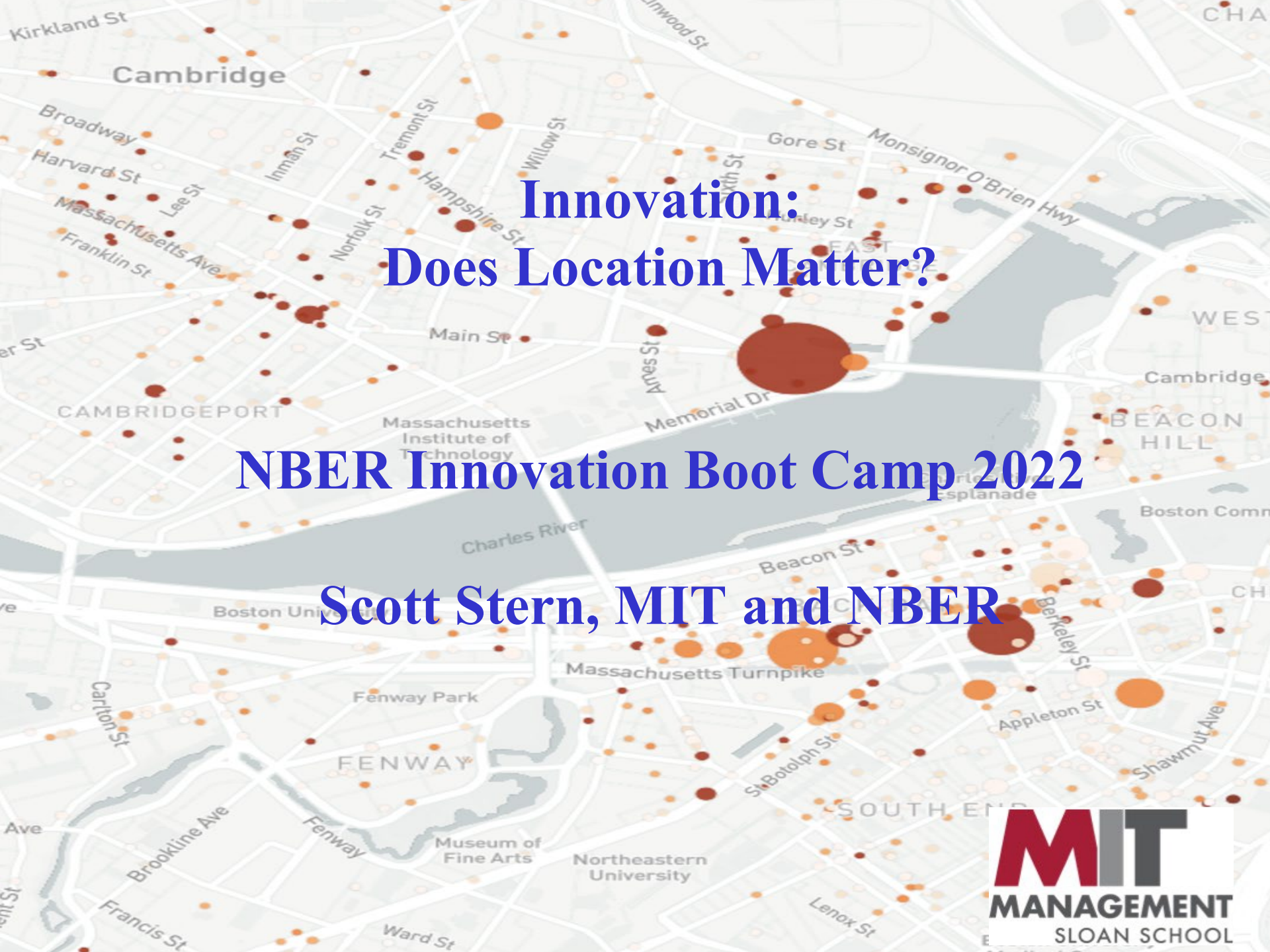

Innovation: Does Location Matter?

NBER Innovation Boot Camp 2022

Scott Stern, MIT and NBER

MIT MANAGEMENT SLOAN SCHOOL

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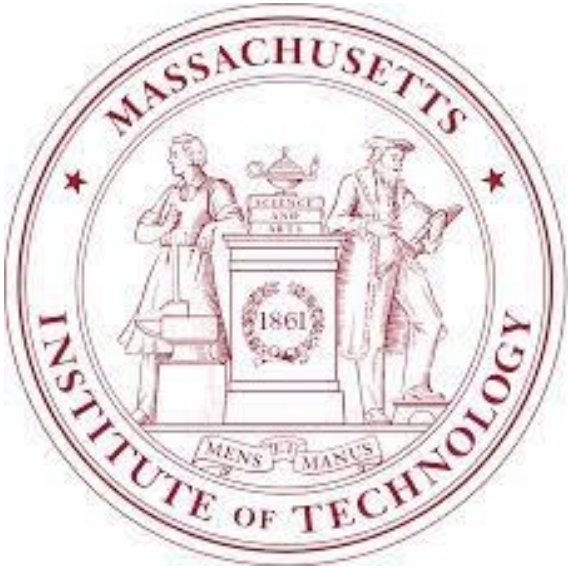
Regional Entrepreneurship Acceleration Program



Tufts
UNIVERSITY

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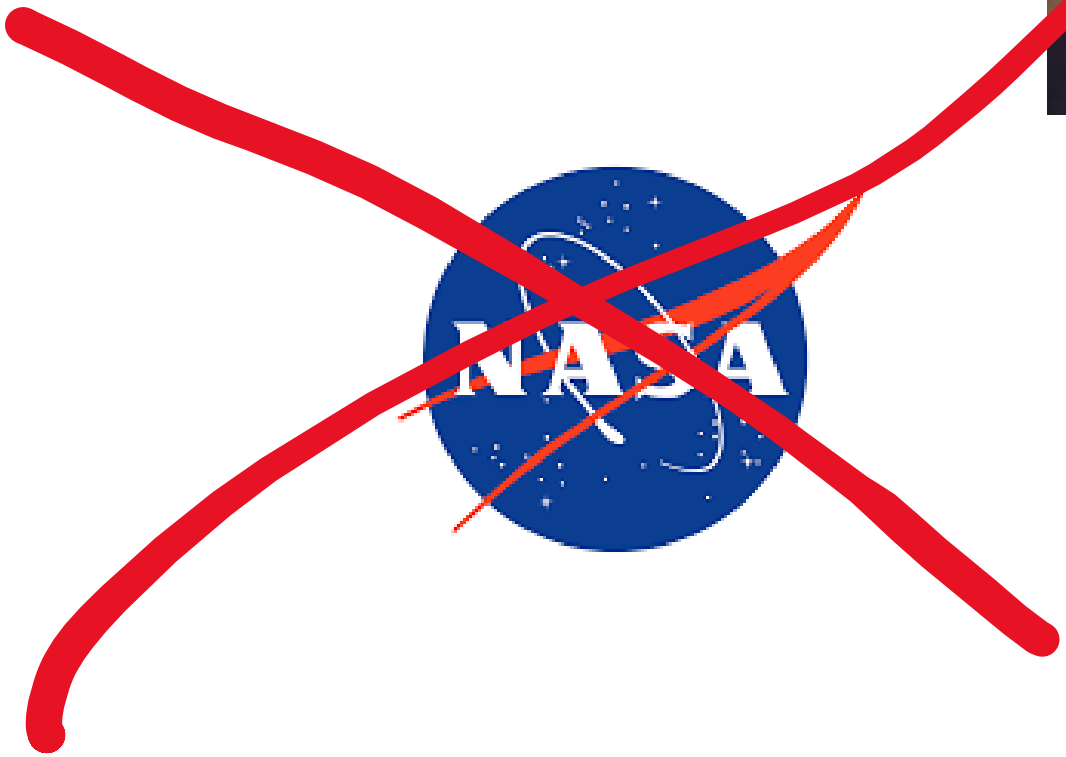

NASA


Lotus software


Pill
Pack


Commonwealth
Fusion Systems


Biogen


by amazon pharmacy


HubSpot


Akamai


moderna

Microsoft

NOVARTIS

BOEING

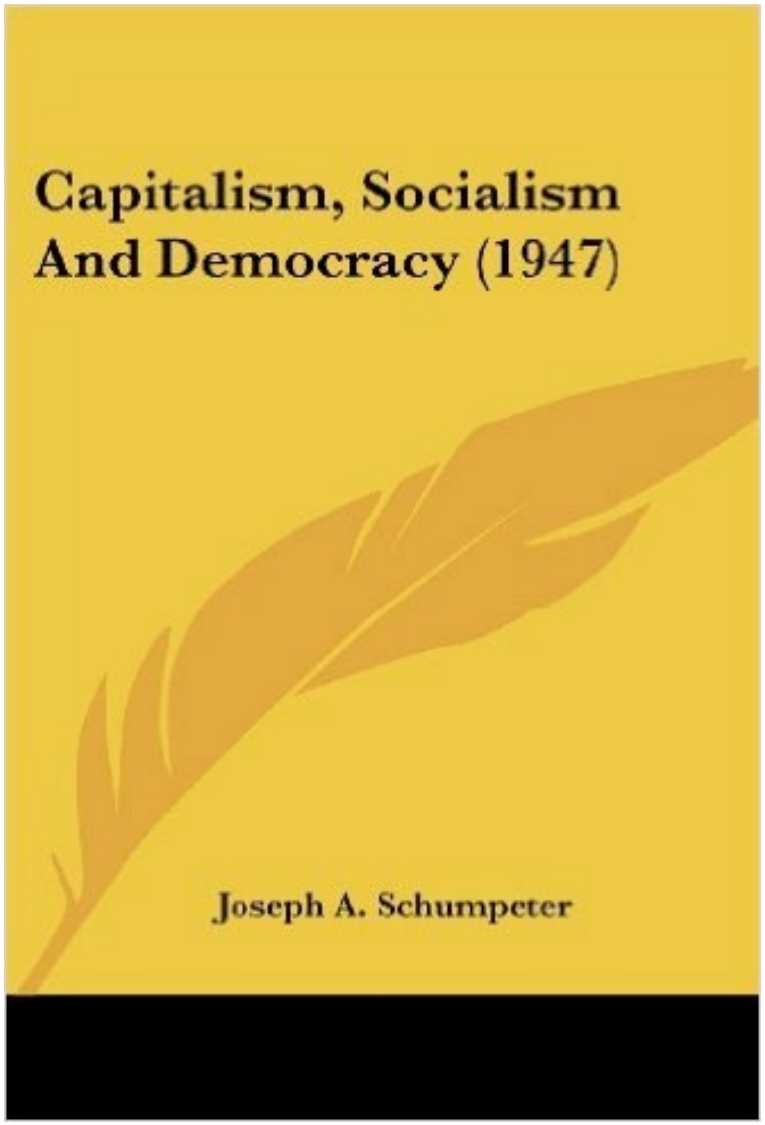
SANOFI

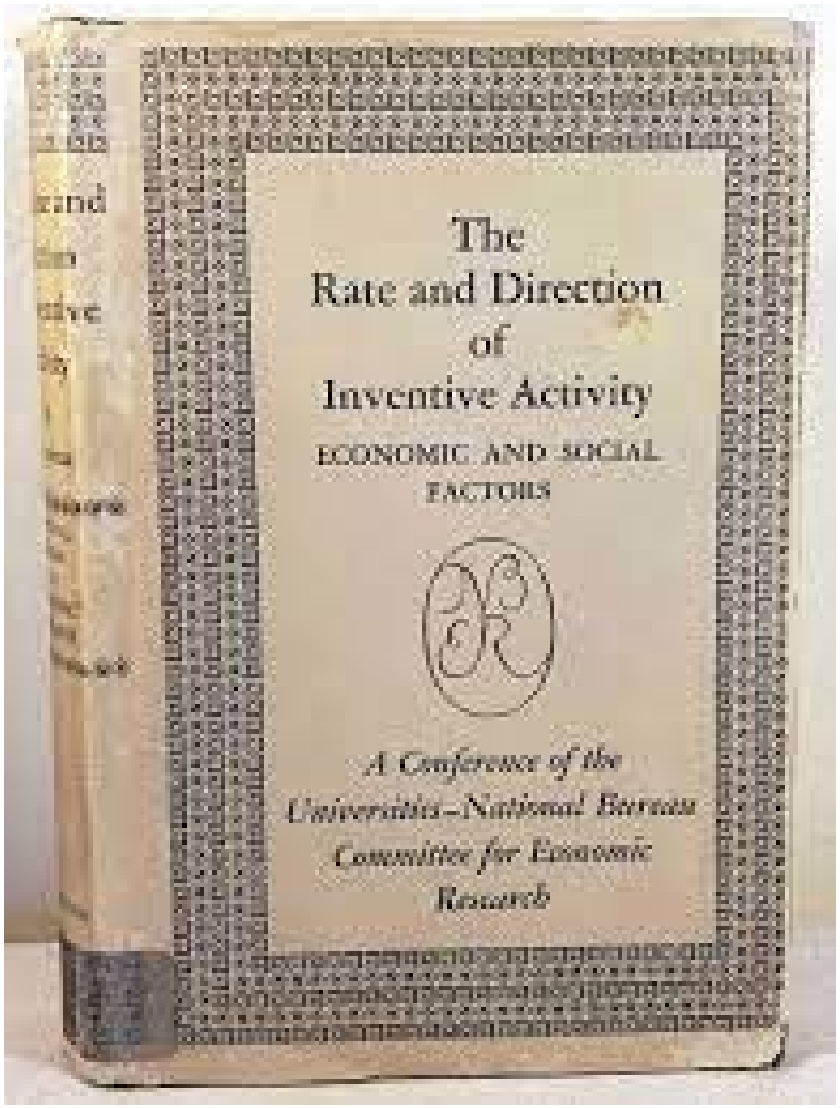
What is the role of "place" in shaping innovation and entrepreneurship?

Why should economists care about supporting place-based innovation?

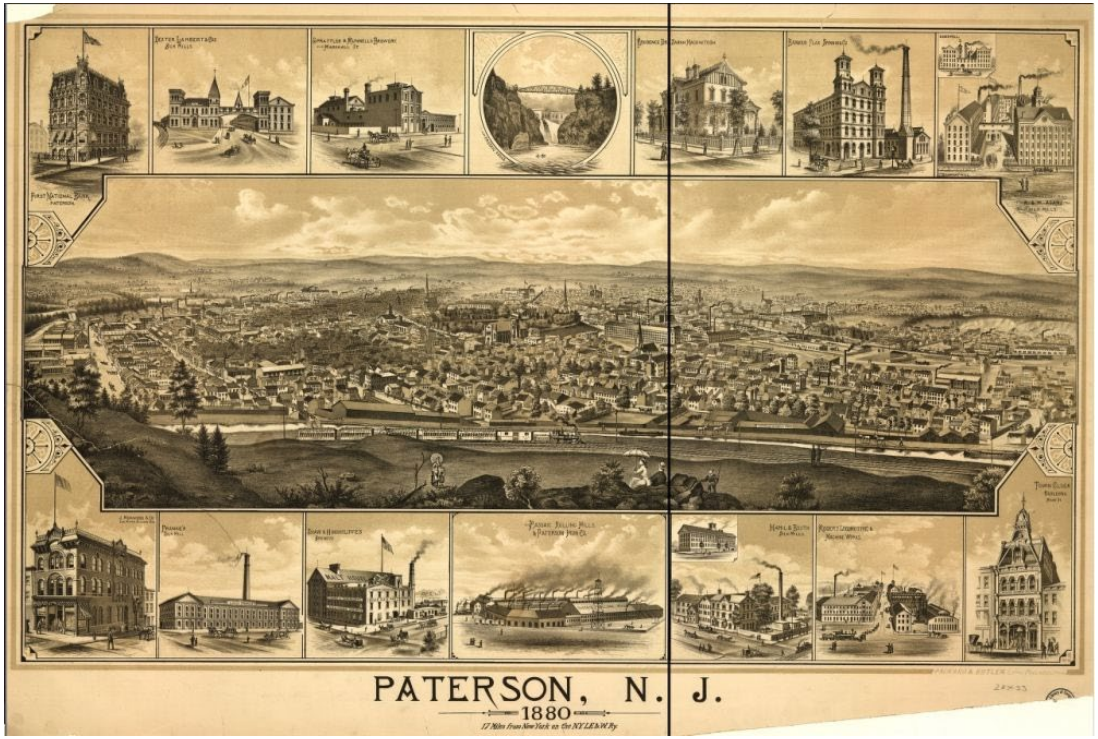
And, what are the challenges of translating the promise of place-based innovation into effective policy and institutions?

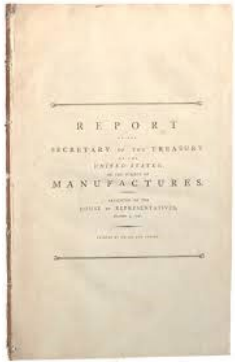
Innovation and Economic Growth



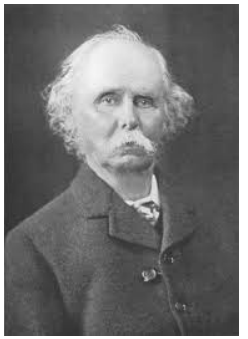


But what is the special role of location?




REPORT
SECRETARY OF THE TREASURY
MANUFACTURES

To cherish and stimulate the activity of the human mind, by multiplying the objects of enterprise, is not among the least considerable of the expedients, by which the wealth of a nation may be promoted…. To produce the desirable changes, as early as may be expedient, may therefore require the incitement and patronage of government.



The mysteries of the trade become no mysteries; but are as it were in the air, and children learn many of them unconsciously”

Alfred Marshall, 1890

Concentration of patent activity in the US

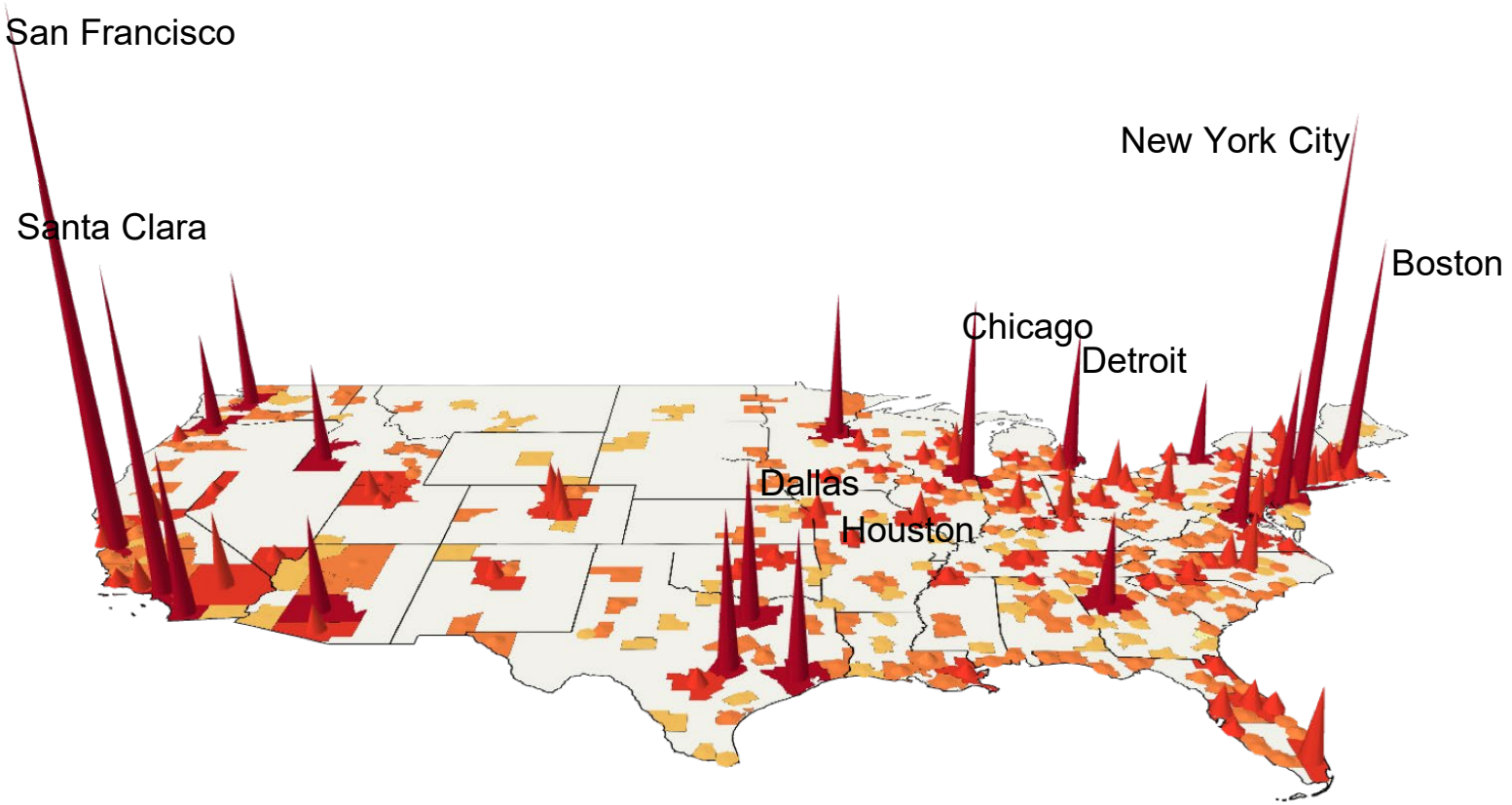


TABLE 6—3SLS REGRESSION RESULTS ESTIMATING GINI C

	Gini of production	Gini of innovation
Gini of innovation	—	—
Natural resources	0.331	—
	(5.145)	
Scale	−0.160	—
	(−4.333)	
Transportation costs	1.432	—
	(5.052)	
Industry R&D/sales	0.440	0.572
	(7.290)	(2.421)
Skilled labor	1.075	0.687
	(14.846)	(3.707)
University research	—	0.119
		(7.887)
Gini of production	—	−0.135
		(−1.247)
Sample size	163	163
Standard error	0.15523	0.21733

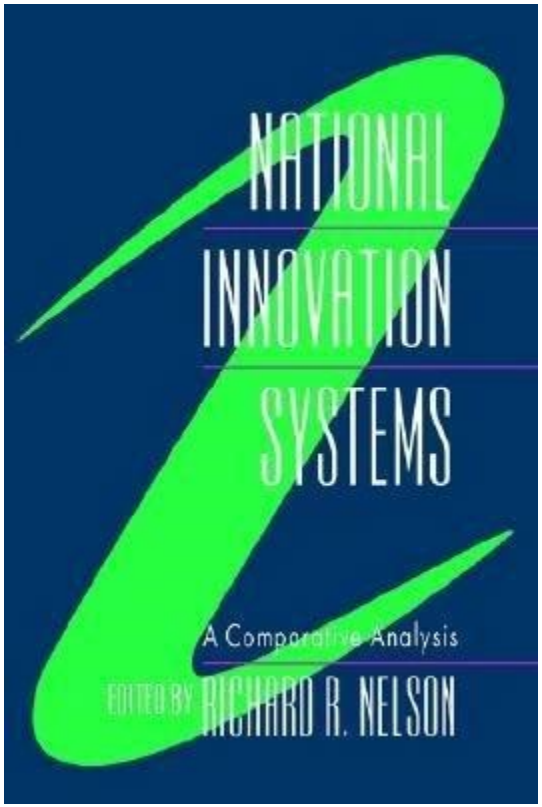
[a] t values are given in parentheses.

TABLE V

PREDICTED LOCALIZATION PERCENTAGES OVER TIME (BASED ON 1975 PROBIT RESULTS FOR CITATIONS OF UNIVERSITY PATENTS)

	Predicted percentage for:		
Lag	Same country	Same state	Same SMSA
0 or 1 year	67.1	9.7	4.8
5 years	65.5	6.5	4.0
10 years	64.6	5.3	3.7
25 years	63.5	4.0	3.3

The National Innovation Systems Framework (Nelson, 1990; Lundvall, Freeman, etc)



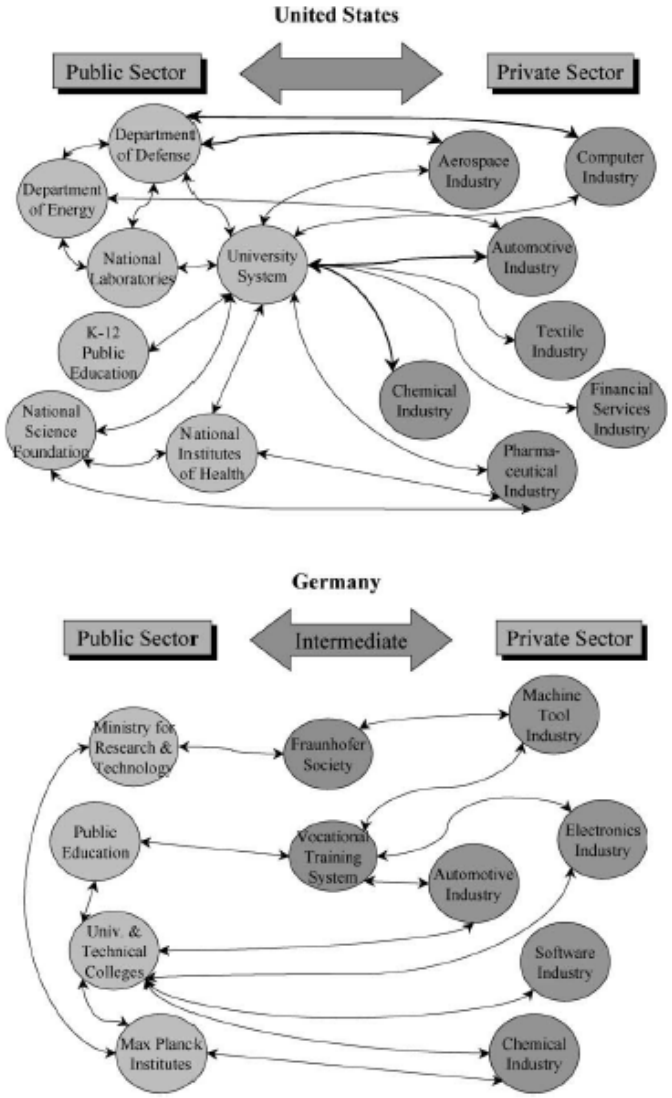
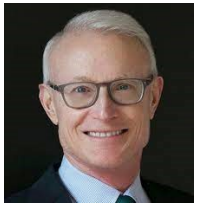


Fig. 2. A comparison of some important elements of the national innovation systems of United States and Germany.

The Determinants of National Innovative Capacity: The Role of Institutions, Policy and Dynamics in Cumulative Knowledge Production



Common Innovation Infrastructure

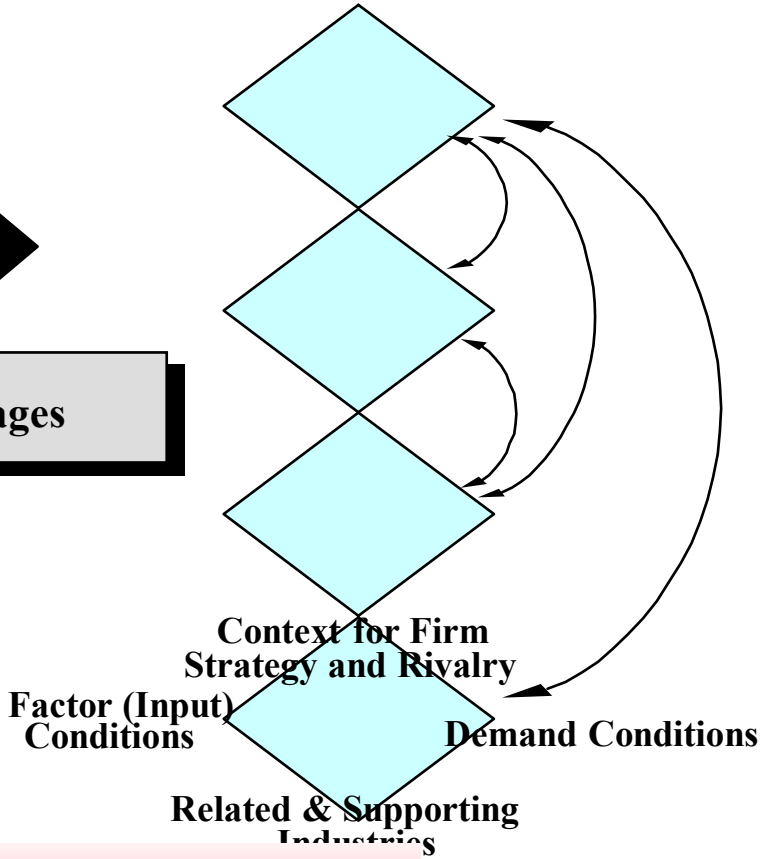
Cluster-Specific Environment for Innovation

Innovation Resources

National "Knowledge" Stock

Innovation Policy

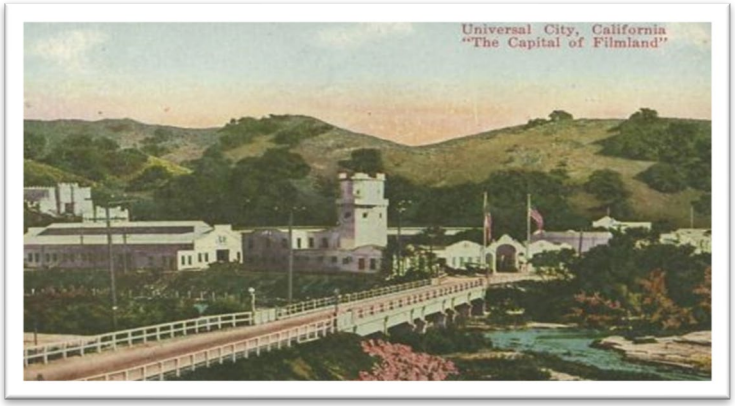
Quality of Linkages



$$\dot{A} = f(L_A, K_A, A; Z_A, \delta)$$

But beyond “R&D” and “STEM,” what shapes place-based innovation and entrepreneurial ecosystems?

Clusters are Everywhere



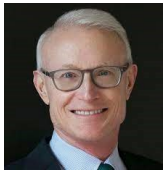
Motion Pictures - LA

Semiconductors - Taiwan

Fashion & Textiles - Milan

Wine Cluster - Australia

Clusters and Innovation



Industries within stronger clusters (in terms of jobs and innovaton) are associated with higher innovation (and jobs) growth

Table 5
EA-industry patenting growth – the duality of employment and patenting in clusters.

	Patenting Growth$_{1990–05}$ (N = 55,083)			
	5-1	5-2	5-3	5-4
ln *Industry Spec*$_{Patent}$	**−.807 (.010)**	**−.812 (.010)**	**−.814 (.010)**	**−.818 (.010)**
ln *Cluster Spec*$_{Employ}$			**.101 (.009)**	**.069 (.010)**
ln *Cluster Spec*$_{Patent}$	**.102 (.014)**	**.052 (.015)**	**.070 (.014)**	***.031 (.015)***
ln *Related Clusters Spec*$_{Employ}$				**.058 (.017)**
ln *Related Clusters Spec*$_{Patent}$		**.138 (.025)**		**.101 (.026)**
ln *Cluster Spec in Neighbors*$_{Employ}$				***.030 (.014)***
ln *Cluster Spec in Neighbors*$_{Patent}$		**.162 (.021)**		**.118 (.022)**
EA fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
R-Squared	.468	.471	.471	.474

Notes: See notes in Table 2. All models include EA-industry with positive employment in 1990.

We test the role of clusters by estimating region-industry patenting growth over 1990-2005 as a function of the initial *Industry Specialization* and *Cluster Specialization* (outside the industry) in a region, and a set of region and industry fixed effects.

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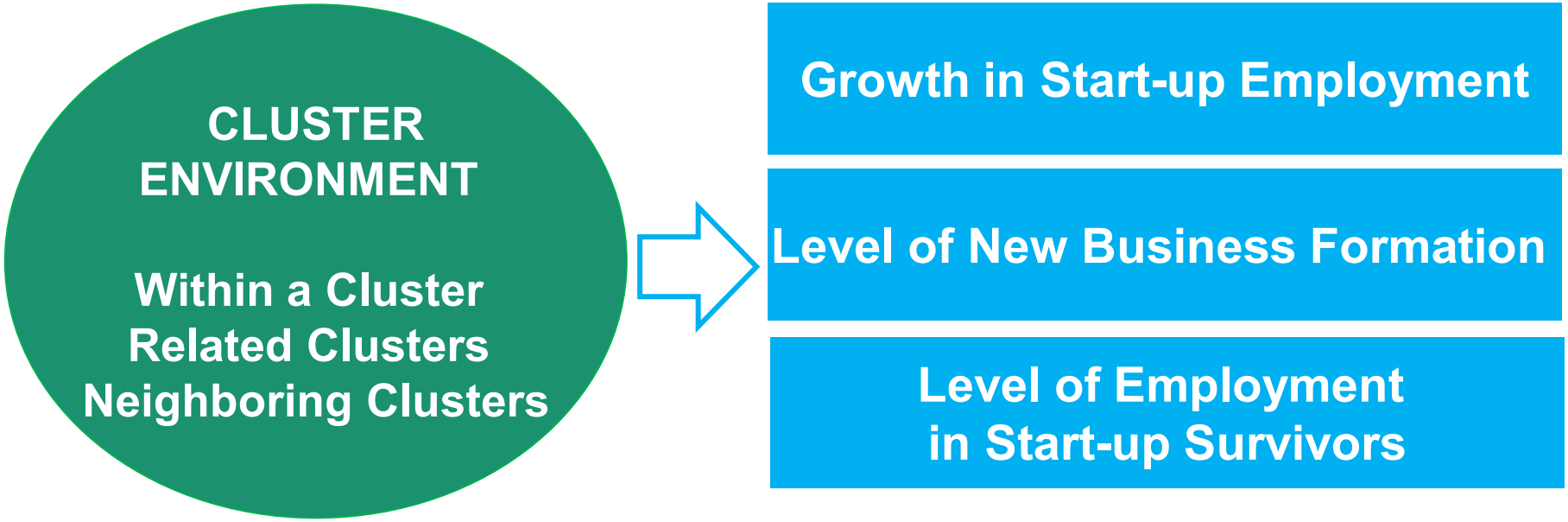
US CLUSTER MAPPING

Clusters and Entrepreneurship

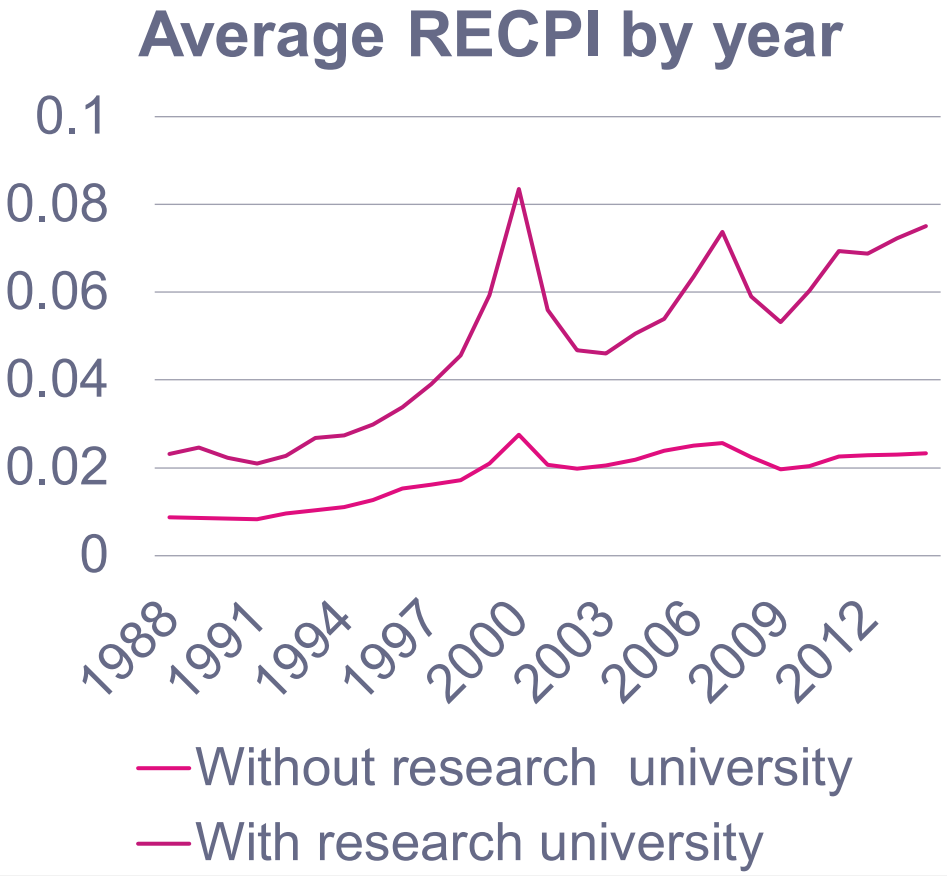
Industries that are part of a strong cluster environment register

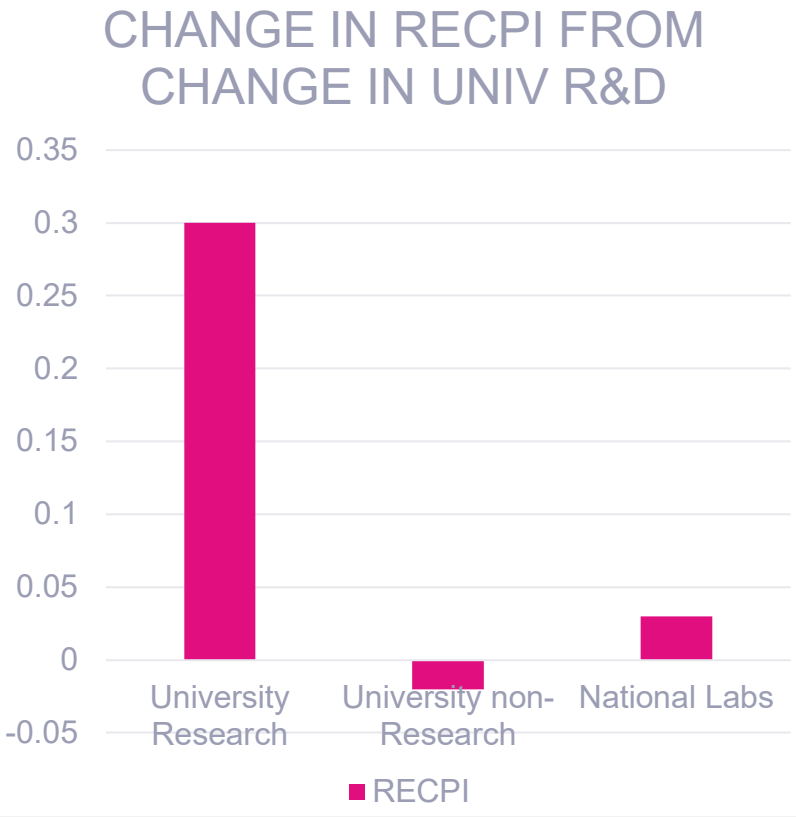
- higher **growth of** start-up activity
- higher **level of** start-up activity
- higher **level of** employment in surviving start-up firms



Source: Delgado/Porter/Stern, Clusters and Entrepreneurship, Journal of Economic Geography, 2010

The Impact of Universities on the Quantity and Quality of Entrepreneurship

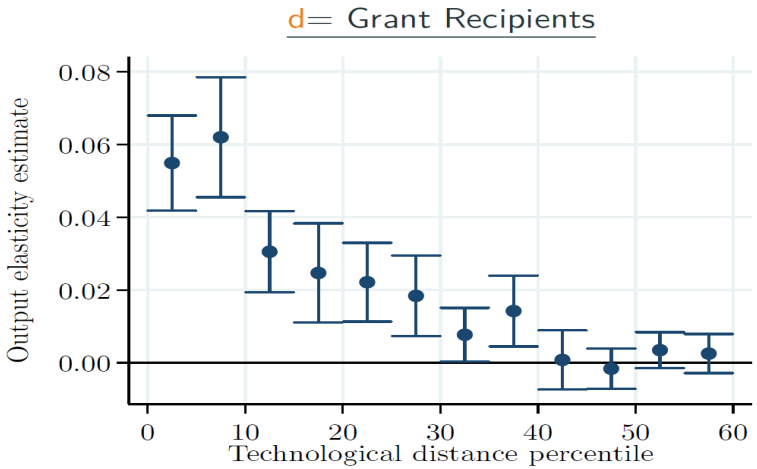


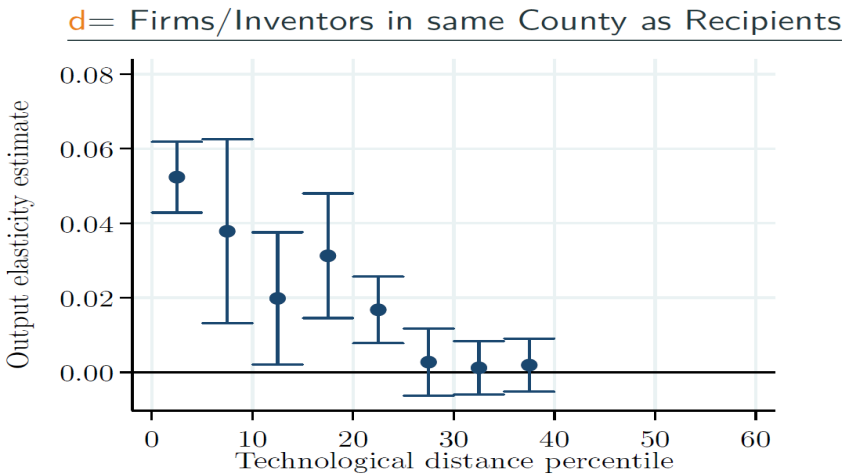


But should economists care? Is there a role for policy?

If the argument for intervention is about place-based spillovers, then need to show the causal impact of funding not simply on the firms that are funded but on OTHER firms or innovation that results (beyond the grantee)….

Estimating Spillovers from Publicly Funded R&D: Evidence from the US Department of Energy

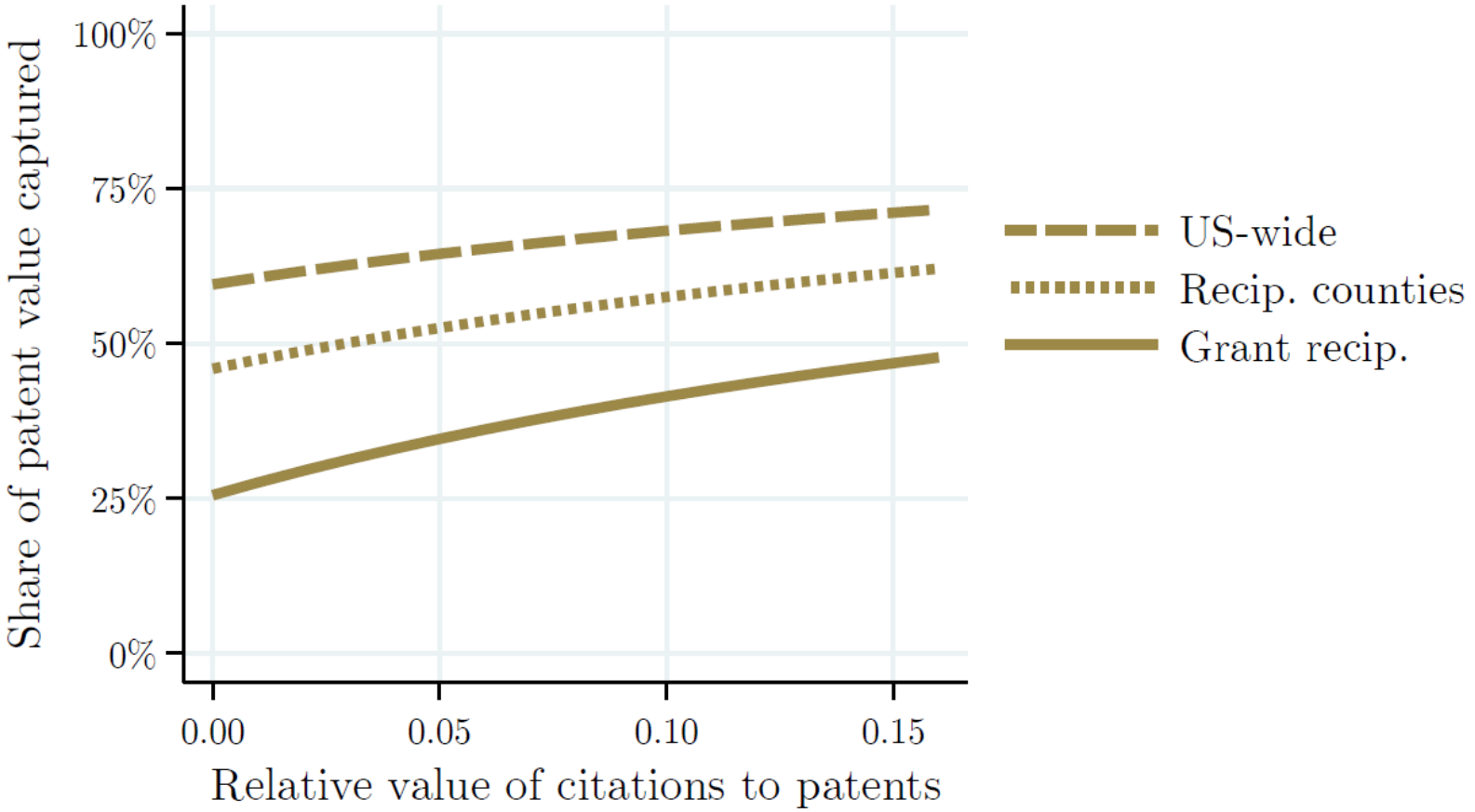




U.S. DEPARTMENT OF ENERGY

SBIR·STTR America's Seed Fund

one north carolina Small Business Program


Share of patent value captured
100%
75%
50%
25%
0%
0.00
0.05
0.10
0.15
Relative value of citations to patents
US-wide
Recip. counties
Grant recip.

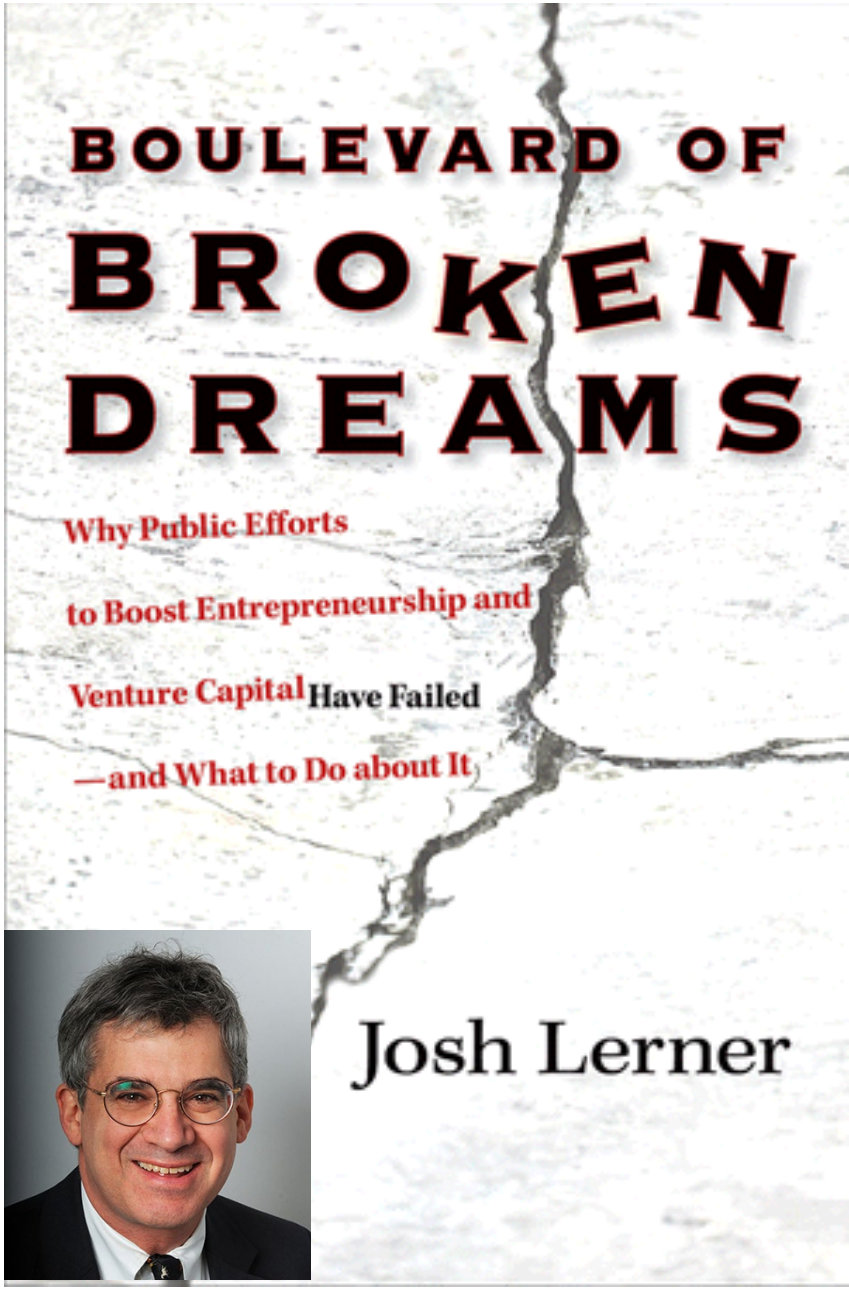
Seems like a compelling case for investing in place-based clusters to enable innovation-driven entrepreneurial ecosystems

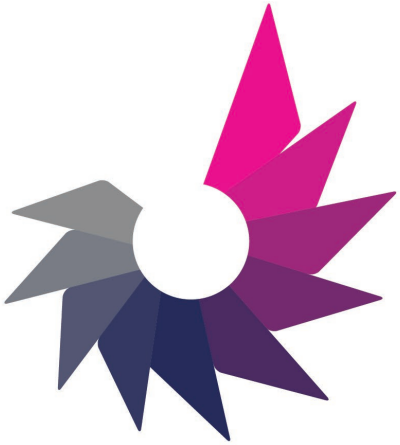
BUT…

Place-Based Innovation and Entrepreneurial Economic Development

- These well-intentioned approaches often end….in the Boulevard of Broken Dreams

- Many regional efforts to accelerate through entrepreneurship fail to turn "ideas" into action, or fizzle out after an initial burst of energy and initiative





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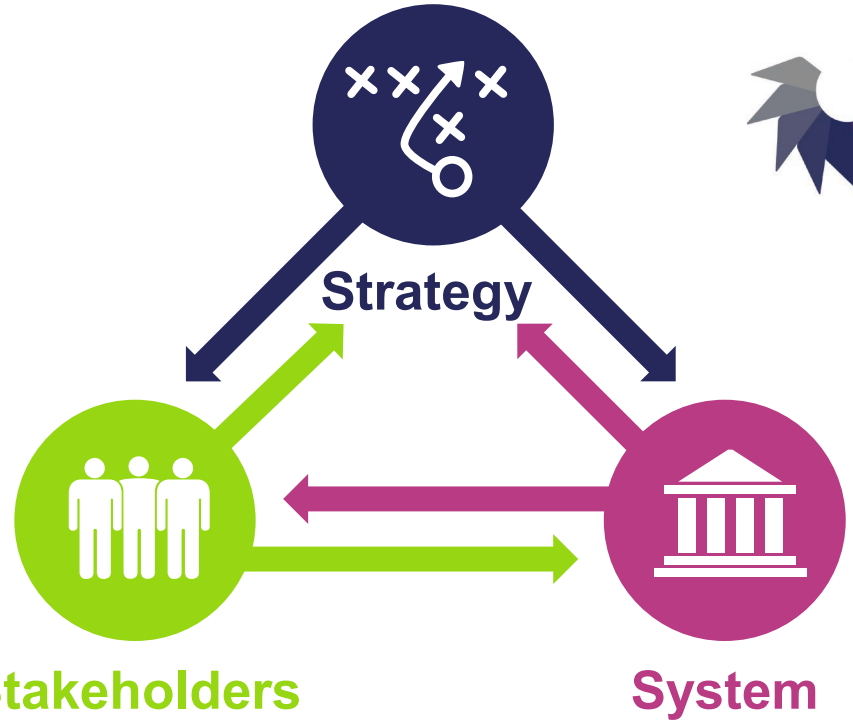

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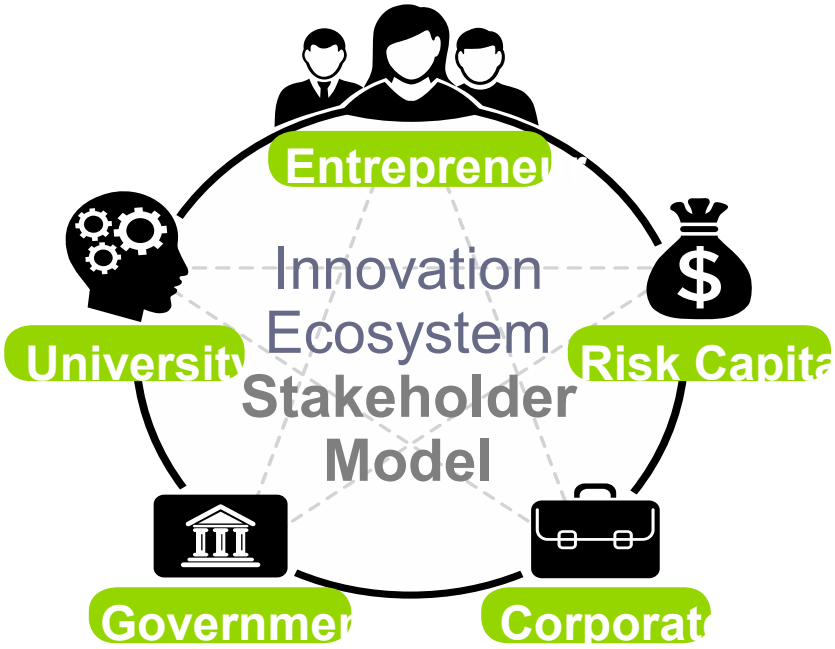
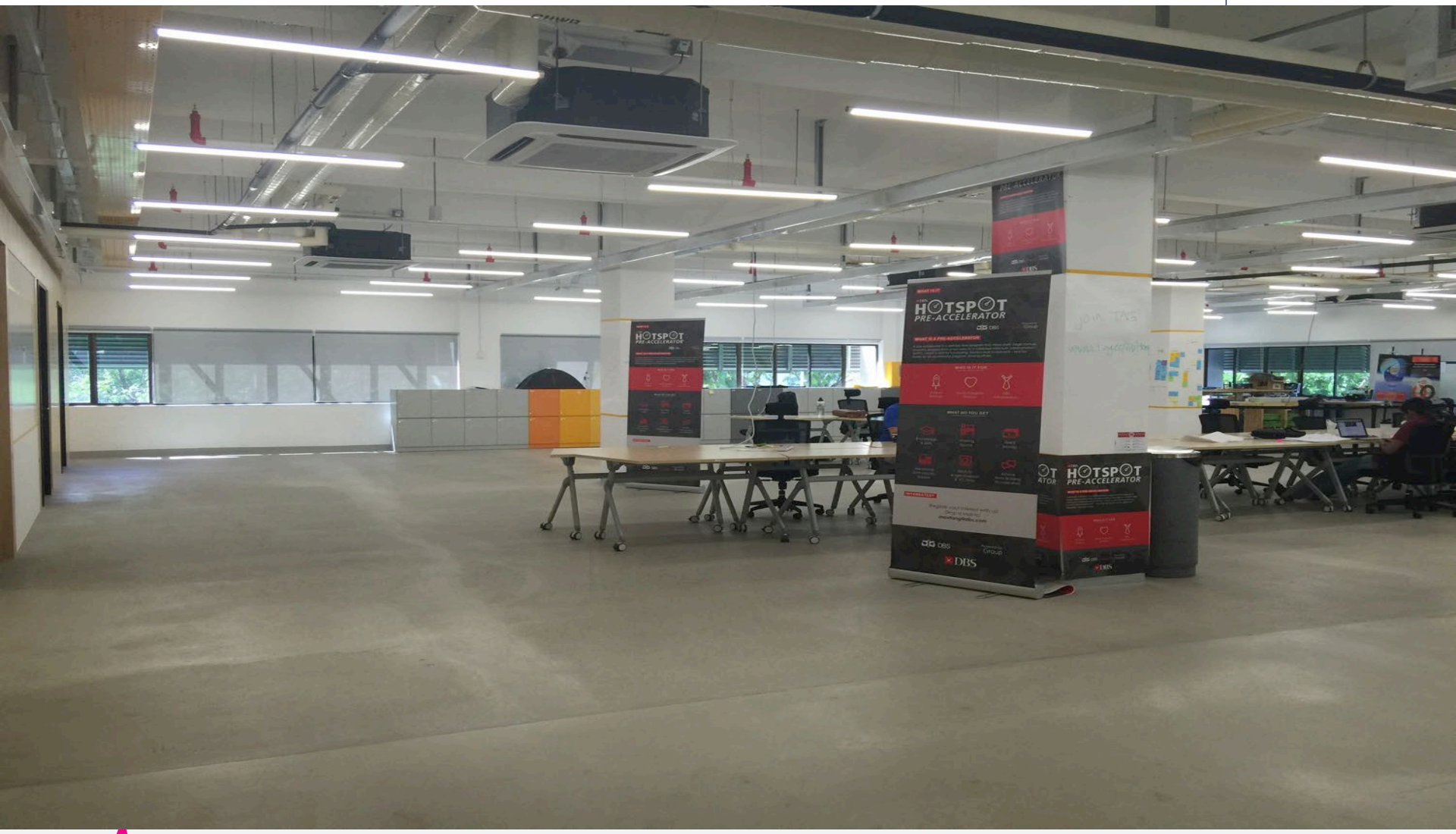
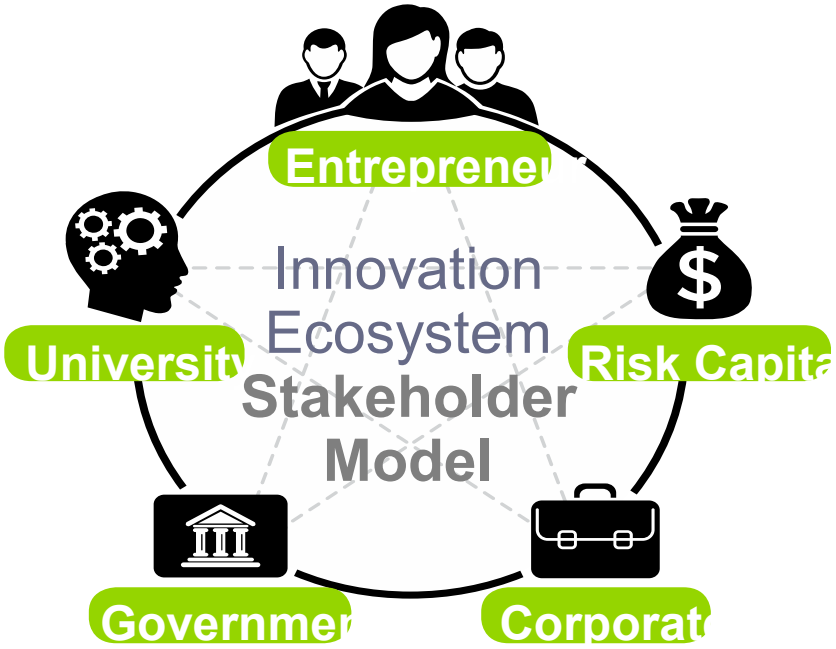
No one is "in charge" of innovation or entrepreneurship…



Entrepreneur? Team Singapore



No one is "in charge" of innovation or entrepreneurship…



But each stakeholder plays a critical role in success…

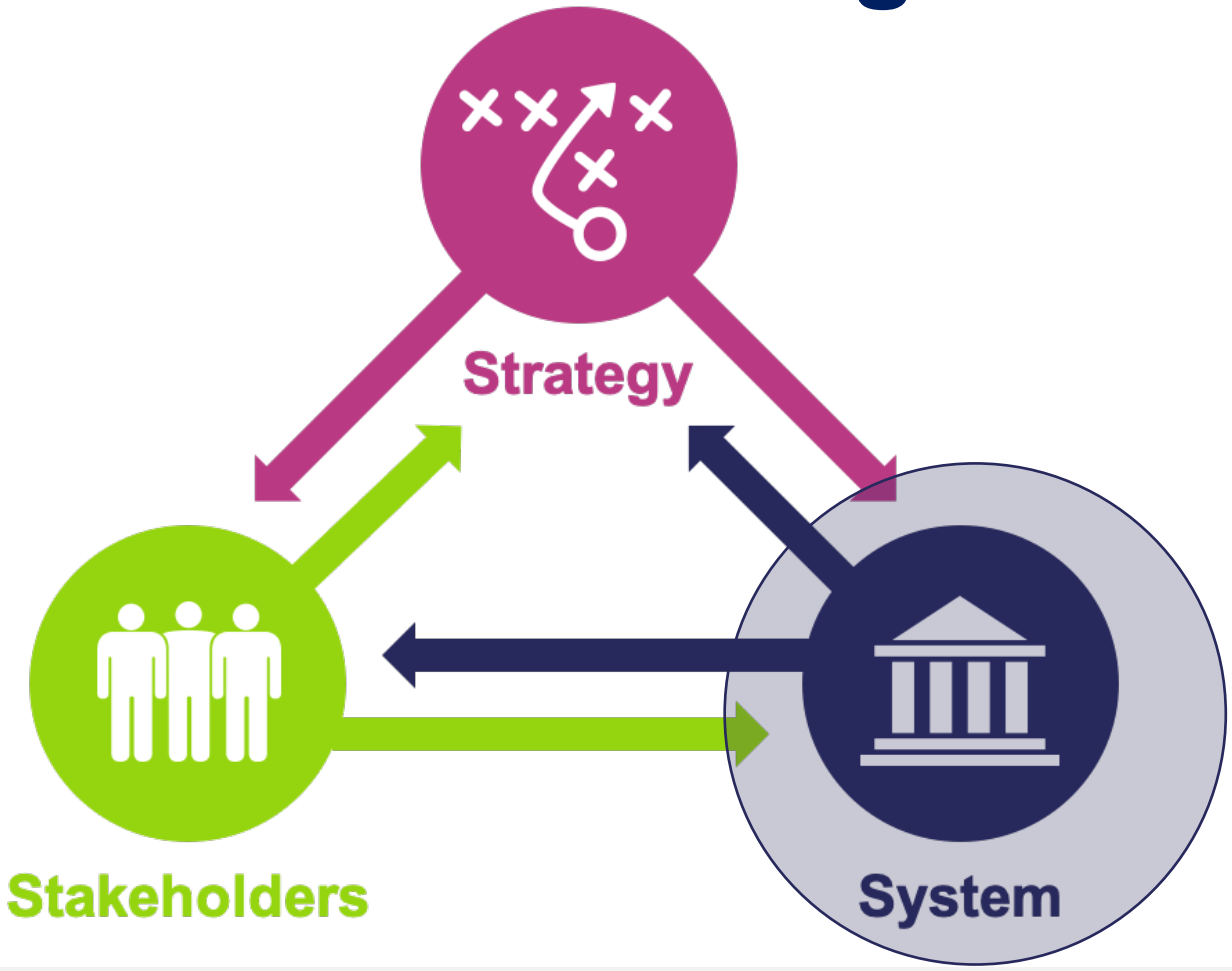
Central Denmark

Aarhus University established “The Kitchen” in February 2020.

The Kitchen is a new interdisciplinary incubator for both students and employees at the University.

The Kitchen has a strong connection with and is open for the surrounding ecosystem. The incubator provides new offers for entrepreneurs including micro grants for student entrepreneurs in collaboration with a regional enterprise.

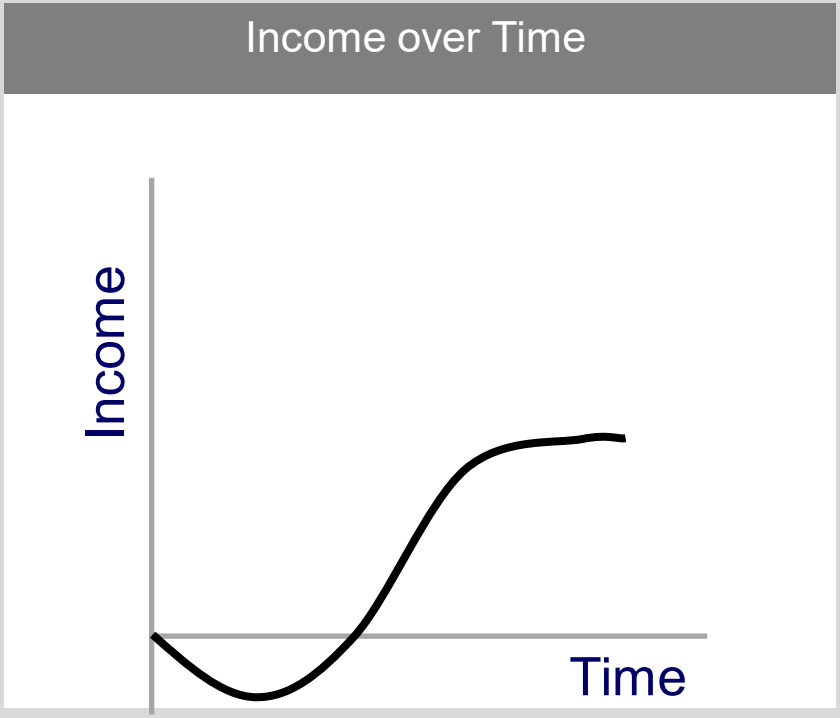
MIT Regional Entrepreneurship Acceleration Program



SMEs & IDEs

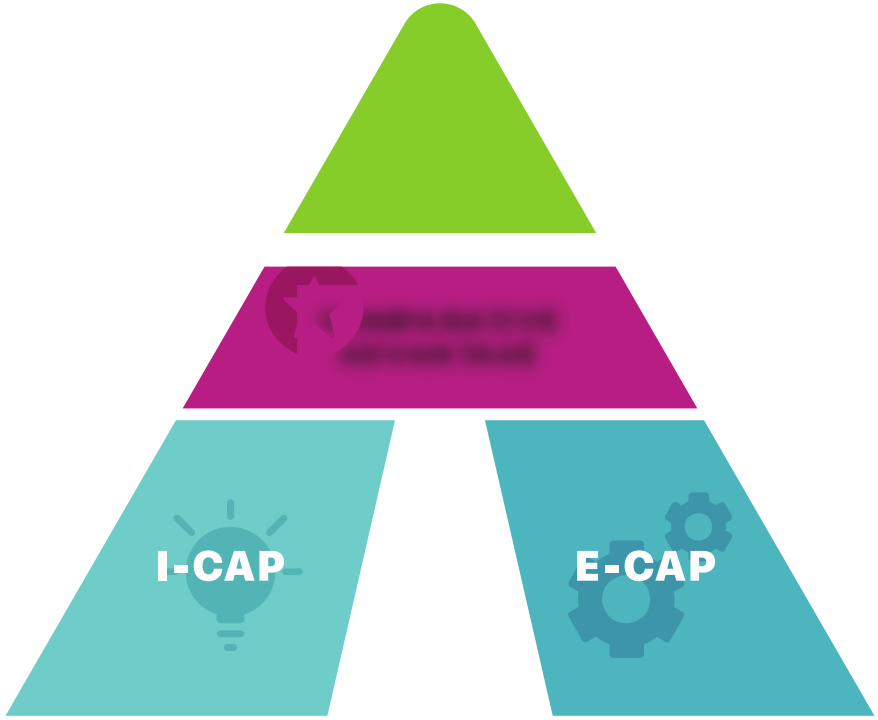
Small-/Medium-sized Enterprise (SME)

Innovation-Driven Enterprise (IDE)



Where do IDEs come from?

MIT REAP System

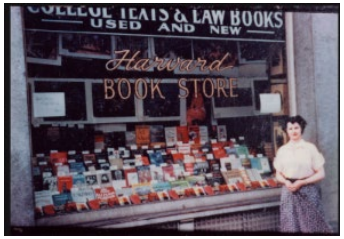


Three Steps to Measuring Entrepreneurial Quality (at or near the time of founding)

Tecnológico de Monterrey

Business Registrations

"Digital Signatures" of Growth Potential

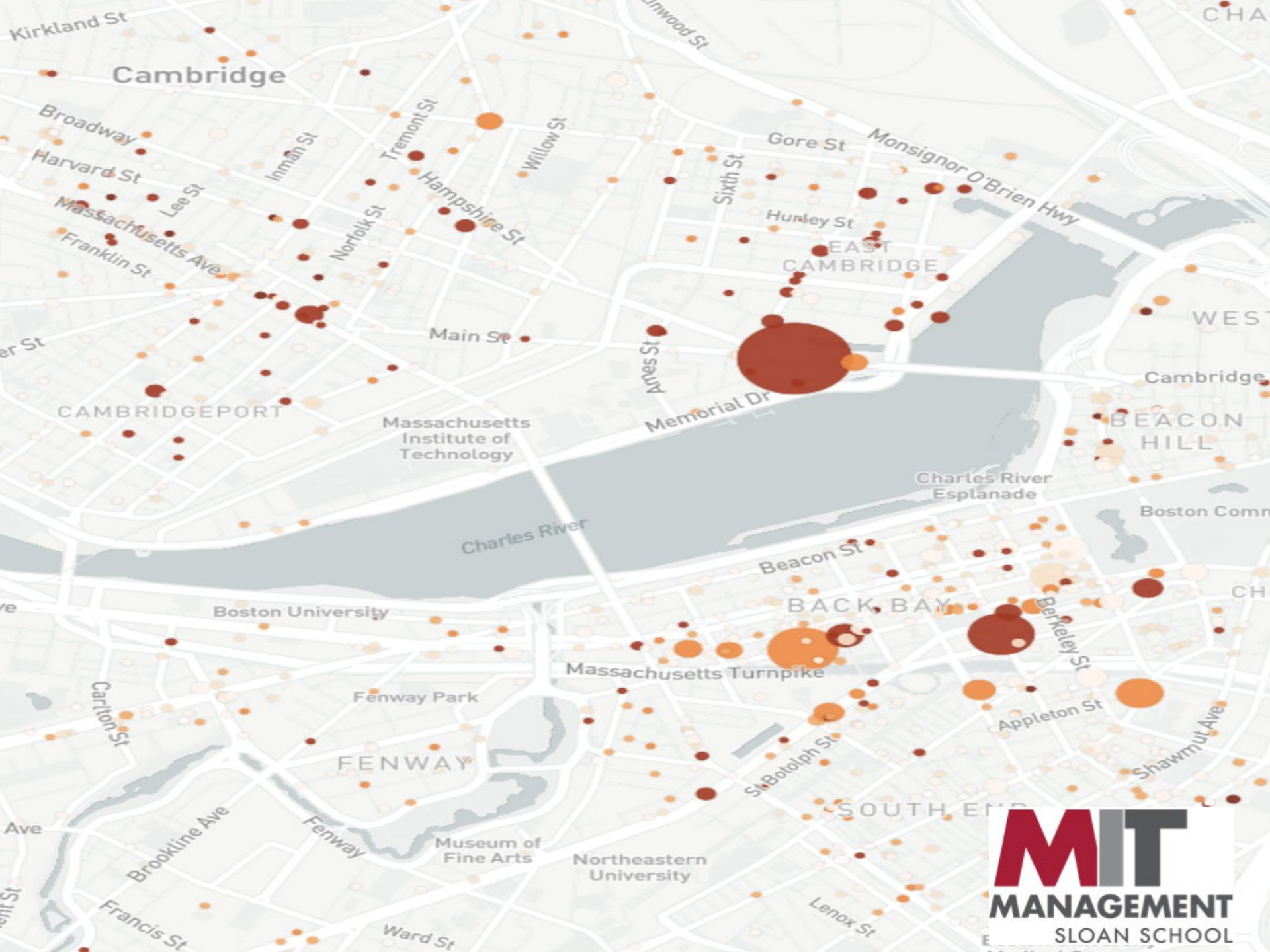


"Success" outcomes can be mapped to initial "digital signatures"

Available at amazon

How do “Digital Start-up Signatures” Predict Growth? (NB: Prediction NOT Causal)

Change in the Probability of Growth	
Has Short Name	248%
Firm Named after Founder	-70%
Corporation (Not Partnership or LLC)	405%
Trademark in First Year	501%
Patent and No Delaware Registration	3,534%
No Patent and Delaware Registration	4,470%
Both Patent and Delaware Reg.	19,640%
Sectoral Controls	Included
State Controls	Included



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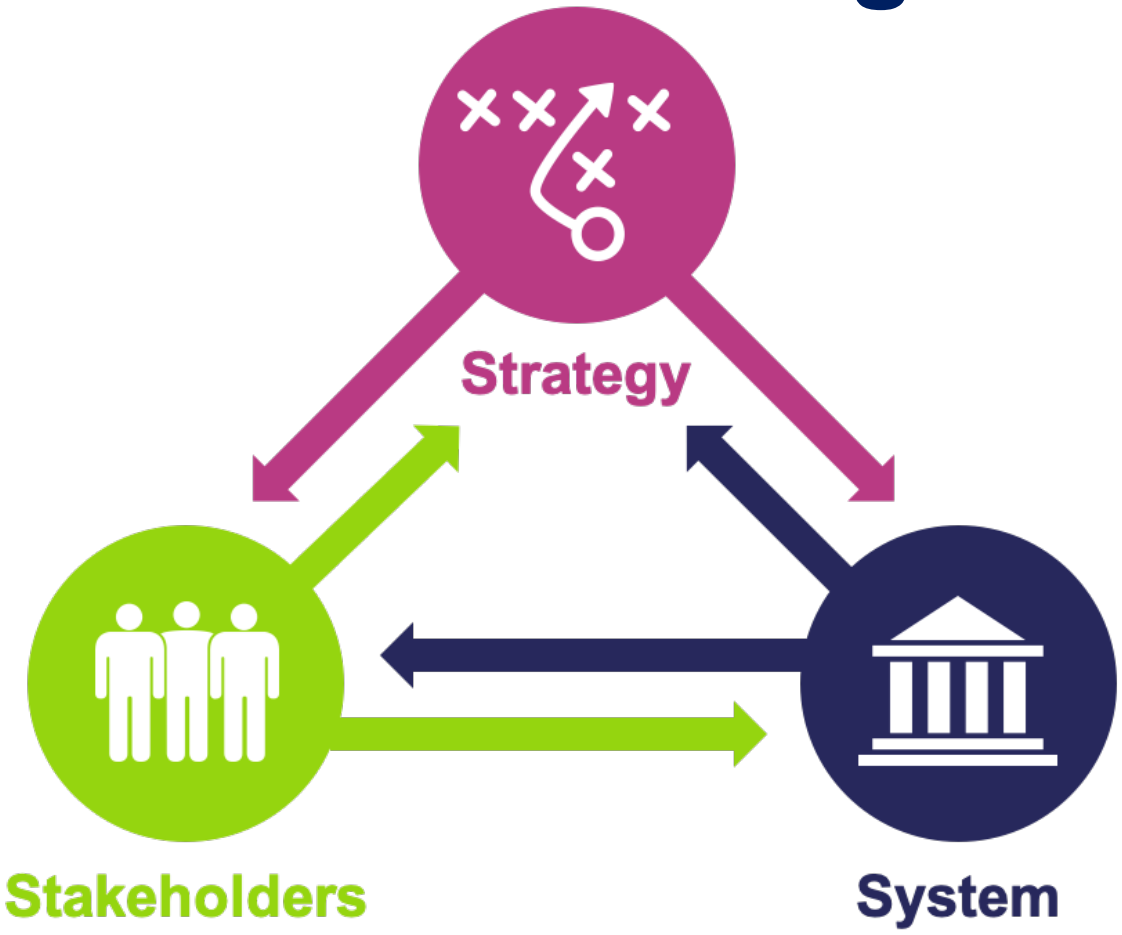


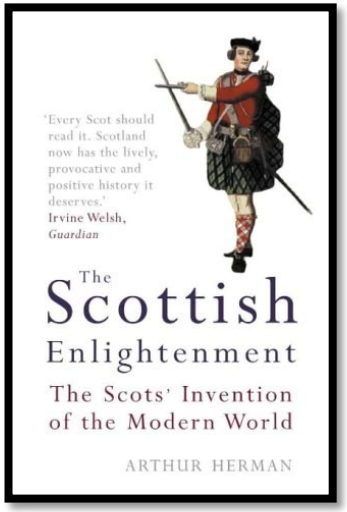
STRATEGY

Choosing an Innovator-Based Entrepreneur-Led Value Proposition

Prioritize and determine your first Must Win Battle.

Choosing and Winning Your REAP Must-Win Battle

Team Scotland



Donna Chisholm
Head of Business Innovation and Growth Sectors, Highlands & Islands Enterprise

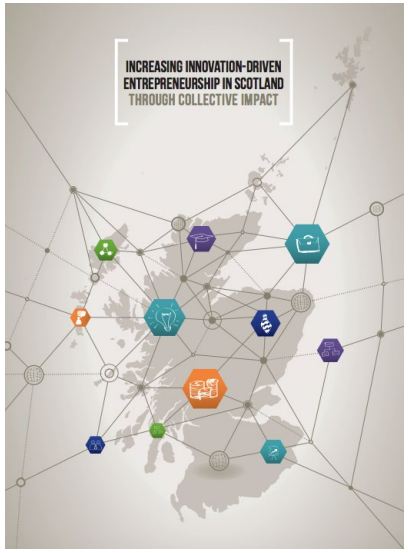
Clive Reeves
Executive, Scottish Enterprise

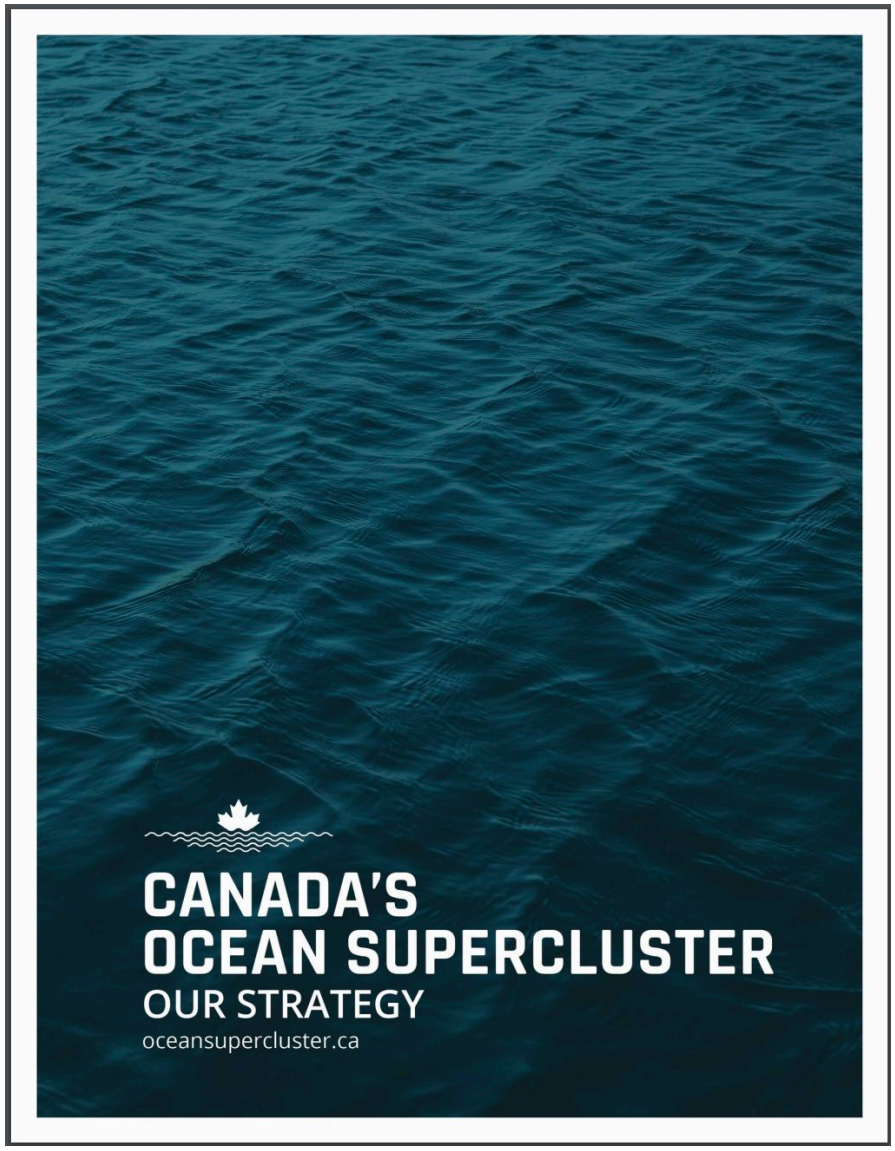
Simon Grey
Chief Executive, AWS Ocean Energy Ltd

Ian Ritchie
Serial software entrepreneur and influential investor

Jonathan Harris
Editor, Young Company Finance

Jonathan Levie
Professor & Director of Centre for Entrepreneurship, U. of Strathclyde




CANADA'S
OCEAN SUPERCLUSTER
OUR STRATEGY
oceansupercluster.ca

Team Lima

STARTUP PERÚ

http://www.start-up.pe/

Team Queensland

https://eprints.qut.edu.au/131590/7/131590.pdf

Team Nova Scotia

ONSIDE

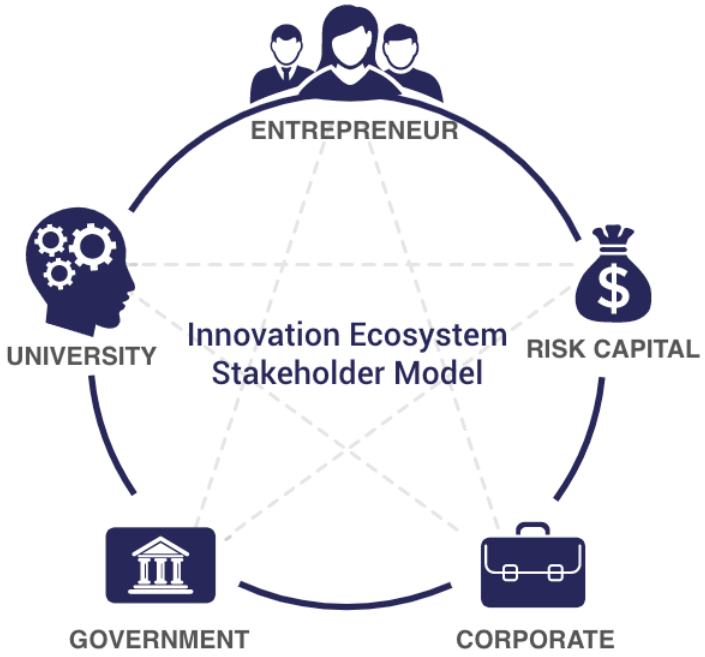
https://onsidenow.ca/

Team SW Norway

MIT REAP SUMMER SCHOOL
Entrepreneurship Accelerator Summer School

https://www.ntnu.edu/ihb/eass

Each of these Acceleration Strategies Resulted from Systematic Stakeholder Engagement…



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Broader Lessons

- Relative to traditional policy analysis, accelerating ecosystems in a rigorous way depends on meaningful engagement across multiple stakeholders within those systems
    - The impact of any policy depends on aligned actions across multiple actors

- The potential to "test" acceleration strategies may be difficult – each region or system is "different," and outcomes are highly skewed

- Ultimately, shaping a cumulative innovation economy depends on aligning multiple initiatives to provide appropriate incentives (at the individual and system level), appropriate institutions, and coordination across institutions and stakeholders to translate the "inputs" of ideas-driven growth into a meaningful ideas-driven economy