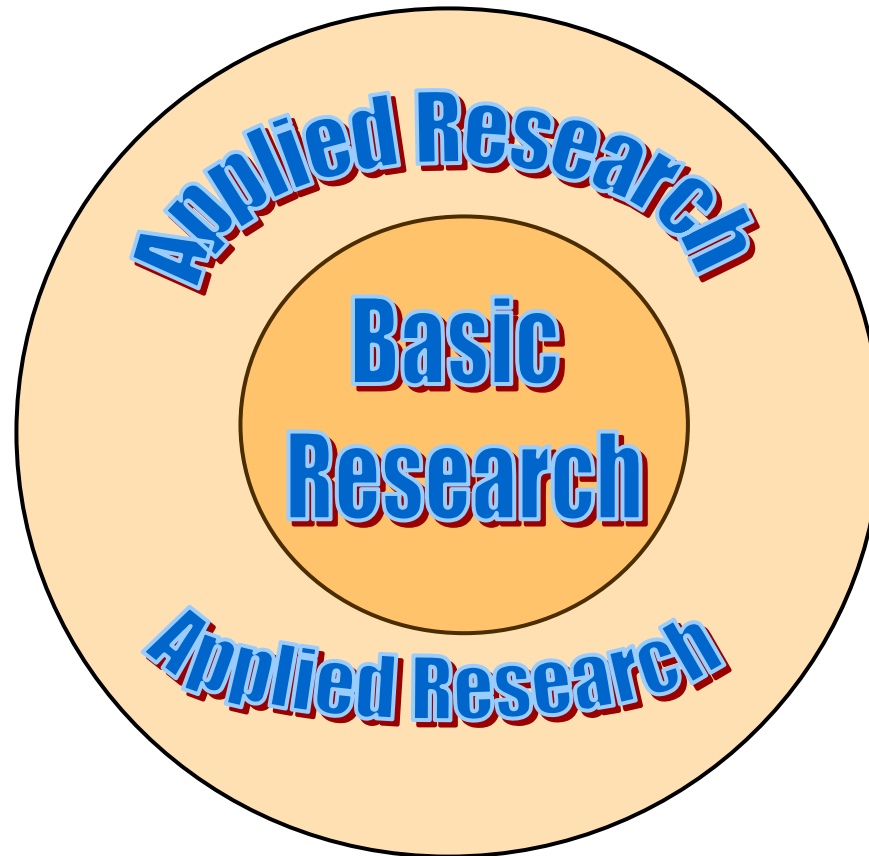


Research Clusters and Regional Economic Growth: Anticipating the Future Growth of U.S. Research/Science Parks

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Knowledge Capital as the Source of Regional Economic Growth



Two Paradoxes of Knowledge Spillovers

- **Geography** – Clusters within Close Spatial Proximity to Knowledge Source
(Adam B. Jaffe, Manuel Trajtenberg, and Rebecca Henderson, 1993, “Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations,” *Quarterly Journal of Economics*; Annalee Saxenian, 1994, *Regional Advantage*; Harvard University Press.)
- **Organizational** – Role of Entrepreneurial New Firms as Conduit of Knowledge Spillovers
(R. Agarwal et al., “The Process of Creative Construction: Knowledge Spillovers, Entrepreneurship and Economic Growth,” *Strategic Entrepreneurship Journal*, 2008.)

The Cluster Context

- Cluster: “The location of complementary and interacting firms, individuals and institutions within close geographic proximity”
- Michael Porter, “firms in downstream industries (that is channels or customers); producers of complementary products; specialized infrastructure providers; government and universities, think tanks, vocational training providers); and standards/setting agencies” (M.E. Porter, “On Competition,” Harvard Business School Publishing, 1999, p. 199.)

Stylized Facts for Geographic Clusters

- ***Emergence of Knowledge-Based Clusters***
(AnnaLee Saxenien, *Regional Advantage*, Harvard University Press, 1994)
- ***Innovative Activity Clusters within Close Geographic Proximity Around Knowledge Sources***
(D. Audretsch & M. Feldman, “R&D Spillovers and the Geography of Innovation and Production,” *American Economic Review*, 1996, 630-640)

Example: Silicon Valley

- “It is not simply the concentration of skilled labor, suppliers and information that distinguish the region. A variety of regional institutions – including Stanford University, several trade associations and local business organizations, and a myriad of specialized consulting, market research, public relations and venture capital firms – provide technical, financial, and networking services which the region’s enterprises often cannot afford individually. These networks defy sectoral barriers: individuals move easily from semiconductor to disk drive firms or from computer to network makers...This decentralized and fluid environment also promotes the diffusion of intangible technological capabilities and understandings.”
(AnnaLee Saxenien, *Regional Advantage*, Harvard University Press, 1994)

Innovative Activity in U.S. Cities

Industry		N	Most Innovative MSA
3573	Electronic Computing Machinery	787	San Jose (166); Boston (48); Los Angeles (48); Anaheim (35)
3823	Process Control Instruments	464	Boston (45); Philadelphia (31); Chicago (26)
3662	Radio/TV Equipment	311	San Jose (58); Boston (25); New York (17); Los Angeles (14)
3674	Semiconductors	168	San Jose (53; Boston (10); Dallas (10); Los Angeles (10)
3825	Instruments to Measure Electricity	114	San Jose (22); Boston (20)
2834	Pharmaceuticals	116	Newark (27); Philadelphia (11); New York (10)
3842	Surgical Appliances	101	Newark (20); Nassau-Suffolk (10); Bergen-Passaic (8); Philadelphia (6)
3494	Valves and Pipe Fittings	81	Anaheim (6); Los Angeles (6); Cleveland (6); Cincinnati (5)
3679	Electronic Components	72	San Jose (19); Anaheim (7); Boston (6);
3561	Pumps and Pumping Equipment	68	Philadelphia (8); Aurora-Elgin (7)
3861	Photographic Equipment	57	Rochester (8); Minneapolis (7)
3579	Office Machines	54	New York (11); Philadelphia (7); Stamford (5)
3622	Industrial Controls	51	San Jose (7); Cleveland (4)
3841	Surgical and Medical Instruments	51	Nassau- Suffolk (10); Bergen-Passaic (8)

Stylized Facts for Geographic Clusters - 2

- ***Knowledge-Based Clusters Exhibit Higher Rates of Economic Growth***
(Ed Glaeser et al., “Growth of Cities,” *Journal of Political Economy*, 1992)
- ***Cluster Growth is Promoted by Diversity Rather than Specialization of Knowledge Resources***
(M. Feldmann & D. Audretsch, “Innovation in Cities,” *European Economic Review*, 1999.)

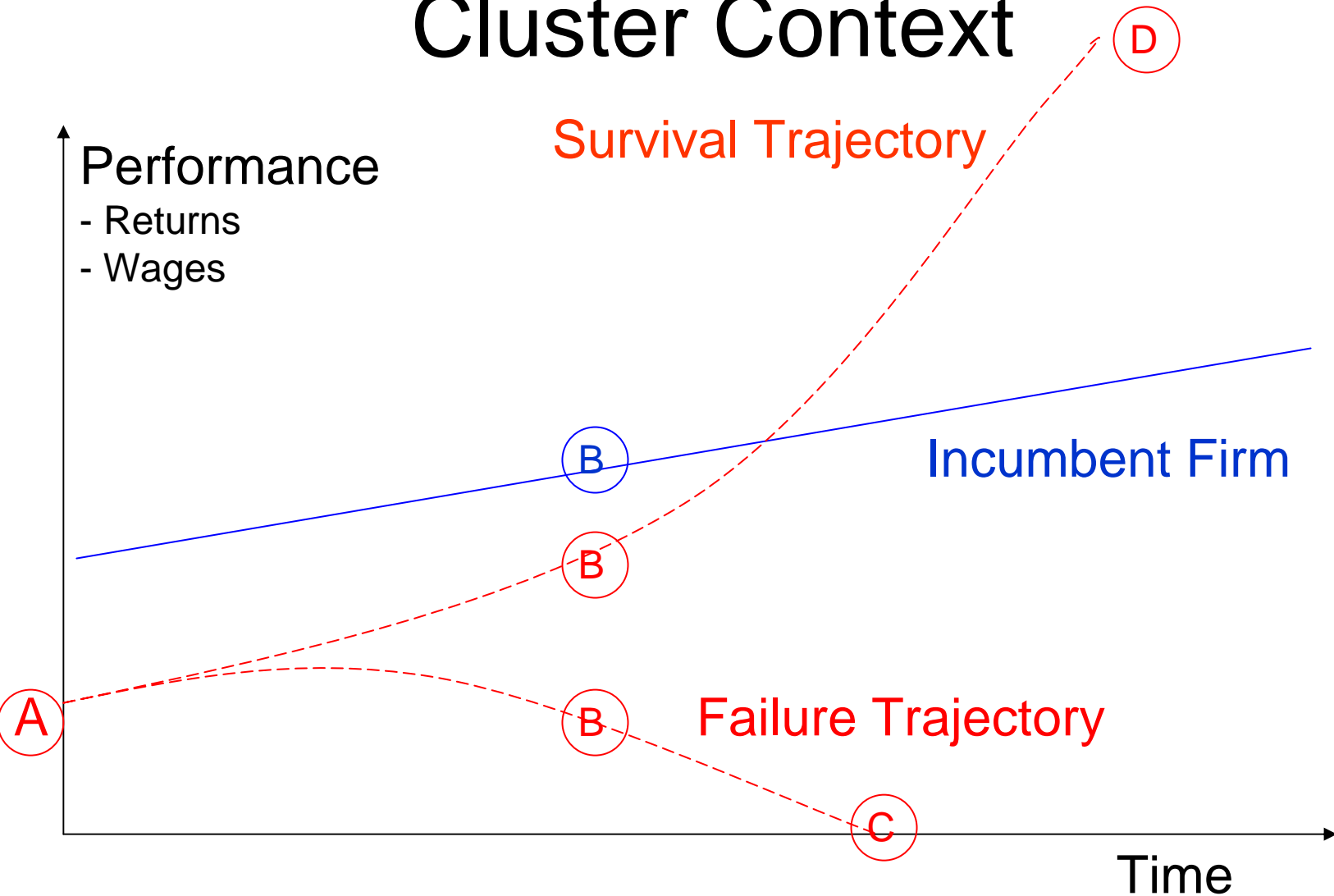
Stylized Facts for Geographic Clusters - 3

- ***New-Venture Growth Greater in Cluster Context than in Non-Cluster Context***
(B. Gilbert et al., “Clusters, Knowledge Spillovers and New Venture Performance: An Empirical Examination,” *Journal of Business Venturing*, 2007; D. Audretsch & E. Lehmann, “Does the Knowledge Spillover Theory of Entrepreneurship hold for regions?”, *Research Policy*, 2005, 1191-1202.

Stylized Facts for Geographic Clusters - 4

- ***New Venture Creation Greater in Cluster Context***
(D. Audretsch et al., 2005, “University Spillovers and New Firm Location,” with Erik E. Lehmann and Susanne Warning, *Research Policy*.)
- ***Locational Sources Provide Capabilities & Knowledge to New Ventures in Cluster Context
Creating High Performing Firms***
(S. Klepper, 2007, “Disagreements, Spinoffs, and the Evolution of Detroit as the Capital of the U.S. Automobile Industry,” *Management Science*, 616–631 and R. Agarwal et al., 2004. “Knowledge Transfer through Inheritance: Spin-Out Generation, Development and Performance. *Academy of Management Journal*, 501-522.)

Entrepreneurship and Growth in Cluster Context



Is Knowledge The Development Policy Panacea?

- The European (Knowledge) Paradox
- *“Why have European countries rich in knowledge (high R&D & Patents) exhibited such low growth rates?”*

Romano Prodi, President of the European Union

The Knowledge Filter

“A wealth of scientific talent at American colleges and universities – talent responsible for the development of numerous innovative scientific breakthroughs each year – is going to waste as a result of bureaucratic red tape and illogical government regulations... What sense does it make to spend billions of dollars each year on government-supported research and then prevent new developments from benefiting the American people because of dumb bureaucratic red tape?”

U.S. Senator Birch Bayh, 1980

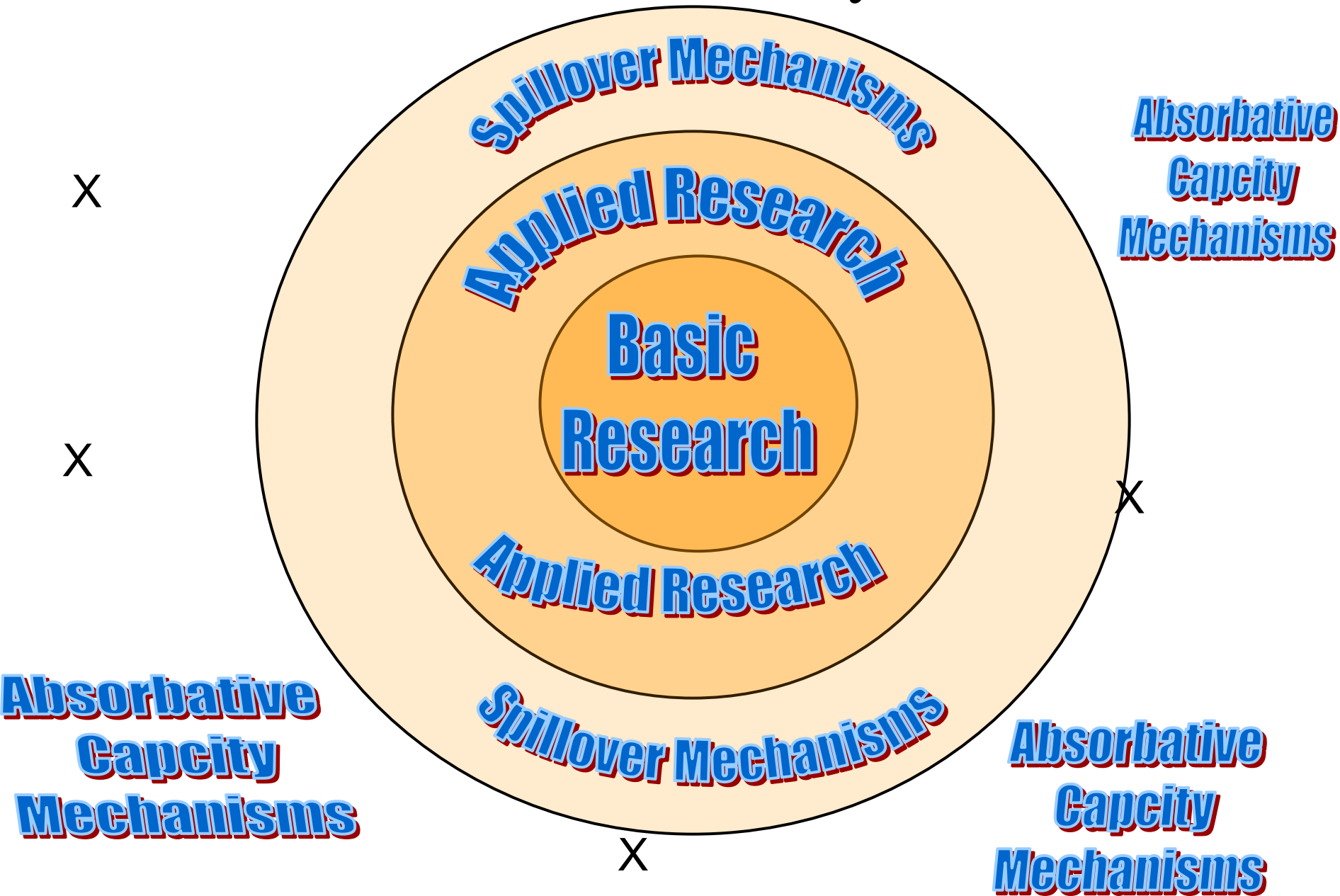
Regional Differences by Growth

- **High Growth Regions**
- High knowledge investments
- Low knowledge filter
- High level of Entrepreneurship Capital
- **Low Growth Regions**
- Low Knowledge Investments
- High knowledge filter
- Low level of Entrepreneurship Capital

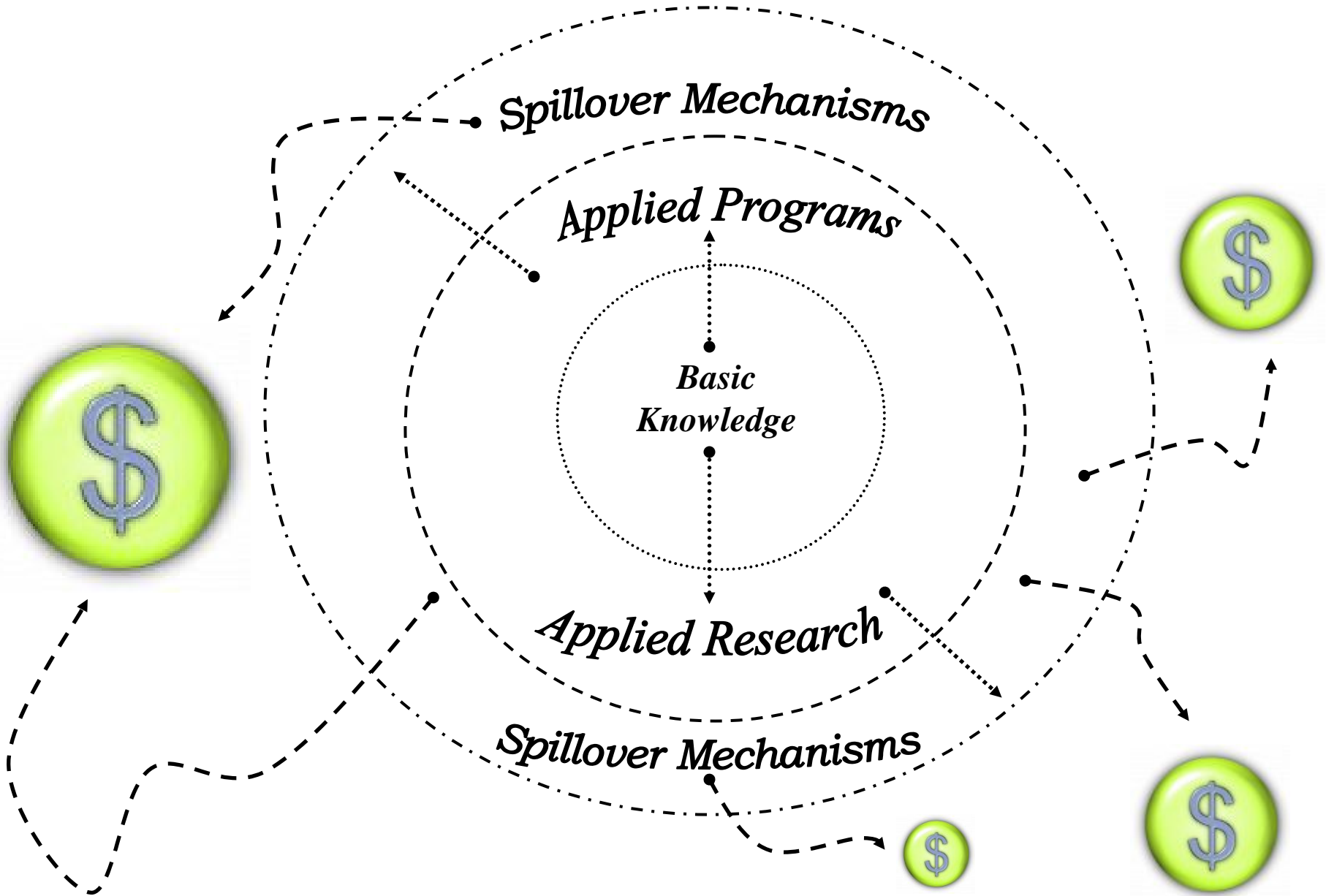
The Mandate for Policy Creating Entrepreneurship Capital

- By creating entrepreneurship capital, public policy helps to overcome the knowledge filter associated with investments in research & human capital, thus helping regions & states to actualize the returns on their investments in research and knowledge

Cluster Policy



Cluster Policy



Research & Science Parks

- NASA Ames Research Center
(Charles Wessner, ed. *A Review of the New Initiatives at the NASA Ames Research Center*, National Academy Press, 2001)
- The Sandia Science & Technology Park
(Charles Wessner, ed. *A Review of the Sandia Science and Technology Park Initiative*, National Academy Press, 1999)

Creating New Metrics to Measure Cluster Ecosystem

- Geographic Cluster as Analytical Unit of Measurement
- Science & Research Parks
- Research Investments
- Scientist Flows
- Entrepreneurial Dynamics (Startup, Growth & Survival)

High Value Research Topics

- Mapping the Evolution of Knowledge Spillovers from Research Investments to Economic Growth (publication, external research funding, infusion of scientists, location of firms, startups, growth, employment)
- The Impact of Institutions & Policies, such as Science & Research Parks on Cluster Ecosystem

Conclusions

- The Mandate for Creating Entrepreneurship Capital in the Cluster Context
- Science & research parks contribute to the creation of regional Entrepreneurship Capital by serving as a conduit of knowledge spillovers and providing resources.
- State, local & regional Entrepreneurship Capital is a crucial component to growth, competitiveness & job creation