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The Silicon Valley – Singapore Connection: The Role of Institutional Gateways in Establishing Knowledge Pipelines

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Abstract: The literature on clusters emphasizes the necessity to integrate external knowledge to maintain their viability. This task, however, is aggravated by institutional differences between clusters. The central question for accessing diverse knowledge then is how to mitigate institutional differences between clusters. We propose that "institutional gateways" between clusters circumvent institutional barriers. Institutional gateways provide a configuration that consists of institutions from both clusters. This hybrid institutional configuration helps to mitigate institutional and cognitive distances. As an example, we explore the 'Block71SF' co-working space in San Francisco. Block71SF was set up by the Singapore government as an extension of Block71 in Singapore.

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1 Introduction

The literature on clusters emphasizes the necessity to permanently integrate new and external knowledge to maintain their diversity and viability (Martin and Sunley, 2006; Maskell and Malmberg, 2007; Menzel and Fornahl, 2010). Studies highlight three mechanisms by which external knowledge is integrated into a cluster. The first is via relations, for example, as the literature on global knowledge pipelines describes how firms access knowledge from other places and clusters (Bathelt et al., 2004; Graf, 2011). A second mechanism is labour mobility. This effect is most prominently described in Saxenian's (2007) Argonauts story of how Taiwanese PhD students and engineers travelling between Taiwan and Silicon Valley contributed to the former becoming the world`s largest computer industry. A third effect is through the location of external firms in a cluster, as particularly described by the literature on global production networks (MacKinnon et al., 2019).

Yet, there are obstacles in these mechanisms of knowledge transfer between places. Places have distinct capabilities (Maskell and Malmberg, 1999), institutional configurations (Harris, 2020), and relational assets (Zukauskaite et al., 2017). These qualities make relations between places that are similar quite easy, and in turn relations between different places difficult. However, relations to places that are different are likely to engender heterogeneity, making them particularly valuable. The goal, then, should not be to simply integrate external knowledge, but to integrate external knowledge that is different and bridges cognitive distances (Nooteboom, 2000), and thus there is significant value in navigating these institutional limitations between different places. The question stands, then, how can the differences between places and clusters be mitigated to enable exchange of different knowledge between them?

We propose the concept of an "institutional gateway". Institutional gateways are places that are created by actors from one cluster in another cluster. Thus, the institutional gateway is an expression of what Njøs et al. (2017, 278) describe as "hubbing", i.e. "new junctions or assemblage points outside the original geographical core area of the cluster". The important particularity is that the institutional gateway additionally fulfils important functions to circumvent institutional limitations between places. Institutional gateways are places provide an institutional configuration that consists of institutions from both clusters. This hybrid institutional configuration helps to mitigate institutional distance, facilitate relations, and therefore the creation of knowledge pipelines between the two clusters.

As an example, we explore the 'Block71SF' coworking space in San Francisco. Block71SF was set up by the Singapore government as an extension of Block71 in Singapore (Harris, 2021a). It is open for both US and Singapore firms that usually stay there several months to a year. Since its launch in 2015, over 100 startups have made the journey, and many expansions, acquisitions, and partnerships have been made. Through this example, we derive the main pillars of an institutional gateway: the setting of institutional hybridity in combination with temporary co-location, different possibilities for interaction, and the support infrastructures provided, enable actors to easily move between different institutional contexts.

The following section investigates the relations between global knowledge pipelines, regional clusters, and diversity. The third section briefly describes the methodology before the fourth section illustrates the Block71SF space and shows how it contributes to form connections between cognitive distant firms. The fifth section describes the benefits of the institutional gateway concept and the sixth section concludes.

2 Cluster Diversity and Global Knowledge Pipelines

2.1 Regional Clusters and Diversity

Diversity in clusters is important for a variety of reasons. Some have argued that knowledge diversity makes a cluster less prone to shocks and downturns (Martin and Sunley, 2006), others that diversity facilitates adaptability (Boschma, 2017), while a third argument is that diversity in clusters increases local learning processes that are difficult to copy over geographical distance (Menzel and Fornahl, 2010), and in doing so enhances dynamic firm capabilities (Teece et al., 1997). Additionally, some take an institutional perspective, arguing for institutional diversity as a key precondition for the viability of a regional cluster. For example, Grabher and Stark (1997) argued that a diversity of institutions and organizational forms both helped to transform the transition economies after the fall of the Berlin Wall and is responsible for the viability of the Italian industrial districts, while Hassink (2010) argued that a lack of institutional diversity is the main driver of cluster lock-in and decline.

While diversity is considered essential to cluster success, diversity is only considered an asset if actors are actually capable of utilizing the diversity (Martin and Sunley, 2006; Menzel and Fornahl, 2010). However, the utilization of a cluster's diversity via learning leads to the depletion of that diversity as actors share their knowledge (Menzel and Fornahl, 2010). Maskell and Malmberg (2007) argue that clustered firms are prone to "myopia", i.e. the "routinized application of similar interpretative schemes and mutual understanding of new knowledge and technologies" (Maskell and Malmberg, 2007, p.607). As a result, clusters develop particular institutional configurations over time that have deep-rooted histories and path dependencies (Harris 2020). Myopia is thus a key dynamic that leads to the differentiation of clusters, but it is also a key process in generating a negative regional lock-in.

To avoid negative lock-ins and to maintain its diversity, the cluster depends on the permanent integration of new and diverse knowledge or institutions to maintain its viability (Martin and Sunley, 2006). This external knowledge often comes from other clusters (Bathelt et al., 2004). Yet, diversity between places makes it difficult for firms to tap into bodies of knowledge in other places. The place specific institutional configurations provide benefits to local firms (Cooke, 2001) but are a source of frictions and barriers for external firms (Christopherson, 2007). The greater the difference in institutional contexts the greater the liability of being an outsider (Johanson and Vahlne, 2009). Thus, while clusters require knowledge from other clusters, institutional differences make it difficult for firms from one cluster to tap into bodies of knowledge in other clusters.

There are several examples of this in the literature. Gertler (1995), for example, describes the institutional differences that led to machines developed and manufactured in Germany not working in Canada. Phene et al. (2006) showed that knowledge can result in breakthrough innovations when it comes from the same sector yet another country, or a different sector yet the same country, but not from another sector and another country. Bathelt et al. (2018) show that firms prioritize internationalizing first into countries that have similar institutional conditions. These results show that the institutional differences between places affects possible relations and collaborations.

Therefore, to maintain cluster viability, it is not only important to integrate external knowledge in the first place, but this external knowledge also has to be different to maintain cluster diversity and viability (Menzel and Fornahl, 2010). However, being different often implies that more diverse knowledge is increasingly difficult to access (Nooteboom, 2000).

2.2 Clusters and Knowledge Pipelines

The literature emphasizes the importance of global knowledge pipelines to connect diverse clusters (Bathelt et al., 2004; Bathelt and Henn, 2014; Lorenzen and Mudambi, 2013; Martin and Sunley, 2011). For Bathelt et al (2004), global pipelines are structured knowledge flows and formal links between firms that connect bodies of knowledge in different places through 'strategic partnerships of inter-regional and international reach' (ibid, p. 40). Examples are R&D agreements, licensing deals, investment ties and marketing arrangements (Owen-Smith and Powell 2004).

Global pipelines can also have important spillover effects to the broader cluster through regional flows. Owen-Smith and Powell (2004) use the Boston biotech industry to demonstrate how while some firms act as "conduits" for highly structured global knowledge flows, this knowledge can then be exchanged via "channels", i.e. connections between regional firms and local buzz, to spillover to other regional firms. Thus, global knowledge pipelines create positive local externalities.

However, the nature of such global knowledge pipelines can vary, and recent literature has gone beyond a dichotomy of local buzz and global pipelines. First, several studies have shown that global pipelines are constituted through complex social processes, often based on informal personal networks rather than only on formalized linkages. For example, Lorenzen and Mudambi (2013) distinguished between organization-based and person-based global linkages. Trippl et al. (2009) elaborated on the importance of personal relations, demonstrating that informal personal knowledge networks operate at all spatial scales, complemented by some formalized relationships. Similarly, Moodysson et al. (2008) found that the mechanisms for knowledge interactions in a Swedish life science cluster were globally configured inter-personal communities or inter-organizational alliances. Secondly, there is growing evidence that emphasizes the range of different international linkages in facilitating innovation. On the basis of a small sample, Trippl et al. (2009) suggest that more radical innovation is associated with a higher number of different types of sources of knowledge. This argument was substantiated by Fitjar and Rodríguez-Pose (2011), whose analysis of innovation in Norwegian city-regions demonstrated that firms involved in a greater diversity of international partnerships tend to be more innovative.

The literature further describes several mechanisms regarding the formation of global pipelines. Maskell et al. (2006) have emphasized the role of so-called temporary clusters. Temporary clusters are periodic gatherings of professionals for limited times in delimited spaces. These gatherings include trade fairs, conferences, conventions, or exhibitions. The main argument here is that these gatherings, similar to permanent clusters, provide knowledge ecologies that are difficult to substitute by other forms of proximity, and thus can be best described as "temporary clusters" (Bathelt et al., 2014; Maskell et al., 2006). In addition to being an immediate source of extra-local knowledge (Bathelt and Schuldt, 2010), temporary clusters help actors to form relations outside a locally embedded context (Li, 2014). There are also other mechanisms for the formation of global pipelines, such as via knowledge facilitators that provide services for large firms (Bathelt and Li, 2020), or how venture capital firms (Powell et al., 2005) help early-stage technology-oriented firms with international networking.

2.3 Knowledge Pipelines and Diversity

At the firm level, Nooteboom (2000) argues that successful collaboration between companies in global pipelines requires a so-called "optimal cognitive distance". That is, too much cognitive distance can prevent collaboration, while too much similarity negates the benefits found in differences:

> 'For learning, partners should have on the one hand sufficient 'cognitive distance', i.e. possess different cognitive categories, to be able to capture knowledge that one could not have captured oneself, but on the other hand must be sufficiently close, in cognition and language, to enable meaningful communication' (Nooteboom, 2000, p. 14).

The optimal cognitive distance consists of two functions. One refers to communicability, as the mutual understanding of actors depends on the compatibility of how they interpret their environment, i.e. on their mutually shared mental models (Denzau and North, 1994). The other refers to the degree of novelty, which depends on the equivalency of the actors' knowledge. The larger the differences in cognitive categories, the more radical the generated knowledge may be. Thus, novelty increases and communicability decreases with cognitive distance and an optimal cognitive distance exists within a certain combination of communicability and novelty. Thus, everything else being equal, an increase in degree of novelty requires an increase in communicability to capture that novelty.

Communicability depends on institutions 'as forms of ongoing and relatively stable patterns of social practice based on mutual expectations that owe their existence to either purposeful constitution or unintentional emergence' (Bathelt and Glückler, 2014, p.346). Usually, this pertains to differences between organizations, as different corporate cultures can aggravate communication and prevent collaboration, even if this would be beneficial from an economic perspective (Lane and Lubatkin, 1998). Yet, these institutional effects on communicability can also apply to exchanges between places. For example, Menzel and Fornahl (2010) use Saxenian and Hsu's (2001) example of Silicon Valley-experienced entrepreneurs in Taiwan to argue that cluster can integrate the institutions of other places within its institutional configuration, which enhances communicability between these places and increases access to heterogenous knowledge.

Clusters have their own institutional configurations, as 'combination[s] of shared goals, behaviours, and relations between cluster actors involved in a cluster' (Harris, 2020, p.437). These have been formed in a path dependent manner, within particular contexts and broader institutional frameworks, creating a unique cluster institutional configuration that conditions and constrains behavior within the cluster. The question facing interested parties is how can the institutional differences between different clusters' institutional configurations be intentionally mitigated to enhance communicability. This enhanced communicability can then facilitate the formation of knowledge pipelines between the knowledge bases of diverse clusters.

In the following, we elaborate on the concept of an institutional gateway, using the example of Block71SF in San Francisco. The institutional gateway provides a hybrid institutional configuration that consists of institutions from different places, mitigating institutional differences and enhancing communicability within the institutional gateway. In so doing, the institutional gateway facilitates the establishment of global knowledge pipelines between these clusters.

3. Methodology

This paper focuses on Block71SF in San Franciso. A *follow-the-path* methodology was used (Harris, 2021b; Pike et al., 2016). This methodology finds entry points into the evolutionary paths of phenomena, and then follows them forwards to find out the effects that they caused, and backwards to find out the causal reasoning for their manifestation. Through this process other notable points will be found, which will in turn be followed forwards and backwards, until all avenues are exhausted and a comprehensive mapping of the evolutionary pathway has been performed. In this instance, to understand Block71SF as extension of Block71 in Singapore and its software cluster requires also considering the evolution of the Singapore cluster.

Evolutionary and historical research can be difficult, particularly surrounding issues of data availability (Henning, 2019), and so a mixed-methods methodology was utilised to offer 'concurrent triangulation' and the ability to corroborate findings (Creswell and Piano Clark, 2018). Table 1 provides an overview of the methods used in this study. Given that Block71SF represents only a part of the entire evolutionary pathway of the Singapore software cluster, not all of these sources provided information used in this paper, and interviews were the primary source of information. Of these 51 Singaporean interviews, 10 had direct relevance to Block71SF, as shown by the bracketed numbers in Table 2.

Table 1: Methods used in the research project

Method	***Details***
Formal and informal interviews	Formal (31) Informal (20)
	With a range of actors such as firms, government organizations, community organizations and investors
Secondary data sources	Industry/government/firm reports
	Secondary interviews (20)
Blogs	Personal (firm) blogs
	News sources written as blogs
	Community group forums

Source: Author's own

Table 2: Breakdown of primary interviews undertaken by actor type

Actor type	*Software entrepreneurs*	*Accelerator and community actors*	*Investors*	*Government actors*
No. of interviews	35 (6)	10 (2)	9 (0)	3 (2)

Souce: Author's own (some interviews are double counted as respondents fit multiple criteria, e.g. an entrepreneur and investor)

Respondents were asked about their experiences with either Block71 or Block71SF during semi-structured interviews that aimed to understand the reasoning behind the creation of these organisations and the effects that they had on firms within the Singapore software cluster. Questions were asked that aimed to elucidate the everyday environment of these places, the type of relations that existed either in these places or that formed as a result of time spent there, and the particularities of how these relationships were formed. Respondents were present at different times within this evolutionary trajectory and so offered us an overview of changes that have occurred at different

stages, so that we could piece together a comprehensive understanding of the evolutionary trajectory of the Singapore software cluster and the particular role of Block71SF.

While understandings of the Singapore cluster and Block71 benefit from quite an extensive array of interviews, research into Block71SF specifically is limited by a relatively low interview count, which can be attributed to several reasons. Firstly, only approximately 100 startups have utilized Block71SF since its inception, so there is a limited pool of entrepreneur respondents to draw on. Furthermore, many of these startups have either been acquired or the founders have moved on to other projects, reducing the pool further. Secondly, Block71SF only has 2-3 staff at any given time, and so speaking to one of them who has been there since the beginning was sufficient. While a greater number of interviews would have been preferred, it is understandable given the context.

4. Establishing an Institutional Gateway between Singapore and Silicon Valley

4.1 The Origins of Block71 in Singapore and its Silicon Valley Spinoff Block71SF

The co-working space Block71SF has its origin in the Singapore software cluster. It was meant to support the Singapore software cluster and was created in a particular evolutionary phase of its parent cluster. Furthermore, it was a direct spin-off of the already existing co-working place Block71. This section describes the formation of the Singapore software cluster, Block71 and its role in this cluster as well as the dynamics that resulted in the formation of Block71SF in San Francisco.

Singapore has a lively software cluster with independent reports ranking it one of the best in the world (StartupBlink, 2021; StartupGenome, 2021), but it is a relatively recent cluster. The emergence phase of the Singapore software cluster can be traced to 2006 when the government, after seeing the success of Silicon Valley and Silicon Wadi, became interested in developing a Singaporean software cluster and subsequently launched a suite of policies that sought to promote entrepreneurial and investment activity around the software sector:

> '[the resurgence in government interest] was around 2006… it was a slow start… around 2008 we spent a lot of money… then about 2010 things start to get interesting' (Government actor 1).

The policies were successful in increasing isolated entrepreneurial activity in the software sector across Singapore, but did little to create the knowledge spillovers and networking externalities necessary for a cluster to emerge (Harris, 2021b).

After this 'slow start', and building on a growing but spatially disparate community of software startups, the critical breakthrough came in 2010 when the government repurposed 'Block71', a disused factory in the Ayer Rajah industrial estate, and allowed startups, investors, and accelerators to co-locate in the building at heavily discounted rents. Government agencies, in partnership with a local university and several local corporates, established Block71 with the intention of it becoming the centre of a burgeoning software cluster, as a coordinating agency concerned with bringing these spatially disparate actors together for mutual benefit. Through its supportive role, Block71 created community spaces, hosted regular events, and supported all comers, so as to enable the aforementioned knowledge spillovers and networking externalities that are so critical for software clusters. As a representative of a government organization described it:

> 'Block71 became a place where if you are starting a company and need a cheap and convenient place then you get an office there. There was a concentration of startups, events were organized, and then accelerators realized this is where the startups are so we should relocate there, then VC's, it became a hub' (Government actor 1).

Based on this early success the government then expanded, repurposing the neighbouring Block's 73 and 79 to enable the co-location of even more startups, and naming the area Launchpad.sg to signify its purpose as a hub for startups. By 2014, the Launchpad.sg area was considered a significant success, with Block71 as its flagship centre, and The Economist named it the 'densest [software startup] ecosystem in the world' (The Economist, 2014).

Singapore was viewed as one of the world's leading software clusters for supporting early-stage startups at this time (StartupGenome, 2021), and according to the director of an accelerator located in Block71, 'in the government's mind, they believed that the very early-stage part [was] solved' (Accelerator director 1). However, concerns began to arise amongst government actors that despite the many early-stage startups located in the area, few had grown into the fast-growing startups known as 'scaleups', 'unicorns', or 'gazelles', and many struggling 'zombie' startups were present: a government actor stated 'the government were disappointed [that] unicorns were far off and knew they had to do something' (Government actor 2). Two causal factors were suspected. Firstly, there was a lack of examples of successful software startups in Singapore to learn from and who could share the knowledge required. Secondly, this lack of knowledge on how to expand and grow rapidly was compounded by the size of the Singaporean domestic market that limited their ability to scale, with the city-state home to under 6 million people (Entrepreneur 1; Government actor 1).

Consequently, the government sought to ease the difficulties for these startups in expanding into new markets and internationalizing, as well as facilitate the entry of extra-local startups into Singapore that may have this knowledge (Government actor 2). Based on the success of Block71 in Singapore as a community-builder, in 2015 the government sought to utilize the brand and the model, launching a spinoff under the name 'Block71SF' in San Francisco, with the intention of facilitating the bidirectional movement of startups between Singapore and Silicon Valley (Entrepreneur 2). Just as Block71 has brought spatially disparate actors together in one community space in Singapore, so to would Block71SF bring Singaporean startups together in Silicon Valley.

Choosing San Francisco was a relatively easy decision to make. Not only was Silicon Valley the leading software cluster in the world and home to one of the largest domestic markets, but Singapore had been steadily building connections there over the last 30+ years. One of Singapore's sovereign wealth funds, GIC (Government Investment Corporation), has been present in the Bay Area since 1987, with the other (Temasek Holdings) joining in 2015 around the same time that Block71SF launched. There are also offices of various government organisations, including the Economic Development Board, Enterprise Singapore, and Smart Nation, as well as a NUS Overseas College programme that sent students to spend a year interning with firms and studying with Stanford University. Indeed:

> 'NUS Overseas College is the one actually that gives Block71 Singapore the kickstart because of all the students that did internship, when they went back to Singapore, they were the first batch of kids that had some success in launching their own companies. And from there, you know, of course, other students see that and they aspire to do the same' (Block71SF employee).

It was not just offices of government agencies either, but prior to the growth of the Singapore software cluster Singaporeans often ventured to Silicon Valley to launch startups: 'you just had to, back in the day… what's here now wasn't before' (Entrepreneur 3); Match.com, for instance, was co-founded by a Singaporean in Silicon Valley.

Consequently, according to one entrepreneur, one of the aims of Block71SF was a 'broader sort of mandate of how do we build the bridge to all these overseas Singaporeans, and get them to come back to support in Singapore' (Entrepreneur 4). Not just Singaporeans, however, Block71SF also sought to attract other startups from Silicon Valley to Singapore:

'since the day we started, we said that we want to have this two-way exchange. You know, not just there to be a Singapore Center in San Francisco' (Block71SF employee).

With this clear aim to help stimulate the flow of startups between the Singapore and Silicon Valley software clusters, the Block71 spinoff organization 'Block71SF' was created, again through a collaboration between NUS enterprise, corporate firms, and government actors, to create a community space for Singaporean startups to co-locate in Silicon Valley and for Valley-based startups to learn about possible routes into Singapore.

4.2 Block71SF and its Firms

Block71SF is open to both Singaporean startups who felt that they were ready to expand into the US market, or US-based startups that wanted to use Singapore to expand into APAC. Block71SF offers two main benefits to the startups: free office space and some limited connections through the sponsoring organisations of SingTel and National University Singapore (NUS) enterprise. While quite limited in the scope of their offerings, startups found these two things to be critically important for their time there. Unlike MNEs who tend to have more financial firepower, the startups that were utilizing Block71SF did not have significant financial and organisational resources to aid with international expansion, and it was the founders themselves that would venture into Block71SF. Financial pressures are arguably the biggest factor facing startups and so removing the cost of office space was a significant offer, especially in a city world-famous for its high rents, and while the contacts in place were not the most expansive, they were a vital first step.

These startups would come for typically between 6 months to a year and have an open invitation to return when it is beneficial. It is often the case that founders will fly back and forth between their Singapore office and Block71SF or their new Silicon Valley office multiple times throughout the year. At any given point there are approximately 20 startups staying in Block71SF. However, unlike accelerator programmes that operate in cohorts where 10 or so startups join and leave at the same time, startups in Block71SF arrive and leave at different times, creating a dynamic environment.

Table 3: Examples of Singaporean and Silicon Valley based startups and their post-Block71SF status

Firm (Country of origin)	*Product/Technology*	*Status*
Zopim (SG)	AI chat solutions	Acquired by Silicon Valley based Zendesk
ViSenze (SG)	AI solutions	Regional office Silicon Valley, HQ Singapore
TenCube (SG)	Wireless technology	Regional office Silicon Valley, HQ Singapore
Lomotif (SG)	Video software	Acquired by US based Vinco Ventures
Carousell (SG)	eCommerce company	Regional office Silicon Valley, HQ Singapore
LEDR technologies (US)	Business intelligence	Regional office Singapore, HQ Silicon Valley
GTRIIP (SG)	Contactless technology	Regional office Singapore, HQ Silicon Valley
Onsophic (US)	Digitalisation solutions	HQ Silicon Valley, Regional office Singapore
Spin (US)	eScooter company	Acquired by Ford

Source: Author's own

While the majority users of Block71SF were Singaporean startups venturing into Silicon Valley and the US market (around 80%; Block71SF employee), there have increasingly been Silicon Valley-based

startups that have utilized the space as part of a strategy to use the Singapore cluster to expand into the Singapore and APAC markets (around 20%). Table 3 gives some examples of these firms. Respondents from Silicon Valley startups mentioned quite a rigorous interview process to ensure that they really wanted to expand to Singapore and were the right fit for potentially expanding into Singapore. Yet, these startups were treated to the same level of generosity that Singaporean startups were provided, with free office space given.

4.3 The Hybrid Institutional Configuration of Block71SF

Block71SF exhibited a hybrid institutional configuration around social norms and behaviours that took aspects of both the Singapore and the Silicon Valley clusters. This hybridity becomes apparent when investigating how entrepreneurs from Singapore and Silicon Valley benefit from Block71SF. Singaporean entrepreneurs described Block71SF, for example, as follows: 'socially it felt very Singapore, but business was San Francisco (Entrepreneur 4)'. On the social side, these were predominantly Singaporean or South-east Asian founders, who had moved across the world, and would benefit from a social security net of having people nearby who had similar lived experiences. For many, being able to have conversations about home, understanding the comparisons between the two places, and being able to find familiar food and other socio-cultural practices was important. Additionally, there were many common personal administrative issues, such as finding a cheap and suitable housing situation, or working through visa issues, that were shared by almost all comers:

> 'you're physically in San Francisco, but you know there are fellow Singaporeans in the same building with you, and probably 99% of the problems and things that you're facing, they can relate to that very well' (Entrepreneur 4).

Block71SF created a safe haven for these Singaporean founders that ensured they were less likely to be intimidated or out of place in a new city, which was further allayed by having some US startups there to help 'dispel some of the myths' (Entrepreneur 6) of Silicon Valley.

These founders form Singapore also shared the same drive and expansive goals for their startup in Silicon Valley, and so when discussing business problems, the tone took a more local setting. Furthermore, whenever outsiders would visit, social activity took a distinctly Silicon Valley form:

> 'the work culture, even the clientele, the clients that are visiting the offices, the investors that visit, it is all very Silicon Valley' (Entrepreneur 4).

Having some US-based startups present as well as hiring from the local talent pool also helped to ensure that the work culture took elements from what would be found in the broader host cluster.

This hybrid institutional configuration of social norms and behaviours also worked well for Silicon Valley based startups located in Block71SF. These firms were trying to expand into Singapore and Block71SF gave them an understanding of how both social and business interactions work in Singapore:

> 'Block71SF was definitely Singaporean... almost everyone who was there was affiliated with Singapore in some way… and now going to Singapore feels relatively easy' (Entrepreneur 5).

For Silicon Valley-based startups, Block71SF offered an institutional configuration that enabled them to understand the important institutions required to succeed in Singapore. Thus, the dominant Singaporean environment prepared these startups for what they felt was the biggest challenge with expanding into Singapore, the different business culture. Silicon Valley startups contrasted the need for stronger, well-developed, trust-based relationships as the core of networking in Block71SF and in turn doing business in Singapore. As one entrepreneur described it:

> ‘building trust is usually much more important than immediately pitching or showing what you have or what you do…. reading between the lines is very, very important in their culture. So aside from trust, there's also not everything seems like it is, you just need to engage and learn and be patient and do the tango in order to find out what's really going on… which is the opposite of what it is in America’ (Entrepreneur 6).

This stood in direct contrast to the speed of Silicon Valley and highlighted the naivety of some American startups: ‘many American companies travel to Singapore, just like they travel to, you know, Europe and say, Alright, we're gonna be there for weeks, and we'll land some deals, that just doesn't work like that in Singapore’ (Entrepreneur 6).

4.4 Reducing Cognitive Distances

This hybrid institutional configuration was a precondition for reducing cognitive distances between startups within Block71SF. Important in facilitating this, however, was the spatial proximity enabled by the sustained use of free office space for startups. Having this potential for daily interactions over a sustained period of time increased the opportunities for (un)intentional interactions between them. For example, one respondent had his desk next to another founder who had been there for a year, who

> ‘was already raising a few rounds in Silicon Valley. So, I could ask him things like, hey, you know, where are you raising from? Could you introduce me to some of those VCs that are investing in you?’ (Entrepreneur 4).

Interactions were also supported by Block71 organizers. Those who ran Block71SF contributed to form relations between the startups. Block71SF organizers provided the startups with many opportunities to engage with actors from both the Silicon Valley and Singapore clusters. One startup noted that the administrative team would offer them the opportunity to pitch when it arose: ‘[they would say] we have these visitors, you can pitch in front of them if you want, because there is this person that could be useful to you’ (Entrepreneur 6); while local startups were told every time a prominent Singaporean investor or member of that cluster was visiting, so that they could gain exposure to that network: ‘they were very helpful in terms of introducing us to visitors anytime they came around from Singapore’ (Entrepreneur 5). Furthermore, the US startups were often asked to:

> ‘just mentor back, you know, inspire people, do talks, joint sessions, things like that, which was a lot of fun, and definitely valuable to us as well’ (Entrepreneur 6).

In general, Block71SF organisers were relatively hands-off with the startups there: ‘[other accelerators] are driven to put you in the network, to place you, to force you to engage, that's not the case in Block71, it's … organic, meaning it's up to you how you proceed’ (Entrepreneur 6). They provided an environment where a community could organize itself.

The benefit of this community in spatial proximity was enhanced by the staggered nature of their entry into Silicon Valley. This was not like a typical accelerator programme where cohorts of 10 startups would join and leave together; startups would come and go as and when it was relevant for them. This meant that founders who had been in Block71SF for a year or more could educate newer members with their experiences and share their contacts, who would in turn do the same for the next founders who arrived (Entrepreneur 4). It was also enhanced by both the Singaporean and US-based startups adding a different set of connections and sources of knowledge into the community.

4.5 Forming Pipelines Between Silicon Valley and Singapore

The hybrid institutional configuration, the learning processes and the connections made in Block71SF helped prepare Singaporean startups for entry to Silicon Valley for example in the following way:

> 'I think the network and introductions are probably the most important. Anyone could buy a flight ticket to Silicon Valley and you know, be physically there, regardless of where you're from. But it is not so simple for you to have access; being physically there does not equate to access to the network, or to the community. So, you do need to have those kinds of introductions and connection to the right people (Entrepreneur 4).'

The community of Singaporean startups in Block71SF also helped US-based startups by sharing their own connections in Singapore with them.

> '[Block71] feels like a place to get to know these people that may be coming to Singapore, because one of the biggest challenges that you have when you go into Southeast Asia, and then specifically Singapore, is no network. Just nobody knows you. And then making deals becomes really, really hard. So, you need to build a trust circle, people that believe in you, people that have seen you succeed' (int3).

In some cases, Silicon Valley startups were also recommended to other Singapore-based accelerator programmes that share the same organisers, such as Pier71 (Entrepreneur 5), which applies startup solutions to the significant maritime and port sector. The startups also received help more directly from the key stakeholders such as SingTel or NUS enterprise:

> 'we received a lot of help from NUS enterprise… [who gave us] a lot of introductions to venture capital, or institutional investors. They introduced us to M1 at one of the events, which is a Telco that later became our investors… and usually it snowballs from there, right' (Entrepreneur 4).

Importantly, these Silicon Valley startups were also offered free office space at Block71 Singapore to ease the transition:

> 'having organisations who are already partners with that country's stakeholders, and at least have a physical office for you to work at so that you can then get the ball rolling for the first few steps is tremendously helpful. Especially if you're a startup with limited resources to set up your own office to do that. (Entrepreneur 4)'

The effects of Block71SF did not stop after the firm has spent their time there. The Singaporean startups that utilized Block71SF did so to either expand into Silicon Valley or set up a new headquarters there. In either strategy, they almost always kept office space in both clusters (Table 2). The same is true of the Silicon Valley-based startups who would keep a presence in Silicon Valley and perhaps even in Block71SF, whilst having an office in Singapore. The founders of these startups would then regularly travel backwards and forwards between the two clusters.

There is also an increasingly globalizing alumni network of startup founders who have utilized Block71SF and Block71 Singapore, who are travelling not just between these clusters but also to other clusters around the world as their startups grow, which sets up the possibility for knowledge pipelines to occur.

We also found several examples where firms adopted practices from the other context. For example, one Singaporean startup noted that they found the working from home culture that was prevalent in Silicon Valley to be beneficial and so adopted it in their Singapore office (Entrepreneur 1). They also stated that Silicon Valley had a much more aggressive fund raising and spending culture, compared to Singapore where operations tended to operate on smaller budgets with less aggressive raising, and that this encouraged them to spend more aggressively in Singapore as well as Silicon Valley (Entrepreneur 1). Some US-based startups stated that the particular 'Singaporean' way of connecting

with partners or selling to people was not just relevant to their Singapore office, but would also be adopted in Silicon Valley depending on whom they were attempting to build relationships with. This experience was especially useful when operating in third countries with other social norms.

5 The Institutional Gateway and Knowledge Pipelines

When firms enter new clusters with no prior acclimatization the cognitive distance can be so large that firms are incapable of bridging it and making connections. However, by entering Block71SF, Singaporean and American firms were able to abate the difficulties of entering either Singapore or Silicon Valley by familiarizing themselves with respective norms and behaviours beforehand with the help of Block71SF as an example of what we termed an "institutional gateway", i.e. a place setup by one cluster in another cluster to facilitate the formation of connections between these clusters (Figure 1).

Using the example of Block71SF, we can derive the following mechanisms by which an institutional gateway helps to form global pipelines between places shaped by different values, norms, and institutions like Silicon Valley and Singapore. First of all, the institutional gateway helps to reduce cognitive distances by reducing institutional difference; becoming acquainted with a new institutional context enhances communicability and in doing so reduces cognitive distances. Yet, reducing cognitive distance requires interacting. Menzel (2015) argues for reducing spatial and network proximities as mechanisms that facilitate interactions and in doing so reduces cognitive distance between actors. We saw the importance of network proximity through organized connections between the different firms and connections that formed within the community. We saw also the role of spatial proximity in facilitating these processes. Thus, being exposed to another institutional environment, with spatial and network proximity, helped to reduce cognitive distances (circles Block71 and Block71SF, as well as their overlaps in Figure 1).

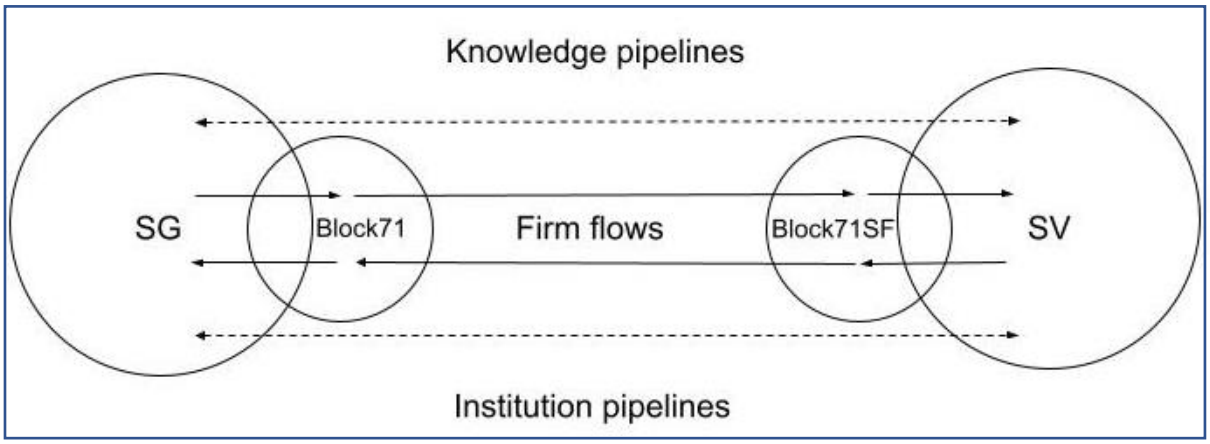
Second, the reduction of cognitive distances was also important to properly utilize the connections and network events offered by Block71SF. Thus, while the community themselves, and the organisers of Block71SF are beneficial in their ability to provide connections to one another, this is only a secondary benefit enabled once the cognitive distances were successfully reduced. These connections were not possible without reducing cognitive distances, first (arrows Block71/SG and Block71SF/SV respectively).

Third, in all these aspects, the temporality of geographical proximity plays an important role. Firms stayed in the hybrid institutional configuration of Block71SF for several months. By having this acclimatization process, Singaporean and US firms were able to prepare for business in Silicon Valley and Singapore, respectively. Therefore, the most important aspect of Block71SF is the co-location of various firms in a shared space for a sustained period of time.

To appreciate the time it takes to decrease cognitive distances in a spatial setting, we speak in the following of "temporal co-location". Temporal co-location is situated between temporal proximity and co-location. "Temporal proximity" can take different forms (Growe 2019) and last between a few hours like in meetings (Torre, 2008) and several days as described in conferences, fairs, and trade shows (Maskell et al., 2006). Co-location describes the permanent geographical proximity between firms due to their localization (Maskell and Malmberg, 1999). Accordingly temporal co-location describes a time span in between. In our example, this time span was several months. This different temporality leads to different learning processes (Menzel, 2015), offering the semi-permanent co-location necessary to bridge cognitive distances and built up localized capabilities (Maskell and Malmberg, 2007). Our example showed that temporal co-location allowed for these bridging of cognitive distances as well.

Furthermore, the importance of temporal co-location is amplified by the fact that the Block71SF firms do not come in cohorts, akin to accelerator programmes, but come and go at different points in time. Newcomers can learn from those already there, as well as benefit from their networks and connections, before then passing on the knowledge and connections to those firms that arrive after them. Thus, the temporal co-location is also the basis for the formation of a dynamic community around Block71SF.

Figure 1: Block71SF as an institutional gateway and its effects



Source: Author's own

Fourth, due to these qualities, the institutional gateway creates a reinforcing dynamic outside the connections made within the gateway. In our example, increased labour mobility between Singapore and Silicon Valley and the formation of a community further intensified connections between Silicon Valley and Singapore. Thus, institutional gateways create positive externalities (dotted lines in Figure 1).

Fifth, we saw also that not only knowledge pipelines were formed, but also that these connections contributed to a transfer of institutions, i.e. a transposition (Powell et al. 2012) between Singapore and Silicon Valley ("institutional pipelines" in Figure 1). By this "translation" (Benner, 2022) from one institutional setting to another, the institutional gateway might contribute to a closer institutional alignment of the respective clusters. Accordingly, the institutional gateway might not only contribute to reduce cognitive distances within its boundaries. It might also contribute to reduce cognitive distances between places and in doing so contributes to make the institutional boundaries of clusters more permeable (Maskell and Malmberg, 2007; Menzel and Fornahl, 2010).

6 Conclusion

The starting contention of our study was that to maintain a cluster's diversity, firms have to form connections to clusters that are different. Yet, these connections are difficult, because clusters have developed along different paths and within varying cluster institutional configurations, which creates potentially large cognitive distances between them. Thus, firms trying to form relationships with another cluster have the liability of outsidership (Johanson and Vahlne, 2009).

We used Block71SF as an example of how these cognitive distances can be reduced. Block7SF was successful in this respect, as it took elements of both the Singapore and Silicon Valley cluster institutional configurations and melded them into a hybrid institutional configuration. In this instance,

respondents described it as socially-Singapore and business-Silicon Valley. This hybrid institutional configuration in combination with a supportive environment and temporal co-location of firms, contributed to reduce cognitive distances. Reduction of cognitive distance was a pre-condition to form successful global pipelines.

Insights about this institutional gateway contribute to the cluster literature in the following ways. First, the institutional gateway concept adds to the debate on global pipelines and the internationalization of firms (Bathelt et al., 2018; Graf, 2011; Johanson and Vahlne, 2009; Lorenzen and Mudambi, 2013). The concept opens up a new avenue for firms to generate knowledge pipelines with actors in disparate clusters. The global pipeline literature documents how large but ultimately individual firms secure their own knowledge pipelines, or how smaller firms use trade fairs to get in touch with firms from other places. Yet, the focus is usually on the single firm. Institutional gateways like Block71SF, however, take the onus off individual firms and the Block71SF story is about how an organization helps to form a dynamic community of actors that aid each other in forming connections to the other place (Bathelt and Cohendet, 2014)**.**

Second, this paper has demonstrated how policy makers can help to diversify knowledge bases, prevent decline, and ensure ongoing cluster growth by creating spaces in extra-local clusters that act as bases for firms from both clusters to locate in. In doing so, Block71SF is a prime example of system level agency (Isaksen et al., 2019). System level agency aims to transform regional innovation systems, whereas "actors exert an influence outside their institutional or organizational borders" (Isaksen et al., 2019, p. 52). Importantly, here, the system level agency in our case that aimed to transform the cluster in Singapore took place outside the spatial borders of the regional innovation system. In doing so, our example points to the multi-scalarity of system level agency and contributes to the discussion of multiscalarity in regional development paths (Hassink et al., 2019).

Third, our case showed the possible role of temporal co-location for cluster evolution. Forms of temporal co-location also take place in other places like co-working places, maker spaces or business accelerators (Schmidt and Brinks, 2017). Just as with the institutional gateway that we described, these places bring firms in close spatial proximity for a period of time, creating potentially unique institutional configurations and externalities. Yet, how these places contribute to internal variegation of clusters is unknown and represents a question for further research.

Fourth, what might be flowing through global pipelines is not simply technological or market knowledge, but also knowledge about institutions, "how to do things", and norms. As a result, knowledge pipelines between places would contribute to an institutional alignment between these places, which affects also the boundaries of the cluster. This effect is already described by Saxenian's (2007) Argonauts. How pipelines between places creates institutional alignments as externalities that facilitates further knowledge pipelines between these places requires further investigation.

There are of course several limitations to our study. We studied software startups. Software startups have a distinct advantage in that they are relatively footloose in their location due to the typically virtual nature of their products (Rossi and Di Bella, 2017). How applicable this concept may be for other industry sectors, particularly those with significant manufacturing footprints or with high-secrecy requirements, remains to be seen. Additionally, we described a particular form of an institutional gateway, which was particularly shaped by temporal co-location. There are also other forms of institutionalized exchange between two different places that might be defined by different mechanisms, but have the same effect of reducing cognitive distances. Examples could be exchange programs, offices of cluster organizations in other places, firm transplantation, or accelerator programmes (Harris, 2021c). Yet, the important point is to investigate how these forms enhance

communicability between institutionally different places and in doing so help to reduce cognitive distances and establish connections.

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