Regional Innovation Ecosystems, Clusters, Entrepreneurship

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Where we've been

"There are two paradoxical characteristics of the contemporary global economy. First, *innovative activity is not uniformly or randomly distributed across the geographical landscape*. Indeed, the more knowledge-intensive the economic activity, the more geographically clustered it tends to be…... Second, *this tendency toward spatial concentration has become more marked over time, not less*….. This reality contradicts long standing predictions that the increasing use of information and communication technologies would lead to the dispersal of innovative activity over time….. [I]t would appear that the process of knowledge production exhibits a very distinctive geography."

(Asheim and Gertler, 2005, p. 291-2)

Regional Agglomeration

- As ICT grew more advanced in the 1990s, some observers predicted that geographic location would cease to be a determining factor in economic development. On the contrary, the last 20 years have shown that location matters more than ever before.

- Economic development is now extensively focused on creating local and regional agglomerations with a special concentration (clusters) often aimed at the high-technology sector.

- Science parks and business incubators are also part of this story. Policy makers sometimes view such initiatives as early stages of a continuum leading to the emergence of vibrant hi-tech clusters.

Cluster Definition

"Geographical concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, associated institutions (for example universities, standards agencies, and trade associations) in particular fields that compete but also cooperate."

(Porter, 1998)

Clusters are agglomerations of people, firms, institutions, and other economic actors working in a similar field who interact in a relatively small region. Clusters are often described geographically, but it is not merely the proximity of related firms and institutions which makes them successful. It is the social interaction between economic actors which helps create the "primordial soup".

Why Industries Cluster

- When many businesses of the same type gather in one region, *information sharing* between firms, competition, and specialization spur development. A virtuous cycle develops where people seeking to be at the forefront of their field choose to live in the leading cluster and large talent pools in turn attracts more businesses.

- Workers then are even more likely to move to such an area because they are confident of finding employment and so on.

- Specialized financial institutions, tailored to a particular industry emerge, making business transactions easier.

- *Increasing returns* and *positive externalities* are key features of clusters. (Breschi and Malerba, 2005)

Porter's Diamond Model

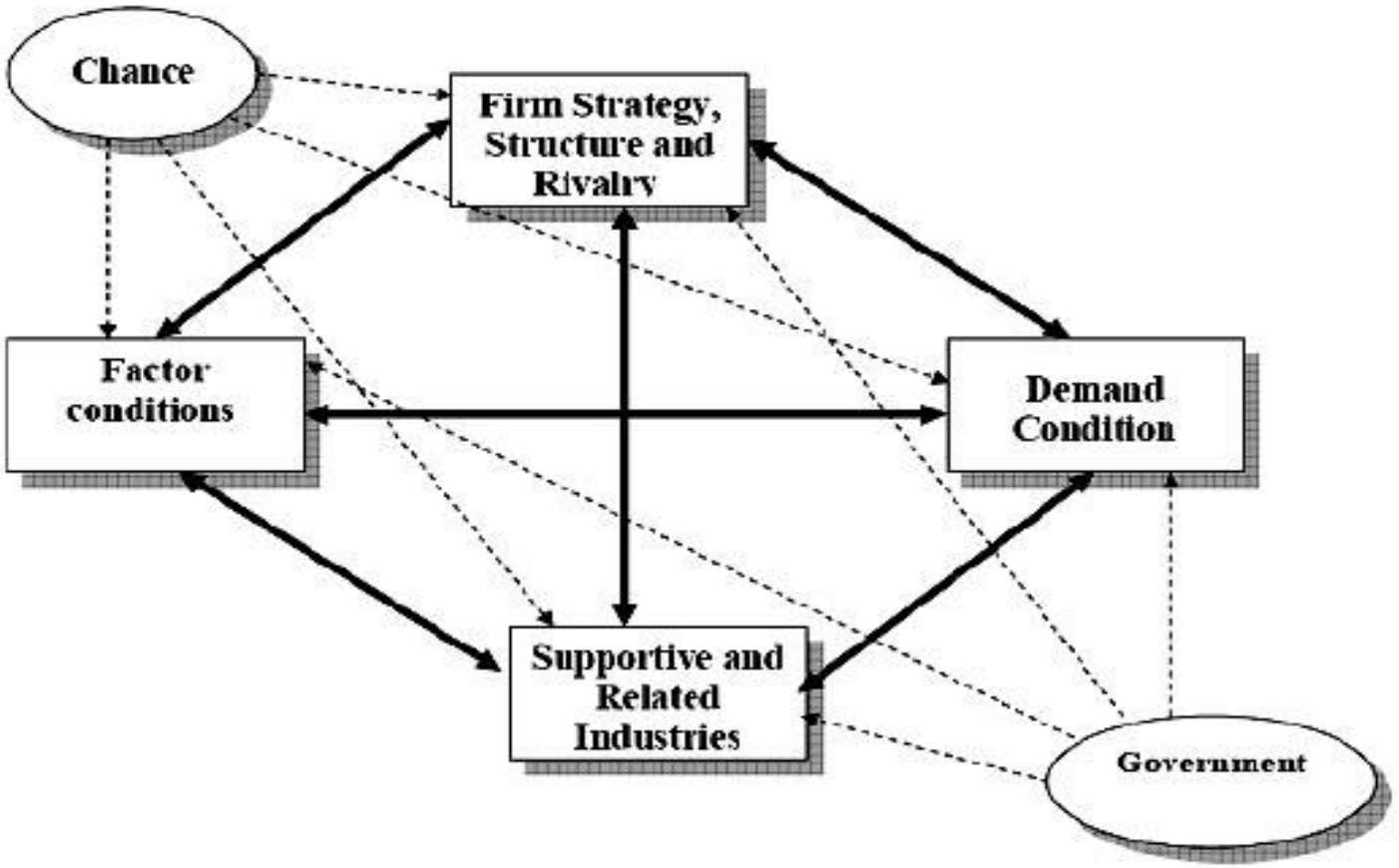


Figure 1. Diamond Model

A Knowledge Argument

Tacit knowledge arguably constitutes the most important basis for innovation-based value creation. When everyone has relatively easy access to *codified knowledge*, the creation of unique capabilities and products depends on the creation and use of tacit knowledge.

- Tacit knowledge defies easy articulation or codification, thus difficult to exchange over long distances.

- Changing nature of the innovation process – innovation based increasingly on the interactions and knowledge flows between firms, research organizations, and public agencies.

The combination of these two features of the innovation process creates a strong basis for an argument in support of the importance of geography.

A Knowledge Argument

The literature on "*learning regions*" further explores the character and geographic consequences of tacit knowledge.

Tacit knowledge is best transmitted through face-to-face interaction between partners who already share some basic commonalities – e.g., common codes of communication and shared conventions and norms due to a shared institutional environment; personal knowledge of each other based on history of formal collaboration and/or informal interaction. *TRUST*

Knowledge does not flow unidirectionally. Users and producers share both tacit and proprietary, codifiable knowledge to their mutual benefit.

A Knowledge Argument

RIS – institutional infrastructure supporting innovation within the production structure of a region.

"[T]he region is increasingly the level at which innovation is produced through regional networks of innovators. Local clusters and the cross-fertilizing effects of research institutions." (Lundwall and Borras, 1999)

RIS associated with team-like character of innovation in networks:

- As the interactive mode of innovation grows in importance, relations between entities are more likely to become regionally contained.
- The prevalence of a set of attitudes, values, norms, routines, and expectations – "regional culture" – influences the practices of firms in a region.

Clustering v. Agglomeration

Cities have long contained districts which cater to a specific type of industry. Sometimes this occurred because of deliberate policy – grouping all butchers and abattoirs in one block to separate the process of animal slaughter from the rest of the city.

Often, though, and especially as modern industry began to emerge, clusters formed organically as tradesmen grouped together to leverage economies of scale and to more effectively compete for business.

> "Very shortly other 'external economies' developed. Once a pool of skilled labour grew up in a mill town that added to the 'inertia' of location. It made it more worth the while for expansion to occur in the same locality. A factory-trained labour force, of semi-skilled women and adolescents, was also an immense local advantage by the second generation. Another very important external economy was the convenience of specialized service industries - such as the bleaching firms, the machine-making shops, machine-servicing facilities which grew up in the shadow of the mills. All these things exercised a 'centripetal' pull on the cotton industry..." (Mathias, 2001)

Clustering v. Agglomeration

However, industrial clustering should be differentiated from simple agglomeration. While not a cut and dry proposition, one key difference is the degree of *backward and forward linkages* between firms.

Some regions, perhaps because of easy access to a vital natural resource tend to specialize in the production of a particular good. While such groupings may contribute to certain positive externalities such as a deep talent pool, they may not on their own lead to an innovative or competitive environment.

Linkages are crucial, especially between SMEs.

Examples

- Silicon Valley
- Bangalore (Electronic City, Whitefield)
- Silicon Wadi
- Daedok Innopolis
- Ciudad del Saber
- Route 128
- Research Triangle
- Washington DC
- Hsinchu Science and Industrial Park
- San Francisco's SoMa neighborhood;
  Cambridge Mass' Kendall Square;
  Lower Manhattan

Governments

Every city planner, regional politician, and national economic official hopes to emulate the success of such dynamic regional clusters. *But each example hints that "blank slate" innovative industrial development is not a simple, fast, or easy process.*

Various strategies have been used to stimulate "cluster-like" economic development across both the developed and developing world. The good news is that some policies can improve the performance of local firms and spur innovation. The bad news is that there is no "genie out of the bottle" solution for creating high-tech innovative clusters.

Most cluster-based development policies have been at best mildly helpful. At worst they use up resources that could better be used elsewhere and produce no discernible impact (Braunerhjelm and Feldman 2006; Colombo and Delmastro 2002).

Where we are going

Geography of Economic Activity

- *A key business and policy concern in the 21st century.*

- In order to thrive, places must be capable of consistently generating wealth, jobs, innovation and opportunities in an ever changing socio-techno-economic environment.

- According to the Competitive Cities report (World Bank, 2015), this is a function of (i) local institutions and regulations; (ii) infrastructure and land; (iii) skills and innovation; and (iv) enterprise support and finance.

- In order to achieve sustained growth, places must compete in the global marketplace, developing strong tradable sectors that allow the city to evolve towards production center or even creative and financial center with higher levels of income.

Systemic Approach Entrepreneurship

- *Focuses on the role of the **entrepreneurial ecosystem** and the processes of its development, adaptation, and sustainability.*

- Advocates research entrepreneurial activity embedded within local contexts rather than focusing on entrepreneurial activity in isolation.

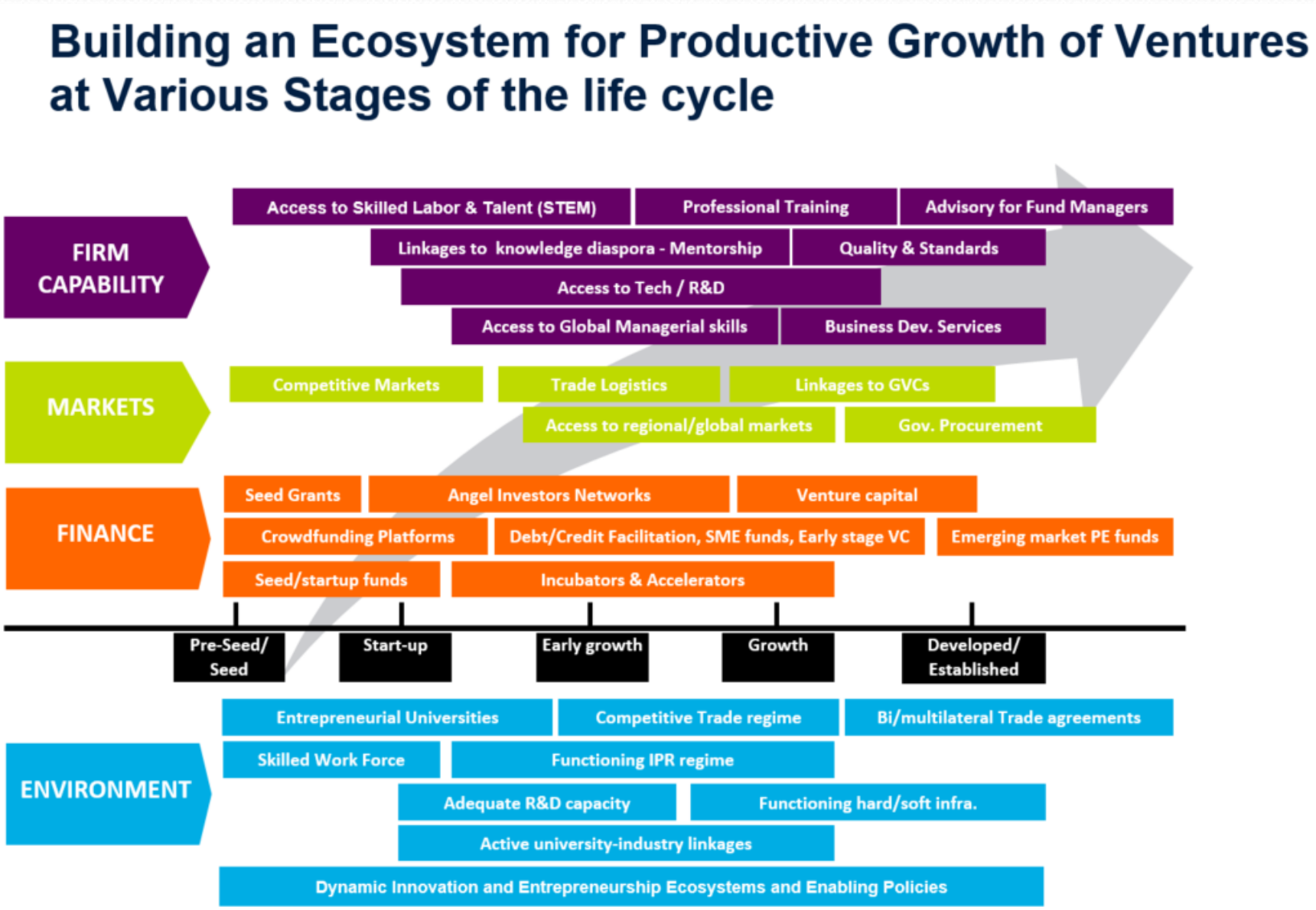
- The systemic approach to regional systems of entrepreneurship will vary depending on the type of a system – single industry cluster or several industries – and the characteristics of geographically bounded systems – human resources, regulation, institutions and norms, infrastructure, city amenities, access to finance and demand.

Entrepreneurial Ecosystems

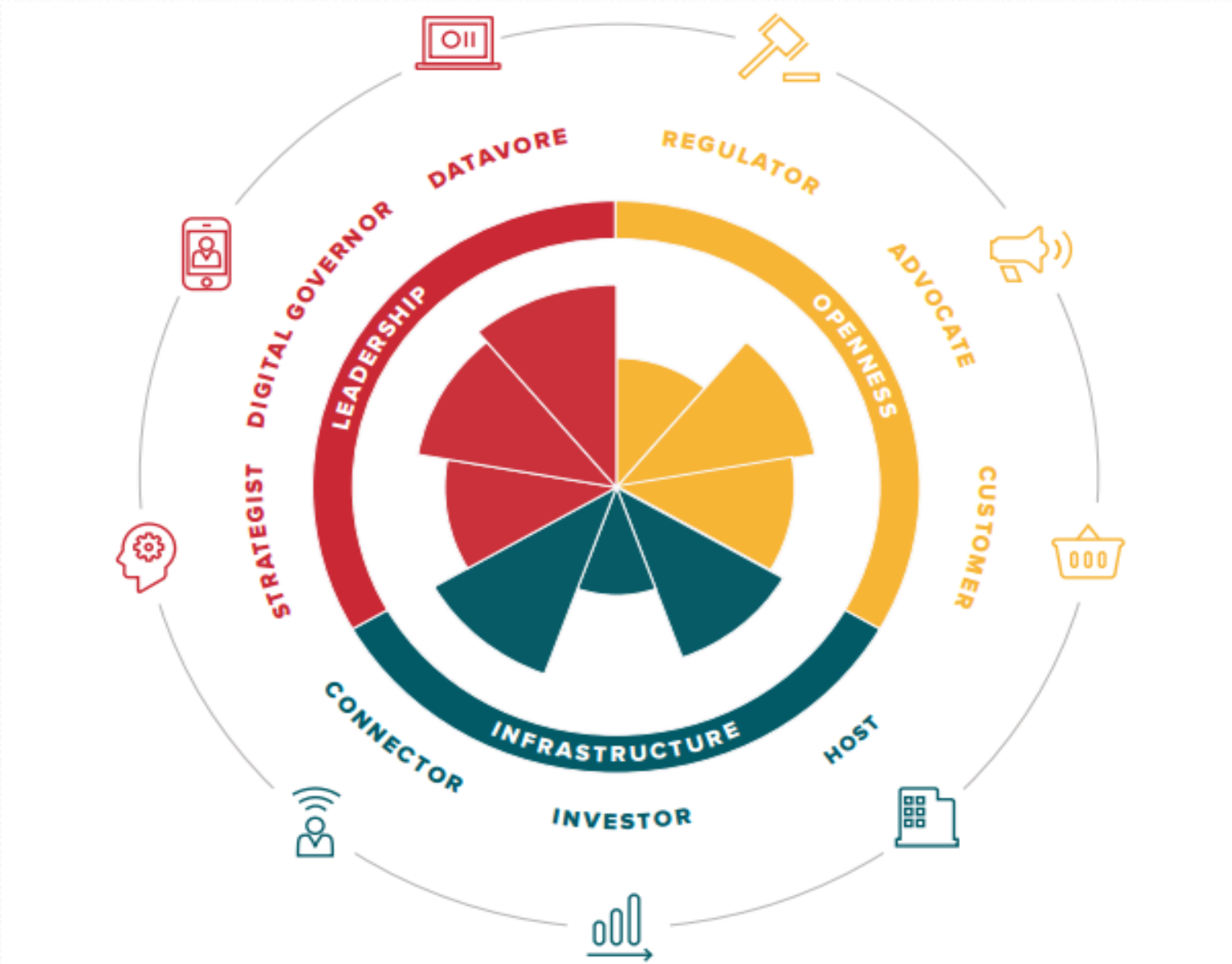
"[A] dynamic community of interdependent actors (entrepreneurs, supplies, buyers, government, etc.) and system-level institutional, informational and socioeconomic contexts."

Audretsch and Belitski (forthcoming)

Firm Life-Cycle Approach (WBG 2016)



The CITIE Framework (NESTA)



The CITIE Framework (NESTA): Openness

How open is the city to new ideas and businesses?

- **Regulator**. How does the city regulate business models in a way that allows for *disruptive entry*?
- **Advocate**. How does the city promote itself as an innovative hub and its new business community to the outside world?
- **Customer**. Is procurement accessible to small businesses, and does it actively seek innovation? (PPI)

The CITIE Framework (NESTA): Infrastructure

How does the city optimize its infrastructure for high-growth businesses?

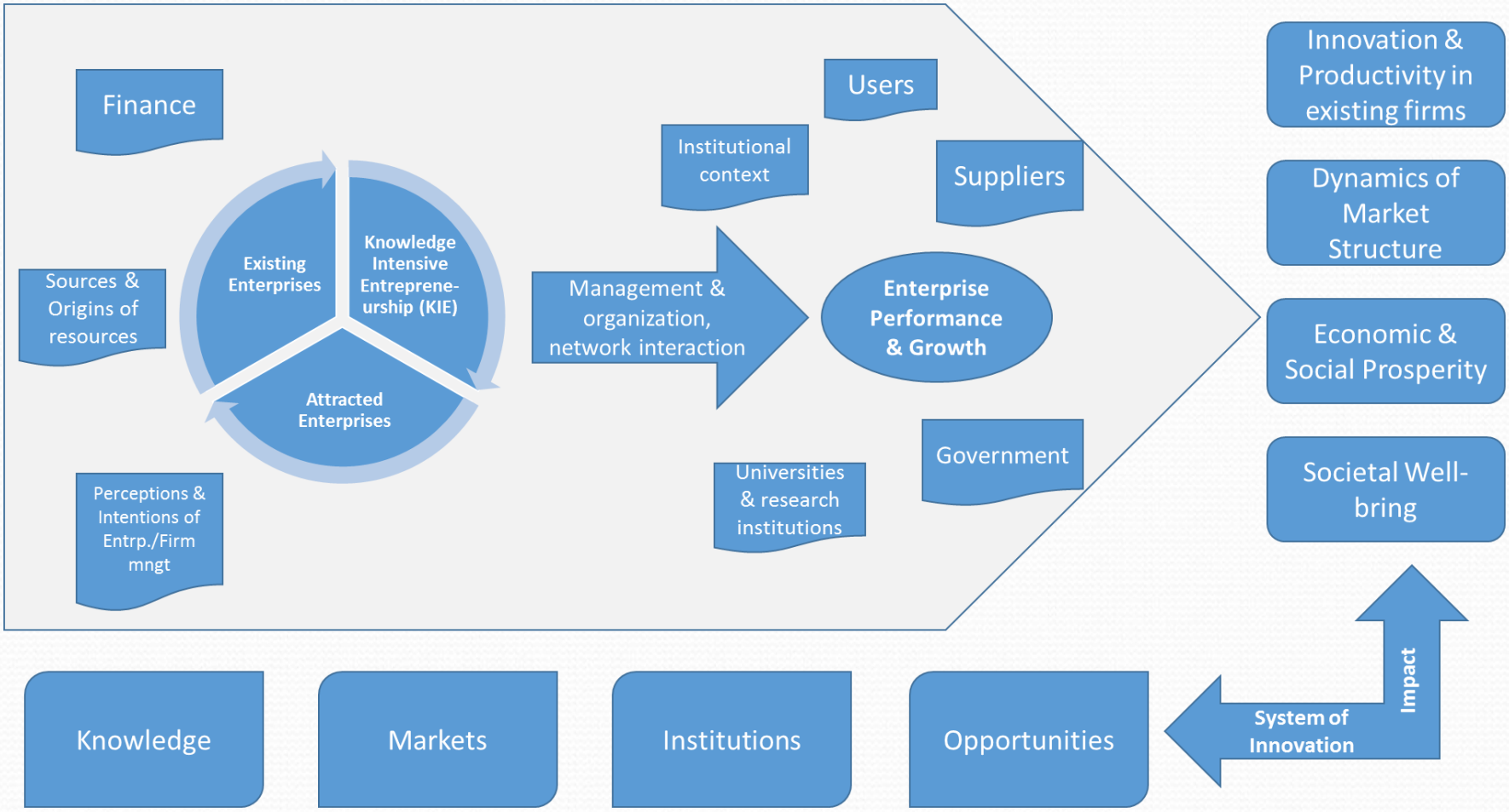
- **Host**: How does the city use space to create opportunities for *high-growth companies*?
- **Investor**: How does the city invest in the skills and businesses required for innovation?
- **Connector**: How does the city facilitate physical and digital connectivity?

The CITIE Framework (NESTA): Leadership

How does the city build innovation into its own activities?

- **Strategist**: How has the city set a clear direction and built the internal capacity required to support innovation?
- **Digital governor**: How does the city use digital channels to foster high-quality, low-friction engagement with citizens?
- **Datavore**: How does the city use data to optimize services and provide the raw material for innovation?

Cities Innovation and Entrepreneurship Framework



Framework Conditions of Entrepreneurial Ecosystems

Audretsch and Beltinski (forthcoming) look at several framework conditions:

- Culture and norms (trust, safety)
- Physical infrastructure and amenities
- Formal institutions (administrative services, regulatory framework)
- Information technologies and internet
- Melting pot index (technology, talent, tolerance – immigrants, gender)
- Demand and workforce

The results support the aforementioned factors.

[Universities in this milieu]

Business and Knowledge Ecosystems

- In an investigation of the Flanders region of Belgium, Clarysse et al. (2014) differentiate between business and knowledge ecosystems. The authors stress find that *knowledge ecosystems* are typically disconnected from *business ecosystems* needed to apply and commercialize new knowledge.

- Further, technology transfer offices (TTOs) and regional public venture funds often reinforce the academic nature of university spinoffs rather than bridge the two disparate ecosystems.

- In short, regional economic dynamism and growth is a function of the interconnectivity of disparate, yet collectively supportive organizations (Whittington et al. 2009).

Knowledge Intermediaries

- G*eneral purpose*: organizations that produce and disseminate knowledge with research universities and their core capabilities – e.g., development of formal entrepreneurship curriculum and research agenda;

- S*pecialized*: organizations that seek out new forms of knowledge and aids in its transmission vis-à-vis licensing to commercial users – e.g., TTOs, technology incubators, science parks, PoCCs, university early-stage funds, cooperative research centers, industry-consulting vehicles;

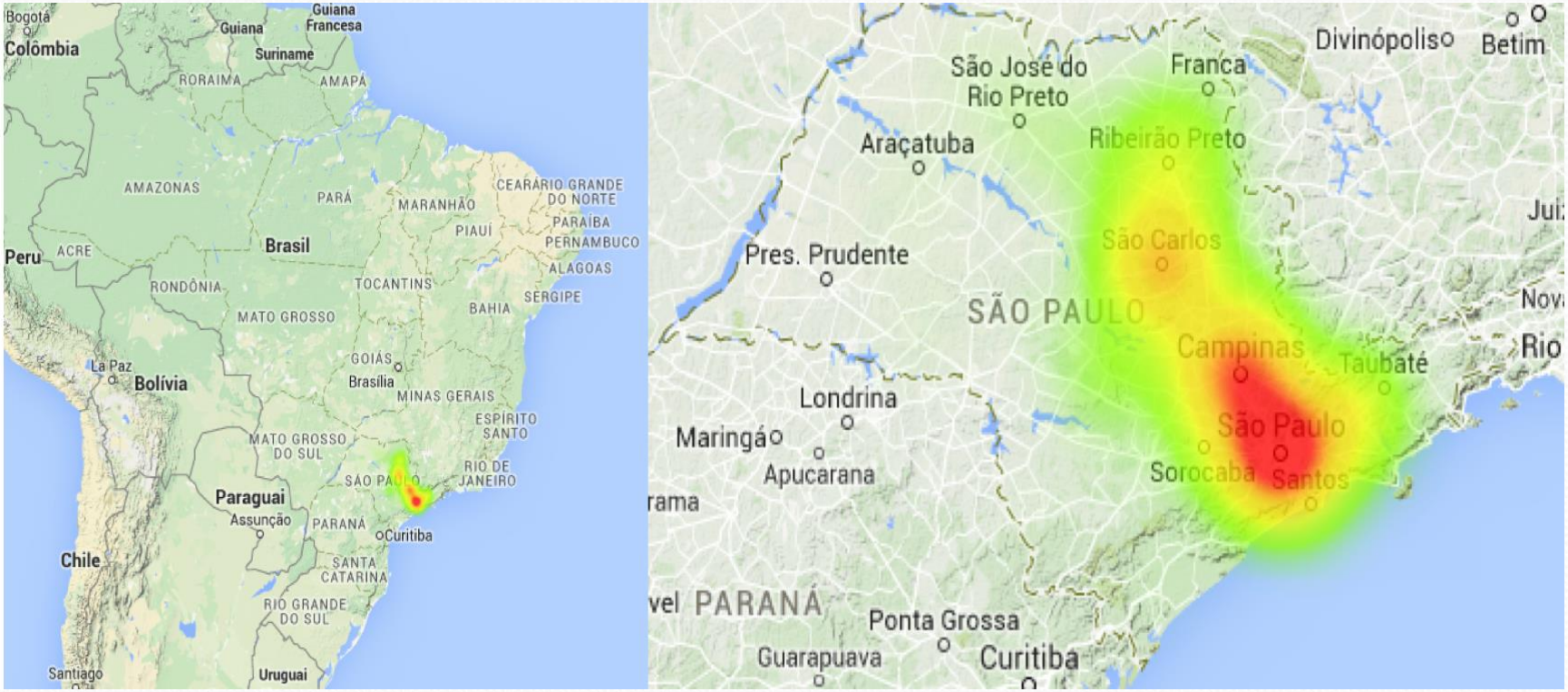
- F*inancial*: organizations such as venture capitalists or angel investors that supply risk capital and provides management know-how, technical skills, and links to other supportive contacts;

- I*nstitutional*: organizations that offer incentives to encourage knowledge transfer and facilitate interaction among researchers and firms – e.g., government funding schemes (SBIR), government VCs, San Diego's CONNECT program.

(Yusef, 2008)

Distribution of PIPE Projects (1998-2014)

(Fischer, Queiroz, Vonortas, 2016)



Policy Implications

- Traditional policy approaches – especially those geared to enhancing internal capabilities, fostering productivity growth, and facilitating access to international markets – that target an "average" firm across the board may fail to achieve the desired impact.

- Better program/policy targeting is required based on the firm's sector, characteristics, and performance, on the one hand, and locality characteristics, on the other.

In the contemporary global economy spatial considerations are more relevant than ever before! Vive the geography of innovation!

US Environmental Protection Agency Building a Successful Technology Cluster, Environmental Technology Clusters Program, Office of Research and Development, EPA/600/R-13/035, June 2013.

B. Fischer, S. Queiroz, N. S. Vonortas (2016) "On the Location of Knowledge-Intensive Entrepreneurship in Developing Countries: The Case of the State of São Paulo", Working Paper, Department of Science and Technology Policy, University of Campinas

THANK YOU!!

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