

If You Build It Will They Come? The Influence of Spatial Configuration on Social and Cognitive Functioning and Knowledge Spillover in Entrepreneurial Co-Working and Hacker Spaces

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Entrepreneurial startups may provide needed economic growth, but also may need appropriate support. Regional innovation centers have been created to encourage the development of these new ventures. However, little empirical evidence exists to guide how these centers should look, and function, or how one should evaluate their results. One unexplored area involves how space, defined not only as physical space, but also as social context, and as a conceptual space within which production occurs, can contribute to new venture creation. This paper provides a model, building a case for empirical measurement of interaction between spatial configuration and ultimate economic outcomes.

INTRODUCTION

The Bureau of Labor Statistics estimates that the U.S. lost over 7 million net jobs from December 2007 to December 2009.¹ Since then, economic recovery has become partly dependent on how well businesses can create jobs. The U.S. Small Business Administration notes that small businesses account for over half of the private-sector workforce, and that entrepreneurial startups, especially those engaged in technology research and development, might ultimately become responsible for a significant number of new jobs. However, many caution that appropriate support needs to be given to help these new ventures succeed.²

The belief that new ventures can aid regional economic recovery has prompted a growing number of entrepreneurial support groups to offer assistance, and has created subsequent “startup communities” in regions known for innovative activity, such as California, Texas, and Colorado.³ Using successes in those regions as a guide, other states and communities are trying to find and mentor first-time entrepreneurs, with the hope that new venture growth will have a lasting and positive regional economic impact. Therefore innovation centers, co-working, hacker/maker spaces, incubator and accelerator spaces are opening up in multiple economic regions of the U.S.

The proliferation of these entrepreneurial support centers, with various configurations, all have the intention of attracting, developing, activating, or impacting regional economic growth. The predominant belief appears to be “if we build it, they will come” and “if they come, someone will see an economic benefit”. Although this belief is intuitively attractive and hopeful, there’s little evidence yet that it’s ultimately achievable.

Ecological models tell us that as a population grows, resource needs become increasingly important, and therefore competition for these resources intensifies. In organizational ecology, the concept of density dependence says that, initially, more entities in a population (a higher density) will enhance that

population's legitimacy, but persistent increases in membership will generate intense competition which will create fewer entrants and more exits – depressed founding rates, and increased mortality (Hannan, Polos, & Carroll, 2007 p. 89). The rapid emergence and acceptance of innovation centers, co-working, hacker/maker spaces, incubator and accelerator spaces signals the definition of these as a population “category”⁴, and therefore subject to the environmental forces that affect the sustainability of all such organizational forms (Audia & Kurkoski, 2011).

Is this current co-working/hacker/maker configuration sustainable? With so many of these centers opening up, copying each other, will there be a density effect, where only some may survive? Is there a certain configuration, with certain spatial elements, that may be more predictive of this survival? Furthermore, what can we learn about social functioning, and, more specifically, collaboration in new venture creation, from the study of these spaces? Is there a certain configuration that may best yield knowledge spillovers, therefore resulting in new venture creation and subsequent economic gains? The creation and proliferation of these entrepreneurial support centers provides the opportunity for case study, useful for observing the variables that might ultimately affect new venture startup, job creation, and long-term economic growth.

BACKGROUND

Entrepreneurial new ventures tend to follow a life cycle, starting in many cases with a part-time, home-based solo practitioner who has an idea and is willing to take a risk to develop that idea into an opportunity that creates value for him/herself and others. If this solo practitioner believes there's a sustainable business opportunity, he or she will commit to this opportunity full time, and may involve others in a startup team that can serve customers and compete for market share. This now becomes a small business with perhaps 10 employees, possibly profitable but still dependent on the vision and energy of the entrepreneur and his or her partners.

Over time, the entrepreneurial team will hopefully evolve this startup venture into a small business with 10 or more employees and a stable business operation. At some point thereafter this small business may become “salient” in its industry by having developed a unique product or service that gives it a differentiated advantage. Here is where the entrepreneurial team may exit the business via a buyout or acquisition, having positioned the firm as “scalable”, self-sustaining and able to expand operations, possibly achieving rapid growth over time. Now this business is fully engaged in economic activity with wide repercussions for success or failure.⁵

If the purpose is to encourage this arc of economic development, support systems should address the initial stages by attracting and mentoring the solo practitioner. Since about 2001, a series of involvement mechanisms have emerged to do just that. First came the “*meetup*”, a way to invite like-minded individuals to an informal gathering to discuss a book, play a game, or learn computer code.⁶ Then, in about 2005, Brad Neuberg, a disgruntled employee at a San Francisco startup, created the “*co-working*” movement by inviting like-minded individuals to join him in a shared collaborative workspace, paying for a portion of the rent and wireless broadband access fees, bringing food and other goodies to share. The idea was that this “physical proximity” would encourage knowledge sharing, the development of natural networks, startup teams, and productive business behavior.⁷

At about the same time, in 2006/2007, a group of North American computer hackers, those people who really understand computer code, came back from Berlin (where it's believed the “hacker” movement started in 1995) inspired to create a physical space where programmers could work together on not only code but also on computer circuit design and prototyping of all kinds of physical devices and products. The “*hackerspace*” hacker/maker/tech shop/fab lab movement was born. For a membership fee, these physical spaces provided workspaces and access to “shop” tools, or high-end manufacturing equipment such as CNC milling machines, welding rigs and laser cutters, state-of-the-art sewing machines and, increasingly, 3D printers. Although the sophisticated equipment required training and some significant safety oversight, the idea was that different people with different talents could pool their expertise and help each other with craft projects and product development alike.⁸

At some point, the entrepreneur or solo practitioner might become confident enough in his or her business model to create a startup team and begin to operate a small business. Perhaps this confidence came from interactions with like-minded individuals encountered at the hackerspace or co-working space, or perhaps it came from a chance encounter with a visitor or program presenter who provided information about available business resources in the area. Here is also where the services of the Small Business Administration, SCORE representatives, or state Small Business Economic Development Centers could be of assistance.

At this stage, it also helps if the business support system has equity investors willing to sponsor business or “seed” *accelerators*, offering sponsored office spaces with mentoring and educational components for a finite period where the objective is a final public pitch or new-idea launch. In these cases, the investor receives equity in return for the mentoring, rent, and other office amenities. Finally, the business *incubator* is a sponsored office space where businesses pay a fee to have access to support services plus access to mentoring and investment opportunities. Incubator candidates are usually chosen for investment potential, and may be acquired soon after launch.⁹ All of these various configurations help create a community where startups can flourish, hopefully giving economic value back to the region where they were “born”.

Such business support centers might be interested in finding, building, and mentoring a technology community that would have an economic impact on a local area. These centers could focus initially on the solo practitioner, providing multiple spaces where entrepreneurial activity could occur. One such space might be the hackerspace/maker space: an open area with a large table where participants could gather and work. Although 3D printers could be readily accessible in this open area, a separate adjacent area could provide key-coded access to shop tools that require safety training. A second space might be a room with desks and chairs and access to high-speed wireless broadband where co-working could occur. The third could be a program space where meetings and instructional events could be held. Additional support facilities would include restrooms, storage facilities, access to food and beverages, and possibly a local SCORE or SBA office located in an adjacent building.

This proposed spatial configuration mirrors that of model facilities in cities around the globe, and assumes that providing co-located collaborative spaces will spark mental stimulation and creative activity, leading to new venture development. However, this idea is still new enough that there has been little to no empirical measurement of interaction between the spatial configuration and ultimate economic outcomes.¹⁰ The assumption appears to be that “if we build it, they will come”, and it will be good for business.¹¹ The model proposed in this paper intends to explore this assumption.

THEORY AND PROPOSITION DEVELOPMENT

The research question under consideration in this paper is the following: what is the relationship between spatial configuration and social and cognitive functioning, and how might this relationship matter when designing effective support facilities to encourage entrepreneurial startup activity? Will a certain spatial configuration lead to collaborative connections that yield knowledge spillovers, resulting in new venture creation and subsequent economic gains? Interest in this topic developed after hearing the following story:

Co-working and hackerspaces are popping up all over the place. You have to go visit one to see the energy. However it’s hard to say just what the space should look like, and hard to figure out how successful it will be. One group I know decided to rent a vacant warehouse – huge empty space with columns and windows – and put a few tables in it. Unfortunately, people didn’t come. It felt too empty with just several tables at one end. Who wants to sit alone in such a big space?¹²

Currently, most innovation centers include some combination of coworking space, hacker/maker/tech shop/fab lab space, accelerator/incubator space, and educational/program space, and look like workspaces

at Google or Apple or other hi-tech corporate campuses. Open areas, modern furnishings, architectural lighting, bright colors, access to amenities such as coffee and tea, games and videos, and bike racks are all common. These design elements might mirror the assumptions of architects appealing to the millennial workforce, but do they actually create a space with both physical and psychological amenities conducive to optimal cognitive and social functioning? And, more importantly, does this inspired level of functioning actually lead to collaborative connections that yield knowledge spillovers, resulting in economic gains? Investigation of these questions requires the development of an appropriate theoretical framework, a framework that begins with the concept of space, itself.

Space

One unexplored area involves how space, defined not only as physical space, but also as lived social context, and as a conceptual space within which production or individualized personal practice occurs, can contribute to new venture creation. For instance, the twentieth century philosopher Henri Lefebvre ((1974) 1991) believed that space was essentially social, and must be considered on three levels: as a “spatial practice” (perceived space) or a physical environment that is perceived and negotiated through daily routines (walking through, occupying, interacting with objects, paying attention to distance and proximity); as a “space of representation” (lived or directed space) or a medium within which we are directed to live, experience and interact with others; and, finally, as a “representation of space” (conceived space) which we create via a conceptual model, providing sometimes complex symbolic and imaginative direction to our activities, our uniquely individual “practices” within whatever space we occupy.¹³

This view of space also has implications for whoever originally *designed* the space, for Lefebvre argued that those who built the space necessarily imposed an external hierarchical framework of power and control on whoever would be chosen to inhabit the space (Gottdiener, 1993). In organizational life, this implies that the planning of and physical configuration of workspaces was intended to create the “space of representation” or a “directed space”, “lived in” in a certain way – where the creators of the space directed inhabitants to interact in a specific way, reinforcing the imposition of order, the dominance and structural control of upper management (Taylor & Spicer, 2007). So, the people who design these support facilities, the people who hope entrepreneurial activity will spark economic growth, may actually, either knowingly or unknowingly, be imposing an external constraint on this very activity.

Lefebvre’s conception suggests that we should focus not on how the space was planned, but on how it might be imagined and used. This frees us up to consider the social relationships embedded in space, and the capability of those who inhabit the space to have a sense of agency in how the space can be instrumental in the production of knowledge and action. In the case of space inhabited by entrepreneurs, Lefebvre might argue that these “new social relations demand a new space” (Lefebvre, (1974) 1991)!

This tripartite view of space provides a theoretical framework and a possible model from which we can proceed. Space designed to be inhabited by entrepreneurs may need to be studied on three levels: the organizational level as designed, where the physical attributes of the space afford some sort of production; the social level, where interactions among participants in the space are encouraged, and knowledge spillover is anticipated; and the individually conceptualized level where choices about personal activity are made and innovative production can actually occur.

The Physical Space as Designed

When we walk into a room, in a building, we have a sometimes unconscious reaction to what we perceive of the space. Research on the relationship between office workspaces, productivity and employee satisfaction has shown that multiple variables play a role in our psychological or social comfort level with our workplace environment. Some of these variables include the degree of “social density” or the number of people within a given space – crowding creates dissatisfaction (Oldham, 1988; Oldham & Fried, 1987; Oldham & Rotchford, 1983); a high level of noise, heat, or low amount of light as well as lack of space can inhibit creativity and productivity, and the overall “openness” of the office layout may either encourage or discourage collaboration, depending on the type of work being done and the personal

characteristics of the worker – when concentration and private conversations are necessary, when the creative process requires time and space for “incubation” to occur, or when the worker has concerns about status or control of his or her surroundings, a more closed-in space is preferred (Kristensen, 2004; Martens, 2011; Parkin, Austin, Pinder, Baguley, & Allenby, 2011; Vischer, 2007). In addition, people feel the need to personalize their workspaces, or have some input into the workplace design, and although some level of autonomy may increase overall satisfaction, it may also create territoriality and an inappropriate sense of “ownership” over physical spaces or even artifacts (Knight & Haslam, 2010a; Knight & Haslam, 2010b).¹⁴

Certain individuals work better when there are fewer distractions, partly because they have less of an ability to screen out interferences from either other people or visual and auditory environmental stimuli, and this may also be a function of the cognitive complexity of the task or nature of the work being done (Fried, 1990; Fried, Slowik, Ben-David, & Tiegs, 2001). However, even when the work demands concentration, there is a need to provide an opportunity for people to come together to share information; a spatial design that “affords unplanned interaction”, or allows for creative “collisions” can increase the transfer of ideas, yielding knowledge spillovers and creative collaborations (Sailer, 2011; Taylor & Spicer, 2007).¹⁵ Therefore, a mix of private and open spaces, with some central area for social interaction, may be best for general employee satisfaction, teamwork effectiveness, and productivity (Kim & deDear, 2012; Kim & deDear, 2013; Magadley & Birdi, 2009; Moultrie, Nilsson, Dissel, Haner, Janssen, & Van der Lugt, 2007).¹⁶

Physical spaces have material constructions, dimensions, and objects, all of which provide an ecosystem of dynamically interacting parts. This environment requires inhabitants to perceive the physical relationships in order to navigate successfully within the space (Gibson, 1986 p. 8). As we navigate a space, we perceive surfaces and their layouts, and these objects, and the events that occur as we interact with these elements, either demand or invite appropriate behaviors. Gibson (1986 p. 102) calls these natural encounters “affordances”, and our behavior is dependent on how we perceive what this environment “offers” us. For instance, the design of a chair “affords” sitting, so a well-placed, well-designed chair communicates its purpose and helps us make decisions about how to interact with it. In this way, when people enter a space such as a co-working or hackerspace, they may see opportunities to proceed, physically, in order to accomplish the purpose for which they entered, or they may be confused or otherwise unwilling to interact with the space as designed. This is not an insignificant component: “unintended consequences can result from designs...that fail to account for significant affordances” (Fayard & Weeks, 2011 p. 106).

In addition, one other type of “physical” space that affects successful interaction might be the organizational or institutional structure of governance by which the organization does its business. A simple example of this is the organizational chart: a newcomer to the organization will be able to gather useful information about this “environment” based on who reports to whom, what the job titles say about the various hierarchical positions, and how many levels of reporting relationships exist between the highest and lowest individuals depicted.

When asked to describe their organization, many managers reflect on and refer to this organizational chart, and, in doing so, constrain their view of the organization to what they perceive as the domain or function of each of the boxes. This functional and vertically hierarchical view of the organizational “space” creates a functional independence, such that “silos” – tall, thick, windowless structures – are built to keep activities contained within the silo structure, preventing cross-functional problem solving (Rummler & Brache, 2013 p. 5). Regardless of the intent, management’s approach to organizational structure will affect how work is done. Also, regardless of the design of the formal structure, or governance “space”, informal relationships will form among the inhabitants of the space that guide interactions and therefore influence behavior and performance (McEvily, Soda, & Tortoriello, 2014).

Although well covered in the work of the organizational behavior and workplace satisfaction scholars previously mentioned, this existing literature on the influence of physical space on performance is primarily based on studies done in organizations that have formal structures – managers and employees – where the spatial design was created to facilitate work behavior in support of a specific organizational

strategy. In these cases, employees may have well-defined work roles, with an associated role identity, which predisposes an individual to act in accordance with role norms while interacting with the organization's spatial elements.

In designing co-working/hacker/maker spaces the intent is to anticipate the needs of the participants, providing a work environment where multiple creative and ultimately productive activities are encouraged. In this case the participants have personal agency regarding their behavior, and are not constrained by pre-existing norms or any formal authority regarding expected performance. Spatial designs can borrow from the organizational behavior literature, but the application is for a different purpose: to attract entrepreneurs and other participants who feel comfortable enough to interact with the space and remain as members.

As previously mentioned, the current co-working/hacker/maker design elements commonly include open areas, modern furnishings, architectural lighting, bright colors, access to amenities such as coffee and tea, games and videos, and bike racks, but do these elements actually create a space with both physical and psychological amenities conducive to optimal cognitive and social functioning?

One solution to the perceptual challenges that physical and structural "space" erect in our attempt to understand how creative and productive work can be encouraged is to actually observe how people interact with the space – how do both formal and informal "structures" influence behavior and patterns of interaction. Therefore:

Proposition 1: An effectively designed physical space will positively influence an individual's productive interaction with its spatial elements.

The Space as Social Network

Research done on communities of learners has determined that certain types of knowledge are socially constructed (Brown, Collins, & Duguid, 1989). Therefore the configuration of the social context might be critical to what is learned. In addition, knowledge transfer may be dependent on a "community of learners" where the possibility exists for "legitimate peripheral participation" (Lave & Wenger, 1991). A learning community is one where members engage in mutual activities, most effectively under the guidance of a mentor, to learn not only the practice, but also the social norms and values that underpin the activity under study. The idea is that, over time, the new member will move from peripheral, guided activity to full participation as a legitimate and competent practitioner. For this to happen, the social "space" must be designed to encourage not only this level of participation, but also provide mentors and models of appropriate behavior. The space should also attract members with the willingness to engage.

This requires that co-working and hackerspaces must pay attention to who they allow in as members, the level of expertise and knowledge that these members have, and whether enough members and mentors (or "managers") have the capability and desire to interact in the social setting to share this knowledge in a way that facilitates the timely development of useful practice. Here's where Lefebvre's concerns about "power" become important, because "certain spatial and temporal arrangements afford certain possibilities and constraints for social relations" (Fahy, Easterby-Smith, & Lervik, 2013 p. 2).

Therefore, it would be helpful for the designers (and managers) of these supportive spaces to understand how social networks and alliances form, and how transfer of practice is sometimes dependent on the level of trust that develops among participants (Szulanski, 1966). They must focus on the degree of social participation, such that:

Proposition 2: An effectively designed social space creates a critical mass of social participation that positively influences profitable alliances, knowledge spillovers and transfer of practice.

The Individual's Psychological and Emotional Space

In order to develop a rich and well-functioning social network, one that can encourage full participation and innovative output, not only is physical proximity in a space that "affords" participation

necessary, but also the participants must have some degree of social similarity (Reagans, 2014). Certainly demographic variables are important, but individual characteristics are also important to consider. For instance, categorization or self-categorization might increase resistance to collaboration when identity boundaries are violated (Tajfel, 1982). Similar to the problem with organizational functional silos, individuals construct “identities” that help them navigate their “spaces” and solve problems related to others who inhabit the same environment. Individuals answer the question “who am I?” by categorizing themselves relative to the persistent roles they play, the distinctive skills or abilities they believe they have, the enduring beliefs they hold about their place in their conception of reality.

Researchers are continuing to discover how identities are formed and the implications for participation in collaborative networks where multiple identities and relationships may develop (Shipilov, Gulati, Kilduff, Li, & Tsai, 2014). This implies that workspace designers (and managers) should carefully consider the attributes of individuals accepted into the space, because how these individuals “conceive” of their role, and their personal degree of confidence or self-efficacy (Bandura, 2006) in their ability to interact with the elements and other inhabitants of the space may affect their degree of collaboration.

In addition, certain personality characteristics may predispose individuals to be more comfortable in the space as designed – they may conceive of themselves as sharing not only the values and beliefs they witness in the space, but also having complementary attitudes toward sharing knowledge and caring about the creative development of new ideas, even though this activity may involve some psychological risk. Although it has been assumed that entrepreneurs share a high tolerance for risk and ambiguity, it’s possible that the spatial configuration may influence the perception of acceptable risk, especially where intellectual property is involved (Stumpf, 2013).

Regarding overall personality characteristics, such as agreeableness and emotional stability, it also helps if the individuals enjoy interacting with others, in general, and are generally trusting of others, generous, and willing to engage as “good partners” with other like-minded people (Spinuzzi, 2012). This implies the following necessary condition:

Proposition 3: Certain individual characteristics will have a positive influence on an individual’s willingness to participate in collaborative environments.

Knowledge Spillovers

As research into entrepreneurship tells us, certain individuals are predisposed to make the decision to start a new venture because of their tolerance for ambiguity and risk, their preference for autonomy and self-directed activity, and their personal self-efficacy or confidence in their ability to utilize the resources around themselves to create something new or different. However although personal characteristics may be necessary, they are not sufficient triggers for entrepreneurial action – access to resources, including financial, human and social capital, are also required (Acs, Audretsch, & Lehmann, 2013). In addition, in order for the entrepreneur to actually identify an opportunity for entrepreneurial action, the individual must be able to perceive that the opportunity exists and that relevant resources are available; and acting on that opportunity may require the encouragement of “knowledgeable peers” (Wood & McKinley, 2010).

Peer support may come from casual contact or through the formation of active partnerships for mutual benefit. If individuals are members of a relevant social network, it’s also possible that “entrepreneurs who identify opportunities that they themselves cannot (easily) exploit have the option to inform other entrepreneurs in their network whom they perceive to be better positioned or endowed to exploit the opportunity” (Ebbers, 2013 p. 2). Therefore, there are significant “spill-over” benefits to being in some proximity, either physically or virtually, to other like-minded individuals.

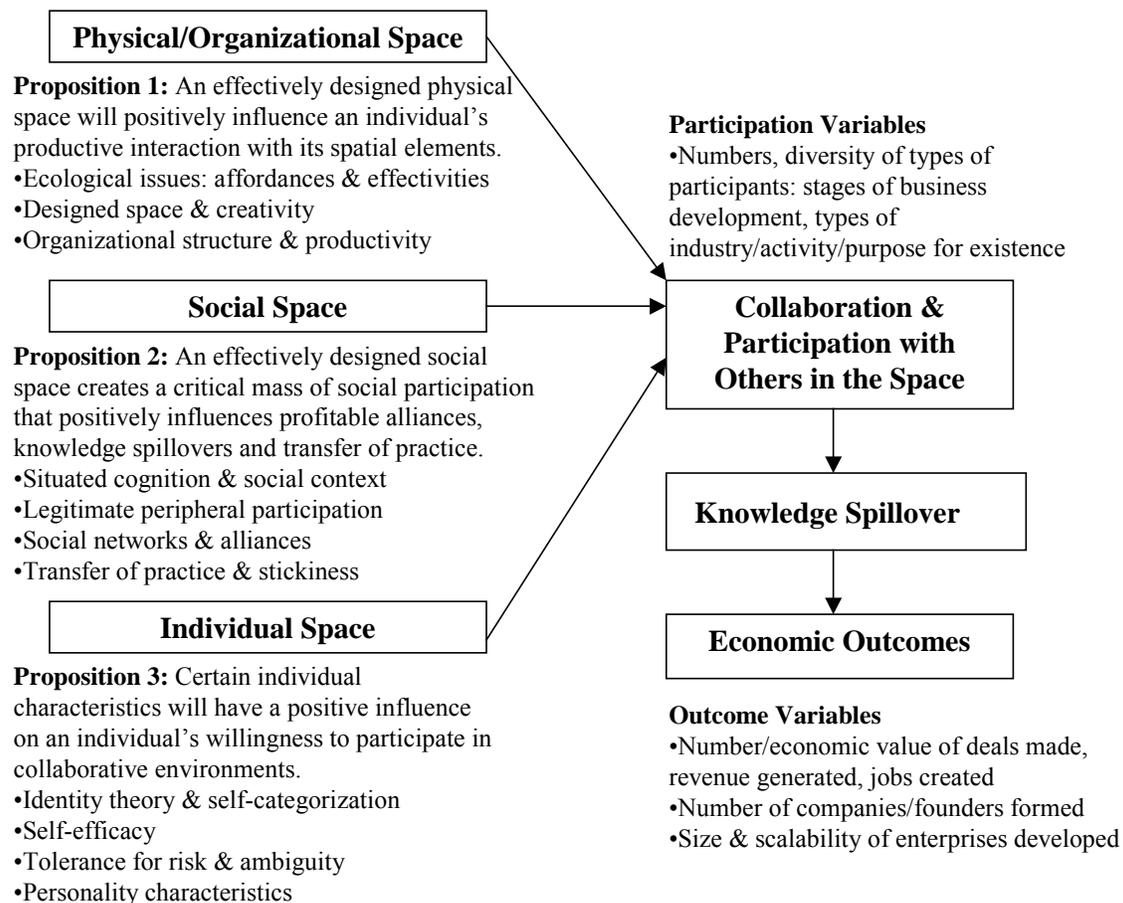
Research on how innovation occurs has proposed that there are both social and knowledge “networks”: there are relationships individuals have with each other based on structural and personal affinities, and there are also “knowledge elements”, beliefs that members of a community holds about “facts, theories, methods, and procedures surrounding a subject matter” (Wang, Rodan, Fruin, & Xu, 2014 p. 485). The ability of an entrepreneur to recognize how new knowledge may have value is

dependent on his or her access to that knowledge, and the capacity of that entrepreneur to understand how to activate that knowledge through the creation of a new venture.

It's been argued that entrepreneurial opportunities come from "knowledge spillovers", or access to knowledge that is "underexploited and not fully commercialized" by others, and therefore available for exploitation or use in new venture creation (Acs et al., 2013 p. 758). Access to this knowledge is gained through informal interaction and therefore requires spatial proximity – both location and context seem to matter (Ghio, Guerini, Lehmann, & Rossi-Lamastra, 2014). To the degree that the innovation or resource center is designed to facilitate the development of a supportive social network, where the physical space affords opportunities for like-minded individuals to engage, and where a rich environment exists with access to diverse information, it's assumed that entrepreneurial activity will thrive, especially if the innovation center's designers or managers recognize how to balance this tripartite view of space.

Now that the theoretical foundations have been identified and discussed, here is the proposed full model, including propositions and variables.

FIGURE 1
THEORETICAL MODEL WITH PROPOSITIONS AND VARIABLES



PROPOSED RESEARCH METHODOLOGY

Given that this topic is so new, with little to no empirical evidence to substantiate claims that these innovation center "spaces" will yield the proposed economic outcomes, a mixed method approach is the preferred research methodology. The best vehicle for beginning the initial investigation and developing

this “space” theory may be the case study. When evidence is gathered via direct observation, in an authentic environment where the phenomenon of interest is evident, the resulting data is not only rich, but also interesting, and can be used to look at patterns of relationships both within and across cases, thereby testing theoretical propositions (Eisenhardt & Graibner, 2007). The model proposed in this paper lends itself to this kind of investigation.

Participants and Case Selection

Since the creation of these centers is still new, it would be ideal to select those centers that are in the early stages as cases representative of this innovation center environment. The individuals who “founded” these centers are likely to be supportive of this research, because the results would yield information useful for evaluating center success. It would be ideal to start with a in-depth single case study, and then use additional cases to investigate any unusual findings, or focus on details that appear to resonate with multiple participants. In this way, the resulting theory may become more robust or generalizable.

Research Procedure

This is intended as a mixed-methods research design, using multiple case studies. In each case environment, initial data on predictive or independent variables would be gathered via observation, including participant observation: individual subjects would be observed as they interact with the physical components of the space – where individuals go as they interact with the physical space, how long they stay at a particular location, how they interact with the physical components there, whether they return over time to the same activities. Once a baseline of activity has been established, subjects would be selected based on their level of activity and asked to participate in a semi-structured interview. Interview questions would be developed based on the observations, but would also include general questions such as “why are you here?”

As more individuals interact in the space over time, social network analysis would be done to track who talks to who and about what, identifying whether they know the person, talk to that person or not, and how often; whether they consider that person’s advice helpful or trustworthy; whether they would consider doing business with that person as either a potential partner or resource provider. These relationships would be assessed during the initial stages of the subject’s interaction with the center, and would be tracked to determine how the social network connections developed over time.

Finally, subjects would be asked to volunteer to take a survey to assess the presence of various entrepreneurial characteristics and personality profiles, measuring the presence of entrepreneurial characteristics such as their social identity/self-categorization, self-efficacy toward entrepreneurial behavior, tolerance for ambiguity and risk, motivation toward goal achievement, and basic personality constructs such as agreeableness and emotional stability.

Due to the case study environment, the entire research procedure may extend over a year. Also due to the grounded nature of this study, it’s possible additional areas for theoretical investigation would arise as the study proceeds. Therefore, specific measures may have to be developed as needed.

Regarding outcome or dependent variables, data could be gathered from center records, including numbers and types of participants, stages of business development, types of industry/activity/purpose for existence. Depending on the center’s larger purpose, data could be gathered on number/economic value of deals made, revenue generated, jobs created, numbers of companies/founders formed, size and scalability of enterprises developed. Relevant stakeholders in the larger economic community may be approached as interview subjects and asked to comment on the progress, hopes and goals of the center as it develops.

As an important component of the “designed space” question – how much did the center’s founders design the space to achieve certain outcomes; how much did the initial designers want to “control” the activity – the founders/designers should also be interviewed to understand the original stated purpose of the center. Some centers will be for-profit ventures, while others may be more of an incubator design where startup success leads to equity investment, and others may be not-for-profit venues with community-based objectives. It is important to find out what the measurable objectives are, and the timeframe for accomplishment of these objectives. In addition, it is important to find out what

feedback/evaluation mechanisms exist for measuring activity and accomplishments, and what resources or infrastructure/systems exist for monitoring and guiding activity. Finally, just as with any startup, what is the leadership succession plan or “exit” strategy for the center?

To further evaluate the environment within which the center was developed, it is important to ask about the status of the larger community, relative to economic indicators. One model that some centers have followed is Brad Feld’s suggestion for building a “startup community” (2012). Feld suggests that startup communities are more easily created if there are “anchor” tenants, firms/industries in the community, ones that have an existing economic impact. In addition, Feld suggests a startup community create activities that engage the “entire entrepreneurial stack” from aspiring to experienced entrepreneurs, service providers, students, and other interested parties (Feld, 2012 p. 19).

Did this community already have a “regional entrepreneurial advantage” due to a geography of innovation, or existence of “external economies” that can provide resources such as specialized legal and accounting services, raw material suppliers, access to skilled labor; existence of an existing network of practitioners/users who have a culture of knowledge sharing and openness across boundaries; existence of a “creative class” of individuals who have an interest in/tolerance for new ideas and weirdness – a critical mass creates a tipping point or virtuous cycle: because the community is attractive, it attracts others (Feld, 2012 p. 22-24)? If so, did the center involve these individuals and resources in regular activities that engaged people directly in hands-on entrepreneurial events that were open to anyone interested? Answers to these questions will provide important information on the larger environment within which the study is situated.

CONCLUSIONS, LIMITATIONS, AND IMPLICATIONS

Because this model is proposed to be investigated as a series of case studies, and may be dependent on a “convenience” sample of centers that are in their early stage of development, results may not be widely generalizable beyond the economic region where they were studied. However, the coworking/hackerspace configuration is still so new that any information generated should be of interest to multiple stakeholders, including not only the organization that created the space, but also local and regional economic policy makers. In addition, the study results may be useful to all those who study entrepreneurship, economic development, social network knowledge spillovers, alliance formations, and the scalability of economic enterprise.

What’s next? Looking beyond the hackerspace: there’s been a good deal of conjecture about the “locus of innovation”, whether it resides in individuals, firms, or networks, and, if the network is key to innovation, especially a more “open source”, collaborative network, what is the most appropriate “form” for this network to take (Ahuja, 2000; Bogers & Horst, 2014; Chesbrough & Bogers, 2014; Davis & Eisenhardt, 2011; Powell, Koput, & Smith-Doer, 1996)? Investigation of the spatial component of this collaborative approach to innovation or new venture creation, using the case study methodology and model described in this paper, may help further develop theory around this important question.

ENDNOTES

1. Headd, Brian. 2010. An Analysis of Small Business and Jobs. *SBA Office of Advocacy*, [http://www.sba.gov/sites/default/files/files/an%20analysis%20of%20small%20business%20and%20jobs\(1\).pdf](http://www.sba.gov/sites/default/files/files/an%20analysis%20of%20small%20business%20and%20jobs(1).pdf).
2. Harrison, J.D. 2013 Who Actually Creates Jobs, Startups, Small Businesses or Big Corporations? *Washington Post*, April 24, 2013, http://www.washingtonpost.com/business/on-small-business/who-actually-creates-jobs-start-ups-small-businesses-or-big-corporations/2013/04/24/d373ef08-ac2b-11e2-a8b9-2a63d75b5459_story.html; see also the SBA March 2012 report, “The Dynamic Relationship between Entrepreneurship, Unemployment, and Growth” <http://www.sba.gov/content/dynamic-relationship-between-entrepreneurship-unemployment-and-growth-evidence-us-industries>, and the SBA April 2013 report on Predicting Growth in Venture Size and Scope among Small Firms

- <http://www.sba.gov/content/utilizing-kauffman-firm-survey-predict-growth-venture-size-and-scope-among-small-firm>
3. See The Kaufmann Index of Entrepreneurial Activity, 2011, http://www.kauffman.org/~media/kauffman_org/research%20reports%20and%20covers/2012/03/kiea_2012_report.pdf, and Brad Feld & David Kaplan, 2012, *Startup Communities: Building an Entrepreneurial Ecosystem in Your City*, Wiley.
 4. Hannan et al (2007) point out that “early organizational ecology defined populations as bounded sets of entities with a common form, often interacting with each other and struggling over common resources” (p. 86). They further argue that the origins of a “population” come about when the members of the “audience” reaches a consensus about the identity of a social “object”, and thereby “labels” it as such.
 5. The terms “salient” and “scalable” are adapted from Bachenheimer, Bruce; Isaak, Robert; & Isaak, Andrew. 2014 Reaching for Scalable Entrepreneurship: Implications for Growth and Job Creation. In A.B. Schulte & B.T.Sauer, *Entrepreneurship: Theory, Role of Economic Development and Practices*. pp. 39-62. Nova Science Publishers.
 6. See <http://observer.com/2011/01/the-long-and-curious-history-of-meetupcom/>
 7. See <http://www.deskmag.com/en/coworking-did-begin-at-regus-but-not-the-way-they-think-362> and <http://www.tiki-toki.com/timeline/entry/156192/The-History-Of-Coworking-Presented-By-Deskmag#vars!panel=1505040!>
 8. See <http://makezine.com/2013/05/22/the-difference-between-hackerspaces-makerspaces-techshops-and-fablabs/>
 9. See http://en.wikipedia.org/wiki/Seed_accelerator ; <http://www.inc.com/christina-desmarais/difference-between-startup-accelerator-and-incubator.html>; <http://www.chicagobusiness.com/article/20120323/BLOGS06/120329903/incubators-or-accelerators-are-they-right-for-your-startup#>
 10. See, for instance, Hurry, Christopher J.P. 2012. The HUB Halifax: A Qualitative Study on Coworking. St. Mary’s University, Halifax, Nova Scotia, <http://library2.smu.ca/handle/01/24826#UyyoOKL-65Y> . Hurry’s literature search uncovered only a few empirical studies of outcomes from co-working spaces. As of October 2013, *DeskMag*, an online publication located in Germany devoted to reporting on the co-working movement, reported that it had found “around 200 studies” of coworking, but only reported on three, noting that much of the research may still be a work in progress. See <http://www.deskmag.com/en/coworking-library-studies-881> *DeskMag* also reports that as of April 2013 there were more than 110,000 people currently working at nearly 2,500 coworking spaces available worldwide. Most coworking spaces are still in the United States (781), which remains ahead of Germany (230), Spain (199), Great Britain (154) and Japan (129). <http://www.deskmag.com/en/2500-coworking-spaces-4-5-per-day-741>
 11. See an article by Mike Butcher, co-founder of TechHub, a London-based co-working space (see <http://www.techhub.com/>), “After 20 months Google’s Campus London Hub has 22,000 Members, So Where Next?”, *Techcrunch*, December 2, 2013, <http://techcrunch.com/2013/12/02/after-20-months-googles-campus-london-hub-has-22000-members-so-where-next/> Butcher reported on the “success” of Google’s startup “hub” created in London in April 2012, see <http://www.campuslondon.com/workspace/> . *DeskMag* also reports that creation of new coworking spaces has slowed, and several have closed, possibly because they did not serve users’ needs. See <http://www.deskmag.com/en/survey-patterns-of-coworking-space-closure-560> ; and reports as of 2014 indicates that this phenomenon is still growing. See <http://www.newrepublic.com/article/118738/coworking-space-can-improve-creativity>
 12. Based on a story told by Michael Kaltschnee, co-founder of the Danbury Hackerspace, Danbury, CT.
 13. NOTE: Lefebvre is considered a Marxist philosopher, and his ideas have been used in both sociology and geography to discuss, “in postmodern terms, how space is discursively constructed in theory... and how the process of its creation lays bare the contradictions of capitalism” (Swyngedouw, 1992: 317). Lefebvre’s work is not used in this paper to provoke a discussion of issues related to critical theory or critical management studies, only to provide an alternative conceptualism of the term, and to engage the imagination in a new way of thinking about and viewing “space”. Lefebvre’s work is becoming more widely used in management research, as noted in Fahy et al, 2013, and Taylor & Spicer, 2007.
 14. One fictional example of this that illustrates the emotional reaction employees can have to environmental constraints is the famous scene from the movie “Office Space” where Milton protects his red stapler. See <https://www.youtube.com/watch?v=uVD3KPUuKHk>

15. Tony Hsieh, Zappos founder & CEO, created an unstructured office environment at his company in order to maximize the chance of “creative collisions”, believing in “the creative power of accidental collisions between different-thinking folks”. See <http://www.fastcompany.com/3000839/why-here/zappos-ceo-tony-hsieh-on-building-a-virtuous-business-in-the-city-of-sin>.
16. The debate over open offices vs cubicles or private offices is still ongoing. In November 2013 *Fast Company* ran a series of articles about this, referencing several studies that point out that there are some significant trade-offs: see <http://www.fastcompany.com/3019758/dialed/offices-for-all-why-open-office-layouts-are-bad-for-employees-bosses-and-productivity>; <http://www.fastcoexist.com/3021713/youre-not-alone-most-people-hate-open-offices>; <http://hbr.org/2011/07/who-moved-my-cube>

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