FITTING SQUARES INTO ROUND HOLES: ENABLING INNOVATION, CREATIVITY, AND ENTREPRENEURSHIP THROUGH CORPORATE FAB LABS

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Abstract

Acting on personal convictions that a large automobile maker's ability to innovate was too closed-off and poorly suited for breakthrough innovation, a small team at the main R&D campus decided in late 2013 to create a corporate Fab Lab. Building upon what started as a MIT outreach program called Fab Labs, these spaces, present in over twenty large multi-national firms since 2009, are seen by their creators as an opportunity to increase employees' ability to innovate. Although innovation is a strategic priority in most firms, the creators of these spaces encountered substantial institutional resistance early on due to the different nature of Fab Labs, or in their words trying to fit a "square in a round hole." This paper presents corporate Fab Labs to scientific literature. It proposes a theoretical foundation building on established fields of research in managing innovation capabilities and institutional entrepreneurship. Empirical data collected from the founders of ten Labs in France, Japan, and South Korea is analyzed to test this framework. Findings include unique contributions made by Fab Labs to a firm's innovation capabilities and proposals of complementary research paths.

Keywords: Fab Labs, Innovation, Entrepreneurship, Design management, New product development

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1   INTRODUCTION

In 2014, two employees at French automobile maker's Renault's primary R&D center proposed working together to develop new management tools that could be used in an emerging setting dedicated to enabling breakthrough innovation (O'Connor et al., 2008). Their initiative, called the "Renault Creative Lab", stemmed from their personal convictions that Renault's existing innovation processes were too closed-off beyond of a small group of employees and poorly suited for breakthrough innovation. Their solution, patterned after an initiative that started as a MIT academic outreach program called Fab Labs (Gershenfeld, 2005), intended to be a modest yet visible, open space combining a strong sense of community with freely available advanced tools such as 3D printers and laser cutters available for "anyone in the company to make (almost) anything."

As the Creative Lab project progressed, pressure mounted for the team to interact with and contribute to established corporate procedures and management tools for innovation. Several key decision makers enthusiastically embraced and lauded their ambition to increase innovation capabilities within the company. However, the Creative Lab founders quickly realized that most managers and executives applied the same performance indicators for innovation used within the company—such as the number of patents obtained—to establish whether the initiative was useful in contributing to the firm's innovation strategy. Not only did these measuring sticks put the Creative Lab at a considerable disadvantage by pitting them against robust and efficient R&D processes, they also flatly ignored the different types of innovation capabilities this initiative hoped to establish. Frustrated by these frequent reactions, one of the Creative Labs founder's peers asked, "how can we fit the Fab Lab, a square, into the company, which is more like a round hole?"

The team at Renault was not alone in asking—and working to solve—this ambitious yet fundamental question. At the time, the Renault team was in contact with nearly two dozen individuals or teams responsible for "corporate Fab Labs" (or Labs) established as early as 2009 in other large multi-national firms, many of whom faced similar internal challenges. While each of these Labs have successfully obtained some corporate resources, most have done so by finding corporate sponsors who sympathize with their viewpoints rather than using existing innovation performance benchmarks.

Corporate Fab Labs are new research objects to scientific literature. Beyond presenting these emerging settings, the goal of this paper is to understand what contributions to innovation capabilities can be expected from corporate Fab Labs, and the impact that the process of creating a Lab has on a firm's ability to innovate. To answer these questions, the first part of this paper proposes a theoretical foundation for corporate Fab Labs and their creators. This portion builds upon established research fields that describe how firms can develop capabilities for innovation, and the specific challenges faced by individuals seeking to innovate in institutionalized settings. The second part of this paper tests this theoretical foundation by building upon empirical data gathered from 10 corporate Fab Labs in large multi-national firms to identify the unique contributions of these research objects using a basic typology of innovation capabilities. Finally, these comparisons result in several propositions for future research.

2   LITERATURE REVIEW

The emergence of corporate Fab Labs may be a relatively recent phenomenon, but they are introduced into a complex yet established and well-studied environment. This section initially presents the managerial, organizational, and institutional context surrounding innovation in corporate settings. Innovation capabilities—the fundamental object corporate Fab Labs hope to develop—are then discussed, along with a basic innovation capabilities framework used in later analysis. followed by a presentation of the challenges faced by individuals leading innovative projects in institutionalized settings. Finally, a key question from the association of these two research fields is presented.

2.1 Issues raised by innovation management in corporate settings

Innovation plays a vital, but often understated, part in most corporate strategies (Teece, 2010), resulting in difficult-to-resolve organizational tensions. Many large firms are organized to effectively innovate by enhancing, refining, and optimizing existing designs (Crossan and Apaydin, 2009), such as through R&D departments. These structures are effective in producing incremental innovations associated with an established dominant design (Henderson and Clark, 1990). When organizations are oriented towards

breakthrough or radical innovation activities, structural deficiencies often appear (Hatchuel et al., 2002). These inadequacies do not necessarily indicate organizational incompetence or ineptitude; they typically highlight a structure uncomfortable with managing the inherent uncertainty of breakthrough innovation (Ahuja and Lampert, 2001), or the "fuzzy front-end" of new product design (Khurana and Rosenthal, 1998).

Solutions for resolving these inadequacies present in scientific literature build primarily upon an outcome-based view of innovation activities—what is produced—(Damanpour and Aravind, 2006), and in lesser part innovation as a process—or how it is produced (Crossan and Apaydin, 2009). This focus on outcomes is partially justified, as most definitions of innovation necessitate the exploitation of ideas (Baregheh et al., 2009; Crossan and Apaydin, 2009).

Focusing on what is innovated and how it comes about does not necessarily account for determining factors of innovation, or in other words considering *whether* innovation is possible. In this sense, management has a key role in orchestrating and enabling innovation within their firms (O'Connor et al., 2008). To do so, managers should manipulate organizational levers to develop capabilities for innovation (Lawson and Samson, 2011). Actuating these levers in a way that permits innovation necessitates individuals stepping out of the bounds of the organization's dominant design of carefully defined roles and processes and "doing different things in different ways." (Francis and Bessant, 2005). However, the very roles that individuals perform within organizations are framed in a way that discourages or inhibits individual agency (Battilana et al., 2009). The following sections present these enabling factors—organizational levers and the managers who control them—through the related theoretical lenses of innovation capabilities and institutional entrepreneurship.

2.1.1 Building innovation capabilities

Innovation capabilities describe an organization's readiness and ability to create and respond to new opportunities (Assink, 2006; Börjesson and Elmquist, 2011; Lawson and Samson, 2011). Building and maintaining innovation capabilities requires mobilizing and "orchestrating (O'Connor, 2008) limited organizational resources (Penrose, 1959). Innovation capabilities are a type of dynamic capability (Eisenhardt and Martin, 2000; Teece et al., 1997), which must be regularly exercised and regenerated in relation to constant changes within and outside of the firm (Börjesson and Elmquist, 2011). Failing to maintain developed capabilities, or simply reinforcing the same capabilities, results in a form of organizational atrophy, which as Leonard-Barton (1992) warns, can devolve into an organizational stumbling block or "rigidity" impeding innovation.

Basic building blocks of innovation capabilities include resources, processes, and mindset (Börjesson and Elmquist, 2012; building on Christensen, 1997; O'Connor, 2008). These three fundamentals, described below, are also used in later analysis. While resources, which includes people, technology, cash, and networks, can be reallocated by managers in almost any configuration imaginable, they are bounded by organizational processes and mindsets (Christensen, 1997). However, organizations are complex systems designed to transform resources and produce consistent results through tightly integrating and enhancing processes, including formalization and bureaucracy (Damanpour, 1991). By design, these processes resist changes that fall outside of their identified purpose (Utterback and Abernathy, 1975). Likewise, an organization's mindset, which goes beyond stated values and culture, are the basic tenants that indicate the firm's priorities and reflected by management decisions. An organization's mindset is naturally resilient to change, as it's the fundamental framework or "compact" that governs interactions between the organization and the individuals who make up the firm (Strebel, 1996). Successfully changing a firm's mindset to embrace long-term innovation strategies and unknown innovation requires persistent, systemic efforts (Dougherty and Heller, 1994), typically over multi-year periods of time (Börjesson and Elmquist, 2011; O'Connor, 2008).

Recent empirical studies of building innovation capabilities, such as Börjesson, Elmquist, and Hooge's longitudinal study of two European car makers (2014), suggest that the constrained, highly competitive environment in the automotive industry encouraged short-term management practices in these firms, leaving little time for reflection and developing innovation capabilities. Dynamic capabilities perform best in malleable organizational settings, and lose their effectiveness when confronted with the pressures of complex processes or diverging mindsets (Benner & Tushman, 2003). Overcoming the aforementioned procedural and cognitive barriers to build innovation capabilities requires individuals willing to exercise individual agency and 'do things differently' in an effort to orchestrate institutional change (Kelley et al., 2011; O'Connor et al., 2008).

2.1.2 Institutional entrepreneurship

Institutional entrepreneurs, initially described in scientific literature by DiMaggio (1988) as 'organized actors with sufficient resources' who see 'an opportunity to realize interests that they value highly,' are agents of change capable of building institutional innovation capabilities (Börjesson et al., 2014). By substituting or adapting institutional mindset with a set of personal values, institutional entrepreneurs "disembed" themselves by allowing themselves to do things differently. One indicator of disembeddedness is the acquisition or creation of resources that enable actors to exercise agency. Examples include constructing discursive strategies and rhetoric (Zott and Huy, 2007), or seeking and obtaining backing from institutionally legitimate, embedded actors.

Early literature often portrayed institutional entrepreneurs as heroic figures (Garud et al., 2007) or "mavericks" (Pinchot, 1985) who go beyond the bounds of their institutional roles. However, more recent research acknowledges that institutions are a setting of stability and familiarity, composed of potentially useful enablers and constraints for innovation. One key, established, institutional enabler and constraint is management. Managers are actors with specific institutional roles that reinforce and maintain existing processes, rather than imagining new ways of doing things in the normal course of exercising their functions and responsibilities (Hardy and Maguire, 2008). This situation, also called the "paradox of embedded agency" (Garud et al., 2007; Seo and Creed, 2002), describes tensions between individuals and pervasive institutional pressures that shape their roles and associated actions and make it difficult to do things differently.

2.2 Agents in institutions building innovation capabilities

Actors trying to develop innovation capabilities appear to walk a fine line between these two theoretical fields. On one hand, these institutional entrepreneurs must disembed themselves from institutions to be able to innovate and do things in different ways. On the other hand, literature on developing innovation capabilities focuses on the role of "orchestrators", and strongly suggests that these actors should be well versed in established practices and other embedded actors, especially strategic decision makers, to facilitate uptake and diffusion of new practices thanks to their detailed knowledge of an institution's inherent complexities. Existing literature does not directly resolve such issues; in this paper, the assumption is made that alternative, complementary roles to an organizational "orchestrators" for building innovation capabilities may exist. Creators of corporate Fab Labs may be one example of a type of alternate profile, but this hypothesis is not explored in detail.

3 METHODOLOGY

Throughout 2015 and 2016, a series of 31 semi-structured and unstructured interviews were conducted with 18 creators and/or managers of corporate Fab Labs, present in 10 multi-national firms. The firms in the sample are large, publically traded companies with over 50,000 employees in the automobile, aviation, banking, consumer electronics, energy, imaging, plastics, and telecommunications sectors. The individuals interviewed were based in three countries: France, Japan, and South Korea. Detailed notes taken during these interviews constitute the primary material used in this study. Additional supporting data used to corroborate or illustrate details from these primary interviews include notes from participative observations in each corporate Fab Lab, PowerPoint presentations and other documentation created by Fab Lab managers, photos, and notes drawn from a series of over 100 secondary interviews conducted with Fab Lab users and non-users.

To identify the extent to which corporate Fab Labs contribute to a firm's innovation capabilities, these documents were reread in their entirety to identify portions that describe forms of resources, processes, or a prevailing mindset. Examples of resources described include the roles fulfilled by Lab managers, new types of machines present, in addition to annual budgets and personnel. Processes described included the creation of a business incubator, the genesis of the Lab itself, and how ideas take shape as they move from concepts to tangible objects. Finally, mindset is partially described by the presence of rules, charters, codes of conduct, adages, slogans, and other symbols, such as a list of twelve "rules of the garage" intended to promote creativity and invention.

Following a systematic coding for the three broad types of innovation capabilities, individual elements were listed together in each category and placed into subcategories based on either material or ideological similarities. For instance, processes described as a "new business accelerator" and a "corporate idea sprint" were gathered together in a subcategory called "corporate springboards" based

on converging descriptions of giving original ideas an opportunity to thrive. These subcategories, grouped together in terms of overall innovation capabilities, are analyzed in the following section.

4 DESCRIPTIVE ANALYSIS

The theoretical foundation proposed in this paper focuses on individuals who seize opportunities to develop new capabilities for innovation within their firms. Three sets of general questions should be asked to establish whether corporate Fab Labs and their creators fit this description.

1. How do corporate Fab Lab creators perceive and qualify their firm's innovation capabilities, both before and after initiating a corporate Fab Lab project?
2. What resources, processes, and mindsets are generated by Fab Labs? To what extent to these new capabilities build upon pre-existing innovation capabilities?
3. Do Fab Lab managers and creators act with an explicit or declared intent of transforming institutionalized innovation capabilities, and how do they qualify their initiatives?

The first question characterizes initiatives from the perspective of individual actors, exploring *why* they choose exercise agency to become disembedded agents for change. The second pair of questions builds upon the three building blocks of the basic innovation framework proposed, by controlling for pre-existing institutional capabilities inherited by institutional entrepreneurs and the resulting, unique contributions. Finally, the last set of questions aim to establish what institutional entrepreneurs hope to accomplish in developing their projects, and establish whether their actions are in line with, exceed, or fall short of their ambitions. The following sections analyze corporate Fab Labs and their creators in order of these general questions.

4.1 Qualifying firms, their innovation capabilities, and opportunities for change

"Innovation" occupies a more explicit and central role in the formally stated corporate strategies of most firms. All corporate Fab Lab creators interviewed during this study indicated that their firms included innovation as one of the key areas for company development, however in most cases felt that discrepancies existed between strategic ambitions and "reality" within their respective companies. From their point of view, their firm was missing some form of innovation capabilities necessary to realizing the full potential of its strategic goals. According to these actors, tensions stem from two main sources: quickly changing market forces, especially in terms of digital lifestyle and trends, and internal control processes that favor short-term results. Difficulties reacting to changing market forces are commonly identified stumbling blocks for large firms that suggest internal rigidities that favor established capabilities, suggesting the need and opportunity to regenerate innovation capabilities. Management by short-term objectives naturally favors allocating resources to clearly defined projects and expected outcomes. When pushed to the extreme these short-term, ROI-focused allocation processes push aside higher risk, exploratory projects that are not disguised using more acceptable formalisms. One individual described this process as a transformation of "management controls into controlled management."

When asked about existing innovation capabilities within their firms, respondents frequently used qualifiers that point out structural deficiencies using adjectives with strong negative connotations, such as ineffective, inexistent, inefficient, inadequate, and insufficient. Although these terms collectively indicate respondents' critical opinion of existing initiatives, they implicitly acknowledge that *some form* of innovative activities already exists within an organization. Over the course of most interviews, negative qualifiers were tempered or explained with greater precision. One Fab Lab manager pointed out, "It's not so much that [our company is] bad at all types of innovation. In fact, we're probably some of the best in the world at incremental innovation. The problem is that's only part of the equation in innovation. You need new ideas too, and not just ideas, but use cases, proofs of concept, business models, and all the rest."

Even though research subjects tempered their views firm's existing capabilities to innovate, they underscored several opportunities to improve. If a firm innovated effectively and/or sufficiently, the introduction of Fab Labs as an alternative means for building innovation would be redundant, but this was not the case for many respondents.

4.2 Opportunities for developing innovation capabilities through Fab Labs

Creators of corporate Fab Labs described the need to fill various gaps in terms of innovation capabilities, whether in terms of resources, processes, and mindset. The following section identifies unique contributions by corporate Fab Labs in terms of individual capabilities as distinct entities. However, changes in one capability are not exclusive and tend to produce adjustments in another area. For instance, introducing a rapid-prototyping design process based around 3D printers would logically be accompanied by additional resources, such as 3D printers and substrate materials, or a mindset-oriented slogan such as "Make it fly!". In addition, it is worth noting that research subjects identified opportunities for developing innovation-oriented processes and mindset with nearly equal frequency, with each of these two aspects individually outweighing mentions of opportunities to develop resources. This outlook is briefly developed, independently of the following section in the concluding discussion.

4.2.1 Resources

Resources are the easiest innovation capability to develop in general, and they are the only capability that can be allocated and redistributed within organizations based on identified opportunities. Resource availability in Fab Labs depends greatly on multiple factors, such as an individual actor's ability to gain support from more embedded actors. When faced with well-positioned actors, Fab Lab creators can position their endeavors both as a means for preparing the firm against the unknown and creating the unknown that could be a competitive strength. This positioning allows them to mobilize resources in a variety of ways, such as using their company's purchasing and procurement processes, or in one case, receiving the equivalent of a blank check from the company's CEO.

Lack of institutional resources are not necessarily an impediment to building innovation capabilities either. Six of the ten Labs studied were initially founded through frugal means, with Lab creators resorting to dumpster diving, recovering chairs and small appliances from friends and family members, ordering and self-installing fire-proof carpet from a large e-commerce site, building furniture, rummaging through storage closets, or "borrowing" tools from other divisions. Regardless of the pecuniary resources initially available to each Lab, each of the physical spaces studied is a modest yet pleasant and functional setting.

Human presence is a key resource in Fab Labs, giving a familiar face to what appears to be an institutionally incongruous setting. In all firms studied, at least one of the founders of the Fab Lab is responsible for overseeing its day-to-day operations. All but two Labs have a staff member present during working hours to assist individuals who come in to work on projects. One of these other Labs requires setting an appointment in advance with an individual who comes in from a nearby building. The other two Labs have no full-time staff dedicated to their operation. Rather, an ad-hoc team of nearly 20 individuals collectively run each Lab, every individual contributing a few hours of time each week. Employees in this firm are required to fill out a weekly activity report and assign each half-day work period to an internal billing code. The managers of at least six employees refused to accept unbillable hours, citing reasons such as poorly reflecting team performance, meaning that these individuals could no longer come help in the Lab. One of the co-founders approached the site's HR director with the problem, who quickly offered to create an unexpected solution: create a fictitious billing code in the system. Employees aware of the code can freely bill working hours, allowing the Fab Lab to seamlessly blend in with more institutionalized practices should some managers so require.

Although corporate Fab Labs only use a fraction of the resources mobilized by their firm's existing R&D and innovation activities, they tend to inherit rather than produce resources. Almost ironically, even the creators of these projects themselves are inherited resources as employees of the firm. One notable exception is the creation of a "place" where innovation, creativity, open research, discovery, experimentation, prototyping, meet-ups, can be in parallel developed. In this sense, corporate Fab Labs create an innovation resource as a "town square" or "commons"—a centrally located intermediary for innovation, which can be used to agitate and stimulate innovative activities while remaining fully dependent on existing innovation capabilities to pursue developing projects beyond the initial stages presented in the Lab.

4.2.2 Processes

Descriptions of opportunities to develop innovation-oriented processes in Fab Labs are grouped into two main categories: "working with others", and "doing things differently". The category working with others describes processes that associate individuals, primarily in ways that break down traditional roles

or barriers. Though similar in description to a cross-functional team, Fab Lab creators distinguish their labs by focusing on individuals as themselves, rather than individuals representing a specific function or job title. In this sense, the Fab Lab becomes a type of internal "fuzzy front end" that—momentarily—blurs out functional roles to the point where an unacquainted observer might easily confuse a mechanical engineer for a community manager or a project accountant for a designer. Working with others also includes opening the door to external actors, such as clients, students, or even employees of a neighboring firm to participate.

The category "doing things differently" describes a fundamental shift from day-to-day activities made possible in Fab Labs, most notably erasing institutional divisions between design and production activities. This process places individuals in an institutionally unfamiliar situation, one that Levi-Strauss (1962) describes as a *bricoleur*, in which they bring their ideas to fruition using whatever tools, materials, and individuals are on-hand in an act of *bricolage*. This does not necessarily imply leaving individuals to their own devices to figure things out themselves. In many Labs for example, informal peer-to-peer training sessions are developed by Lab users to facilitate the process of knowledge sharing and cultivate a sense of community.

Processes inherited from existing innovation capabilities can also be enhanced or enriched by Fab Labs. In one company, an existing, highly formalized process for the creation of new subsidiaries was adapted by the corporate Fab Lab founder to accompany ad-hoc teams from the Lab with an innovative project through the phases of product development, including marketing, legal, and distribution aspects. Based on feedback from initial groups using this "launch" process, the same large firm decided to develop a process for crowdfunding the development of prototypes by using 3rd party online platforms and eventually creating their own online crowdfunding system.

4.2.3 Mindset

Developing an institutionalized mindset receptive towards all types of innovation is a long-term undertaking that takes great efforts, as described in Börjesson et al.'s (2014) longitudinal study of developing innovation capabilities within two automobile makers. A group of three employees from one of the firms included in the aforementioned study decided to create a Fab Lab included in the present research. Despite initial hopes to create highly innovative processes, after a year and a half of operation, one of the Lab's founders realized that "these structures are far more useful in changing people's mindset than producing innovations." Most other Lab managers recognize this opportunity, seeing their mission as one of generating and disseminating a "spirit of innovation" or a "maker mindset" to all reaches of the firm.

Creating a generalized mindset for innovation in the form of a tight-knit community of innovators is the most frequently cited opportunity to create innovation capabilities in large firms identified by creators of Fab Labs. Although the classic nature of a community of individuals might be more appropriately considered a resource in the simple innovation capability framework, it is in the fullest sense a fundamental framework of values by which active Lab participants elect to disembed themselves from their institutional roles to develop innovation capabilities.

The power of an innovation-oriented community mindset can also go beyond resource limitations and unforgiving processes. In one company, a request to create a physical Fab Lab space was refused. One of the engineers responsible for the proposal simply said "No place? No problem!", adding that physical space can simply take the shape of mental space amongst a large group of colleagues. "Pretending" through a mindset can have similar effects to creating a space as a resource. In this sense, Fab Labs becomes a mental or imaginary square in an alternate dimension, which, like a positive attitude, produces tangible effects while remaining invisible or unimportant to the firm's more confined institutional forms. The disproportionate size of Fab Labs and the surrounding organizations they intend to serve underscores their symbolic nature in developing an innovation mindset and makes a strong argument for their ability to generate an innovation-oriented mindset. The equivalent of 20 full-time employees and a handful of willing volunteers who help from time to time were responsible for operating Fab Labs available to over 55,000 employees that work on the 10 corporate campuses with Fab Labs included in this study. This assessment does not indicate that these initiatives are unsuccessful, but rather indicate their potency in representing a mindset more favorable to breakthrough innovation rather than a means of creating new processes or supplemental resources. Fab Labs may provide credence for restoring key practices that may have been put aside as institutionalized processes increased in efficiency, such as using tools to make an object oneself, expressing one's ideas, trying things out, or breaking free from a

day-to-day routine. Once these ideals are re-institutionalized, Fab Labs may no longer be necessary as an embodiment of these values.

4.3 Meaning to change

After identifying opportunities and ways that innovation capabilities are developed by corporate Fab Labs, this final analysis verifies whether Lab creators *intend* to change institutional innovation capabilities, and whether they feel they're able to gain sufficient traction to bring about the intended changes. Of the 18 individuals interviewed during this study, all but four explicitly expressed their intent to change aspects of their company's ability to innovate. Three of the four remaining individuals suggested that their main objective was to change culture or create a place for creativity—elements used by other Lab creators as change agents—worked directly with a colleague who expressed intent for change. The remaining case comes from a project manager tasked with creating a Fab Lab, who recognized the situation as uncharted waters for him and for his regional division. He stated, "we want to make expression of individual creativity a priority to innovate and discover new applications, but do not know how to do this." This seemingly genuine and honest response reflects the potential existence of both individual and institutional blind spots. If unresolved, these unknowns generate friction or tension between institutional entrepreneurs and institutions.

The primary source of resistance cited by Fab Lab creators stems from uncertainty related to institutional management controls. Reliably gauging intent and effectiveness in ways that control functions can interpret are difficult measurements to establish. Members of Fab Lab communities often suggest what they call "poor proxies" to justify something—anything—in a language already understood by corporate control processes, which are ironically the same source of frustration and incomprehension cited by Fab Lab creators in the introduction to this study. Recurring examples include the number of patents stemming from projects undertaken in Fab Labs, calculating costs and time saved by making in-house prototypes instead of using 3rd party suppliers and onerous procurement procedures, or the number of hours of free peer-to-peer training dispensed in Labs to teach coworkers new skills.

These poor measures may indicate the difficulties of escaping the pull of institutional embeddedness, or constitute a justified first step that disguises Fab Labs as something they're not as a means of ensuring early survival… a form of organizational Trojan horse. Notwithstanding, they partially or substantially occult the core ambitions and intent of institutional entrepreneurs wanting to build innovation capabilities. Later empirical research could examine to what extent this institutional mimicry enables or curtails these types of projects.

5 CONCLUSION & FUTURE RESEARCH

This paper introduces corporate Fab Labs, a new research object in the field of innovation management, along with three key contributions. First, an initial theoretical foundation is proposed for corporate Fab Labs, building upon established innovation literature and a basic framework for innovation capabilities, paired with the notion of institutional entrepreneurs as agents of change. Modest contributions are made to these fields of literature by highlighting tensions between existing roles of actors for building innovation capabilities, namely the role of "orchestrator", and the requirement of disembeddedness for innovation by institutional entrepreneurs, which could be resolved by identifying complementary roles for building capabilities. Second, an empirical analysis of ten corporate Fab Labs establishes their emergence, from actors identifying initial opportunities to the development of new capabilities for innovation within firms. Interestingly, opportunities to develop innovation-oriented resources was the least mentioned opportunity for capability building identified by practitioners. One explanation could be that these individuals work in a relatively resource-rich embedded environment, and simply take resource availability for granted. An alternative might include a resilient new model for innovation that automatically adapts to available resources while maintaining core objectives, or a resource-independent model for innovation. Finally, this paper suggests several avenues for future contributions, including the impact of transitioning from temporary resources to more permanent ones, the necessity of corporate Fab Labs once an innovation-oriented mindset is established, or how Fab Labs could formalize a process that places individuals directly in a *bricolage* state-of-mind.

In addition to these questions closely aligned with the present paper, additional contributions are welcomed as corporate Fab Labs mature. Related research in this field could look at general traits of firms in which Fab Labs have appeared, such as whether these firms take higher risks overall, whether

the Fab Lab model is less pertinent in smaller businesses, or the types of externalities associated with firms housing corporate Fab Labs.

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