Management international
International Management
Gestiòn Internacional

Local and Social Dynamics in Innovation Ecosystems: The Case of the Video Game Industry in Montreal
Dynamiques locales et sociales dans les écosystèmes d'innovation : le cas de l'industrie du jeu vidéo à Montréal
Dinámicas locales y sociales en los ecosistemas de innovación: el caso de la industria de los videojuegos en Montreal

Romain Rampa, Laurent Simon et Margaux Manent

Aller au sommaire du numéro

Découvrir la revue

Citer cet article

Résumé de l'article

Ce papier vise à mieux comprendre les dynamiques qui sous-tendent le concept d'écosystème d'innovation. Nous soutenons que les interactions et les interdépendances entre les différents acteurs d'un écosystème ne peuvent être considérées comme résultant uniquement d'un arrangement complexe de liens formels. Ces dynamiques ne peuvent être déconnectées de l'environnement local dans lequel elles s'inscrivent, car cet environnement est censé fournir une variété de ressources qui ne peuvent être contrôlées formellement par les acteurs du système et pourtant sont essentielles pour stimuler les capacités de régénération et d'attraction des écosystèmes d'innovation. Nos résultats montrent que des plateformes locales d'interactions et diverses communautés jouent un rôle majeur dans cette interaction.

Local and Social Dynamics in Innovation Ecosystems: The Case of the Video Game Industry in Montreal

Dynamiques locales et sociales dans les écosystèmes d'innovation : le cas de l'industrie du jeu vidéo à Montréal

Dinámicas locales y sociales en los ecosistemas de innovación: el caso de la industria de los videojuegos en Montreal

Romain Rampa
Mosaic, HEC Montreal

Laurent Simon
Mosaic, HEC Montreal

Margaux Manent
Mosaic, HEC Montreal

ABSTRACT

This paper aims at a better understanding of the dynamics behind the concept of innovation ecosystems. We argue that interactions and interdependencies between the various actors of an ecosystem cannot be thought of as solely resulting from a complex arrangement of formal linkages. These dynamics cannot be disconnected from the local environment in which they are embedded, as this environment will be expected to provide a variety of resources that cannot be formally controlled by the actors of the system, and yet are key in driving the regeneration and attraction capacities of innovation ecosystems. Our results show that informal local platforms of interactions and various communities play a major role in this interplay.

Keywords: Innovation ecosystems, Value co-creation, Local platforms of interactions, Informal linkages

Résumé

Ce papier vise à mieux comprendre les dynamiques qui sous-tendent le concept d'écosystème d'innovation. Nous soutenons que les interactions et les interdépendances entre les différents acteurs d'un écosystème ne peuvent être considérées comme résultant uniquement d'un arrangement complexe de liens formels. Ces dynamiques ne peuvent être déconnectées de l'environnement local dans lequel elles s'inscrivent, car cet environnement est censé fournir une variété de ressources qui ne peuvent être contrôlées formellement par les acteurs du système et pourtant sont essentielles pour stimuler les capacités de régénération et d'attraction des écosystèmes d'innovation. Nos résultats montrent que des plateformes locales d'interactions et diverses communautés jouent un rôle majeur dans cette interaction.

Mots-Clés : Écosystèmes d'innovation; Co-création de valeur, Plateformes locales d'interactions, Interactions informelles

Resumen

El presente artículo tiene como objetivo comprender mejor la dinámica que subyace al concepto de ecosistemas de innovación. Sostenemos que no se puede pensar que las interacciones e interdependencias entre los diversos actores de un ecosistema sean únicamente el resultado de un complejo arreglo de vínculos formales. Estas dinámicas no pueden desconectarse del entorno local en el que se insertan, ya que se espera que este entorno proporcione una variedad de recursos que no pueden ser controlados formalmente por los actores del sistema y que, sin embargo, son clave para impulsar las capacidades de regeneración y atracción de los ecosistemas de innovación. Nuestros resultados muestran que las plataformas locales de interacciones y diversas comunidades desempeñan un papel importante en esta interacción.

Palabras Clave: Ecosistemas de innovación, Co-creación de valor, Plataformas de interacción local, Interacciones informales

Collective strategies for value creation have become a key issue for organizations to adapt, renew and evolve in a world where the pace of innovation is accelerating and the complexity of products, services, and business models is increasing. Cooperative agreements, global value chains or platforms strategies are some examples of these growing practices that mobilize firms outside their own boundaries. These strategies have become common, and their practices have been widely discussed in the literature, particularly in the perspective of open innovation. These collaborative organizational strategies tend to be more and more driven by more decentralized and territorialized organizational forms, with multiple heterogeneous actors contributing to value co-creation.

An important body of work has shed light on actors and processes to understand and theorize these strategies of collective value creation around the concept of innovation ecosystems. While there is no consensual definition of what an innovation ecosystem is (Jacobides *et al.*, 2018), this literature has put forward the layout of *connected networks of entities who create value out of a common object* (physical, technical, digital or cognitive), *thus emphasizes the critical aspects of interdependencies* (Moore, 1993; Gueguen and Torrès, 2004; Iansiti and Levien, 2004a, 2004b; Adner, 2006, 2012, 2017; Kapoor and Agarwal, 2017; Hannah and Eisenhardt, 2018). While they offer important insights on the specific dynamics of innovation and value creation between heterogeneous actors, they somewhat overlook the territorial dynamics that take place in a firm's ecosystem, and in a wider innovation ecosystem, which cut across different relational, organizational, and spatial scales.

Specifically, by focusing mainly on the relationships and complementarities that surround focal firms, platforms, or collaborative arrangements between different organizations to create a common offering (Jacobides *et al.* 2018), few articles have looked at the set of informal links and relationships between the various actors in the ecosystem which generally lie outside any form of direct control of a firm or set of firms, and which, in many cases, contribute to the innovation process. Thus, by failing to take into account the close links and interdependencies that exist between firms seen as formal structures and the myriad of informal local active units, this literature tends to overlook parts of the dynamics that could explain the attraction and regeneration capacities of innovation ecosystems.

To explore these aspects, we raise the following questions: 1) What role and what place do local and social dynamics of knowledge and creativity play in innovations ecosystems? 2) What are the mechanisms that could explain the attraction and regeneration capacity of a firm's innovation ecosystem?

Our intent is to broaden the traditional scope on which many studies are based and to show that institutions can emerge and renew from social dynamics of their ecosystem. In this way, we argue that innovation ecosystems differ from business ecosystems in the sense that part of the value creation process goes beyond the firm(s) boundaries and control. We further suggest that their capacities of regeneration and their attractivity for talents cannot be understood by looking solely at internal value chains or value-networks with other organizations but should be viewed instead as emerging from the combination of both formal and informal dynamics in which local informal communities play a major role.

In order to reach our overall objective, we analyze the case of the video game industry in Montreal, which has succeeded in becoming, over the years, one of the most important hubs worldwide. We examine how the industry has progressively developed, in the Greater Montreal region, a rich and vibrant ecosystem, attracting and fostering talents, that is a unique source of generation of ideas. One of our main findings is that the core of the ecosystem is a "common reservoir of resources" facilitating different forms of creation and exchange of knowledge between diverse communities, firms and institutions, and continuously connecting the formal entities with the informal active units of the local environment. These results strongly suggest that the notion of innovation ecosystem has to be inherently associated with a geographical and situated dimension, such as the one exemplified in the pioneering works from Saxenian on the Silicon Valley (1994).

The Concept of the Innovation Ecosystem in the Recent Literature

In her book (1994), Saxenian highlighted that in the Silicon Valley, interacting communities (of engineers, software designers, entrepreneurs, business lawyers, venture capitalists, and managers, etc.) are genuinely self-organizing, in such ways that organizations emerge from the interactions between informal communities and formal groups rather than the opposite. The dynamics of such

a regional territory is largely autopoeitic[1] and depends upon the structure of interaction and communication between communities, and between communities and firms. Thus, for example, when a firm goes bankrupt, the collective interaction of communities takes over to ensure that the competencies and experiences of individuals are preserved, redistributed, and eventually re-used, and that eventually new organizations will be formed. In such a resilient structure, redundancy is maintained and sunk costs are not lost as a result of the systemic vibrancy that emanates from strong local ties.

Saxenian thus explained that, as California's Silicon Valley was based on decentralized organizational forms, non-proprietary standards, and traditions of cooperative exchange, it was able to keep up with the fast pace of technological progress during the 1980s, while the vertically integrated firms of the Route 128 beltway, based on hierarchical and independent industrial systems and formal, contractual agreements in the East Coast, fell behind in contrast. Without explicitly referring to the notion of the ecosystem, Saxenian highlighted the essence of what makes the Silicon Valley a self-generating ecosystem, as opposed to the routinized and rigid procedures of the system of Route 128. She suggests that such a system may eventually come to a decline with the obsolescence of the technologies and know-how trapped within the vertically integrated companies of the region.

Saxenian's influential work in economic geography has inspired many scholars working on the notion of the ecosystem and her work is frequently cited throughout the management literature investigating this concept (Moore, 2006; Adner *et al.*, 2013; Ben Letaifa *et al.*, 2013). Somewhat paradoxically, the literature on eco-systems has only partially captured the essence of Saxenian's arguments by focusing primarily on the formal actors and/or formal linkages between these actors. It thus omits to take into account the informal actors and/or linkages between these actors and their local environment, which seem particularly relevant in explaining the success of the Bay Area.

Central to Saxenian's argument is the idea that innovation processes are embedded within a specific ecosystem that emerges, not only from organizations, in the sense that it is nurtured by them, but is also the breeding ground by which organizations emerge and regenerate, as the ecosystem feeds them in return. This idea finds a positive echo in Moore's work (1993), who draws on the biological analogy of predators and preys to characterize the interdependence mechanisms defining how the production of knowledge and ideas and use side coexist and coevolve within a given environment. Ecosystems are seen as interconnected devices, in which the linkages between actors are determined by the control that each one of these actors has over the resources embedded in the system (Moore, 2006).

Moore's early perspective has influenced many scholars who have put much effort into describing these interdependencies and the various structures characterizing these complex systems (Adner, 2006, 2012; Iansiti and Levien, 2004a, 2004b; Adner, 2017, Jacobides *et al.*, 2018). The literature has explored the different phases of the business ecosystem lifecycle (Moore, 1993, 1996; Rabelo & Bernus, 2015), the roles that are played by some actors within eco-systems (Iansiti and Levien, 2004a, 2004b), the impacts of ecosystem strategies on decision-making within companies (Adner, 2006, 2012), their impact on business models (Attour and Burger-Helmchen, 2014), as well as the categories in which ecosystems can be classified (Koenig, 2012; Gawer & Cusumano, 2014; Oh *et al.*, 2016; Russo-Spena *et al.*, 2017).

Specifically, Gomes and colleagues (2016) distinguish "business ecosystems" from "innovation ecosystems" assessing that the first only "capture value ", while the second "create value". Such a distinction is also shared by Valkokari and colleagues (2017): "in an innovation or entrepreneurial ecosystem, the focus is on creating new business opportunities or new knowledge, whereas a business ecosystem operates within the present business context and uses existing resources" (2017: 13). Innovation ecosystems also differ from entrepreneurial ecosystems which, far from taking into account all the actors involved in the value creation process, focus exclusively on: "the set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship" (Stam, 2015, p. 1765). While the latter, more recent literature has taken the local dimension very seriously, looking carefully at the role and dynamics of the multiple regional actors and institutions and in the development of new and emerging start-ups and entrepreneurs, it is more focused on entre-preneurship. Specifically, it is still adressing entrepreneurial activity within a

---

1. This term refers to the property of a system to reproduce and maintain itself. The term was introduced in 1972 by Chilean biologists Humberto Maturana and Francisco Varela to define the self-maintaining chemistry of living cells.

community of interdependent actors, which are more than often formal actors and organizations, like venture capital firms, investors, incubators and accelerators, universities, and so on… (Kuckertz, 2019; Roundy et al., 2018).

An important body of work has thus progressively shed light on the main aspects of innovation ecosystems, drawning on close concepts such as interfirm alliances and strategic networks (Uzzi, 1997; Dyer and Singh, 1998; Afuah, 2000; Gulati et al., 2000), value constellations and value networks (Christensen and Rosenbloom, 1995; Stabell and Fjeldstad, 1998), as well as product architectures and modularity (Henderson and Clark, 1990; Baldwin and Clark, 2000). Such a literature has contributed to significantly enhance our understanding of the mutli-actors non-linear and evolving processes underlying co-creation and co-innovation in open innovation, ecosystemic contexts. These works help distinguish the notion of the ecosystem from other theoretical constructs, such as supply chain networks and value-chains (Porter, 1985), in particular.

However, authors have usually considered different approaches – theoretical and empirical – depending on the context in which the ecosystem concept has been applied, therefore adding to the confusion surrounding the boundaries, structures and dynamics associated with this construct (Autio and Thomas, 2014). We address these three elements in the following paragraphs.

In terms of their boundaries, innovation ecosystems distinguish themselves from other theoretical constructs by their broad coverage, which generally extends far beyond the contractual cooperation agreements between two firms (Adner et al., 2013; Ben Letaifa et al., 2013). As opposed to other constructs, ecosystems offer a comprehensive view on innovation as both an upstream and downstream process, which integrates a large variety of stakeholders, including producers and users, as well as competitors, and complementors (Moore, 1996; Iansiti and Levien, 2004a). The key insight is that firms evolve within a complex system that is not limited to the industrial framework of which they are members, but rather extends to the various communities of individuals, organizations and institutions (including universities, financial institutions, outsourcing companies, technology providers, government and regulatory agencies, as well as associations or standard-setting bodies, consumers and users), which all contribute to shape a common offering (Moore, 1996; Iansiti and Levien, 2004a, 2004b; Adner, 2017; Hannah and Eisenhardt, 2018).

Throughout the literature, innovation ecosystems are generally considered to operate around a shared focal point or asset, which brings together both the production and the use side. Actors are connected to each other through a hub (Moore, 1993, 1996; Iansiti and Levien, 2004a, 2004b), a focal firm (Teece, 2007; Adner and Kapoor, 2010; Adner, 2017), or a shared platform (Cusumano and Gawer, 2002; Gawer and Cusumano, 2014; Helfat and Raubitschek, 2018), which serve as a coordination mechanism for the ecosystem as a whole, by determining its capacity to articulate diverse sets of interrelated technologies and/or organizational competencies and by enabling it to further create and share value among its components. These coordination mechanisms – that should require a deeper analysis - are the main drivers of both individual and collective performance within these innovation ecosystems (Chesbrough and Appleyard, 2007).

The last defining element of an innovation ecosystem, relates to its ability to adapt and evolve to changing constraints (Teece, 2007). As pointed out by Moore (1996), linkages among actors of an ecosystem are generally considered to be symbiotic, suggesting that actors co-evolve with one another and with the system (Mäkinen & Dedehayir, 2014), by managing threats and opportunities in both a collaborative and competitive way. The actions of one actor will therefore impact and will be impacted by the actions of the others (Adner et al., 2013). According to this perspective, innovation ecosystems should be seen as dynamic structures driven by the interactions and interdependencies between the participating actors, who all share the fate of the system and who will be expected to act accordingly (Moore, 1996; Iansiti and Levien, 2004a; Li, 2009). As opposed to other similar constructs, the focus, in that respect, is more on the actual evolution of the system as a whole, viewed in some cases as a dynamic and purposive network of interconnected actors, rather than on the optimal configuration of preexisting structures of interaction (Gustafsson and Autio, 2011).

The specific boundaries, structures and dynamics characterizing the notion of ecosystem have been analyzed extensively throughout the literature in strategy and have provided important insights on the mechanisms driving innovation. In our view, however, and in spite of these major advances, this literature still suffers from significant shortcomings, which derive from the various elements described above.

A first limitation that can be found with this concept relates to the very composition of the ecosystem. In most cases, the focus is on the partners working on a common project or directly involved in the shaping of a common offering. That is to say that authors have generally emphasized the role of actors directly and actively participating in the process of value co-creation. In complement, we suggest taking into account those actors that are not explicitly or formally mobilized within the course of this process, and yet still contribute to characterize the environment in which the innovative activity takes place, for instance through epistemic orientations, knowledge contributions, or talents connections.

A second limitation relates to the structural properties and governance mechanisms used to coordinate the various components of the ecosystem. As mentioned earlier, coordination is generally achieved by the focal, anchor firm at the core of the ecosystem. This means that the roles and positions of the actors are somewhat predetermined by the distribution of resources and organization of the value-chain around this pivotal point. The linkages among the active units of the system, as a consequence of this, are often viewed as formal control devices based on classical bargaining and transaction costs mechanisms. In doing so, this literature have had a tendency to overlook the set of informal linkages and relationships existing between the various actors in the ecosystem which covers three types of inter-actions: first, those that are not planned or formally structured come more or less spontaneously from the needs of individuals; second, those that take place alongside the formal, and finally those that oppose the formal (Litterer, 1963, p.13). Yet these informal links and relationships, which generally lie out of formal control, contribute to the innovation process by facilitating the valuable circulation and combination of dispersed bits of knowledge.

A third and final limitation that can be found with this concept relates to the way actors co-evolve within the ever-changing ecosystem to which they belong. In most cases, because the behaviour of actors depends almost exclusively on that of others, novelty is generally expected to be generated endogenously and is only very rarely expected to be driven by external entities or artefacts embedded in the local environment. In other words, ecosystem relationships are considered to be the sole driving forces behind externalities, leaving out the possibility that the environment might influence the evolution of the innovation ecosystem and therefore generate externalities on its own.

It thus appears that in spite of the significant progress made around the notion of innovation ecosystems, more efforts would appear to be necessary in order to adequately grasp the concept in its entirety. By and large, the scope of analysis too often remains circumscribed to a limited set of formal actors and contractual relationships, which, again, fail to fully capture the dynamics of informal actors and informal linkages within these ecosystems, as well as the role played by the local environment on these dynamics.

Methodology

Our study is based on a qualitative analysis of the video game industry in Quebec. With more than 11,000 employees and nearly 240 studios, small and big, including Epic Games, Warner, Eidos, Electronic Arts, Ubisoft, and more recently Google with its Stadia Project, the video game industry in Quebec, and in particular in Montreal, is one of the world's leading clusters in this field. Renowned for its workforce and as a place of creation where many world-famous franchises such as Assasin Creed have been created, the video game ecosystem has developed extremely rapidly, attracting many firms and talents from all over the world every year for over twenty years. Employment in the sector increased tenfold between 2002 and 2017. As models in the gaming industry diversify and transform, the Montreal ecosystem has constantly renewed its ways of developping successful games, with global blockbusters and independent experimental gems as well. Strongly rooted in the creative urban culture of Montreal, the video game industry has not only benefited from the presence of many studios but has also been nourished by multiples exchanges and interactions with many actors and communities that flourish within the city, developing many groups of interest, associations, and events that contribute greatly to the visibility and renewal of the sector.

We have chosen to rely on an inductive approach to gradually understand the complex and evolving formal and informal relations driving the local dynamics of innovation within the video game industry. Qualitative case study methodology provides tools for researchers to study complex phenomena within their contexts (Yin, 1994). Through collecting fine- grained qualitative data, it allows the researcher to explore the multiple inter-relations between individuals, communities and organizations. It provides insights into an issue and helps to refine theories by illustrating and understanding in depth phenomena that are otherwise difficult to grasp (Stake, 1995).

We draw on qualitative data collection, analysis, and reasoning methods, as developed in the literature (Glaser and Strauss, 2017; Langley, 1999). In this regard, we used multiple sources, combining direct observations and in-depth interviews with the main actors of the industry, and data from previous studies. Fourteen interviews with employees, managers, and public representatives working in the video game industry were conducted between 2016 and 2017, allowing for a better understanding of the role and linkages between the various institutions, communities and actors. These interviews, which lasted approximately one hour each, were all tape-recorded and transcribed. We conducted them in an evolutionary manner, initially questioning respondents about their personal stories and then gradually leading them to more specific questions about their relationships with the industry, their interactions within and outside their organization, including with differents communities, or the importance they placed on particular events. In particular, this material has enabled us to better understand at different scales the evolution of different informal or associative groups in the city, to understand certain personal trajectories of individuals, and to identify mechanisms of interdependence between different institutions, actors and collectives within this innovation ecosystem.

Moreover, in order to strengthen our results, we have chosen to focus in particular on the interactions of a particular, iconic firm within its local environment in order to partly illustrate the dynamics of the industry: Ubisoft Montreal's studio. The French-based company set up one of its studio in Montreal in 1997. Located in the heart of the Mile End, considered as one of the most creative neighborhoods in the city, the organization is very much connected to the creative milieu of Montreal (Cohendet et al., 2010). The firm is very active in its environment, supporting the development of a myriad of cultural events and projects, and provides incentives to its employees to build informal contacts with local actors from different backgrounds in the city.

An extensive case study was led by one of the co-authors in the development of the Montreal studio. During a period of fourteen months (1999-2001), he conducted a comprehensive ethnography of the organization (Simon, 2002), in line with traditional approaches of organizational ethnography (Van Maanen, 1979; Schwartzman, 1993). This work and the knowledge accumulated served as a basis for this study. Following up on this work, several action-research

TABLE 1
Empirical data collections

Data sets	Method
1. Case study	- In-depth interviews. 14 interviews (in 2016-2017) in 4 differents organizations: 2 company founders, 4 managers (production directors, team leader, product manager), 6 employees (programmers, lead game designers, Scriptwriter), 2 public representatives
2. Ethnography	- Participant observation. 19 months from 1997-1999: Monography (142 pages) - 3 one-month research projects in 2003, 2005, and 2006: 3 × 50 page reports - Frequent participant observations in formal and informal events (festivals, game-jams, independent gaming competitions, talents competitions, etc.)
3. Training sessions	- Intensive interactive debates on innovation and creativity with managers at Ubisoft. 24 three-day sessions with an average of 15 participants for each session.

projects were conducted from 2003 to 2019. Since then, the researcher has developed an ongoing training program-on leadership and the management of creativity for the firm, cultivating and active dialogue with the firm's employees. All along the process, the researcher tried to act as an outside observer and maintained a field journal, in line with recognized ethnographic practices (Watson, 1999). These sets of data were in parallel complemented with participant observations in formal and informal events in the cluster: festivals, game-jams, independent gaming competitions, talents competitions, etc.

Combined, these works and observations led to a better understanding of the role of different formal/informal, internal/external, local/global dynamics of the video game industry in Montreal. Our data analysis was conducted through an inductive/abductive process, with iterative and frequent back-and-forth analyses from data to literature. Particular attention was given to the numerous

"war stories" (Orr, 1990) shared by the respondents, which were transcribed, compared and analyzed to extract information on informal practices operating inside and outside organizations. Secondary sources, including diverse public documents and online resources, were used to complement the research. A triangulation of these different streams of data was done. The data was finally gathered in order to produce a synthetic case study (Yin, 1994; Eisenhardt and Graebner, 2007).

The stories and narratives that came out of the interviews, the research team's direct interactions with informants, and secondary data generated the main framework on which this analysis is based. The progressive analyses of these set of data revealed similarities and redundancies, thus confirming that a theoretical saturation had been reached. These narratives specifically high-lighted the fact that the video game studios in Montreal have been closely interacting with many different stakeholders from the local environment and in particular that firms are inter-connected with a myriad of communities, associations and local actors with whom they establish formal and also very dense informal links through personal trajectories and dual affiliation phenomena. The availability of multiple sources enabled the juxtaposition of evidence, which was essential to strengthen and guarantee the consistency of our findings.

Results

As previous studies highlighted the role of Ubisoft Montreal Studio as an "anchor firm" (Cohendet *et al.*, 2010; Grandadam *et al.*, 2013), our results offer a more nuanced perspective, revealing instead a more balanced situation where local and international mid-range studios developed their own vertical relationships with local informal communities over and beyond Ubisoft business ecosystem. This emphasizes both the predominant present local dynamics at play, but also points to a richer narrative of complex links between different formal entities, on the one hand, and the multiple informal groups and communities on the other.

Assessing Multiple Actors Interdependencies of Montreal Video Game Innovation Ecosystem

Limited to three SMEs, the video game industry was relatively underdeveloped in the Greater Montreal area in 1997. Twenty years later, most of the major global video game companies are present in the city, many services and industry support companies have emerged or redeployed in the city, and many funding and training programs have been developed there. Along with London, Tokyo and Los Angeles, a significant industrial cluster has arisen as one of the main hubs in the development of digital technology in the world (Cohendet *et al.*, 2018). The increasing complexity of products and business models in the industry have also contributed to broadening its scope and creating many links with firms in the fields of telecommunications, simulation, visual arts, entertainment and, more recently, artificial intelligence.

Major studios, universities and other firms (publishers, suppliers of hardware and software, support services in testing and quality assesment, etc.) are not the only central players in this local ecosystem. Numerous associations and informal groups are playing a major role in supporting the development of new initiatives, connecting many stakeholders, acting as spokespersons for minority groups wishing to make their voices heard, and organizing dedicated or hybrid events. One example is the International Game Developers Association (IGDA), a worldwide not-for-profit association of video game employees (with over 400 members in Montreal). The functioning of the association largely depends on volunteering and financial sponsorhsip from most major Montreal studios. It promoted events and meetings to connect employees in the industry and set up workshops for training, and dissemination and sharing of technical knowledge. These informal meetings have eventually led to the creation of start-ups and service companies designed to serve the needs of the game industry. For example, Wave Generation (a sound editing and post-production company) was born from the encounter between a former employee of Ubisoft and a sound engineer working for the film industry at one of IGDA's meetings. With the rise of entrepreneurship and independent gaming, a community of entrepreneurs and developers, institutionalizing itself in a cooperative called the "*Guild of Independent Video Game Developers*", progressively took over in 2016, in a bot-tom-up process. This was showing that small and medium studios were starting to play a more active and defining role. Taking over the mission of the international association, the "*Guild*" is also expanding its mandate to encourage and facilitate the development of emerging independent studios, particularly by pooling resources, fostering useful connections with talents, and sharing best practices from fund raising to development processes.
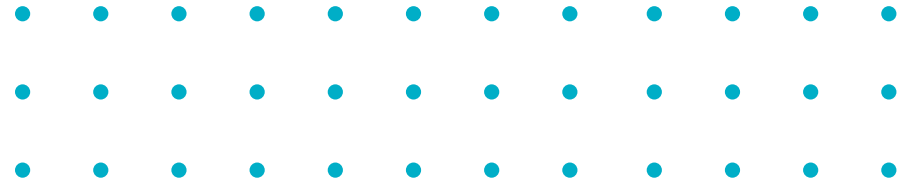
In addition to these institutions with decentralized governance, vibrant communities of artists, techno-geeks, hackers, artists, players, and even historians are also connected through loose networks to formal entities and the main studios. According to many of our respondents, the presence of these communities is central to explain the dynamism and attractiveness of the local ecosystem that has gradually emerged in Montreal. It is because of them that new models are created, that debates are fostered, that criticism about established paradigms takes place openly, that new epistemologies emerge, leaving room for a more diverse genetic pool than those found inside already well-established companies. Often, it is the studios' employees themselves who actively participate in these communities, revealing the multiple citizenships that partially compose the relationships and informal links that take place outside traditional value chains. It is sometimes thanks to this experimental, rebellious and more authentic edge -acting as an exploratory "avant-garde" - that new creative concepts and practice can emerge, as exemplified by creative collectives and underground creative competitions. However, their integration into established firms is not always easy or obvious, as they may often clash with existing models. An employee of one of these major firms, very involved in many informal grunge and punk groups, relates her unsuccessful attempt to offer a game at the crossroads of her passion and her profession:

We had already tried to pitch our concept of a game on zombie battles at an early stage in 2004 - 2005. We had a lot of materials, but it was badly received by the management when they said there was no value in it. We really missed an opportunity because after that it was the madness of the Zombie survival games!

In fact, these various communities and informal groups that gradually explore knowledge bases and build meaning together, often firmly and creatively oppose dominant models, and try, through approaches that are sometimes successful and sometimes not, to make things evolve freely on the periphery or within firms. This echoes Grabher's work highlighting the dynamics of "*diversity, sustained engagement, overlap and confrontation*" in heterarchies (Grabher, 2001: p.357). These heterarchies are partly made up of game fans, hackers, committed communities, or even occasional players who participate in feeding this diversity, through connections supported sometimes by virtual platforms, yet mostly through local face-to-face events.
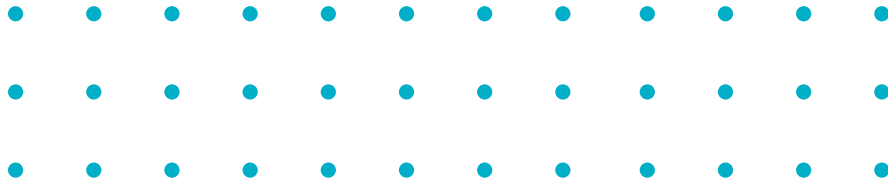
While it is difficult to clearly quantify the contributions of these actors, often overlooked, to the renewal in the gaming industry and the work they can do from within, our study shows that they coexist at least in parallel with the various contractual relationships, formal arrangements and cooperative agreements between firms on which the literature on ecosystems focuses, and contribute to renew the epistemes (paradigms, trends, uses, methods and practices, business models, etc.) of organizations.

However, one of the limitations raised by some of our interviewees is that they respond to the difficulty of young start-ups to find funding in the first stages of fundraising. An actor from one of the few venture capital funds specializing in financing the video game industry explains:

One of the challenges in early stage funding is the lack of angel networks in the city. In other Montreal sectors, there are angel investors who tend to reinvest in the industry where they are because it is something they knows very well and a field on which they feel they can bring their network and value. In the gaming industry, there is almost no network of angel investors because the majority of successes are foreign owned towers. And others did not have enough to be active angel investor. Because none were shareholders of towers, none could become angels.

Unlike the Silicon Valley's complex innovation networks, as described in the study by Ferrary and Granovetter (2009) where venture capital firms (VCs) and angel investors play majors roles in the ecosystem (namely financing, selection, collective learning, embedding and signalling), these roles are distributed in the Montreal ecosystem. They are shared among public, government institutions such as the Canadian Media Fund, or Investissement Quebec for the financing aspect. Somehow, the larger studios are also directly or indirectly investing in emerging endeavours, through direct investment of through different means of support (sometimes lending developers or managers, or opening their networks of business contacts, for instance). Associations such as the Guild and multiple local communities play a key role in the collective learning process and in networking within the city.

Finally, events, large trade shows and even crowdfunding platforms like Kickstarter, Indiegogo, or more local Haricot, are used in a significant way by the ecosystem to detect, select and signal the most promising projects and start-ups. Along the years, complementary venture capital funds such as

Execution Lab and Ubisoft's Lumens project, a partnership with WhiteStar, a high-tech venture cap, have begun to emerge in recent years. It is noticeable that these initiatives are also betting on the distributed wisdom of informal communities to identify and pre-select the projects they invest on. For instance, the managers of Execution Labs, former active borad members of IGDA, are strongly dedicated to participate to most local formal and less formal video game events, festivals, lectures and the like, in order to keep in touch with the local buzz. As one of the managers describes:

> You have to be there. That's the only way to learn and to keep in touch with the grassroots of the industry. Montreal culture is very much horizontal – it's typically two degrees of separation! So, you have to be there. If you wait for a project to appear on the radar, on social medias or in the news, it's already too late. The community is vibrant, expert, and tigh-knit. Listen to those guys and you will detect projects with potential earlier, and then you will be able so support, advise, and sponsor them earlier…

In the case of Ubisoft, the studio co-organise and co-sponsor game creation competitions with the Guild and education institution to favor early detection of talents and projects, that are then later approached by their venture capital partner. Again, the relationships between the formal institutions and the informal actors dynamise the ecosystem to foster innovation.

Local Attributes in the Video Game Industry in Montreal: Platforms of Interactions and Common Reservoirs of Resources

Our results also show that it is largely through personal trajectories, repeated involvement in informal associations, creative underground collectives, and communities, participation in many events on the local scene that new start-ups emerge, networks between organizations are formed, and opportunities and talents are detected in the local scene. In particular, we have identified two main components at the local level that are central to explain these dynamics: local platforms for interaction, and the progressive construction of a common reservoir that feeds and supports the entire ecosystem. We first focus on one of the city's anchor companies, Ubisoft, to illustrate these interactions. We will then look more broadly into the characteristics of this common reservoir of resources that plays a major role in the local scene.

The Role of Local Platforms of Interaction: Events, Associations and Communities

In order to stimulate the creativity of its employees, Ubisoft strongly supports (financially and materially) their participation to local events and cultural activities organized by various clubs, associations or collectives in the city. In doing so, the studio encourages its employees to freely explore new creative avenues, to find inspiration, ideas, new knowledge, and to develop their critical and aesthetic sensitivity outside the formal boundaries of the firm. Thus, the organization delegates part of its capabilities to the various communities that tap into the local milieu of the city, to sense new opportunities that, in some cases, will be seized by the firm, and in some case only, will bring commercial value back to the organization. Among the many events that Ubisoft sponsored with other institutions, the Fantasia Festival gathered more than 120,000 people over 22 days in 2018 to publicize artists and films at the crossroads of various fields. According to the firm, it is a mindful investment in a staggered form of creation, which serves not only to capture new knowledge and ways of doing things but also plays an important role in detecting talent or offers opportunities for partnerships with other creative organizations and communities.

From this entanglement with the local, a large number of temporary part-nerships with local craftsmen (for the construction of luxury figurines for example, limited edition graphic poster prints, or high-end lines of clothing) and many more artists and entities, such as the National Theater School, have emerged. Partnerships with actors of the Theater Company succeeded in advancing methods and techniques for motion capture to enhance 3D animation but also contributed to the development of a training program to improve the visual performances of actors. In many ways, these initiatives could not have been viable would the local environment have not provided a fertile ground for individuals to build informal contacts with local communities of artists and creators, and if it had not provided the formal institutional settings supporting the development of creative cultural endeavours.

Over and beyond the reach of Ubisoft's studio, these interaction platforms are commonly used by the industry as a whole and are invested by many studios and other institutions that also use them as creative levers. The Alliance Numérique is another good example of a non-profit organization, which serves the network of Quebec's interactive digital content. The association writes industry reports,

organizes workshops and meetings between the players in the industry, and serves as the main interest and lobby group interacting with the government. In doing so, it helps to clarify and publicize the needs of businesses and seeks the right support among the authorities (in terms of tax credits and incentives, specialized education, etc.). One of the key roles of the Alliance Numérique is also to organize an annual event, the Montreal International Game Summit. This specialized event is meant to give visibility to local projects and helps in expanding the network of professionals. It also helps to disseminate practices, techniques and international trends in the field of video game development, and it allows firms to enrich their knowledge bases and talents pools in many areas. This event provides a common place for all specialists to meet with peers in a context where rivalry is secondary and temporary communities can form in order to share their ideas and knowledge about their passion: creating and producing video games.

A Common Reservoir of Resources

If the generativity of video game studios in Montreal strongly relies on the local milieu, their innovation ecosystem is not only based on the ties they build with other formal units, but also with a common pool of resources that they share and develop with other institutions. By common reservoir of resources, we refer to the notion of *commons* that was highlighted by the pionier work of Ostrom (1990), analyzing the natural resources commonality. Ostrom and collegues later extended the concept to include knowledge resources, which they labeled as "knowledge commons" (Hess and Ostrom, 2007). We adopted the broader definition of Potts (2012), who defines this common pool of resources as "*the result of collective action to contribute shared resources, knowledge and information to create an innovation resource pool*" (Ibid, p.9).

Many initiatives are indeed connected to the collective efforts put in place by a set of formal entities (associations, but also competitors in the industry), partly fuelled by public and academic institutions, partly co-created by a dense network of informal relationships and links. This construction is done in many ways. It sometimes takes the form of personal trajectories, where the links that tie competitors are indicative of the comings and goings of employees in the various game development companies in the city. We thus find for example over 10 former Ubisoft employees in executive positions among the 20 largest companies in the region, such as Warner, EA, Eidos, Gameloft, Behaviour, Ludia, Budge Studios, Square Enix Montreal or Google Stadia. These informal links created through the effects of the turnover of the industry allows for transfers from one organization to another, therefore strengthening common dynamics within the industry. This also stimulates the creation of start-ups and service companies designed to serve the needs of the entire video game sector, thus generating new ideas and perspectives for the industry. For example, Bugtracker, a quality assessment company, and Audiokinetic, a sound recording company, were both founded by former Ubisoft employees to meet the company's need in the years following its installation, and later extended their services to the industry as a whole, and even beyond the boundaries of the video game cluster.

These dynamics also take place within local platforms of interactions, that are co-constructed by the formal institutions and actors from the local milieu, through associations, festivals and joint events. The associations are probably the most emblematic constructs, revolving around common goals, from which weak ties can be established, cognitive spaces around which members can build their network, and regular events in which hybridization with outside influencers can be created.

In late 2018, under a new leadership, the Guild engage in a friendly takeover of the Alliance Numérique, until then mostly acting as the lobby group of major studios. Leaders of the Alliance quickly accepted the offer, recognizing the value of implementing a unique platform of shared and accessible resources (training, networks, legal and financial services, talents pools, learning and promotional events…) at the service of all the stakeholders of the cluster. As the general director of the Guild recalls:

Where we were at, it seemed the natural thing to do. This integration - under a cooperative model - is for the greater good of Montreal video game sector. (…) Here, rather than eating each other and competing, people would better collaborate than anywhere else. The Guild gives an excellent exemple: it is a cooperative of almost all the producers that gathers to mutualize services. (…). It is always better to have one voice, when you address a partner or a government. (…) Together, this will give us an increased business intelligence. (…) There's an obvious complementarity between the large studios, the almost 200 independent local studios, and the milieu. We saw it when we decided to regroup our events, professional and independent, in a larger one. It brought us over 10 000 persons. The success was phenomenal. (CBC interview – 2019[2])

The developments of the relationships between the Guild and Alliance Numérique are emblematic of the evolution of the video game industry in Montreal from a business ecosystem gravitating around Ubisoft anchor studio to a wider, more diversified innovation ecosystem encompassing several major studios, local medium range studios, a rich ecology of small entrepreneurial independent endeavours, and a wide array of informal bodies, communities and collectives contributing to the dynamism of knowledge creation and sharing for innovation.

The growing number of independent game developers in the Montreal area, as shown by the example of the "*Guild*", reveals the enthusiasm that the industry has generated around the video game industry and the common reservoir of resources that it continuously built over time. Original connections are also occurring through the work of academic institutions, exploring the innovative potential for video games beyond established gaming practices, to use games as learning or connecting tools to promote creation, collaboration, or inclusions of minorities. For instance, a project led by anthropologists at Concordia University allowed students to develop games about natives' culture, with native citizens, to support genuine intercultural encounters, and to attract more native people to techno-creative careers. As the Guild leader comments:

We often talk only about the entertainment part of video games, yet I'm convinced that we will see more on more socially driven applications, in healthcare, for instance, for elderly people, for students, and for workers in different sectors. The number of possibilities that we can exploit with video games – for social, economic, education or entertainment purposes - is infinite. That's why we need to keep opening and connecting inside and over the boundaries of the industry. (CBC interview – 2019[3])

These accounts of the evolution of the local milieu, its growing openness and the development of multiple interconnections between formal bodies and informal stakeholders offer significant insights of which we offer a synthetic and visual representation through our Figure 1. This multi-level perspective explicitly shows that beyond the contractual arrangements between anchor firms and other formal institutions, which are so finely described in the current literature (Moore, 1993; Iansiti & Levien, 2004b; Adner, 2013), some of the central dynamics

of innovation ecosystem transit through an innovation common that is co-constructed and co-exploited by both formal and informal entities. At the heart of these interactions, this common reservoir of resources (of new epistemes, new ideas, new connections between actors, etc.) is the result of a cooperative construction, sometimes voluntary, sometimes organic, between the different institutions and informal local active units, and whose fertility is then at the very core of the regenerative and attracting capacity of innovation ecosystems. We discuss the implications of these findings in the next section.

Discussion

The analysis of the Montreal video game industry confirms that, when facing rapidly changing environments, companies increasingly need to adapt and to evolve. To do so, they tend to mobilize and to capture value beyond their own borders. The notion of innovation ecosystems provides an attractive metaphor to assess the opening of the closed boundaries of firms and to understand value creation as a co-constructed, territorialized, and situated collective process. However, what our case study also suggests is a nuance and enrichment of the existing literature on innovation ecosystems by focusing on two essential results:

a. As we tried to expose it, notably in Figure 1, the innovation ecosystem of Montreal video game studios, their power of regeneration and their capacity to attract talents cannot be understood by looking solely at value chains and networks with other organizations (Iyer *et al*., 2006; Teece, 2007; Adner and Kapoor, 2010), or by narrowly focusing on the cooperative agreements with diverse firms, labs or public agencies. The essence of the generative power of innovation ecosystems relies on the continuous interplay between, on the one hand, firms viewed as formal structures, and, on the other, the myriad of informal local active units such as communities and other collectives. The formal continuously taps in the informal to re-generate ideas, to access new trends and new modes of usage, to validate concepts, and to co-create products. In turn, the formal also nurture the informal with events, projects, and challenges. Organizations and other forms of institutions will change as the local dynamics evolves, while new ideas and talents will emerge continuously from the informal activities. Ideas sensed in the informal may become projects that will reconfigure organizations; talents, attracted and detected

_____
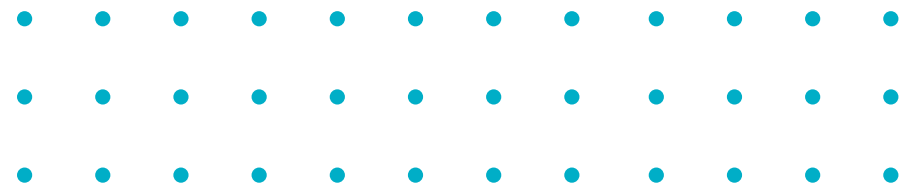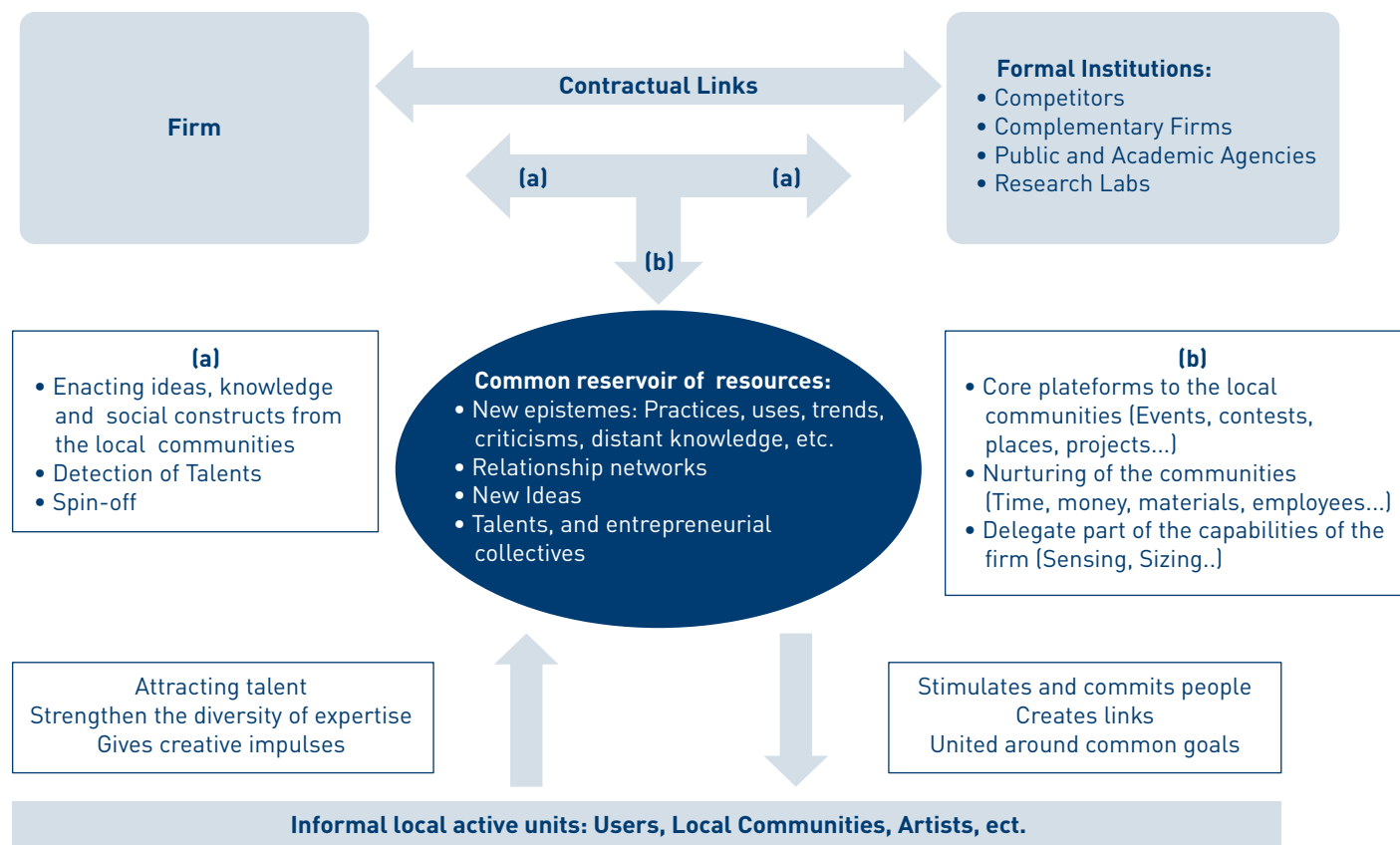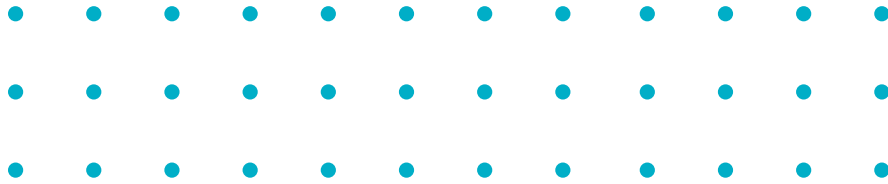3. Ibid.

FIGURE 1
The structure of the local dynamics of a firm innovation ecosystem

Firm	Contractual Links	Formal Institutions:

Firm

Contractual Links

(a) **(a)**

(b)

Formal Institutions:
- Competitors
- Complementary Firms
- Public and Academic Agencies
- Research Labs

(a)
- Enacting ideas, knowledge and social constructs from the local communities
- Detection of Talents
- Spin-off

Common reservoir of resources:
- New epistemes: Practices, uses, trends, criticisms, distant knowledge, etc.
- Relationship networks
- New Ideas
- Talents, and entrepreneurial collectives

(b)
- Core plateforms to the local communities (Events, contests, places, projects...)
- Nurturing of the communities (Time, money, materials, employees...)
- Delegate part of the capabilities of the firm (Sensing, Sizing..)

Attracting talent
Strengthen the diversity of expertise
Gives creative impulses

Stimulates and commits people
Creates links
United around common goals

Informal local active units: Users, Local Communities, Artists, ect.

in events, festivals, and challenges, may become employees; and, finally, entrepreneurial informal collectives may be transformed into small business units within studios. In addition, some firms do not hesitate to decentralize and delegate part of their competencies to diverse communities of specialists and underground amateurs that are partly engaged in informal activities, through events, competitions, hackathons, and the likes.

b. Innovation ecosystems cannot be understood nor function without including the fundamental dynamics that are being played locally. Our results show that interactions and the dynamics that take place on the local scene are crucial to explain the development and generativity of firms which relies on the dense networks set up in its local environment. A significant part of the value created by the studio of Ubisoft Montreal is inherently generated from the "fertile soil" of Montreal. That is, the organization continuously builds together with other local actors (including competitors) an ever-evolving common reservoir of resources and nodes that generate ideas, talents, and entrepreneurial collectives. The reservoir can be seen as a local common good in constant evolution, which is based both on the available talents, on more or less temporary collectives, on cognitive resources, on a slack of knowledge and on constantly blended ideas. A large part of this collective construction emerges out of a significant variety of informal initiatives, which are not often linked to any hierarchical logic and frequently lie beyond the control of the economical system, to such an extent that they are generally forgotten from traditional economic and managerial theories.

These results are discussed in the following sub-sections of the contribution. We first explore in more depth the concept of communities as the "representative" concept encapsulating the active forces of the "informal" in innovation eco-systems. We then focus on the local dimension of the ecosystem and detail the mechanisms that are at the core of the existence of an innovation ecosystem: Local commons.

Communities As the Active Informal Units of Innovation Ecosystems

The literature review on innovation ecosystems has confirmed that scholars in the field have regularly referred to the structuring role of the interactions between formal entities. Without denying the importance of these inter-actions, we consider that these relationships between formal entities only capture part of what an innovation ecosystem is. As emphasized in the pioneering work of Saxenian (1994), our view is that the essence of an innovation ecosystem, its power of regeneration and attraction rely on the dynamics of the "informal", which as she suggested is "encapsulated" in diverse knowing communities.

Knowing communities are informal groups of agents either internal or external to the organization, characterized by a voluntary engagement in the construction, exchange, reflexivity and sharing of a common cognitive resource directory (Wenger, 1998; Wenger et al., 2002; Brown and Duguid, 1991; Amin and Cohendet, 2004). This literature has identified many types of knowing communities based on their characteristics, such as epistemic communities (Cowan et al., 2000; Cohendet et al., 2014), communities of practices (Lave and Wenger, 1991; Brown and Duguid, 1991; Amin and Roberts, 2008), com-munities of users (Von Hippel and von Krogh, 2003), or communities of innovation (Lynn et al., 1997). The value created through these collectives is not directly controlled by institutions but can be leveraged by them. Com-munities create different "units of competencies" (Wenger et al., 2002). They do considerable work in order to re-think, create, maintain and disseminate cognitive resources to allow organizations to revitalize their ideas, knowledge and routines. One of the main generic values of communities lies in their ability to absorb a significant portion of the unavoidable fixed costs associated with the building and exchange of knowledge (Amin and Cohendet, 2004). These costs correspond, for instance, to the progressive construction of languages and models of action and interpretation that are required for the implementation of new knowledge that cannot be covered through the classical efforts of organizations (or markets). This explains why the "informal" is generally better equipped than formal organizations to produce new ideas, new knowledge, new episteme and new concepts. It should though be empha-sized that firms, as shown notably by the example of Ubisoft, can progressively learn how to deal with these possible contributions of communities by, for instance, allowing employees to spend time participating and allocating time to it, supporting their development through issue- and knowledge-sharing, organizing also gathering and connecting events, or even stimulating reflections and innovation through competitions and events.

Local Commons At the Heart of Innovation Ecosystems

Our observations of the video game industry in Montreal have also highlighted that the interactions and dynamics that take place in the local scene are crucial to explain the development and generativity of the company, in particular because of the co-construction of a common reservoir. A remarkable characteristic is that firms share their innovation ecosystem with other local actors (including competitors). Together, they build an evolving common reservoir of resources (knowledge, ideas, talents, networks, proto-entrepreneurial endeavours...). This common reservoir, which is geographically and culturally conditioned, is one of the keys to a dynamic approach to the co-construction of value that takes place between the formal and the informal at the local level. Through local platforms of interaction, formal institutions enact ideas and social constructs, detect talents, and start-ups can emerge in a dynamic and constantly evolving process. But it is also through the intense exchanges, debates, criticisms and deviant positions that are built in these platforms between different actors and communities, that firms also transform their ways of doing things.

Thus, at the local level, the concept of innovation ecosystem is inherently associated with broader "local common", which is partly nurtured by formal organizations, partly orchestrated by public local authorities and partly built by different communities. In this regard, this local knowledge pool goes beyond the simple phenomena of externalities defined by the fact that producing or consuming a good have an impact on third parties not directly related to the activity or the transaction (Buchanan & Stubblebine, 1962). The multiple innovation ecosystems of video game companies in Montreal, nurture and, in turn, are nurtured by these local commons. We argue that these "local commons" can be conceptualized in terms of a dynamic, ever-evolving heterarchy orchestrated by diverse parties. Each of these parties simultaneously taps in and invests in this unique local nucleus of knowledge, ideas, and proto-entrepreneurial projects that make the videogame ecosystem of Montreal so vibrant and competitive as shown in Figure 1. Together, they build common rules through their regular interactions, which are sometimes formalized, particularly in the context of associations, and sometimes much more tacit, rooted and shaped in habits, routines and conventions accepted by the actors within the mouvements of communities in the local ecosystem. And, as the recent example of the guild shows, some intermediary actors can voluntarily take on a larger role in the orchestration and governance of this common, but our knowledge is still limited on how this shared governance can emerge and define more voluntarily the bundle of rights of the whole.

Our results also provide insight into the fact that, beyond the role of communities, some of the interactions between formal and informal bodies are also based on the multiple affiliations of the firms' employees. Indeed, in the video game industry in Montreal, employees go back and forth between different citizenships, sometimes as part of the organization, sometimes as part of an association, sometimes by participating in different events, by building personal projects on their free time or even by debating with other enthusiasts. Through these means, firms continuously tap in the informal to re-generate ideas and knowledge. But organizations are also a driving force supporting theses multiple citizenship through their investments in interaction platforms. As in the case of Ubisoft, these investments can be of several types. They can take the form of partnerships or sponsorships. But formal entities can also invest more directly in events, competitions, associations or federative projects that can feed the common pool of resources.

TABLE 2

Practical Implications in Managing an Innovation Ecosystem

Firm	Formal	Informal
Internal	- Allocation of resources - Steering interdisciplinary projects - Exploitation - No control on CoPs	- Bring out, nurture and harness internal communities - Recognize multiple "citizenships" of the employees - Allow employees to legitimately "go outside and play"
External	- Strategic alliances - Acquisition / Mergers - Licence - Spin-In	- Support institutional entrepreneurs - Delegate capabilities (sensing, absorption, diffusion) - Devote core platforms to the local communities (events, places, spaces, etc.) - Detect talents in core plateforms - Enacting ideas and social constructs from the local communities - Experiment with the local communities
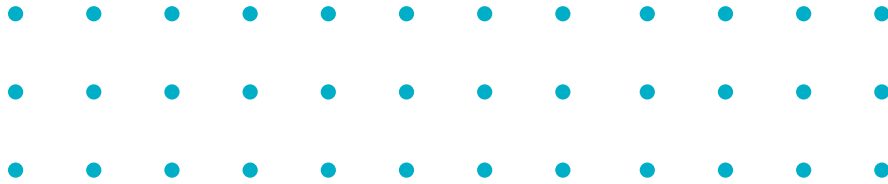
Conclusion

Our analysis of the video game industry in Montreal has brought forward some major results that add to the existing literature on innovation ecosystems. First, our analysis clearly shows that the essence of the innovation ecosystem of a given business organization lies in its capacity to articulate its formal hierarchical structures with diverse informal communities and collectives. The firm must, therefore, agree not to control the entire value creation process and not to assert an excessive dominant position that would prevent a large part of these interactions from emerging.

Generative dynamics, which permanently contribute to reconfigure and reshape organizations, emerge out of these continuous interactions between the formal and the informal bodies and favour the creation of new forms of informal, connective initiatives. Indeed, these dynamics have a two-sided effect: it continuously connects informal initiatives to formal structures, as well as it allows the participation of formal structures to informal collectives and communities, in order to sustain the ongoing regeneration of innovation ecosystems. Thus, beyond the potential and uncertain formation of economic externalities that may eventually be the outcome of the clustering of formal entities, the results strongly suggest that the formation of improvisational sparks of ideas and initiatives necessary for fuelling and innovation ecosystem resides in these frictions between formal and informal components. Such a perspective opens a new research agenda to broaden the scope of analysis surrounding the notion of innovation ecosystem beyond the classical framework presented by Moore (1993).

Second, our study shows that the innovation ecosystem of a firm has a strong local component, which is inherently embedded in what we considered to be a local ecosystem around video games in Montreal, explicitly referring to the geographical notion of ecosystem, such as the one emerging from the pioneering works from Saxenian on the Silicon Valley (1994). Rather than a single anchor firm, we argue that, through time, the core of this local ecosystem became a common reservoir of resources encapsulated in shared local platforms of interaction, facilitating different forms of knowledge creation and circulation between diverse communities, and continuously connecting formal entities with informal active units.

Moreover, in the classic vision of a business ecosystem, if the focal firm collapses the ecosystem has a great chance to collapse as well, in that they share a community of fate. In the case of the dynamics that take place locally in this innovation ecosystem, it could be hypothesized that these "local commons" and these platforms of interactions that bind organizations together in a community of fate will survive and act as a permanent reservoir for knowledge, talents, and ideas as a source for resilience and further creative endeavours. An innovation ecosystem could then manage to be resilient by not relying on a single firm but rather by drawing much of its energy and wealth from shared innovation commons, anchored in local formal and informal dynamics. Future research in this domain is certainly needed in order to better explain how different parties co-invest in these local social platforms, and how the different business ecosystems of firms are articulated with local informal bodies in generative, attractive, and resilient innovation ecosystems.

We are aware that, by focusing on the local component of an innovation ecosystem, our study may have neglected some fundamental aspects of the notion of innovation ecosystems. We fully recognize that the innovation ecosystem of a firm has a much broader scope than the restricted dimension examined in this paper. For instance, we voluntarily didn't analyze specifically the fact that videogame firms may delegate part of their creative efforts to specific communities of users, or more generally to the "crowd". The reason for this is that this dimension of research is largely covered by the literature (Von Hippel, 2005; Dahlander and Magnusson, 2008; Burger-Helmchen and Cohendet, 2011). In the same vein, by focusing on the videogame industry, we did not include in our study the interactions of the local videogame ecosystem in Montreal with other domains of activities (such as movie industry, entertainment, aeronautics, electronics, telecommunications, hospitals, etc.), where strong interactions with local videogames companies are currently developed, or the strong links that exist between the local and the global, as other studies have shown (Cohendet *et al.*, 2018).

Finally, while remaining at a holistic level, we have not entered into the content of exchanges between local actors any more than we have detailed the crucial roles that certain individuals can play as brokers, energizers, orchestrators, or central connectors in the structuring, animation and maintenance of the ecosystem (Arena, Cross, Sims, & Uhl-Bien, 2017). In particular, Ferrary and

Grannovetter's (2009) study of the various contributions of Venture Capital to Silicon Valley's complex innovation network firms provides some extremely promising new insights in this regard to look in more details to the issue of power and legitimacy of some actors within innovation ecosystem. Nor have we entered into the specific narrative of personal trajectories to explore in more detail the role of multiple citizenships that employees may have and how organizations can foster them. It would lastly be interesting to to explore the governance issues raised by the uncovering of innovation commons. These again are important and rich new avenues for future research in the domain.

Bibliography

Adner, R. (2006). "Match your innovation strategy to your innovation ecosystem". *Harvard Business Review*, Vol. 84(4), p. 98-107.
Google Scholar

Adner, R. (2012). "The Wide Lens: A New Strategy for Innovation". Penguin, New York, NY.
Google Scholar

Adner, R., Kapoor, R. (2010). "Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations". *Strategic Management Journal*, Vol. 31, N° 3, p. 306-333.
Google Scholar   https://doi.org/10.1002/smj.821

Adner, R., Oxley, J. E., Silverman, B. S. (2013). *Collaboration and Competition in Business Ecosystems*. Advances in Strategic Management, Vol. 30, Emerald Group Publishing Limited, 436 p.
Google Scholar

Adner, R. (2017). "Ecosystem as structure: an actionable construct for strategy". *Journal of Management*, Vol. 43, N° 1, p. 39-58.
Google Scholar   https://doi.org/10.1177/0149206316678451

Afuah, A. (2000). "How much do your co-opetitors' capabilities matter in the face of technological change?". *Strategic Management Journal*, Vol. 21, p. 387-404.
Google Scholar   https://doi.org/10.1002/(SICI)1097-0266(200003)21:3%3C397::AID-SMJ88%3E3.0.CO;2-1

Amin, A., Cohendet, P. (2004). *Architectures of knowledge: Firms, capabilities, and communities*. Oxford: Oxford University Press, 196 p.
Google Scholar

Amin, A., Roberts, J. (2008). *Community, Economic Creativity and Organization*. Oxford: Oxford University Press, 328 p.
Google Scholar

Arena, M., Cross, R., Sims, J., Uhl-Bien, M. (2017). "How to catalyze innovation in your organization". MIT Sloan, *Management Review*, Vol. 58, N° 4, p. 38-48.
Google Scholar

Attour, A., Burger-Helmchen, T. (2014). "Écosystèmes et modèles d'affaires: Introduction". *Revue d'Économie Industrielle*, Vol. 146, N° 2, p. 11-25.
Google Scholar   https://doi.org/10.4000/rei.5784

Autio, E., Thomas, L. D. (2014). "Innovation Ecosystems: Implications for Innovation Management?". In Dodgson, M., Gann, D.M., and Phillips, N. (Eds.), *The Oxford Handbook of Innovation Management*, p. 204-228. Oxford University Press.
Google Scholar

Baldwin, C. Y., Clark, K. B. (2000). *Design rules: The power of modularity*. Cambridge, MA: MIT press, 483 p.
Google Scholar

Ben Letaifa, S., Gratacap, A., Isckia, T. (2013). *Understanding Business Ecosystems: How Firms Succeed in the New World of Convergence?*. Brussels: De Boeck, 256 p.
Google Scholar

Brown, J. S., Duguid, P. (1991). "Organizational learning and communities-of-practice: Toward a unified view of working, learning, and innovation". *Organization Science*, Vol. 2, N° 1, p. 40-57.
Google Scholar   https://doi.org/10.1287/orsc.2.1.40

Burger-Helmchen, T., Cohendet, P. (2011). "User communities and social software in the video game industry". *Long Range Planning*, Vol. 44, N° 5, p. 317-343.
Google Scholar   https://doi.org/10.1016/j.lrp.2011.09.003

Chesbrough, H., Appleyard, M. (2007). "Open Innovation and Strategy". *California Management Review*, Vol. 50, N° 1, p. 57-76.
Google Scholar   https://doi.org/10.2307/41166416

Christensen, C. M., Rosenbloom, R. S. (1995). "Explaining the Attacker's Advantage: Technological Paradigms, Organizational Dynamics, and the Value Network". *Research Policy*, Vol. 24, N° 2, p. 233-257
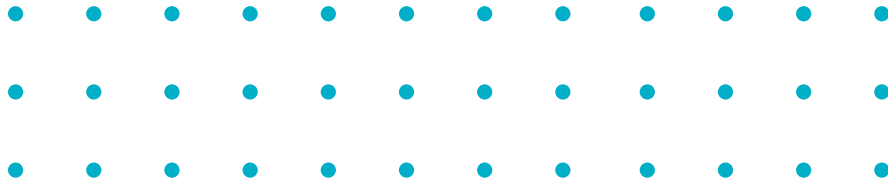Google Scholar   https://doi.org/10.1016/0048-7333(93)00764-K
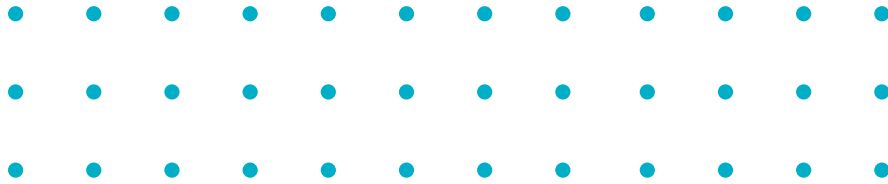
Cohendet, P., Grandadam, D., Simon, L. (2010). "The anatomy of the creative city". *Industry and innovation*, Vol. 17, Nº 1, p. 91-111.
Google Scholar   https://doi.org/10.1080/13662710903573869

Cohendet, P., Grandadam, D., Simon, L., Capdevila, I. (2014). "Epistemic communities, localization and the dynamics of knowledge creation". *Journal of Economic Geography*, Vol. 14, Nº 5, p. 929-954.
Google Scholar   https://doi.org/10.1093/jeg/lbu018

Cohendet, P., Grandadam, D., Mehouachi, C., Simon, L. (2018). "The local, the global and the industry common: the case of the video game industry". *Journal of Economic Geography*, Vol. 18, Nº 5, p. 1045-1068.
Google Scholar   https://doi.org/10.1093/jeg/lby040

Cowan, R., David, p. A., Foray, D. (2000). "The Explicit Economics of Knowledge Codification and Tacitness". *Industrial and Corporate Change*. Vol. 9, Nº 2, p. 211-253.
Google Scholar   https://doi.org/10.1093/icc/9.2.211

Cusumano, M. A., Gawer, A. (2002). "The elements of platform leadership". *MIT Sloan Management Review*, Vol. 43, Nº 3, p. 51.
Google Scholar

Dyer, J. H., Singh, H. (1998). "The relational view: Cooperative strategy and sources of interorganizational competitive advantage". *Academy of Management Review*, Vol. 23, Nº 4, p. 660-679.
Google Scholar   https://doi.org/10.5465/amr.1998.1255632

Eisenhardt, K. M., Graebner, M. E. (2007). "Theory building from cases: opportunities and challenges". Academy of Management Journal, Vol. 50, Nº 1, p. 25-32.
Google Scholar   https://doi.org/10.5465/amj.2007.24160888

Ferrary, M., Granovetter, M. (2009). "The role of venture capital firms in Silicon Valley's complex innovation network". *Economy and society*, Vol. 38, Nº 2, p. 326-359.
Google Scholar   https://doi.org/10.1080/03085140902786827

Gawer, A., Cusumano, M. A. (2014). "Industry Platforms and Ecosystem Innovation". *Journal of Product Innovation Management*, Vol. 31, Nº 3, p. 417-433.
Google Scholar   https://doi.org/10.1111/jpim.12105

Glaser, B. G., Strauss, A. L. (2017). *Discovery of grounded theory: Strategies for qualitative research*. Routledge, 282 p.
Google Scholar   https://doi.org/10.4324/9780203793206

Gomes, L.A.V., Facin, A.L.F., Salerno, M.S., Ikenami, R.K. (2016). "Unpacking the innovation ecosystem construct: Evolution, gaps and trends". *Technological Forecasting and Social Change*, Vol. 136, p. 30-48.
Google Scholar   https://doi.org/10.1016/j.techfore.2016.11.009

Grabher, G. (2001). "Ecologies of creativity: the Village, the Group, and the heterarchic organization of the British advertising industry". *Environment and Planning A*, Vol. 33, Nº 2, p. 351-374.
Google Scholar   https://doi.org/10.1068/a3314

Grandadam, D., Cohendet, P., Simon, L. (2013). "Places, spaces and the dynamics of creativity: The video game industry in Montreal" *Regional studies*, 47(10), p. 1701-1714.
Google Scholar   https://doi.org/10.1080/00343404.2012.699191

Gueguen, G., Torrès, O. (2004). "La dynamique concurrentielle des écosystèmes d'affaires". *Revue Française de Gestion*, Vol. 158, Nº 1(2004), p. 227-248.
Google Scholar   https://doi.org/10.3166/rfg.148.227-248

Gulati, R., Nohria, N., Zaheer, A. (2000). "Strategic Networks". *Strategic Management Journal*, Vol. 21, Nº 3, p. 203-215.
Google Scholar   https://doi.org/10.1002/(SICI)1097-0266(200003)21:3%3C203::AID-SMJ102%3E3.0.CO;2-K

Gustafsson, R., Autio, E. (2011). "A failure trichotomy in knowledge exploration and exploitation". *Research Policy*, Vol. 40, Nº 6, p. 819-831.
Google Scholar   https://doi.org/10.1016/j.respol.2011.03.007

Hannah, D. P., Eisenhardt, K. M. (2018). "How firms navigate cooperation and competition in nascent ecosystems". *Strategic Management Journal*, Vol. 39, Nº 12, p. 3163-3192.
Google Scholar   https://doi.org/10.1002/smj.2750

Helfat, C. E., Raubitschek, R. S. (2018). "Dynamic and integrative capabilities for profiting from innovation in digital platform-based ecosystems". *Research Policy*, Vol. 47, Nº 8, p. 1391-1399.
Google Scholar

Henderson, R. M., Clark, K. B. (1990). "Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms". *Administrative Science Quarterly*, Vol. 35, Nº 1, p. 9-30.
Google Scholar   https://doi.org/10.1016/j.respol.2018.01.019

Hess, C., Ostrom, E. (2007). *Understanding Knowledge as a Commons*. Boston, USA: The MIT Press, 382 p.
Google Scholar
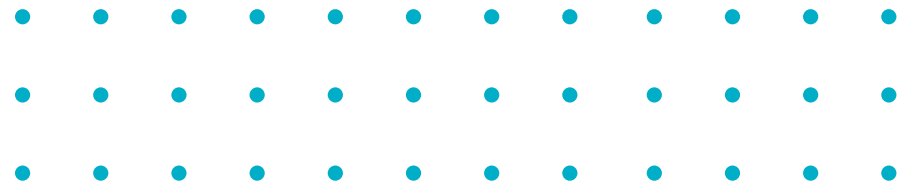
Iansiti, M., Levien, R. (2004a). "Strategy as ecology". *Harvard Business Review*, Vol. 82, N° 3, p. 68-81.
Google Scholar

Iansiti, M., Levien, R. (2004b). *The Keystone Advantage: What the New Dynamics of Business Ecosystems Mean for Strategy, Innovation, and Sustainability*. Cambridge, MA: Harvard Business School Press, 272 p.
Google Scholar

Iyer, B., Lee, C. H., Venkatraman, N. (2006). "Managing in a small world ecosystem: Some lessons from the software sector". *California Management Review*, Vol. 48, N° 3, p. 28-47.
Google Scholar   https://doi.org/10.2307/41166348

Jacobides, M. G., Cennamo, C., Gawer, A. (2018). "Towards a theory of ecosystems". *Strategic Management Journal*. Vol. 38, N° 8., p. 2255-2276.
Google Scholar   https://doi.org/10.1002/smj.2904

Kapoor, R., Agarwal, S. (2017). "Sustaining superior performance in business ecosystems: Evidence from application software developers in the iOS and Android smartphone ecosystems". *Organization Science*, Vol. 28, N° 3, p. 531-551.
Google Scholar   https://doi.org/10.1287/orsc.2017.1122

Koenig, G. (2012). "Research note: Business Ecosystems Revisited". *M@n@gement*, Vol. 15, N° 2, p. 208-224.
Google Scholar

Kuckertz, A. (2019). "Let's take the entrepreneurial ecosystem metaphor seriously!". Journal of Business Venturing Insights, Vol. 11 (article in Press).
Google Scholar   https://doi.org/10.1016/j.jbvi.2019.e00124

Langley, A. (1999). "Strategies for theorizing from process data". Academy of Management review, Vol. 24, N° 4, p. 691-710.
Google Scholar   https://doi.org/10.5465/amr.1999.2553248

Lave, J., Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press, 138 p.
Google Scholar

Litterer, J. A. (1963), *Organizations: Structure and behavior*, New York, John Wiley & Sons, 625 p.
Google Scholar

Lynn, L. H., Aram, J. D., Reddy, N. M. (1997). "Technology communities and innovation communities". *Journal of Engineering and Technology Management*, Vol. 14, N° 2, p. 129-145.
Google Scholar   https://doi.org/10.1016/S0923-4748(97)00006-4

Mäkinen, S. J., Dedehayir, O. (2014). "Business Ecosystems' Evolution — An Ecosystem Clockspeed Perspective ", in R. Adner, J. Oxley, B. Silverman (ed.) *Collaboration and Competition in Business Ecosystems, Advances in Strategic Management*, Vol. 30, Emerald Group Publishing Limited, p. 99-125
Google Scholar   https://doi.org/10.1108/S0742-3322(2013)0000030007

Maturana, H.,Varela, F., (1980) *Autopoiesis and Cognition: the Realization of the Living*. Robert S.Cohen and Marx W.Wartofsky (Eds.), Boston Studies in the Philosophy of Science, 146 p.
Google Scholar

Moore, J. F. (1993). "Predators and prey: a new ecology of competition". *Harvard Business Review*, Vol. 71, N° 3, p. 75-83.
Google Scholar

Moore, J. F. (1996). *The Death of Competition: Leadership and strategy in the age of business ecosystems*. New York: HarperBusiness, 320 p.
Google Scholar

Moore, J.F. (2006). "Business ecosystems and the view from the firm". *The Antitrust Bulletin*, Vol. 51, N° 1, p. 31-75.
Google Scholar   https://doi.org/10.1177/0003603X0605100103

Oh, D.-S., Phillips, F., Park, S., Lee, E., (2016). "Innovation ecosystems: a critical examination". *Technovation*. Vol. 54, p. 1-6.
Google Scholar   https://doi.org/10.1016/j.technovation.2016.02.004

Orr, J. (1990). "Sharing knowledge, celebrating identity: war stories and community memory in a service culture". In Middleton D. S., and Edwards D. (Eds), *Inquiries in social construction. Collective Remembering*: Memory in Society, p. 169-189. Beverly Hills, CA: Sage Publications, Inc.
Google Scholar

Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge, UK: Cambridge University Press, 298 p.
Google Scholar

Porter, M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: Free Press, 592 p.
Google Scholar

Potts, J. (2012). *Innovation in the Commons*. Working Paper. School Economics & Finance, RMIT University, Australia
Google Scholar

Rabelo, J., Bernus, J., (2015). "A Holistic Model of Building Innovation Ecosystems ", Conference Paper Archive (IFAC), *Science Direct*. Vol. 43. Nº 3, p. 2250-2257.
Google Scholar   https://doi.org/10.1016/j.ifacol.2015.06.423

Roundy P.T., Bradshaw M., Brockman B.K. (2018) "The emergence of entrepreneurial eco-systems: A complex adaptive systems approach ", *Journal of Business Research*, Vol. 86, p. 1-10.
Google Scholar   https://doi.org/10.1016/j.jbusres.2018.01.032

Saxenian, A. (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge, MA: Harvard University Press, 240 p.
Google Scholar

Schwartzman, H. B. (1993). *Ethnography in organizations* (Vol. 27). London, UK: SAGE.
Google Scholar

Simon, L. (2002). *Le Management en Univers Ludique: Jouer et Travailler chez Ubisoft, une Entreprise du Multimédia à Montréal (1998–1999)*. PhD Thesis, Université de Montréal.
Google Scholar

Stabell, C. B., And Fjeldstad, Ø. D. (1998). "Configuring value for competitive advantage: on chains, shops, and networks". *Strategic Management Journal*, Vol. 19, Nº 5, p .413-437.
Google Scholar   https://doi.org/10.1002/(SICI)1097-0266(199805)19:5<413::AID-SMJ946>3.0.CO;2-C

Stake, R. E. (1995). *The art of case study research*. Sage, 192 p.
Google Scholar

Stam, E. (2015). Entrepreneurial ecosystems and regional policy: a sympathetic cri-tique. European Planning Studies, Vol. 23, Nº 9, p. 1759-1769.
Google Scholar   https://doi.org/10.1080/09654313.2015.1061484

Teece, D. J. (2007). "Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance". *Strategic Management Journal*, Vol. 28, Nº 13, p. 1319-1350.
Google Scholar   https://doi.org/10.1002/smj.640

Uzzi, B. (1997). "Social Structure and Competition in Inter-firm Networks: The Paradox of Embeddedness". *Administrative Science Quarterly*, Vol. 42, Nº 1, p. 35-67.
Google Scholar   https://doi.org/10.2307/2393808

Valkokari, K., Seppänen, M., Mäntylä M., Jylhä-Ollila S. (2017) "Orchestrating Innovation Ecosystems: A qualitative Analysis of Ecosystem Positioning Strategies", *Technology Innovation Management Review*, Vol. 7, Nº 3, p. 12-24.
Google Scholar   http://doi.org/10.22215/timreview/1061

Van Maanen, J. (1979). "The fact of fiction in organizational ethnography". *Administrative Science Quarterly*, Vol. 24, Nº 4, p. 539-550.
Google Scholar   https://doi.org/10.2307/2392360

Von Hippel, E. (2005). *Democratizing Innovation*. Cambridge, MA: MIT Press, 216 p.
Google Scholar

Von Hippel, E., Von Krogh, G. (2003). "Open source software and the 'private-collective' innovation model: Issues for organization science". *Organization Science*, Vol. 14, Nº 2, p. 209-223.
Google Scholar   https://doi.org/10.1287/orsc.14.2.209.14992

Voronov, M., Vince, R. (2012). "Integrating emotions into the analysis of institutional work". *Academy of Management Review*, Vol. 37, Nº 1, p. 58-81.
Google Scholar   https://doi.org/10.5465/amr.2010.0247

Watson, C. W. (Ed.) (1999). *Being There: Fieldwork in Anthropology*, London, UK: Pluto Press, 184 p.
Google Scholar

Wenger, E. (1998). "Communities of practice: Learning as a social system". *Systems thinker*, Vol. 9, Nº 5, p. 2-3.
Google Scholar

Wenger, E., McDermott, A., Snyder, W. (2002). *Cultivating Communities of Practice: A Guide to Managing Knowledge*. Cambridge, MA: Harvard Business Press, 304 p.
Google Scholar

Yin, R. K. (1994). *Case Study Research: Design and Methods*. Thousand Oaks, CA: SAGE, 312 p.
Google Scholar