Connections and commercialization

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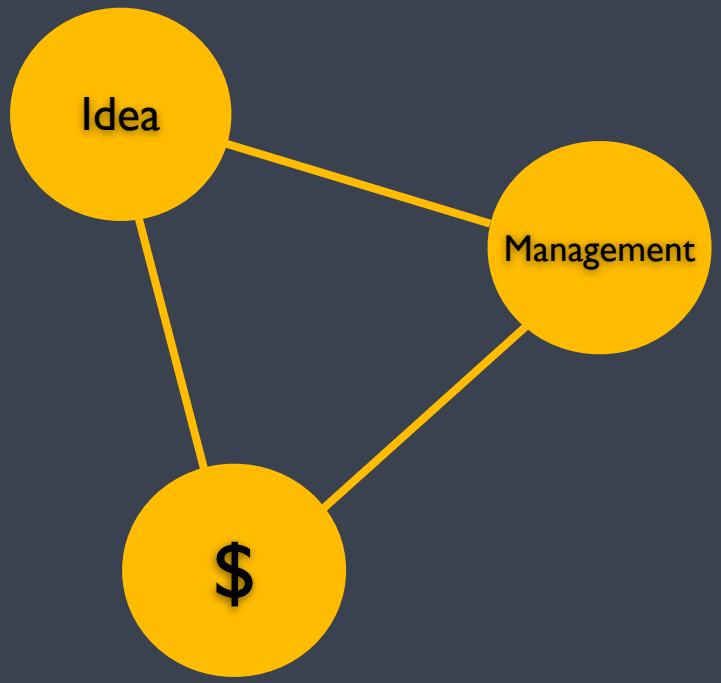
Central problem: Putting the pieces together

Agenda

- Inputs matter
- Incentives matter
- Co-location matters
- Connections matter



Where do the ideas come from?

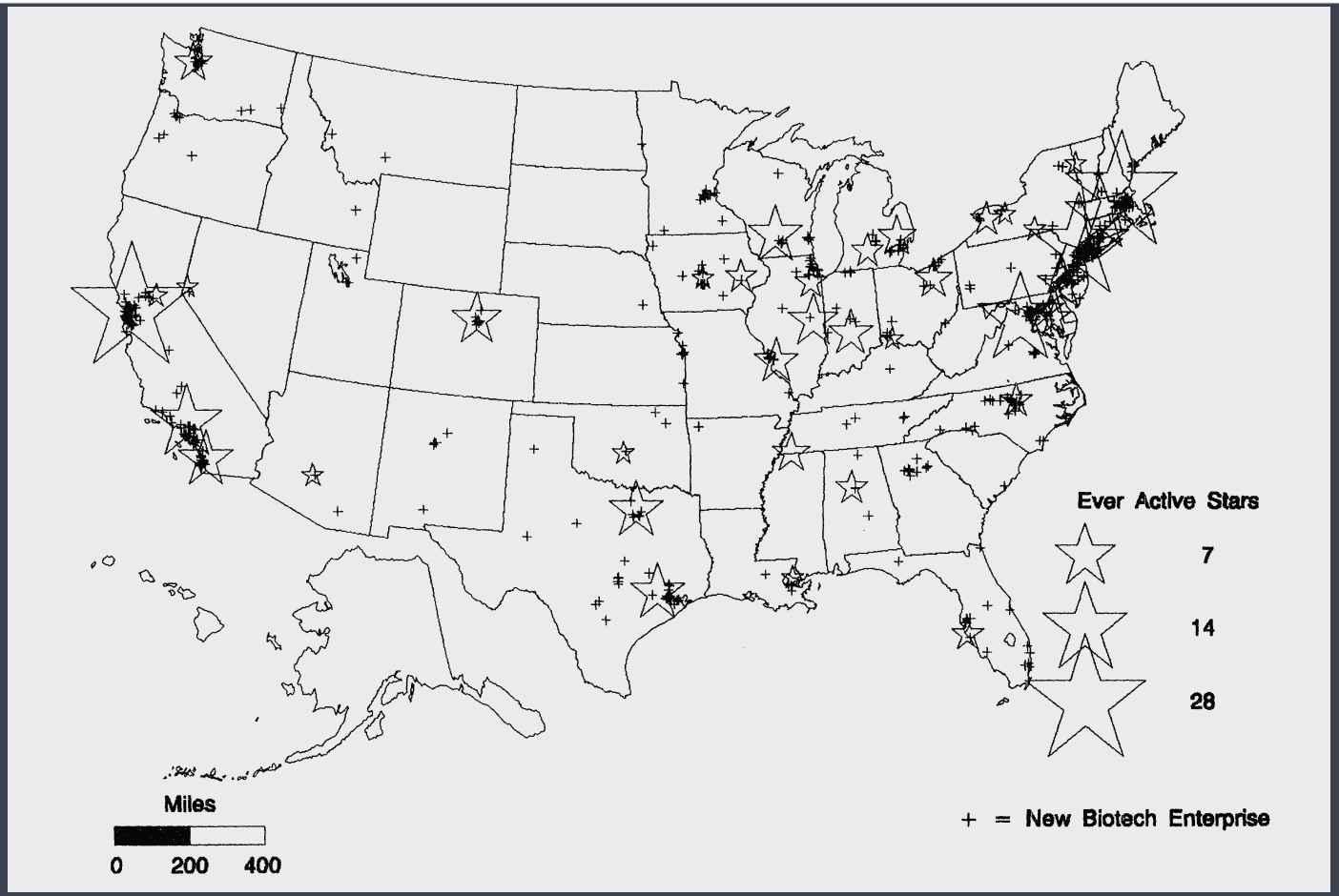
‘Star’ scientists

1. Those that publish a lot
2. Those that have patented
3. Those working for top research institutions with PhD programs
4. Those working with co-workers that have been involved with a commercial venture

What does not matter?

Technology Transfer Office

Source: Stuart & Ding, *American Journal of Sociology*, 2006



Source: Zucker, Darby & Brewer, *American Economic Review*, 1998

Regions with stars have become biotech hubs

Each star scientist increases the *annual* number of biotech startups in a region by 16% to 28%

Stars in the life sciences by country (1996)

Country	'Stars'	'Stars' per million	Fraction tied to industry	Net migration
United States	104	.35	33.3	2.9
Japan	26	.21	21.1	9.6
United Kingdom	16	.26	9.7	-32.3
Australia	7	.35	7.1	7.1
Canada	5	.15	0	-30.0

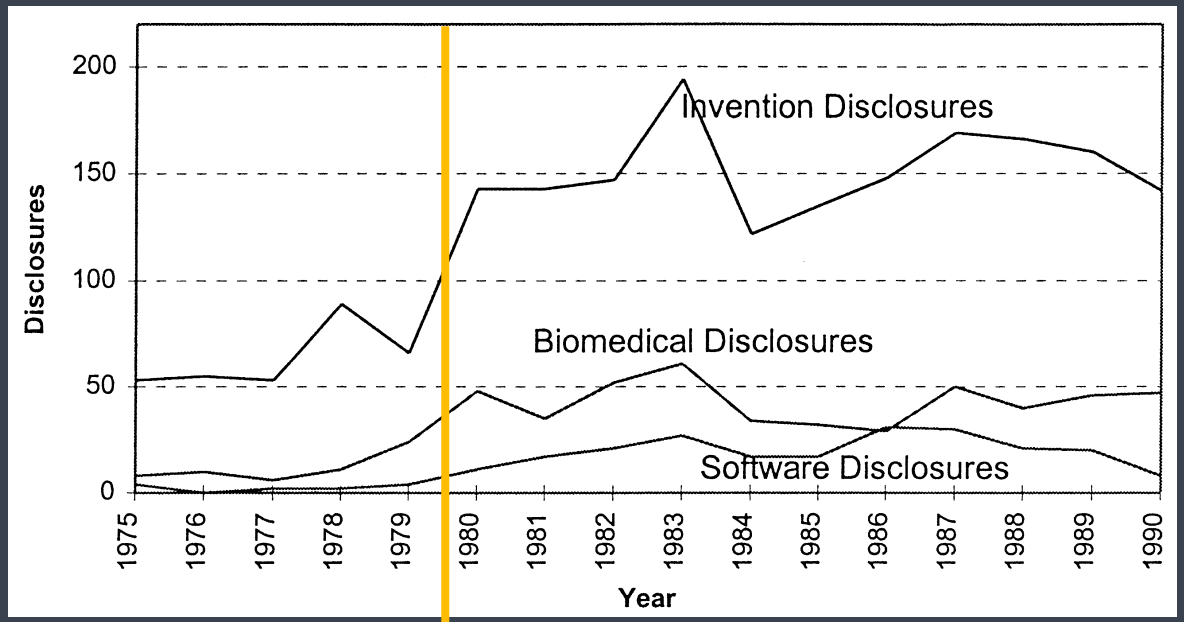
Source: Zucker & Darby, *Proceedings of the National Academy of Sciences*, 1996

Stars in the life sciences by country (2007)

Country	'Stars'	'Stars' per million
United States	218	.73
Japan	9	.07
United Kingdom	16	.26
Australia	1	.05
Canada	8	.24

Source: ISI HighlyCited.com

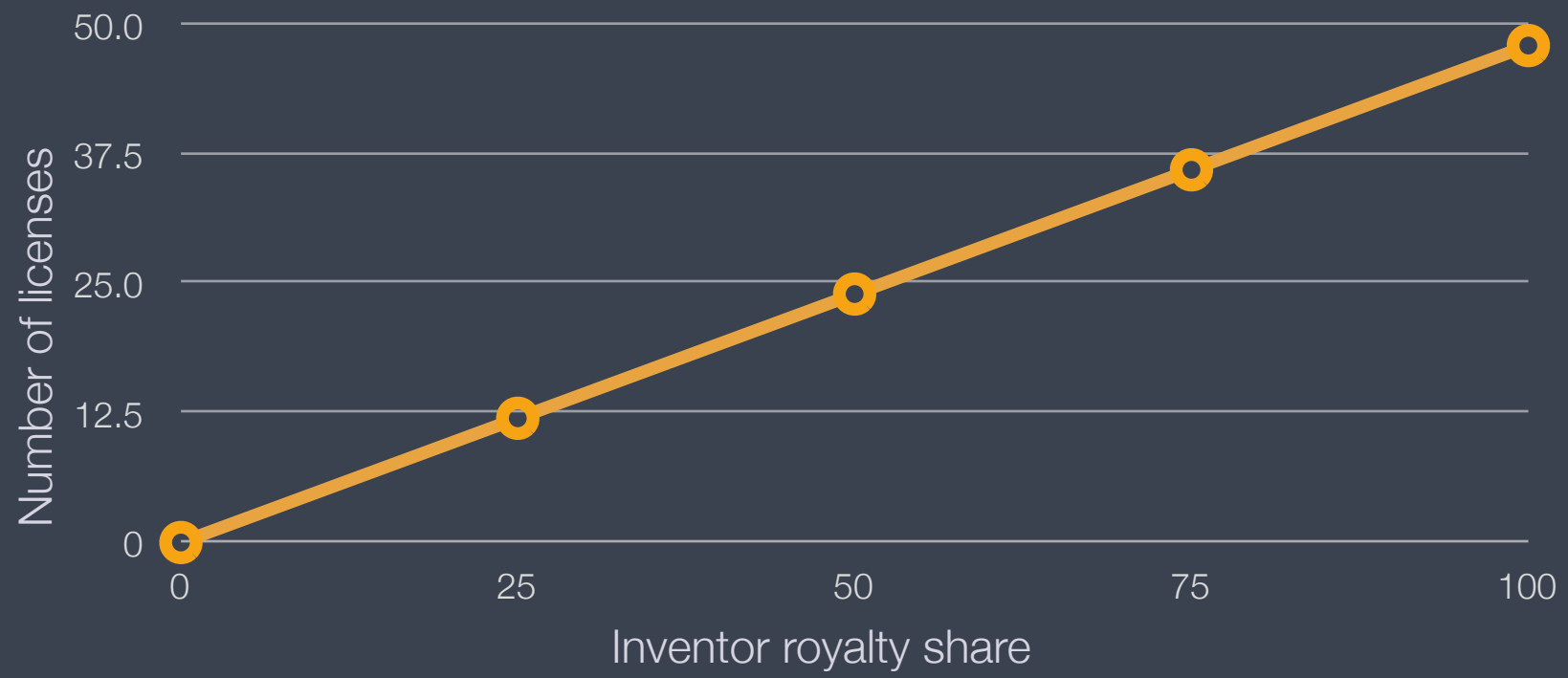
Invention disclosures to the Stanford Technology Transfer Office



Bayh-Dole Act

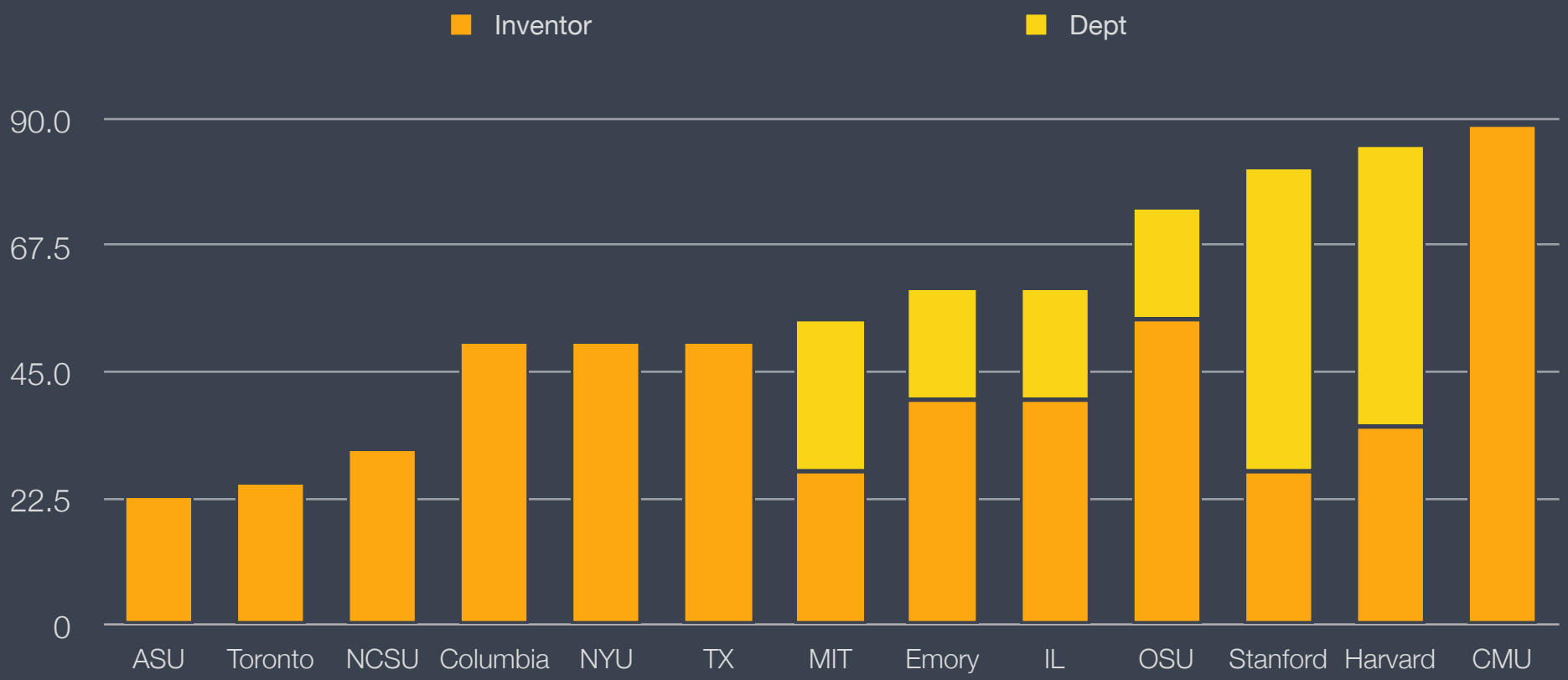
Source: Mowery, et al., *Research Policy*, 2001

Individual incentives also important



Source: Friedman & Silberman, *Journal of Technology Transfer*, 2003

Inventor share of revenue by school



Source: Friedman & Silberman, *Journal of Technology Transfer*, 2003

High share schools outperform on commercialization

Biomedical research ranking	Biomedical commercial ranking
Harvard	Texas
Stanford	Stanford
MIT	Columbia
Texas	Harvard
Columbia	MIT
North Carolina	NYU
Toronto	North Carolina
NYU	Toronto

Sources: Friedman & Silberman, *Journal of Technology Transfer*, 2003; DeVol et al., Milken Institute, 2006

Where do high tech firms form?

1. Regions with lots of existing firms in the same industry
2. Regions with a strong VC community
3. Regions with inventors
4. Regions with universities

Source: Stuart & Sorenson, *Research Policy*, 2003

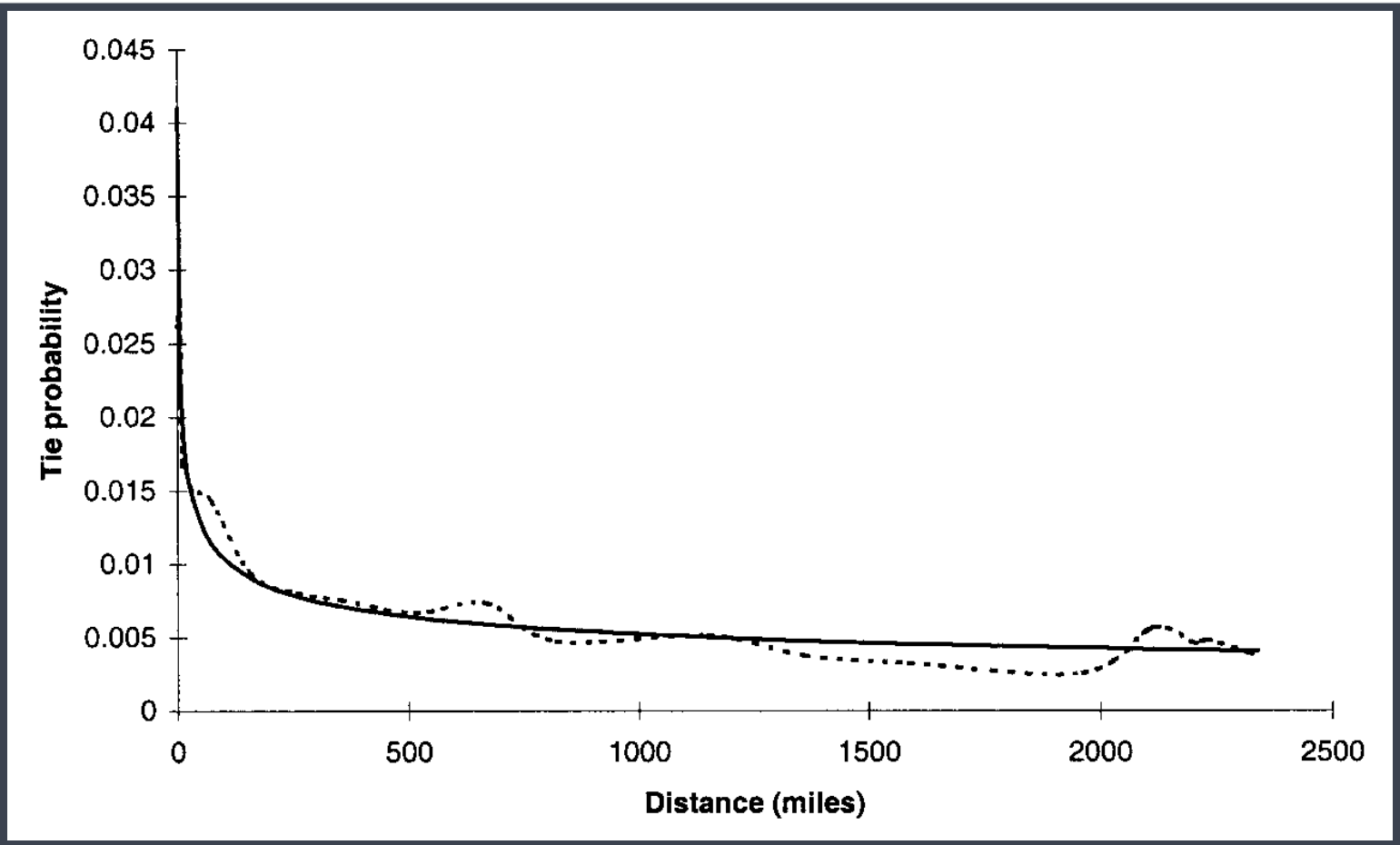
Geography of high tech matches geography of venture capital

Venture capital

Source: Sorenson & Stuart, *American Journal of Sociology*, 2001

Biotech

Source: Stuart & Sorenson, *Research Policy*, 2003

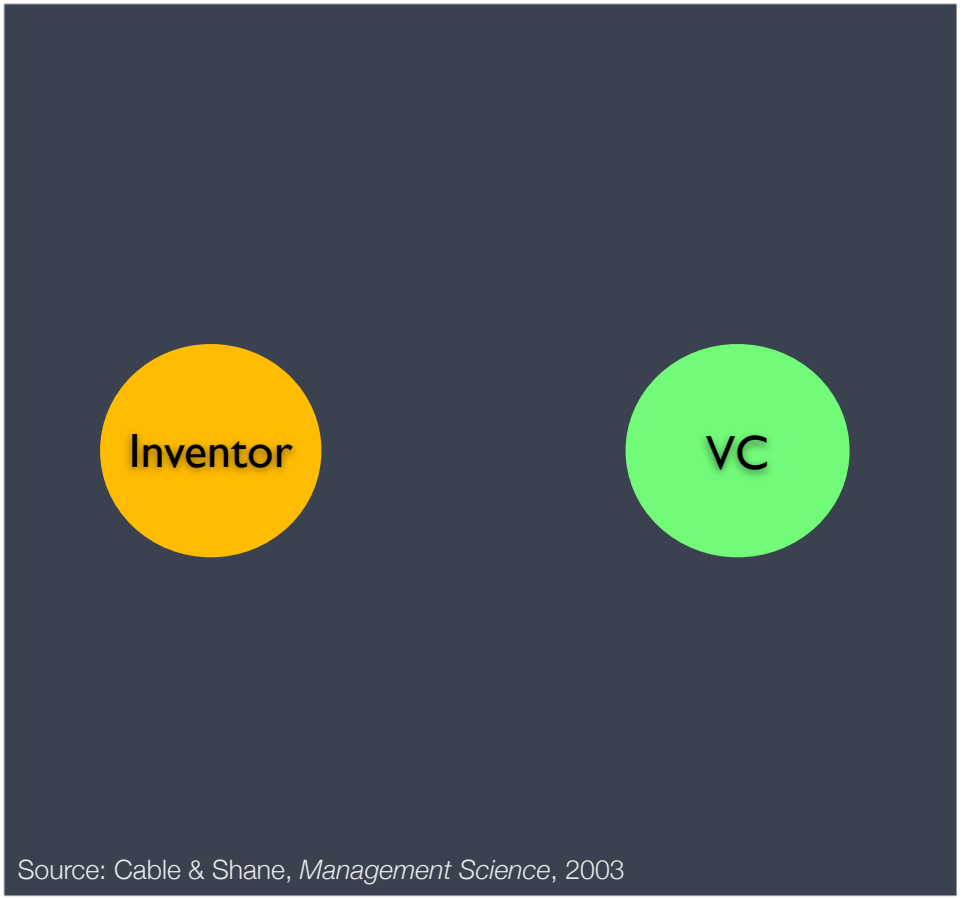


Source: Sorenson & Stuart, *American Journal of Sociology*, 2001

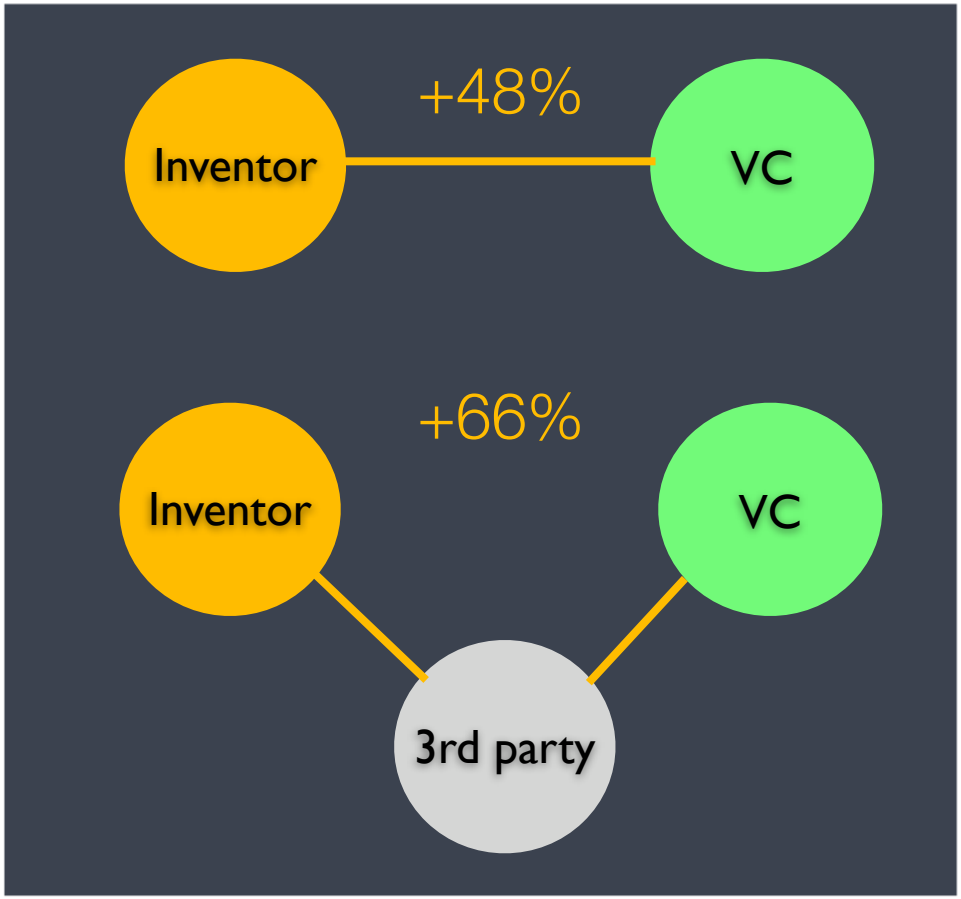
VC firms rarely invest in firms more than 60 miles away

Beyond 120 miles VCs only invest as partners in syndicates

Connections increase odds of being funded



Source: Cable & Shane, *Management Science*, 2003



Why are connections so important?

Capital

Uncertainty

Importance of private information

"Leap of faith"

Labor

All of the above

No ability to diversify

Partners

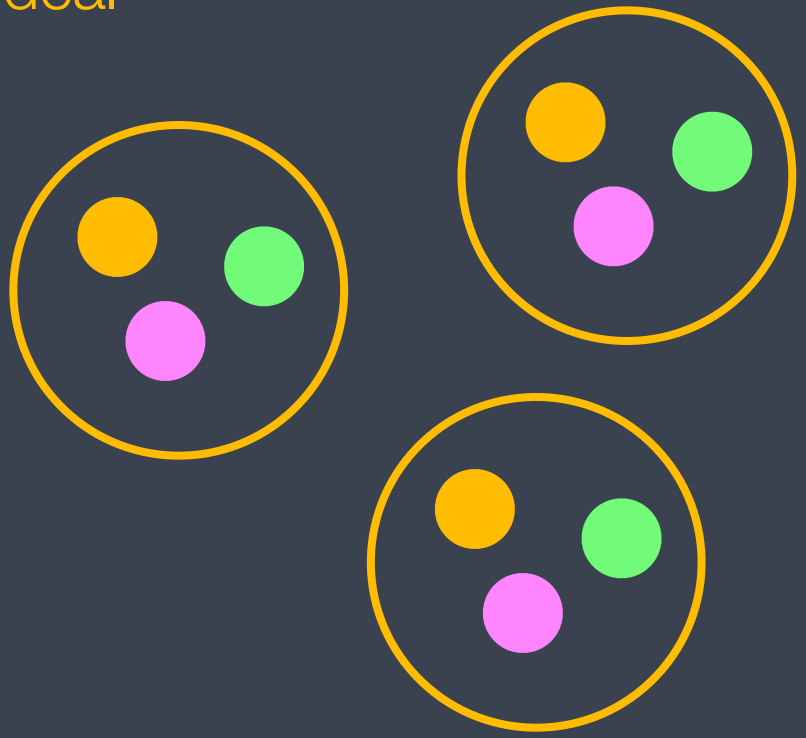
Uncertainty, private information

Incomplete contracts

Source: Sorenson & Stuar, 2005

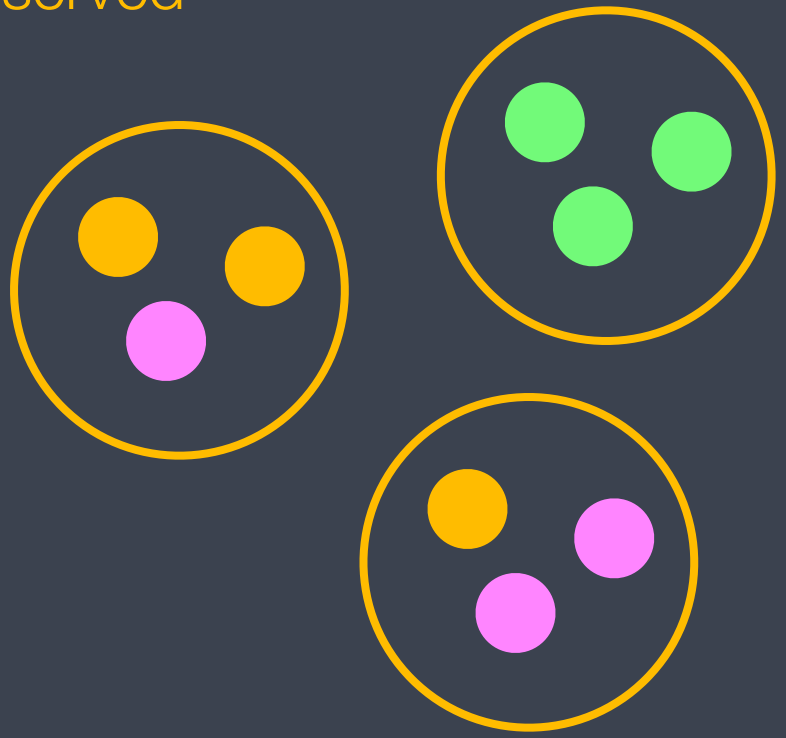
Homophily in founding teams

Ideal



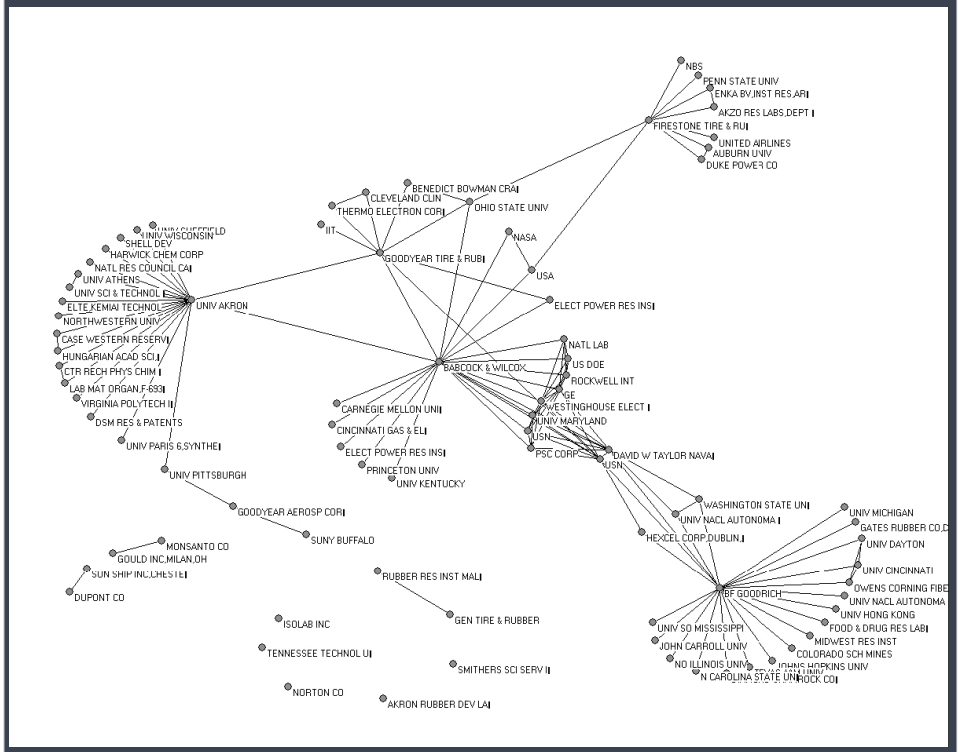
Sources: Ruef, Aldrich & Carter, *American Sociological Review*, 2003; Beckman & Burton, *Organization Science*, 2007

Observed



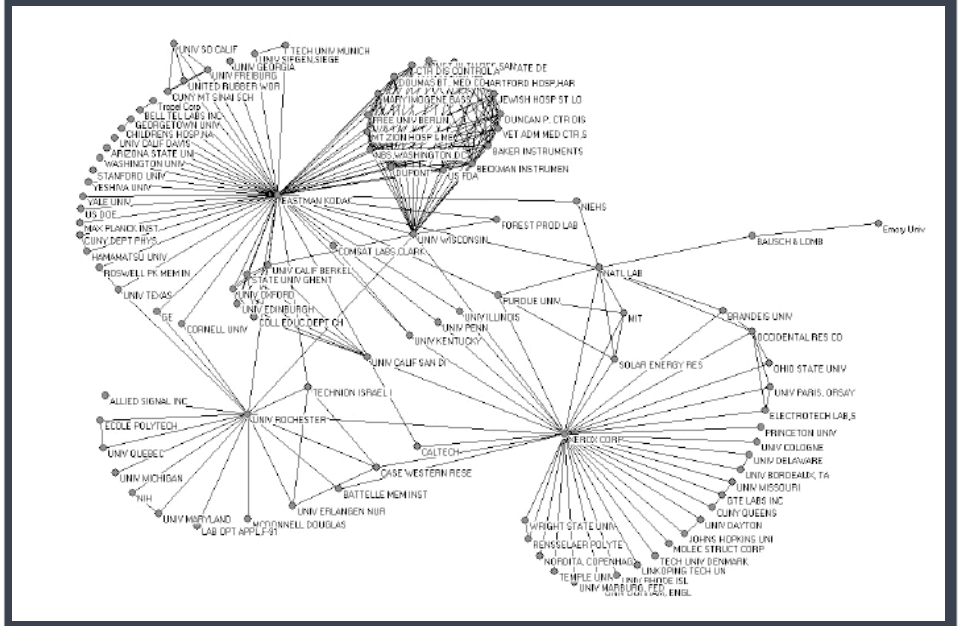
A tale of two cities 1980-1982

Akron



Source: Safford, 2004

Rochester



A tale of two cities 2000-2002

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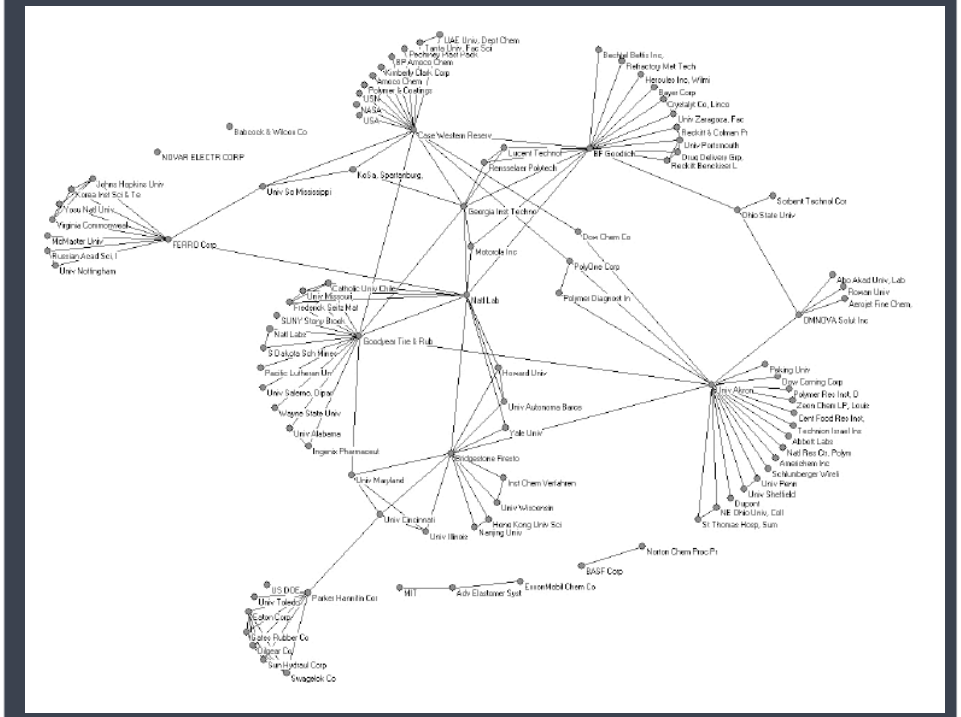
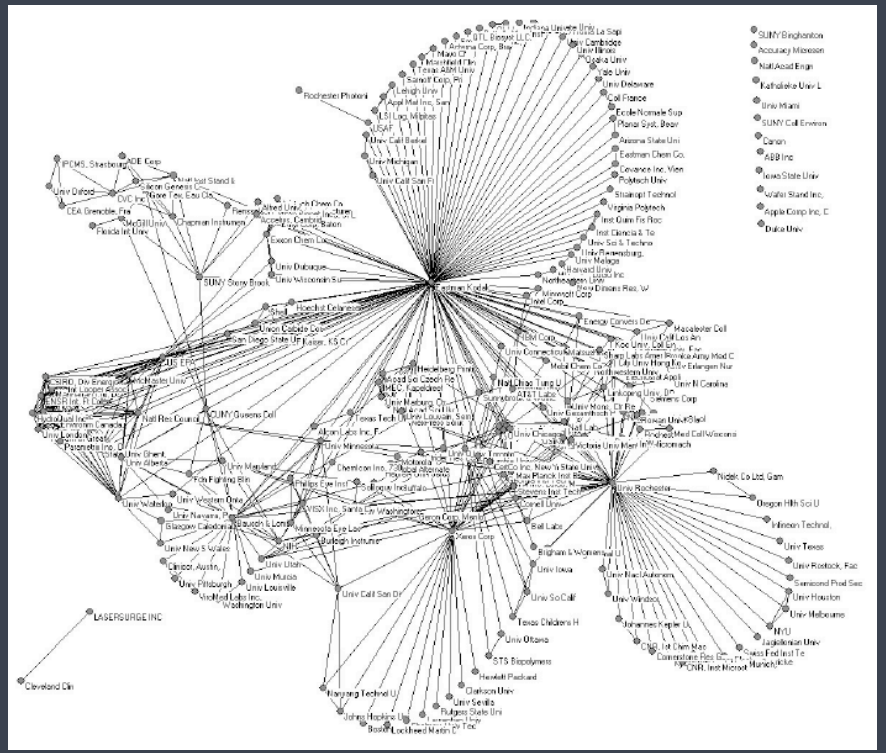


Source: Safford, 2004

Rochester



Central challenge: Creating connections

Critical connections: Those that link individuals and organizations with different kinds of resources - science, money, managerial expertise.