

Forums vs. Fountains: The Evolution of Knowledge Networks in Akron and Rochester

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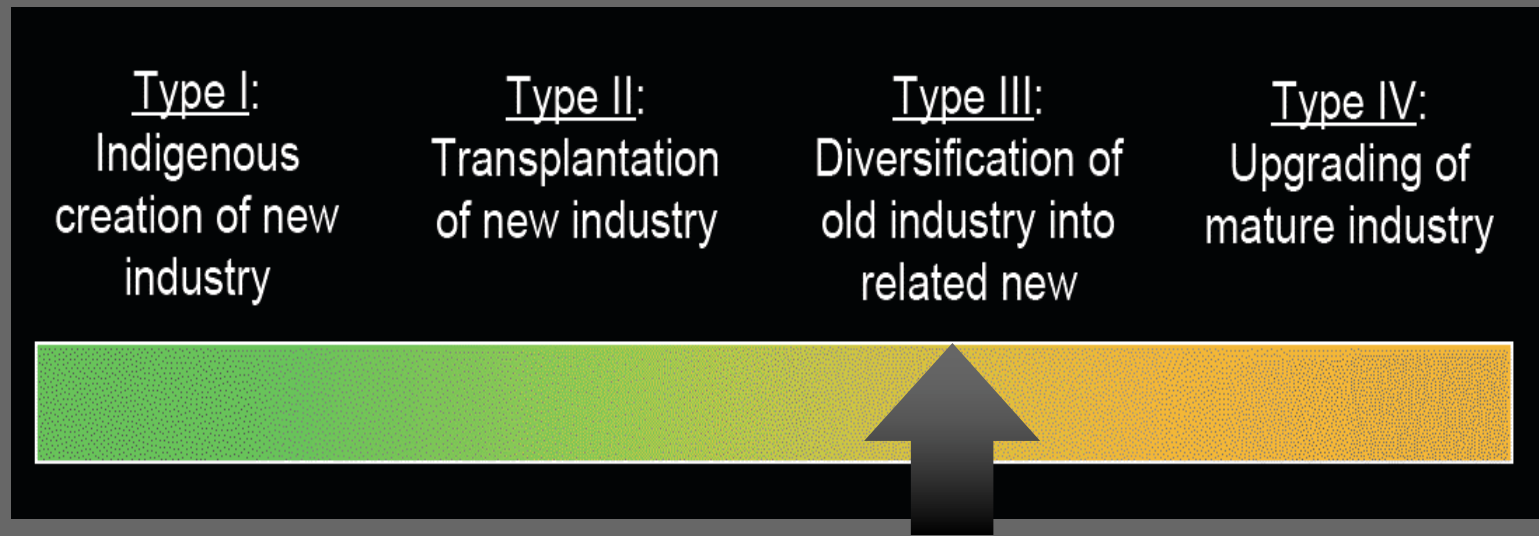


The Question

How can local economies prosper in a rapidly changing, increasingly open global economy?



Typology of Regional Trajectories



Absorbing and Unlocking:
Diversifying Innovation Ecosystems

Silicon Valleys of the Second Industrial Revolution



Absorbing and Unlocking:
Diversifying Innovation Ecosystems

Silicon Valleys of the Second Industrial Revolution



- By the 1980s, major companies had moved manufacturing to lower cost regions



- Broadened research and development beyond local area



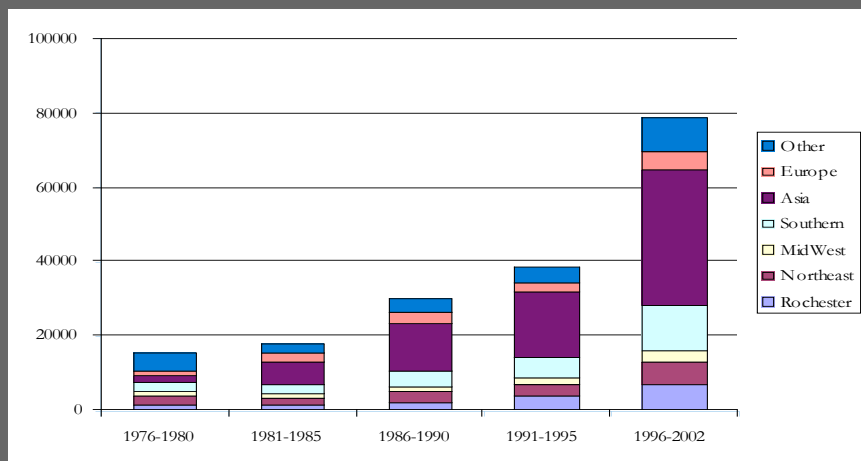
- Shifted R&D toward advanced materials and applications.



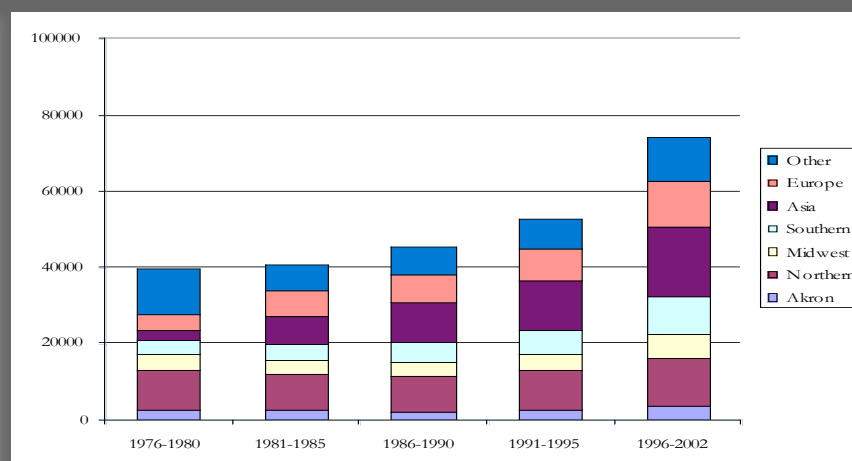
Global Patents

Optics and Polymers 1976-2002

Optics



Polymers



Absorbing and Unlocking:
Diversifying Innovation Ecosystems

Fears of a 'Flat World'



“There is nothing that guarantees that Americans or West Europeans will continue leading the way [in innovation].”

- Thomas Friedman. *It's a Flat World After All*. New York Times 3 April 2005



Two Competing Scenarios

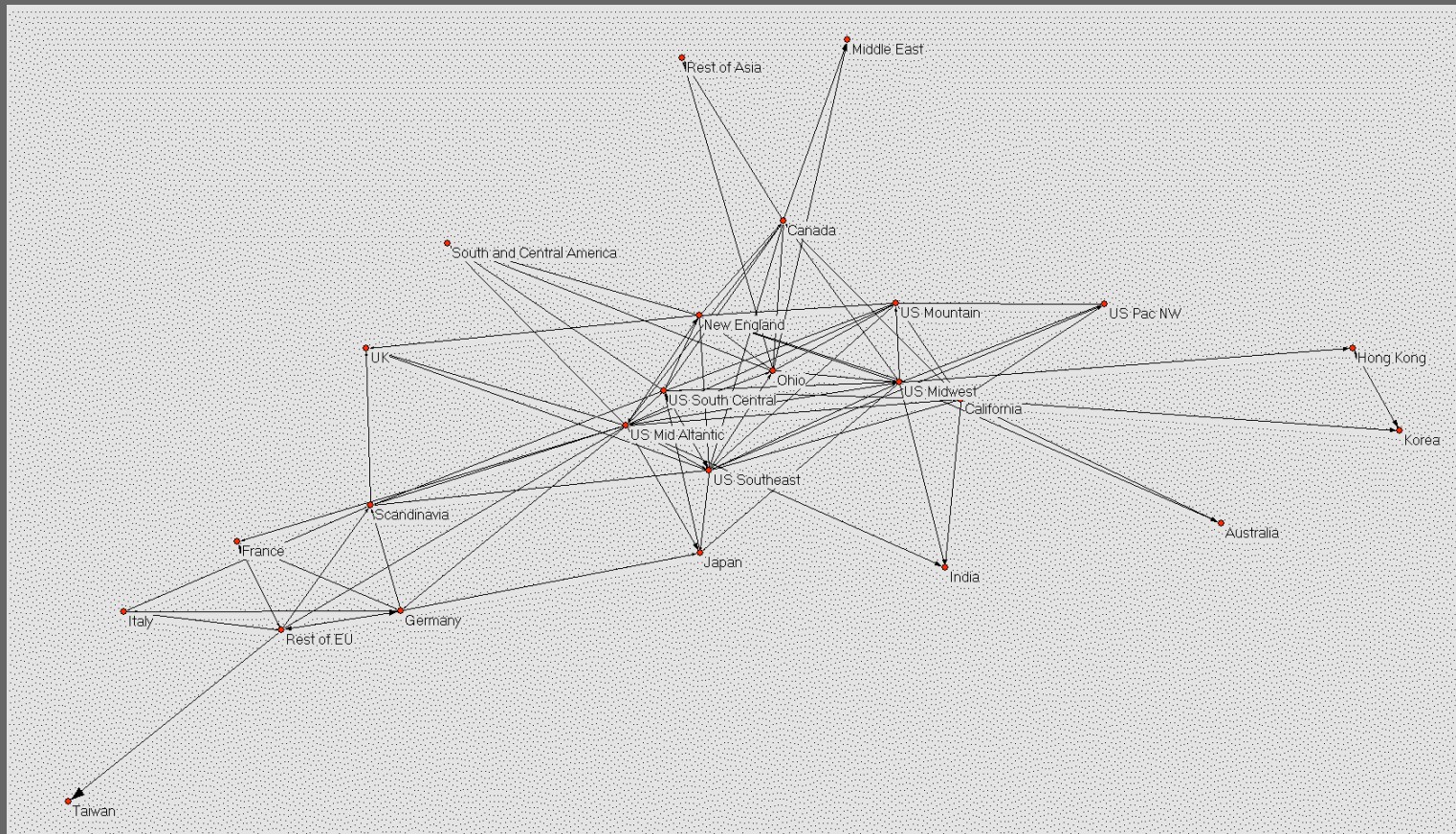
Hollowing out



Agglomeration

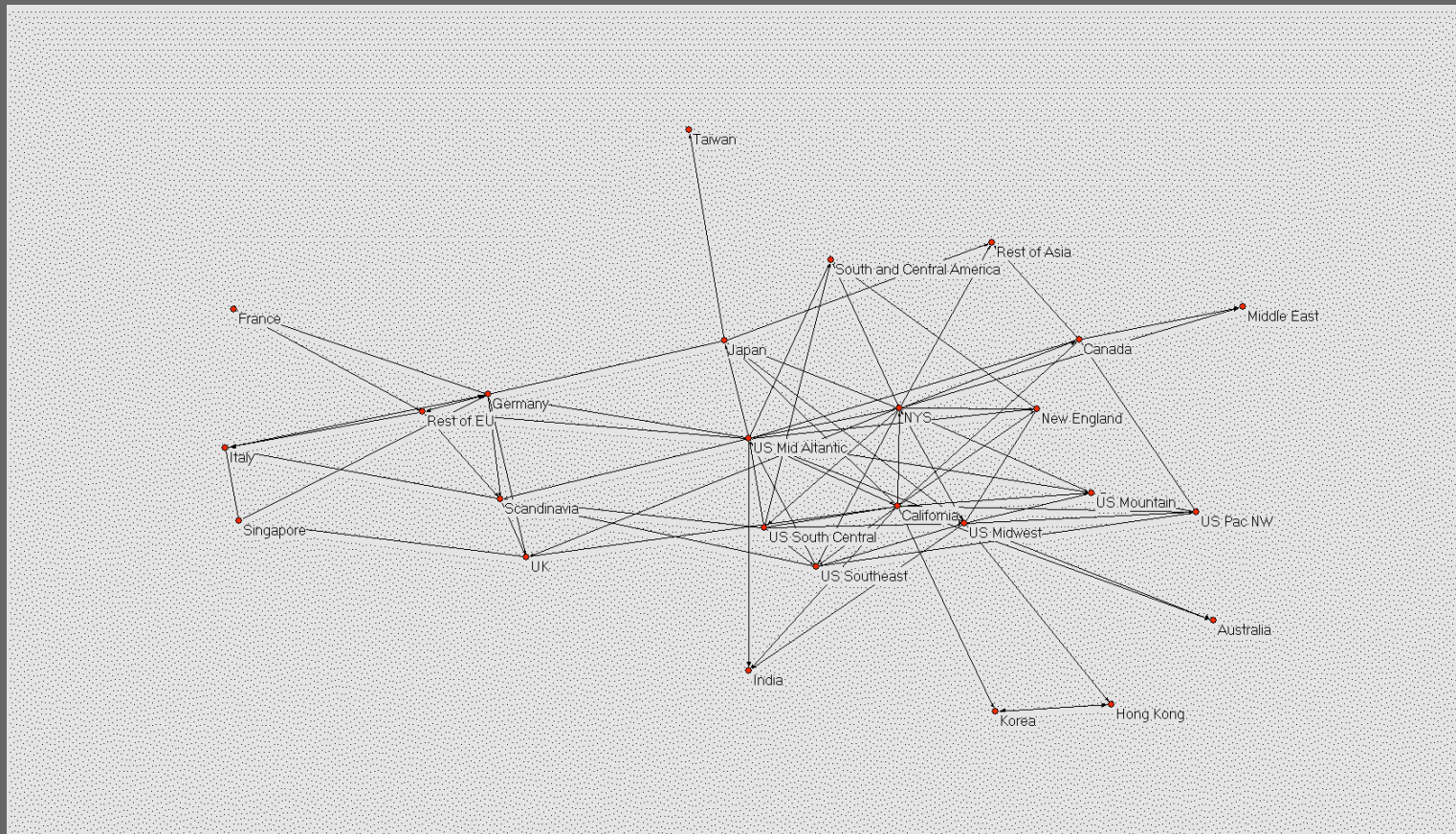


Global Co-Patenting Network Polymers 1976-1980



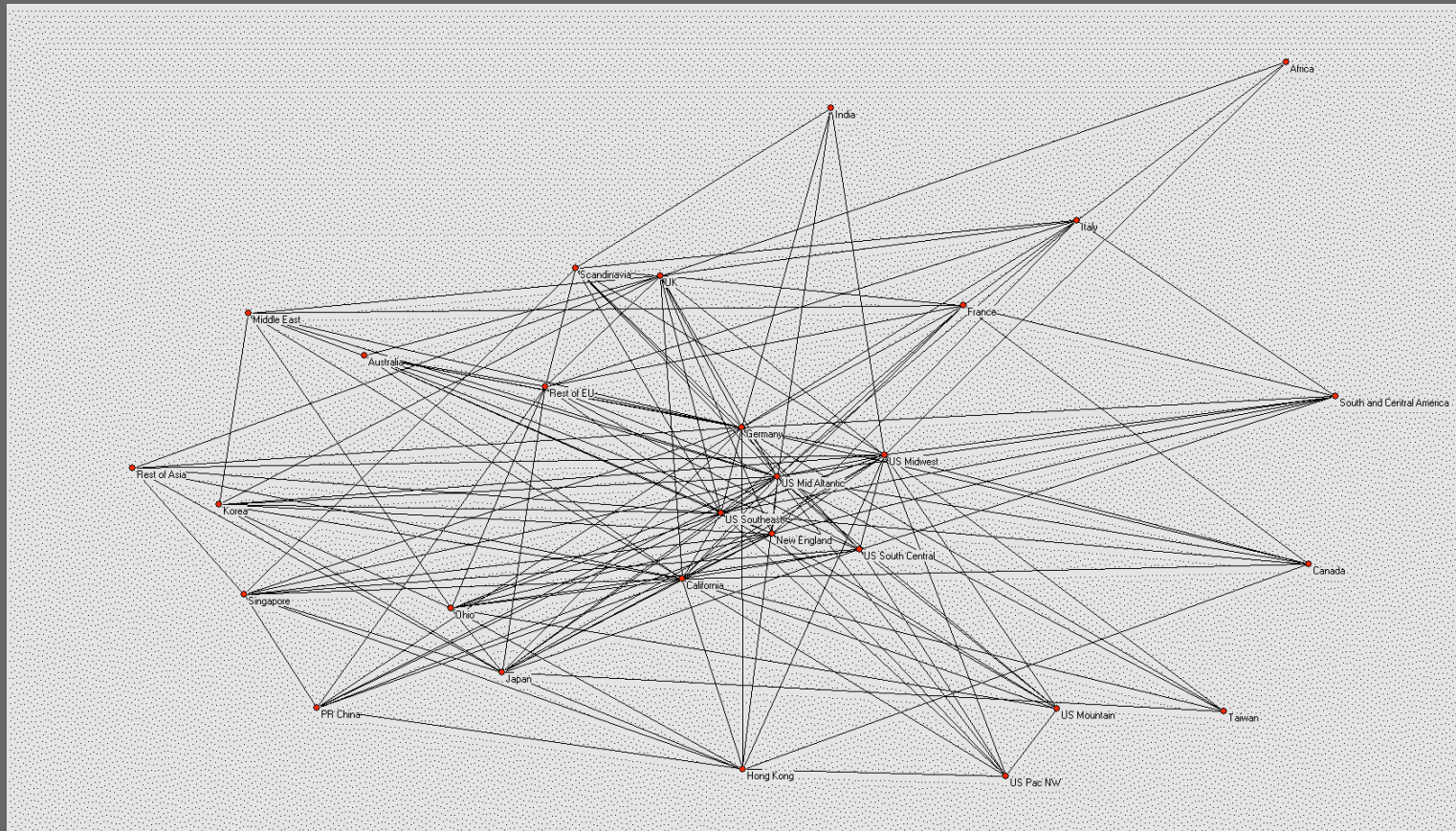
Absorbing and Unlocking:
Diversifying Innovation Ecosystems

Global Co-Patenting Network Polymers 2002-2007



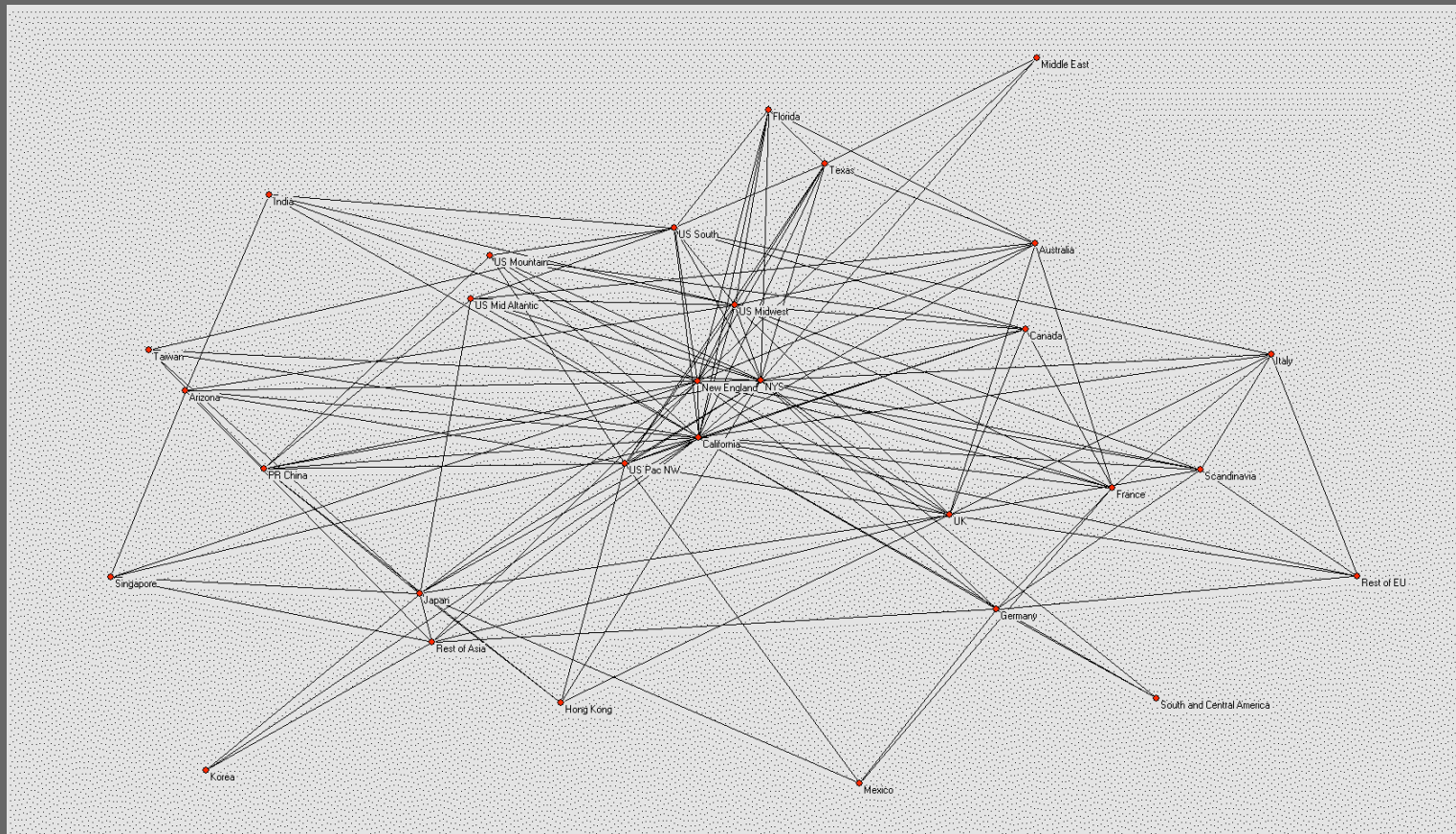
Absorbing and Unlocking:
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Global Co-Patenting Network Polymers 2002-2007



Absorbing and Unlocking:
Diversifying Innovation Ecosystems

Global Co-Patenting Network Optics and Optoelectronics 2002-2007



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Diversifying Innovation Ecosystems

Co-Authoring Network: Akron

Table 9.a Akron 1980-1982: Truncated Block Model

	Local Multinational	Local Tech Firms	Local Universities and Labs	Non-Local Multinational	U.S. Tech Firms	U.S. Universities and Labs	Non-U.S. Tech Firms	Non-U.S. Universities and Labs	n	χ^2 d.f.
Local Multinationals	86.1% ♦	0.1%	0.4%	0.8%	2.5%	9.5%	0.2%	0.5%	1277	5
Local Tech Firms	1.7%	95.0% ♦				3.3%			60	5
Local Univs and Labs	2.4%		77.6%	1.0% ♦	2.4% ♦	8.1%	1.0%	7.6%	210	5
Category Total	71.4% ♦	3.7% ♦	10.9% ♦	2.4% ‡	9.0% ♦	0.3% ♦	0.3% ♦	1.5%	1547	5
Group Total		86.0% ♦			12.2%			1.7%		2

♦ — significantly different from Rochester

Table 9.b Akron 2000-2002: Truncated Block Model

	Local Multinational	Local Tech Firms	Local Universities and Labs	Non-Local Multinational	U.S. Tech Firms	U.S. Universities and Labs	Non-U.S. Tech Firms	Non-U.S. Universities and Labs	n	χ^2 d.f.
Local Multinationals	62.3% ‡		3.7%	5.2%	8.1%	10.6%	3.1% ♦‡	7.1%	621	5
Local Tech Firms		64.8% ♦‡	6.0%	3.8% ♦	3.3% ♦	17.3% ♦		4.9%	369	5
Local Univs and Labs	2.1%	2.0% ♦‡	77.1%	5.3% ♦‡	3.5%	6.2%	0.5% ♦	3.2%	1091	5
Category Total	19.7% ♦‡	12.5% ♦‡	42.6% ♦‡	5.0% ♦‡	4.8% ♦‡	9.5%	1.2% ♦‡	4.7%	2081	5
Group Total		74.8% ♦‡			19.3% ♦‡			5.9% ♦‡		2

‡ — significant change from 1980-1982

♦ — significantly different from Rochester



Absorbing and Unlocking:
Diversifying Innovation Ecosystems

Co-Authoring Network: Rochester

Table 9.c Rochester 1980-1982: Truncated Block Model

	Local Multinational	Local Tech Firms	Local Universities and Labs	Non-Local Multinational	U.S. Tech Firms	U.S. Universities and Labs	Non-U.S. Tech Firms	Non-U.S. Universities and Labs	n	χ^2 d.f.
Local Multinationals	66.7% ♦	0.3%	2.8%	1.6%	2.4%	21.8%	0.1% ♦	0.1%	1359	5
Local Tech Firms	8.5% ♦	57.4% ♦		6.4%	6.4%	21.3%			47	5
Local Univs and Labs	2.9%		77.1%	1.6% ♦	0.1% ♦	15.5%		2.8%	1310	5
Category Total	34.9% ♦	1.1% ♦	38.6% ♦	1.7%	1.3% ♦	18.7% ♦	>0.1% ♦	3.5%	1547	5
Group Total		74.7%			21.8%			3.6%		2

♦ — significantly different from Akron

Table 9.d Rochester 2000-2002: Truncated Block Model

	Local Multinational	Local Tech Firms	Local Universities and Labs	Non-Local Multinational	U.S. Tech Firms	U.S. Universities and Labs	Non-U.S. Tech Firms	Non-U.S. Universities and Labs	n	χ^2 d.f.
Local Multinationals	68.2%	1.3%	7.6%	1.3%	2.1%	11.3%	0.3% ‡	7.8%	2847	5
Local Tech Firms	7.0% ♦	62.3% ♦	8.0% ‡	0.6% ♦	0.8% ♦	16.1%	1.1% ♦	4.2%	528	5
Local Univs and Labs	8.3%	1.6% ♦‡	77.7%	1.2%	1.1% ‡	5.1% ‡	1.1% ♦‡	3.8%	2575	5
Category Total	36.9% ♦	6.9% ♦‡	37.9% ♦	1.2% ♦	1.5% ♦	9.1% ‡	0.7% ♦‡	5.7% ‡	5950	5
Group Total		81.7% ♦‡			11.8% ♦‡			6.5% ‡		2

‡ — significant change from 1980-1982

♦ — significantly different from Akron



Absorbing and Unlocking:
Diversifying Innovation Ecosystems

The problem restated: institutional lock-in

Long line of research suggests that the issue has to do with institutional lock-in (Herrigel 1997; Grabher 1997; Krugman 1996). Mature industrial regions cannot regenerate out of existing capabilities because institutional lock-in will impede the development of institutions consistent with environmental needs.



Stark and Grabher: Bricolage and Post-Communist Transformation

- Actors faced with acute economic crisis withhold resource investments and engage in provisional moves.
- Localized processes of sense-making with specific interlocutors result in provisional resource investment accompanied by adjustment of organizational identities.



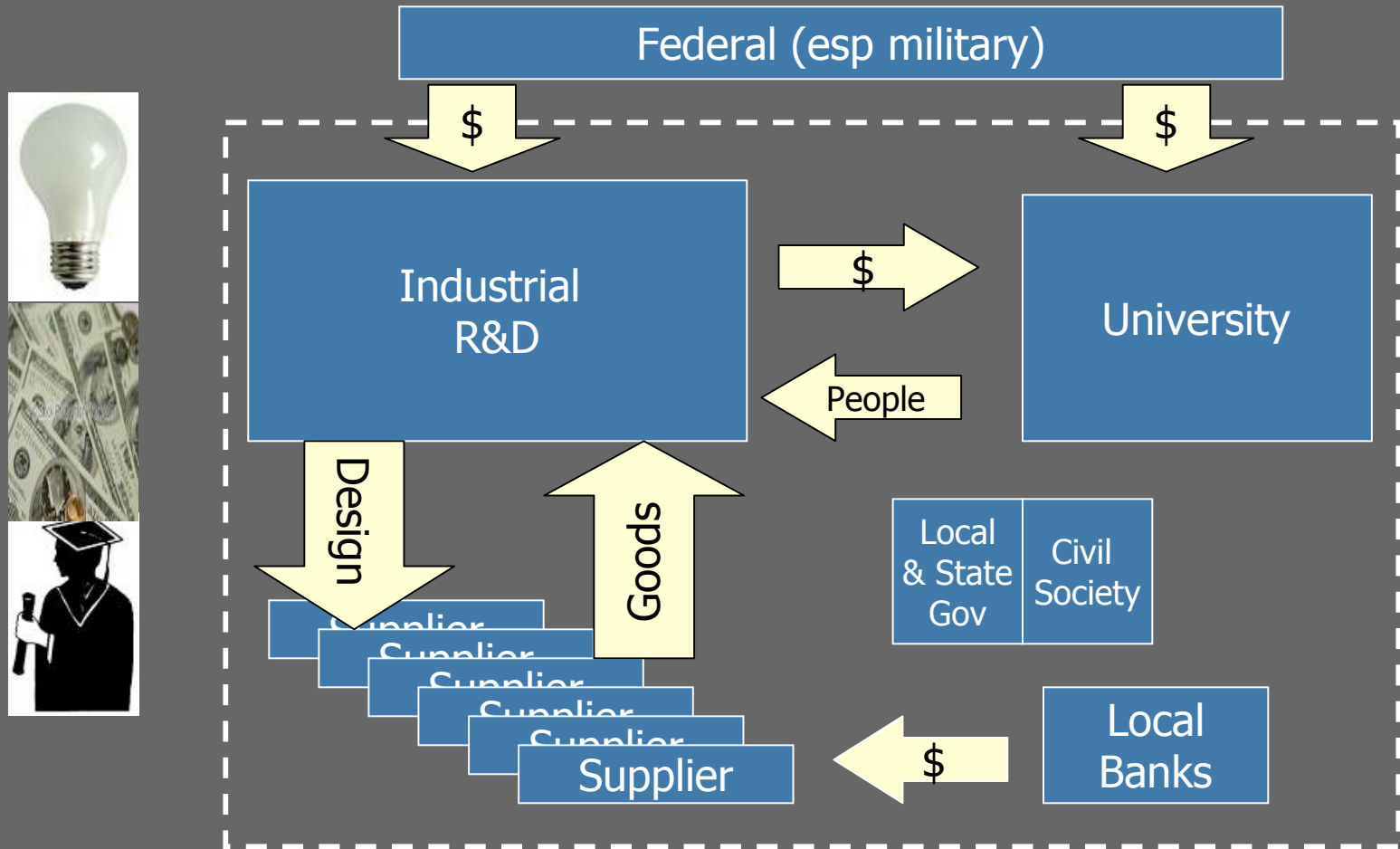
Annealing

A process used to remove internal stresses in metals, alloys, or glasses making the material less brittle usually by re-heating and then cooling in a specialized furnace.



Disentangling Entrepreneurship and Innovation:
Toward an Innovation Ecosystem Approach

Second Industrial Revolution Innovation Ecosystems



Absorbing and Unlocking:
Diversifying Innovation Ecosystems

What has changed?



- Large companies: global strategic research partnerships
- Suppliers: need design capability
- Careers unfold across multiple employers and regions
- Small companies need access to patient, knowledgeable capital and specialized equipment
- Hollowing out of civic power structures



What has changed?

Universities roles have expanded to occupy the central role in the local innovation ecosystem.

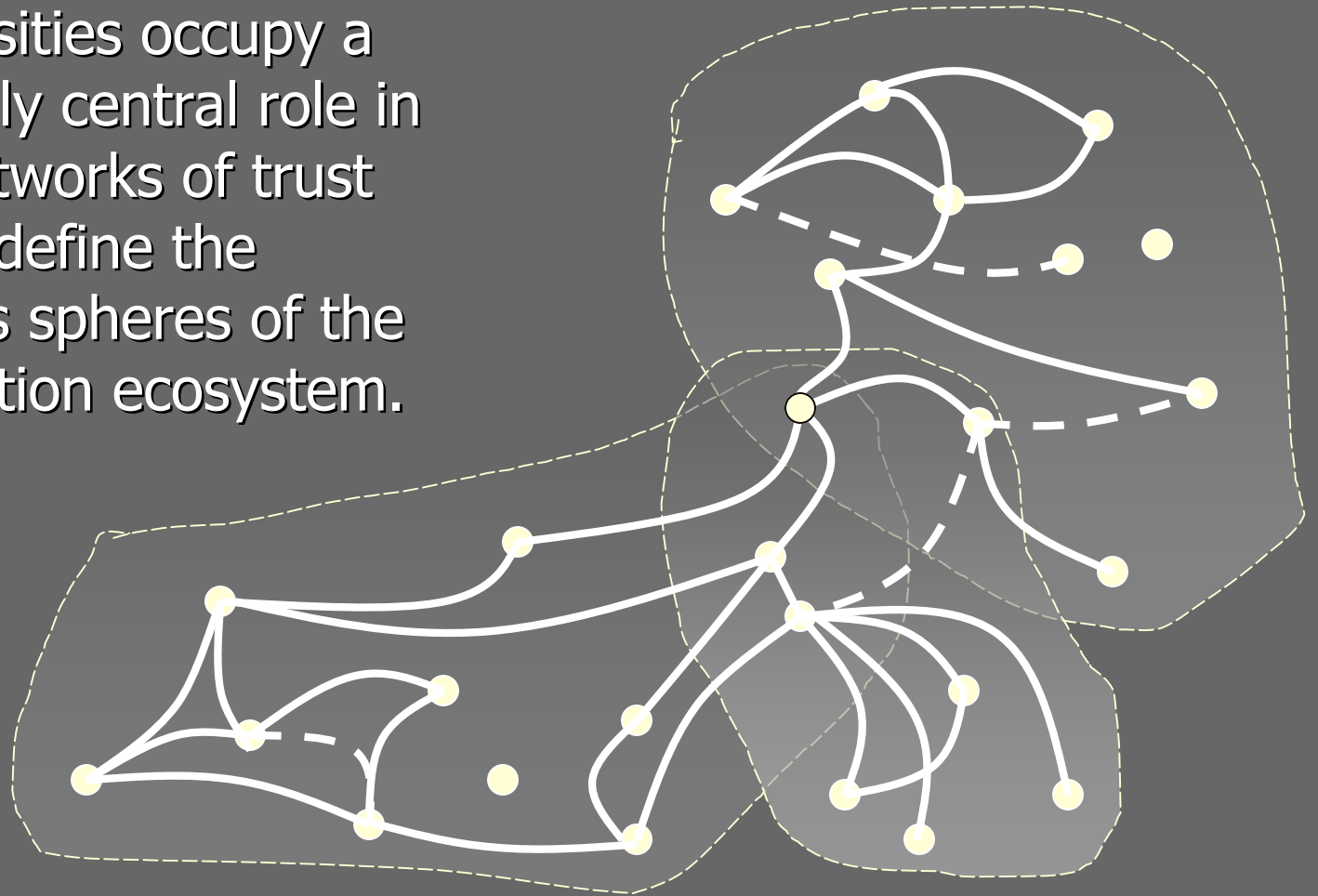


- Generate new innovations
- Educate at all levels of the labor market
- Spin-out new companies
- Open access to specialized equipment
- Investments in property and high-growth ventures
- Facilitate industry groups and lead civil society response



The Social Capital of the University

Universities occupy a uniquely central role in the networks of trust which define the various spheres of the innovation ecosystem.



Absorbing and Unlocking:
Diversifying Innovation Ecosystems

The Host at the Party vs. the Life of the Party



Absorbing and Unlocking:
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Akron: Fountain Approach



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Rochester: Forum Approach



Absorbing and Unlocking:
Diversifying Innovation Ecosystems

Knowledge: Semrock

- Founder: Promising Assistant Professor from the University of Rochester
- Technology: world leading optical thin film technology, layers of material that sort light in minute ways.
- No intellectual property licensed with or from the University.
- "I was very familiar with optical thin film technology. I had a couple of students working on that stuff. We didn't make the kinds of structures we make here. It was more intellectual connections than it was realization..."



Absorbing, Unlocking and Annealing:
Recapturing Innovation in Mature Industrial Regions

Knowledge: Bausch & Lomb and CAT-EIS

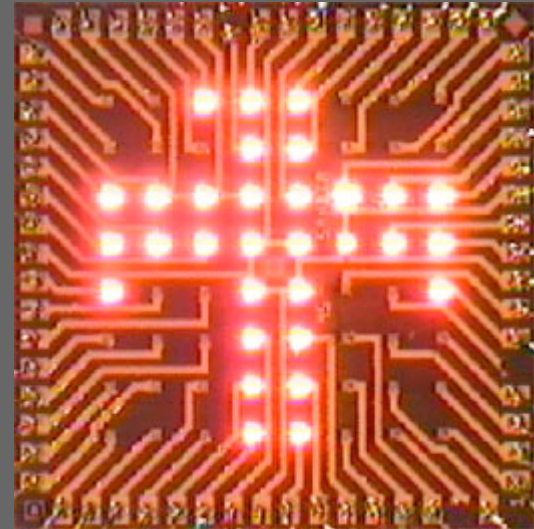
- Ian Cox, director of research.
- Longstanding philanthropic relationship with the university; no incentives or interest in moving beyond that.
- “And so you know we talk about the Alliance sometimes. That was a nice name for publicity purposes in press releases.”
- [Became a real] alliance because it sort of brings together both Bausch & Lomb and the clinical side which is the Department of Ophthalmology, but also the optical side which is the Center for Visual Science so that’s where the tie in with the Center for Electronic Imaging Systems (CEIS) comes in.



Absorbing, Unlocking and Annealing:
Recapturing Innovation in Mature Industrial Regions

Labor market: Rochester Photonics

- Prominent University of Rochester Professor with an entrepreneurial bent
- Technology: minimizing light scatter in photolithography
- Acquired by Corning Incorporated in 1998
- Only hires experienced people; poached mainly from Kodak and Corning. But the connections were made (really maintained) through university ties.



Absorbing, Unlocking and Annealing:
Recapturing Innovation in Mature Industrial Regions

Financial: Trillium

- Venture capital fund with money from High Wealth Individuals, Monroe County and the University of Rochester.
- “We have invested in three companies: an orphaned technology out of Kodak which we brought to the photonics cluster guys and they said there’s probably something there. They bought it to us and it developed and we invested.”



Absorbing, Unlocking and Annealing:
Recapturing Innovation in Mature Industrial Regions

Conclusion

- Institutional change as a process of identity adjustment (annealing) which happens through interaction in the process of problem solving.
- Universities (and other key intermediaries) are in a unique position to facilitate these interactions due to their social capital.

