The local, the global and the industry common: Re-coupling geographically dispersed clusters in the video game industry

Patrick Cohendet*, David Grandadam*, Chahira Mehouachi**, Laurent Simon*
*Mosaic, HEC Montreal, **ISG Paris

Direct correspondence to:
Patrick Cohendet, Professor and co-director of Mosaic, HEC Montreal
3000, Chemin de la Côte-Sainte-Catherine
Montreal, Canada H3T 2A7
Tel.: +1 514 340-6909
Email: patrick.cohendet@hec.ca

The local, the global and the industry common: Re-coupling geographically dispersed clusters in the video game industry

Abstract: This paper investigates the complex relation existing between industrial and spatial dynamics of innovation of the video game industry, as an exemplary illustration of creative industries clusters. The authors propose a new framework to understand the emergence and connectivity of creative clusters, based on the interplay between formal and informal interactions, on one hand, and local and global linkages, on the other. The results suggest that the video game industry can be viewed as a worldwide organization with different clusters connected to each other through a dense network of industrial pipelines and personal relationships. In such a perspective, the articulation between these two dimensions of interaction generates specific dynamics that contribute to develop the common ground (or infrastructure) out of which the industry is built.

1. Introduction

Both international business scholars and economic geographers have developed a rich literature aiming at explaining the emergence and development of creative industry clusters as well as the nature of connectivity between these clusters.

In a recent contribution contrasting two cases of creative industries (the Indian filmed entertainment cluster in Mumbai and the Indian software cluster in Bangalore), Lorenzen and Mudambi (2013) have provided a broader theory of cluster connectivity that has hitherto focused on organization-based pipelines and MNE subsidiaries, by including global linkages in the form of personal relationships across different locations. In their view, global pipelines (Bathelt *et al.*, 2004; Owen-Smith and Powell, 2004; Giuliani and Bell, 2005; Maskell *et al.*; 2006) are mainly industrial formal linkages established between organizations belonging to different clusters for the purpose of maximizing the effectiveness of flows of resources across geographical space. Shared ownership or strategic cooperation guarantees organizational commonality at both ends of the pipeline, such that the nature and concentration of global pipelines at a cluster level (whether belonging to indigenous firms or being the local branches of an MNE) is viewed as an indicator of the degree of maturity and development of a given cluster (Lorenzen and Mudambi, 2013, 2015). The second kind of global connections are informal linkages established between individuals and based on personal affinity, social proximity and membership to the same communities. These links, despite being weaker than global pipelines, can serve as circuits for different flows of knowledge and can help the formation of different forms of inter-personal trust, which, in turn, may support the distanced organizational relationships (Bresnahan *et al.*, 2001; Agrawal *et al.*, 2006; Saxenian, 2006; Zaheer *et al.*, 2009). Lorenzen and Mudambi (2013) conclude by suggesting that clusters linked to the global economy by decentralized pipelines are more likely to generate local spillovers in specialized technological and industrial areas, while clusters linked through decentralized personal relationships are more likely to generate local spillovers in a range of (different yet) related industries and technologies.

While recognizing that Lorenzen and Mudambi's work has brought forward useful and insightful analytical inputs in our understanding of the connectivity between creative clusters, one of the limitations with their approach is that global pipelines and personal relationships are essentially viewed as static and independent mechanisms. In their article, they underline the possible interdependence existing between personal relationships and pipelines, suggesting that these two analytical categories "may coexist and reinforce each other" (Lorenzen, Mudambi, 2013: 524). Despite these remarks, the potential connections between the two categories and their impact on the innovativeness of clusters are just alluded to. Our aim in this contribution is to add to this literature on connectivity between clusters by considering formal pipelines and informal relationships as complements and dynamically intertwined.

The literature clearly identifies these two forms of linkages as key to understand both industrial and spatial dynamics within a creative industry. Our main argument is that to understand more specifically the interplay between these two dynamics of innovation, it is necessary to consider how the (formal) pipelines and (informal) relationships come together to form the ground on which the interactions between all actors (economic and non-economic) take place. These different linkages each bridge different scales and scopes, and eventually merge, thus generating specific dynamics, which are at the origin of the development of a *common* (or *common infrastructure*) encompassing the entire industry and linking the local with the global. In this way, understanding the interplay between industrial and spatial dynamics within a creative industry goes beyond simple inspections of separate global connections between different localized entities, by requiring an in-depth examination of how these connections may influence and eventually reinforce each other as the industry evolves.

To illustrate the central role of the coupling between the informal and the formal in the spatial and industrial evolution of a creative industry, we focus, in this contribution, on the video game industry. The reason for this choice is that, amongst all creative industries, video game activities are probably those for which the coupling between the arts (that tend to rely on intense local embeddedness) and technology (that tends to rely on important global connections) is the strongest. These distinctive features of the video game industry have contributed to shape, in characteristic ways, the spatial organization of production processes. The focus of the research is to understand and highlight these mechanisms and further broaden our findings to creative industries in general.

Our results suggest that the video game industry can be viewed as a worldwide organization with different clusters connected to each other through a dense network of industrial pipelines and personal relationships. These networks have played a strategic role in the local and global development of the industry. We here show, however, that the capacity to articulate these linkages with one another is only present in a small set of core creative clusters acting as main orchestrators of the industry. The paper explores the characteristics of these core clusters.

The outline of the paper is as follows. In section 2, we present the innovation dynamics inherent to video game industry. We present our data and methods in section 3. We then turn to section 4, where we explore the dynamics of innovation in the video game industry with a focus on the interplay between the formal and the informal, and between the local and the global. We draw on the example of the video game industry throughout this section as an illustrative case. In section 5, we propose to reinterpret the interplay between formal/informal and local/global dynamics, and suggest a new framework emphasizing the key role of core creative clusters and integrating the works of international business and economic geography scholars. We conclude with some thoughts on future avenues of research.

2. On industry evolution and spatial distribution of video game activities

The video game industry should be considered as exemplary of creative industries, where the constant demand for novelty, the accelerated development of digital technology, the many cycles of fads and fashions and the constant renegotiation of value require firms to constantly innovate and adapt their processes and organizations in consequence (Aoyama and Izushi, 2003; Johns, 2005; Izushi and Aoyama, 2006). This constant need to innovate is exemplified by the evolution of video games over time. The distance that separates the first early games such as "Pong", for example, with contemporary first-person shooter titles such as "Call of Duty" is considerable, whether in terms of quality, in terms of sophistication and details, in terms of complexity, or in terms of the diverse competences used to develop a video game. A video game is now viewed as a compound mix of technology, art and interactive story-telling, which involves the development and integration of a scenario, a design of interactivity, programming activities, graphic arts, sound design, music, integration as well as tests and quality assessments (Salen and Zimmerman, 2004; Zackariasson and Wilson, 2012; Newman, 2013). A video game is also a cultural product for which the technological part of the artefact is expected to disappear behind the magic of the scenario, the smoothness of controls and the realism of the simulation.

Video game activities, much like other creative activities, tend to rely on prototypical and temporary systems of productions, project-based organizations and frequent interactions between multiple autonomous agents, involving creative entrepreneurs as well as business-oriented agents (Caves, 2000; Eikhof and Haunschild, 2007; DeFillippi *et al.*, 2007; Murphy and Pauleen, 2007). A commercial video game project (as opposed to an independent project, more artistically inclined) is compelled to respect constraints of time and money, and aims at reaching significant market shares in a ruthless environment, where studios and project teams alike constantly compete against each other to develop the best games possible, but also to attract the best talents (Claussen *et al.*, 2013; De Vaan *et al.*, 2015, Storz *et al.*, 2015). Managers in the video game industry must now harness expressions of high artistic values and technological virtuosity to meet the constraints of the economics of mass entertainment (Zackariasson *et al.*, 2006; Tschang, 2007). These high requirements in terms of innovation, in combination with the particularities of cultural production, have driven the industry's evolution since its origin (Balland *et al.*, 2013; De Vaan *et al.*, 2013; De Vaan, 2014).

Similarly to other creative industries, the globalization of video games would seem, at first, to have liberated creative agents from the necessity of co-localization and proximity with their targeted markets. The emergence of transnational cultures has induced an increased homogenization of the demand for creative and cultural content, which has encouraged the production of globalized forms of content, such as big blockbuster games, destined to satisfy global market needs. In this unified setting, the logics of delocalization continue to apply, whether firms seek to benefit from the advantages of globalization for exploitation or exploration purposes. It is common today for creative actors, both among big conglomerates

and small creative firms, to establish branches in regions where the costs of production and innovation are low and where they have easier access to skilled labor. It is also common for creative firms to attempt to enhance their exploration processes, their search for new knowledge and ideas or their experimentation scope by globalizing their innovation processes and activities.

Examinations of the innovation dynamics associated with creative industries highlight many examples where these globalization forces are at play, including in the video game industry (Dyer-Witheford and De Peuter, 2009). Many creative projects take place at a global level and involve globally scattered agents. Despite these trends, there are many cases for which these globalization forces, instead of undermining and weakening the tendencies toward localization, promote them.

As in other industries, the geographical disaggregation of classical value chains and the delocalization of several of their parts to other locations are inducing the formation of new nodes through the geographical concentration and coalescence of these delocalized parts in new locations (Cantwell and Mudambi, 2005, 2011; Cantwell, 2017). Trade across national borders is increasingly carried out in terms of value chain parts (or constellations) rather than in terms of complete goods or services (Mudambi, 2008). Globalization forces tend to relocate the middle production of these value constellations to emerging market economies, whereas the conception and marketing activities at the beginning and end of these constellations have been kept in advanced market economies. Maskell and Lorenzen (2004) give evidence of this phenomenon in the music industry, where artistic activities (generally driven by important creative efforts) have been geographically dissociated from production activities or "humdrum" tasks (which obey cost-cutting logics). In the film industry, similar patterns have taken place and have led to the global dispersion of value chains and the geographical aggregation of these parts in a range of locations (Vang and Chaminade, 2007).

For MNEs and globalized firms, multiple embeddedness within creative nodes offers considerable advantages by allowing these firms to access new sources of knowledge and by enabling them to leverage the available resources within major creative centers. MNEs can thus position themselves as coordinators of knowledge flows and creative projects across multiple national boundaries and creative centers (Lorenzen, 2004; Mudambi and Swift, 2012; Cantwell and Mudambi, 2011).

Just as the practices of delocalization and internationalization of MNEs from the creative industries would be expected to promote the dispersion and diffusion of technical knowledge on processes and practices of cultural production, these practices would also be expected to offer opportunities for new creative agents and firms to leverage their local cultures with the aim of increasing the originality of their products in new markets and enhancing their internationalization. Globalization forces, in this perspective, would certainly be expected to reinforce the role played by creative hubs, they would also be expected to foster the formation of new spaces of production and consumption through the dissemination of technical and market knowledge, therefore enabling new entrants, particularly from emerging markets, to access the global competitive

landscape and eventually promote their own local culture (Malecki, 2010; Yoon and Malecki, 2010).

What these elements suggest altogether is that the relationship between localization and globalization, as well as the classical separation made between, on one hand, primary spaces of production and, on the other hand, secondary spaces, where the processes and patterns of production are mostly anecdotal and essentially concentrated in niches, is not as straightforward as it would appear to be at a first glance. The new forces of globalization are not merely reducing the tendencies toward co-localization or questioning the various externalities associated with geographical agglomeration; rather, both sets of tendencies and forces, localization and globalization, influence each other in intricate and ambivalent ways. The global feeds the local, just as the local feeds the global. The actors involved, the flows of knowledge and resources circulating between them, as well as the processes they bring together, co-evolve alongside each other through various patterns of mutual influence facilitating the articulation between the local and the global.

Much like other creative industries, the specific patterns characterizing the video game industry's evolution cannot be reduced to plain dichotomous categorizations between production spaces and provision spaces, or between production spaces in developed countries and production spaces in developing countries, but instead, follow more complex mechanisms, which have yet to be uncovered.

All these observations claim for a renewal of our understanding of 1) how co-localization enhances the quality of knowledge flows and learning capabilities, while generating spillover effects and knowledge externalities, and 2) how, in this context, global pipelines and cross-national social networks contribute to the coupling and interactions between different creative clusters. We provide some insights on these interrogations in the following sections.

3. Data and methods

For this study, we have chosen to rely on an inductive approach specifically aimed at qualitatively refining our understanding of the complex and evolving relation driving industrial and spatial dynamics of innovation within the video game industry. Such an approach allows an important depth of analysis, which is ultimately used in theory development (Eisenhardt 1989, Yin, 2013). We draw on qualitative data collection, analysis, and reasoning methods, as developed in the literature (Glaser and Strauss, 1967; Miles and Huberman, 1994; Langley, 1999).

We used multiple sources, combining primary data, secondary data, and direct observation. The primary information and data were collected through observations and in-depth semi-structured interviews, conducted during previous and current research with employees, managers and public representatives working in the video game industry. These interviews, which lasted approximately one hour each, were all tape-recorded and transcribed. They are at the basis of this analysis and have allowed for a better understanding of the role and linkages between the various institutions, communities and actors. Our data

analysis was conducted through an inductive/abductive process, with iterative and frequent back-and-forth from data to literature. In doing so, our aim was to develop cohesive constructs by drawing on the narratives of the informants and by systematically linking our findings with concepts and frameworks developed in the literature. Researchers remained outside observers throughout the entire research process. The goal was to faithfully render the stories told by the informants and to allow them to openly express their views, without introducing the researchers' personal opinions or biases.

Starting in 2009, these datasets were gradually put together by the research team, following a specific three-step process:

i) Between March and November 2009, a preliminary study was carried out by the research team on a sample of 16 video game studios from different clusters in diverse national contexts (France, UK, Canada, Australia). For this study, a total of 47 semi-structured interviews were achieved. The aim of this first step was to investigate the behavior and strategy of each studio vis-à-vis the cluster in which the studio was embedded, as well as the local and global mechanisms driving the innovation dynamics within these clusters. The stories and narratives that came out of the research team's interactions with interviewees during this preliminary study generated the main framework out of which is based this analysis. These narratives specifically highlighted the fact that two distinct categories of video game clusters coexist, with a small handful of core creative clusters on one side (Los Angeles, San Francisco, London, Tokyo, and Montreal[1]), acting as drivers of the worldwide video game industry, and, on the other side, a large majority of industrial "niche" clusters with a concentration of firms and institutions in specialized fields of video game development (programming, animation, art and design, and so on), following the lead of the former.

ii) To get a deeper understanding of the unique nature and characteristics of the core creative clusters, the research team followed up on this initial fieldwork with a series of qualitative case study analyses, which were carried out from 2009 to 2016 in one of these core creative clusters: Montreal. These exchanges, along with the many links established in time between the research team and the various actors and firms of the video game industry in Montreal provided further insights on the context, processes, linkages and culture associated with video game development, which altogether contributed to highlight what could be the unique characteristics of these main hubs.

In Montreal, an extensive case study was also led by one of the co-authors in the local studio of Ubisoft[2]. After having carried out, in the beginning of 2000, a comprehensive study of the firm, in line with traditional approaches of organizational ethnography (Van Maanen, 1979; Schwartzman, 1993), the co-author

---

[1] Seoul, Paris, Berlin, Seattle, Austin, were also mentioned by some of the respondents.
[2] The French-based company set up one of its studio in Montreal in 1997. This studio grew up significantly and with about 3000 employees is now the biggest video game studio worldwide. Located in the heart of the Mile End, one of the most creative neighborhoods in the city, the studio, which is connected to the dynamic local milieu of Montreal, is very active in its environment and supports the development of a myriad of cultural events and projects.

conducted several action-research projects. Since 2009, he developed a training program on the management of creativity for the organization, maintaining the dialogue with the firm's employees (more than 30 three-day sessions with an average of 15 participants for each session, in the Montreal studio, but also in the Toronto, Quebec City and Bucharest studios). This work led to a better understanding of the role of different formal/informal and local/global dynamics characterizing the Ubisoft studio and a better understanding of its contribution to the local innovation ecosystem.

iii) Drawing from the results of the Montreal study, we performed a cross-case analysis to precise some of the common traits and features defining core creative hubs. By confronting and comparing these cases with one another and building on the various stories told by our interlocutors, we were able to identify some of the patterns and mechanisms on which creative activities are established (see Tables 1 and 2). This work enabled the team to progressively gain a deeper and more fine-grained understanding of the innovation dynamics characterizing the industry and the central role played by creative nodes in driving these dynamics both on an industrial and spatial scale. It also enabled us to better grasp the rationale behind the various formal and informal flows and circuits observed within the video game industry, which, in turn, enabled us to develop the framework that is presented in this analysis.

For time and cost reasons, we could not proceed to intense interviews in the other four core creative clusters (London, Los Angeles, Tokyo and San Francisco). Aware of such limitations with our approach, we used secondary data to support our findings. Industry-level data came from a combination of multiple articles and reports, which were published by expert groups, professional networks and non-profit organizations (including the Entertainment Software Association, the Entertainment Software Association of Canada, the NESTA foundation and the Computer Entertainment Supplier's Association). Background information on firms came from a combination of press clippings, articles, reviews and interviews published in the local and international media, prior histories of the industry, and video game enthusiast websites (including Moby Games, OGDB, UVL, Giant Bomb, VGChartz, etc.). Product-level data came from a combination of product manuals and online databases. Additional data was provided by sectorial and company websites, social media as well as community platforms, which altogether offered a new perspective to more traditional economic analyses. The availability of multiple sources enabled the juxtaposition of evidence, which was essential to strengthen and guarantee the consistency of our findings.

[Insert Table 1 and Table 2 about here]

4. Findings

The core creative clusters identified (Los Angeles, San Francisco, London, Tokyo, and Montreal) were unanimously pointed out by our respondents as the main hubs of worldwide video game production. As interviewees suggested, these clusters are "where the industry is built". There is no dominant hub in this

category. Instead, they all add up to form a kind of heterarchy of creative hubs where power and authority are globally distributed.

We draw on the analysis of Montreal to try to emphasize some of the main characteristics of core creative clusters.[3] These clusters share some obvious features: for instance, in each of these clusters, there is at least one major studio acting as an anchor firm and interacting with a myriad of firms specialized in different constitutive elements of the video game industry (programming, computer graphics and animation, sound and music, and so on). These clusters also exhibit strong cross-fertilization with other creative sectors (including the film, TV, and advertisement clusters). Beyond these common observations, the Montreal case suggests some more fundamental and in-depth explanations of the characteristics of core creative clusters, which highlight the crucial role played by formal/informal and local/global interactions in driving the industrial and spatial organization of video game production.

4.1. The interplay between the formal and the informal

Our interviewees have repetitively underlined that the power of generativity, attraction and resilience, which are main attributes of a creative cluster, cannot be understood by solely observing the interactions between the formal entities of the cluster (firms, labs, government agencies, etc.). As exemplified in the literature (Cohendet and Simon, 2007; Bathelt and Cohendet, 2014), creative firms – be they early-stage start-ups that look for market opportunities or experienced firms that are integrated into global production networks – often tap into the cognitive constructs of different local informal groups and communities to enhance their innovative capabilities, the generation of new ideas, their access to new trends and uses, the validation of concepts, and even the co-creation of new products.

What a careful analysis of the Montreal case suggests is that the keys to the dynamics of a cluster reside in the interplay between formal entities and informal local active units. From the continuous interaction between the formal organizations and the informal active units, new ideas can permanently emerge and be locally equipped by complementary forms of knowledge, a myriad of new projects can continually be assessed and recombined, drastic and disruptive concepts or business models can be tested and eventually put into practice, and an ever-evolving network of workers leaping from start-up to start-up, of companies that fail and then recombine with other failures into big successes, can develop and grow. The data suggests that 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 are not formally defined and that cannot be formally owned or controlled by the actors of the system, and yet are key in driving innovation. The interviews have also clearly revealed that if video game firms naturally use digital platforms to "harness" communities (Dahlander and Magnusson, 2005), they also rely on physical local amenities to interact with

---

[3] See also Nouri-Noeki and Rantisi (2013), Pilon and Tremblay (2013), and Darchen and Tremblay, 2015.

the informal groups and collectives, thus benefiting from face-to-face contacts, from local reputation effects, or from unexpected meetings to increase the value of their activities.

In creative nodes (as opposed to niche clusters), spontaneous mechanisms occur in specific locations, where heterogeneous groups of actors can meet, confront ideas, rethink theories and current practices, and create new models and visions that can eventually become the foundations for the development of innovative goods or services (Cohendet *et al.*, 2010; Grandadam *et al.*, 2013). These places are where the "buzz" happens, and where the much-needed diversity comes together, thus offering the grounds on which creative agents can summon the context-specific and varied forms of knowledge necessary to develop their expertise and skills (Christopherson and Storper, 1989; Maskell and Lorenzen, 2004; Scott and Storper, 2005).

Of course, the distinctions between the formal and the informal are not static and fixed. Part of the informal may become formal and vice-versa. Organizations and other forms of institutions change as clusters evolve and new ideas and talents continuously emerge from the informal activities. Ideas sensed in the informal may become projects that will reconfigure several organizations of the formal; talents, attracted and detected in events, festivals, and challenges, may become employees of the organization; and entrepreneurial informal collectives may be transformed into small business units within studios. Along this perspective, what matters are the local mechanisms at stake that drive the two-way interactions between the formal and the informal units in the cluster. We illustrate some of these mechanisms by referring to the study of the Ubisoft Montreal studio.

In order to stimulate the creativity of its employees, Ubisoft strongly encourages them to participate in local events and cultural activities organized by various communities, associations or informal groups 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 look 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 (but also nurture), to sense new opportunities that, in some cases, will be seized by the firm, and in some cases only, will bring commercial value back to the organization. As the president of the Ubisoft studio often says, "Montreal is our research lab".

The collaboration between Ubisoft and electronic music artist Amon Tobin on the Splinter Cell III game series or singer Coeur de Pirate on the Child of Light game, which both emerged out of employee initiatives, illustrates the ways by which the company has benefited from local talent to influence the commercial success of a game. Other partnerships with actors of the National Theater School, for example, succeeded in advancing methods and techniques for motion capture and in enhancing 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 if the local environment had 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 cultural life.

The studio invests directly in its local neighborhood by sponsoring various events and activities in the video game field, but also in a range of related domains. Ubisoft sponsors, for example, the Fantasia festival, which emphasizes Asian original creations. It also sponsors the Atelier du Mile-end, which highlights local artists, as well as the "Marché des Possibles", which brings to the fore local crafts and products. With such initiatives, the studio mindfully invests in a staggered form of creation, which serves to capture new knowledge and ways of doing things, but also plays an important role in detecting talent. Ubisoft regularly organizes prize-winning contests and academic competitions to identify local talents and bring them into the gaming industry. The studio also participates in nurturing these platforms by investing in the next generation of employees through diverse training activities[4]. The growing number of independent game developers in the Montreal area reveals the dynamism that the company has generated amongst the new generation.

Over time, the company has had a continuous influence on the evolution of the cluster, to the extent that more than half of the main executive positions within the largest studios in the region, including Electronic Arts, Warner, or Square Enix, are now occupied by former Ubisoft employees. The informal links created with the turnover of the industry have enabled transfers from one organization to another, therefore strengthening common dynamics within the industry. This has also stimulated 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 debugging company, and Audiokinetic, a sound recording company, were both founded by former Ubisoft employees to meet the company's need, and later extended their services to the worldwide industry.

All these examples confirm that new economic opportunities may emerge such that new business models are continuously formed and tested by Ubisoft, sometimes for the company alone, most of the time, through coupled initiatives with other economic actors, including competitors. We have detailed here the results for Ubisoft, but our data confirm that the same perspective can be observed for the other main video game studios of the cluster. One of our main findings is thus that the core of the creative dynamics is the existence, for the whole video game industry, of a common platform composed of specific places, events and associated mechanisms facilitating different forms of creation and exchange of knowledge between diverse communities, and continuously connecting the formal entities with the informal active units of the local

---

[4] A recent investment of more than $8 million over 5 years was made in a program called CODEX, in collaboration with 17 educational partners. This program encompasses several initiatives at all levels of education to "embrace the stages of production of a video game as a learning tool", to promote the video game industry to future generations, and offer students a program to become familiar with and train for a world of technology and connectivity. This program for the future generation will affect the entire industry, by educating the youth of the region to the field of video games, creating day camps for young children, or developing activities from primary schools to university classes.

environment. This platform is a "local common", partly nurtured by the video game companies, partly supported by informal communities and partly orchestrated by public local authorities.

As underlined above, we could not compare with similar interviews what we have observed in Montreal. However, a careful examination of the situation in Tokyo, London, San Francisco and Los Angeles seems to confirm the importance of the interplay between the formal and the informal in these core creative clusters. As an example, specific places within the major creative hubs (such as the Soho area in London or the Shibuya district in Tokyo, popularly dubbed "Bit Valley", in reference to its crucial role in video game development and promotion) are known to concentrate many video game studios, which all benefit from the creative atmosphere provided by the local amenities. In Tokyo, for example, both small and big video games companies benefit from the dynamics of knowledge creation and exchange taking place at the local level (Baba and Shibuya, 1999; Hanzawa, 2004; Storz, 2008, 2012). For small studios, the city and its local creative ecosystem offer a privileged access to resources they generally lack internally. The informal relationships linking their employees to those working in big companies enhance their access to essential information on the technological evolution of consoles, especially when new generations of consoles are involved. These informal webs of interpersonal and inter-organizational networks also enhance the quality of interactions with the publishers and console manufacturers, which act as main gatekeepers for access to the market. In a similar vein, Livingstone and Hope (2011) have shown how, within the London ecosystem, iOS video game companies have absorbed ideas from the local communities of specialists in design and advertising, and how these forms of cooperation have boosted the quality of knowledge creation and exchanges locally.

4.2. The interplay between the local and the global

An important component of the creativity within the video game industry draws on the local dynamics of interaction, which, particularly in the case of these main creative hubs, influence and are influenced by their integration into globally distributed networks of production.

Our observations of the video game industry confirm the benefits and related advantages of global linkages, especially in major creative hubs, where actors mobilize many different global linkages to ensure the openness, the continuous regeneration of the local milieu and the creativity of its members. In many aspects, the nature of these linkages and the way they contribute to the overall quality of creative milieus are quite unique and can add to our knowledge on the way the global interacts with local creative hubs.

Global industrial connections linking main creative hubs to other localities are mostly constituted by the portfolios of global partnerships between the studios in each city and publishers and/or studios located elsewhere. Most major video game companies, be they small or medium-sized enterprises or local branches of MNEs, have expanded their production network to other countries by establishing inter-organizational

cooperation linkages with firms situated in other local hubs. Several of these partnerships are long-term vertical relationships that are part of global value chains. In some cases, these partners are publishers and/or studios situated in other creative clusters. In most cases, however, companies have important portfolios of partnerships with other studios in developed and developing countries for subcontracting purposes. The motivations for subcontracting are quite varied: pursuit of cost advantages, high-skilled talents or proximity to new markets, etc. Much like other creative industries, many of these inter-organizational arrangements can enable independent studios (not belonging to a given publisher) to save on development costs while employing qualified talents and skills regardless of their locations. They also allow the video game companies to adapt their products to the local cultures in order to penetrate local markets with products based on local cultures.

MNEs embedded within these major hubs – whether Ubisoft in Montreal, Activision in the Los Angeles area, Electronic Arts in the Bay area, or Eidos in the London area – have been the source of important flows of inter-regional mobility, which have contributed significantly to the formation of these clusters and continue to maintain their internal dynamics. As such, number of talented expatriates have moved to these cities and have helped trigger the establishment of global flows of knowledge exchanges, which go beyond internal labor mobility mechanisms within MNEs. The global linkages established by these clusters include the varied networks of strong relationships of foreign labor that have been attracted to these cities and their positive creative dynamics both in terms of products and jobs. These workers are affiliated with many localities and help nurture the global connections of these clusters through their relationships with the outside, in the professional context, but also in a more community-oriented context.

In the same way, just as communities play an important role in driving the local dynamics of innovation, communities are also active globally. The video game industry harbors several independent non-profit networked organizations which help, at the global level, gather the different communities of video game professionals in an almost permanent way. Many global associations play this role, including the IGDA (International Game Developers Association), which is the most developed global non-profit network of video game professionals, with chapters established in more than 90 locations worldwide, each supported by the main local development and publishing studios. Organizations such as the IGDA serve to unify the local and global communities of game developers, while also providing a global platform (both physical and virtual) for local developers to exchange with their peers and beyond, in formal and informal ways. By linking the different communities of practice through various platforms that support global interactions, possibly on a daily basis, such networks and organizations contribute to the circulation of resources (human, financial and cognitive) and to their mobilization, thus further enhancing the internal dynamics of innovation within video game hubs, but also at the global industrial level. In this way, these intermediate infrastructures offer new spaces of learning, providing parallel circuits for the creation and capture of specialized as well

as non-specialized knowledge, which, to a large extent, are instrumental in the shaping of the video game industry as a whole.

Temporary face-to-face meetings and gatherings play a similar role, by allowing important connections to be drawn between the different regions and countries operating in the video game industry. These temporary meetings, often viewed as "organized anarchies" (Bathelt and Gibson 2015), operate in sometimes seemingly chaotic and unpredictable ways, yet have been shown to connect different institutional environments and support the diffusion of ideas and technologies, while at the same time, reproducing institutional differences that exist between regions and/or industrial fields (Bathelt and Schuldt, 2010; Bathelt and Henn, 2014). The video game industry relies on many temporary gatherings of economic agents including international trade fairs, conventions, conferences, and other forms of international meetings or events, many of which are supported by professional associations or independent non-profit networked organizations. The E3 conference in Los Angeles organized by the Entertainment Software Association, or the Tokyo Game Show organized by the Computer Entertainment Supplier's Association and Nikkei Business Publications are fundamental elements that contribute to the interaction between the local and the global in these clusters.

In Montreal, an event such as the International Game Summit, organized annually by the Alliance Numérique, has played a crucial role in driving industry dynamics. Such an event, targeting video games professionals and consumers alike, was initially aimed at the local video game industry, but has increasingly attracted foreign developers desiring to target different market, thus enabling video game actors to structure their international strategy and expand their business overseas. It has also contributed to connect local production contexts with global value chains and has thus helped bring together members of the industry to stimulate dynamics of knowledge generation and exchange in the sector. By reuniting dispersed professionals, such gatherings help build the connections between formal and informal networks of video game companies, studios and publishers, including the different communities of practice that animate creative clusters in many regions. These events serve as "temporary clusters" connecting local production contexts with global value chains, while equally triggering new opportunities for exchanges. They also generate new relations that can be mobilized and transformed into cooperative projects in the future.

From a developmental perspective, these gatherings enhance the overall learning and innovation dynamics within the industry and create particularly important connections between city-regions and between clusters. On the one hand, they connect advanced producers from developing countries with firms in sophisticated industry clusters at a global level, thus generating opportunities for learning and further upgrading over time. On the other hand, they provide opportunities for firms from industry clusters in developing countries to create linkages with each other, thus creating sophisticated knowledge exchange practices and strengthening creative competitive advantages. These periodical congregation and avenues also contribute

to the widespread of common cognitive and interpretative schemes as well as to the homogenization of industrial practices, which can facilitate cooperative work across distance. The video game companies can thus continue to speak a unified language. This is especially important with regards to all the mutations that are impacting the industry and its dominant business models (Johns, 2005; Martin and Deuze, 2009; Swords and Wray, 2010; Burger-Helmchen and Cohendet, 2011, Chantepie *et al.*, 2014; Parker *et al.*, 2014; Planells, 2015).

What all the above developments suggest is that the global connections linking the creative hubs to external environments go beyond simple dyadic relationships from one or several firms to another. Many of these linkages are part of globalized networks, which have clear identities and boundaries and are characterized by a certain form of stability that is not always well captured in the literature, and that offers many advantages, notably against some of the drawbacks and risks associated with distant interactions. Global connections require a lot of time and efforts to be established and maintained, and usually rely on regular communication and interaction to continue to exist (Bathelt *et al.*, 2004). They are not as spontaneous as local linkages, and are often plagued by uncertainty. Yet, when these global linkages are stable over a certain period and allow for the development of trust and fine-grained information transfer, they can trigger the formation of complex cooperative projects across several clusters.

Of course, the development and maintenance of different global linkages within the video game industry has been facilitated by the digital nature of video game content. What we wish to emphasize here is that these distant virtual interactions have been supported by permanent and stable globalized networks, which, overall, have contributed to the formation of several informal communities that cover a global scope and transcend local and national borders by reuniting people and teams from several different national contexts (Coe and Bunnel, 2003; Faulconbridge, 2006, 2010). These de-territorialized networks help overcome the uncertainty related to global linkages, while reducing the time and efforts needed for their establishment and maintenance. They offer shared spaces of meaning, a common identity and mutual resource endowments that can assist their members in their knowledge search and problem solving. In combination with temporary gatherings, these networks can help the formation of trust even if the conditions of co-localization are absent. Such global networks can also help link the members of a cluster to complementary categories of actors that are missing from the cluster, whether subcontractors, service providers and/or virtual global retailers.

5. Discussion: Towards a new framework

The developments above have highlighted the role of core creative clusters in the formation of the video game industry. These specific clusters are creative nodes that build on and from the formal/informal and local/global linkages depicted in the previous sections. Extending the perspective opened by Lorenzen and

Mudambi (2013), we argue, in this contribution, that what enables these linkages to come together is the common ground, which lies at the crossroads of industrial pipelines and personal relationships, and which bridges the two dimensions of interaction (formal/informal and local/global). These linkages complement each other (replacing one another whenever one is less efficient than the other) and nourish themselves from each other, thus contributing to the development of the industry, both locally and globally.

5.1. Reinterpreting clusters as fabrics of ideas

Our perspective offers a renewed way to look at the role of the local in the development of a creative industry such as the video game industry. What characterizes creative nodes, such as London, Los Angeles, Montreal, San Francisco, or Tokyo, is not only the fact that these hubs benefit from the concentration and the attraction of creative enterprises and studios, neither the fact that these hubs have succeeded in gathering and attracting creative individual talents.

Based on our investigations, the key elements characterizing core creative clusters lie in their ability not only to generate ideas, but also to equip them with the sufficient knowledge to make them economically viable and potentially ready to be diffused on international markets. Creative clusters provide the means to transform the informal emerging ideas exchanged through personal relationships into formal outputs exchanged through global formal pipelines. These complex and rich processes cannot be achieved solely through virtual connections or platforms. They require some form of physical presence for people to meet, to share their experience, to participate in instances of validation, to expose their deviant ideas, to receive critics, to be part of collective endeavors, to socialize, and so on (Grandadam *et al.*, 2013).

From this perspective, we can explain why cities, such as Paris, Melbourne, Vancouver or Lyon, despite having all the required components and assets to be at the core of the industry, have remained in the periphery. These clusters benefit from the concentration of video game firms, talents, research facilities and a rich and dense artistic milieu that could have stimulated the sustained and continuous dynamics of innovation. In spite of these traits, these clusters have not succeeded, for the time being, to articulate the local/global and formal/informal dimensions in a virtuous manner, and thus are not clusters 1) which can generate on a permanent basis the core products and outputs of the industry, 2) which can provoke, cope and benefit from disruptive innovations in the domain, 3) which can be resilient to major crises (either at the global industry level or because of the failure of a key local organization in the field), 4) which can develop rich and intense relationships with organizations of other clusters in diverse industries, and 5) which can attract the best talents. Local hubs that benefit from this richness are "fabrics of ideas" that have the potential to build up the foundations of the entire industry.

5.2. Building the global infrastructure of innovation

As one might expect, major creative nodes across the video game industry usually tend to compete against one another. Large studios in Los Angeles, San Francisco, London, Montreal and Tokyo fight hard to get the best critics' recognition for each triple-A game they develop (a game with a marketing budget of several million dollars, which is planned to sell over one million copies). However, beyond these classical forms of competition, these creative nodes share and continuously develop many common features that are constitutive of the video game industry: repeated field configuring events that go from one of these nodes to the other (such as the main IGDA summits and festivals), permanent circulation of talents between these nodes, regular exchanges between top managers of large studios on the future of the rules of the games in the domain, etc. In essence, what these creative nodes share is the building of a global common, understandable by each player of the video game industry, and contributing to shape and orient the evolution of the industry (see Table 3).

[Insert Table 3 about here]

To some extent, this global common is akin to the "infrastructure of innovation" presented by Van de Ven and Garud (1989), stipulating that firms in a given activity need to build a common infrastructure, viewed as a quasi-common good, which allows collective learning and ensures sustainability of the whole industry. This shared common acts as an essential component of the industrial community, which brings together private firms developing similar, complementary, or substitute good or services, with all the other actors in the public and private sectors who contribute to the development of the innovation infrastructure. As emphasized by Van de Ven (1993: 27), "this infrastructure includes 1) institutional arrangements to legitimate, regulate, and standardize a new technology, 2) public resource endowments of basic scientific knowledge, financing mechanism, and a pool of competent labor, as well as 3) proprietary R&D, manufacturing, marketing, and distribution functions that are required to develop and commercialize an innovation". The above results suggest that the nucleus of the video game industry resides on this global common, which plays the role of the infrastructure of innovation in this domain.

5.3. Connecting the global infrastructure of innovation to distant clusters
The global infrastructure of innovation that emerges from the creative nodes contributes to shape and orient the tendencies, the norms, and the business practices of the myriad of actors of the video game industry that are generally regrouped in specialized localized clusters. The evolution of these distant clusters can be interpreted along the theoretical frameworks of international business or economic geography depending on the chosen focus. As an example, the literature on international business has already emphasized the importance for organizations to replicate the intimacy of local networks over long distances (Amin and

Cohendet, 2005). In most cases, however, this literature still adopts a centric view focalized on a single meta-organization. Our perspective is that the specific circuits of knowledge creation and diffusion are not only contingent on the internal organizational architecture of certain meta-organizations (MNEs, strategic alliances, etc.), but also depend on the nature of, and quality of interactions between, different global connections, which constitute a shared common for the overall industry. Many of the global connections in the video game industry, including those emanating from formal and informal communities of knowledge as well as those built from temporary gatherings, are mainly geared toward steering the ideas of organizers and integrators to the most relevant connections, at the global level, in such a way that these connections support the adequate "geographical dispersion" of ideas.

Our observations show that networks and communities act on both the local and global levels and constantly move from the formal to the informal (and vice-versa) in ways that promote open exchanges of ideas and collective problem solving and enhance the development of a professional culture and common practices throughout the whole industry. These interactions facilitate the establishment of different flows between diverse localized communities, ever-evolving networks, and diffused collectives, while integrating new devices linking formal institutions to informal units at the global level. By enabling local clusters and their members to access partly localized and partly globalized knowledge bases, such communities enhance the overall creative capability of the industry.

In conformity with the existent literature, our investigations clearly support the view that global connections can enable creative actors to negotiate, learn, translate and share situated forms of knowledge across different and heterogeneous contexts (Duguid, 2008, Cole and Barberá-Tomás, 2012). We complete this perspective by adding to the knowledge on the functioning and roles of these global connections. Our main findings are illustrated and summarized in Figure 1.

[Insert Figure 1 about here]

6. Conclusion

We have focused, in the present contribution, on what we consider as the main locus for the formation and evolution of the video game industry: a heterarchy of creative clusters (including Los Angeles, San Francisco, London, Tokyo and Montreal) where artistic and technological bodies of competencies are articulated. These core creative nodes are the loci of emergence and formation of most of the breakthroughs of this industry: they are the testbeds for new tendencies, new business models, new computational tools, and new technologies. These core nodes are permanently irrigated by flows of knowledge carried out by global pipelines and by personal relationships. The global pipelines that connect these core nodes to other dispersed clusters may be centralized pipelines orchestrated by flagship firms (Rugman and D'Cruz, 2000) and/or anchor tenants (Agrawal and Cockburn, 2003), or decentralized pipelines connecting high-

technology indigenous firms or MNE subsidiaries that choose to locate in a specific cluster to participate in widespread local knowledge sharing (Lorenzen and Mahnke, 2004). In a similar vein, the personal relationships that connect these core nodes to other clusters may be centralized personal relationships (clans and familial communities, particularly within business networks in the domain) or decentralized personal relationships (such as the multitude of independent diaspora members, who frequently move from one core node to another).

Such a unique ability to bridge the formal and the informal on one side, and, on the other side, the local and the global, allows for 1) the continuous generation of ideas and breakthroughs, 2) increasing attraction of talents, and 3) the permanent combination of value capture with innovation in value creation (which leads to the generation of new tendencies, new genres and new business models that are then diffused to the entire industry).

Another main result of the contribution is the formation of a common infrastructure within the video game industry, which is co-created by the core nodes, and which can be interpreted as an analytical concept that is at the interplay between industrial dynamics and spatial dynamics. This common, which is necessary for the constitution of the industry, offers, in our view, an opportunity to develop strong analytical connections between the disciplines of economic geography and international business studies. As such, we have seen that the success and viability of a given cluster is dependent upon its capability, as a collective actor, to absorb, process and integrate the new knowledge circulating in the networks of global pipelines. In the literature, there is a shared recognition that the success of global pipelines is dependent upon the absorptive capabilities of local firms and their ability to assimilate the knowledge arriving through extra-local linkages. This absorptive capability conditions how well local firms articulate localized and global knowledge processes and tap into external knowledge pools situated outside the cluster they are embedded in. Along these lines, we have seen how global connections and this shared common contribute to collective creativity at inter-organizational and global levels. The informal linkages we observed have supported open exchanges of knowledge, circulation of bricks of ideas and collective problem solving, and have thus played a major role in enhancing the development of a unified professional culture and common practices throughout the whole industry. By enabling local clusters and their members to access partly localized and partly globalized knowledge bases, these informal linkages enhance the overall creative capability of the industry.

Theoretically, our argumentation provides a bridge between the theory of clusters and the literature on collective creativity by detailing how the global geography and organization of knowledge distribution within an industry can influence the creativity of its actors. We advocate for the applicability of the framework developed by Bathelt *et al.* (2004) to analyze the ingredients of industrial creative capabilities and their functioning. This framework stresses the importance of combining local buzz with global pipelines to ensure the efficiency and performance of clusters especially in terms of knowledge management. We

extend this line of reasoning to the level of the industry. The examination of the creative capability of the video game industry proves that the local and global are, in combination, necessary for the efficiency of knowledge creation and circulation and for the management of the paradoxes inherent to creativity. We believe our case is illustrative of the important variety in the ways these articulations are established and maintained and the complexity of the issues they raise.

Of course, any generalization of these results to other industrial contexts would need to consider several limitations and facts.

An important limitation with our argumentation is related to our strong focus on only one of the five main video game clusters. We are fully aware that further studies on other core creative video game clusters would be necessary to complete our perspective.

A second limitation with our work stems from the fact that the core group, which has been composed by the same key nodes for more than a decade, is not bound to be always so. Positions can vary, and the situation of one of the core clusters can deteriorate in time. The increasing commodification of the various technological assets that make up for a video game, the development of new game types (casual games, serious games, etc.), the multiplication of platforms and devices (mobile, online, tablet, etc.), as well as the virtualization of the marketing and distribution of an important part of the video game value-chain have all recently contributed to open new opportunities for newcomers, particularly in Germany, Finland, Poland or Sweden. In a near future, these clusters could very well join the group of core creative nodes (Teipen, 2008; Parker *et al.*, 2014; Plum and Hassink, 2014).

A third limitation with our work arises from the fact that we did not compare the connectivity between clusters of the video game industry with what happens in other industries. Major hubs, whether Los Angeles, Hong Kong and Mumbai in the film industry, Nashville and Detroit in the music industry, or New York and London in the media industry, have emerged and acted as main centers of creativity and innovation in time, generating important local and global spillovers. The video game industry is no different in those regards, as the main creative nodes have acted as essential loci of creativity, which have magnetized, both talented individuals as well as firms and organizations.

A final limitation with our study resides in our focus on the spatial organization of the processes of knowledge creation and circulation. While this focus has helped provide interesting insights on the role of knowledge dynamics, we are aware that many other factors, like the collective and deliberate strategies of firms, for example, can influence the creative capability of an industry.

Additional research is clearly needed in those regards.

References

Agrawal, A., Cockburn, I. (2003). The anchor tenant hypothesis: exploring the role of large, local, R&D-intensive firms in regional innovation systems. *International journal of industrial organization*, 21(9): 1227-1253.

Agrawal, A., Cockburn, I., McHale, J. (2006). Gone but not forgotten: knowledge flows, labor mobility, and enduring social relationships. *Journal of Economic Geography*, 6(5): 571-591.

Amin, A., Cohendet, P. (2005). Geographies of knowledge formation in firms. *Industry and Innovation*, 12(4): 465-486.

Aoyama, Y., Izushi, H. (2003). Hardware gimmick or cultural innovation? Technological, cultural, and social foundations of the Japanese video game industry. *Research policy*, 32(3): 423-444.

Baba, Y., Shibuya, M. 1999. Tôkyô gêmu sofuto kurasutâ (Tokyo's games software cluster). *Kenkyû Gijutsu Keikaku*, 14(4): 266-278.

Balland, P.A., De Vaan, M., Boschma, R. (2013) The dynamics of interfirm networks along the industry life cycle: The case of the global video game industry, 1987-2007. *Journal of Economic Geography*, 13(5): 741-765.

Bathelt, H., Cohendet, P. (2014). The creation of knowledge: local building, global accessing and economic development—toward an agenda. *Journal of Economic Geography*, 14(5): 869-882.

Bathelt, H., Gibson, R. (2015). Learning in 'organized anarchies': the nature of technological search processes at trade fairs. *Regional Studies*, 49(6): 985-1002.

Bathelt, H., Henn, S. (2014). The geographies of knowledge transfers over distance: toward a typology. *Environment and Planning A*, 46(6): 1403-1424.

Bathelt, H., Malmberg, A., Maskell, P. (2004). Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation. *Progress in human geography*, 28(1): 31-56.

Bathelt, H., Schuldt, N. (2010). International trade fairs and global buzz, part I: ecology of global buzz. *European Planning Studies*, 18(12): 1957-1974.

Bresnahan, T., Gambardella, A., Saxenian, A. (2001). 'Old economy' inputs for 'new economy' outcomes: cluster formation in the new Silicon Valleys. *Industrial and Corporate Change*, 10(4): 835-860.

Burger-Helmchen, T., Cohendet, P. (2011). User communities and social software in the video game industry. *Long Range Planning*, 44(5): 317-343.

Cantwell, J. A., Mudambi, R. (2005). MNE competence-creating subsidiary mandates. *Strategic Management Journal*, 26(12): 1109-1128.

Cantwell, J. A., Mudambi, R. (2011). Physical attraction and the geography of knowledge sourcing in multinational enterprises. *Global Strategy Journal*, 1(3-4): 206-232.

Cantwell, J. A. (2017). Innovation and international business. *Industry and Innovation*, 24(1): 41-60.

Caves, R. E. (2000). *Creative industries: Contracts between art and commerce*. Harvard University Press.

Chantepie, E., Michaud, L., Simon, L., Zackariasson, P. (2014). The Rebound of Videogame Industry. *Communications & Strategies*, 94: 9.

Christopherson, S., Storper, M. (1989). The effects of flexible specialization on industrial politics and the labor market: The motion picture industry. *Industrial and Labor Relations Review*, 42(3): 331-347.

Claussen, J., Falck, O., Grohsjean, T. (2012). The strength of direct ties: Evidence from the electronic game industry. *International Journal of Industrial Organization*, 30(2): 223-230.

Coe, N. M., Bunnell, T. G. (2003). 'Spatializing' knowledge communities: towards a conceptualization of transnational innovation networks. *Global networks*, 3(4): 437-456.

Cohendet, P., Grandadam, D., Simon, L. (2010). The anatomy of the creative city. *Industry and Innovation*, 17(1): 91-111.

Cohendet, P., Simon, L. (2007). Playing across the playground: paradoxes of knowledge creation in the videogame firm. *Journal of Organizational Behavior*, 28(5): 587-605.

Cole, A., Barberá-Tomás, D. (2014). Negotiating conventions and creating community: the case of Cartoon and European animation. *Journal of Economic Geography*, 14(5): 973-993.

Dahlander, L., Magnusson, M. G. (2005). Relationships between open source software companies and

communities: Observations from Nordic firms. *Research Policy*, 34(4): 481-493.

Darchen, S., Tremblay, D. G. (2015). Policies for creative clusters: A comparison between the video game industries in Melbourne and Montreal. *European Planning Studies*, 23(2): 311-331.

De Vaan, M. (2014). Interfirm networks in periods of technological turbulence and stability. *Research Policy*, 43(10): 1666-1680.

De Vaan, M., Boschma, R., Frenken, K. (2013) Clustering and firm performance in project-based industries: the case of the global video game industry, 1972-2007. *Journal of Economic Geography*, 13(6): 965-991.

De Vaan, M., Stark, D., Vedres, B. (2015). Game Changer: The Topology of Creativity. *American Journal of Sociology*, 120(4): 1144-1194.

DeFillippi, R., Grabher, G. Jones, C. (2007). Introduction to paradoxes of creativity: managerial and organizational challenges in the cultural economy. *Journal of Organizational Behavior*, 28(5): 511-521.

Duguid, P. (2008). Prologue: community of practice: then and now. In Amin, A., Roberts, J. (Eds.), *Community, Economic Creativity and Organization*, Oxford University Press, pp. 1-10.

Dyer-Witheford, N., De Peuter, G. (2009). *Games of empire: Global capitalism and video games (Vol. 29).* University of Minnesota Press.

Dyer-Witheford, N., Sharman, Z. (2005). The political economy of Canada's video and computer game industry. *Canadian Journal of Communication*, 30(2).

Eikhof, D. R., Haunschild, A. (2007). For art's sake! Artistic and economic logics in creative production. *Journal of Organizational Behavior*, 28(5): 523-538.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4): 488-511.

Faulconbridge, J. R. (2006). Stretching tacit knowledge beyond a local fix? Global spaces of learning in advertising professional service firms. *Journal of Economic Geography*, 6(4): 517-540.

Faulconbridge, J. R. (2010). Global architects: learning and innovation through communities and constellations of practice. *Environment and Planning A*,42(12): 2842-2858.

Giuliani, E., Bell, M. (2005). The micro-determinants of meso-level learning and innovation: evidence from a Chilean wine cluster. *Research policy*, 34(1): 47-68.

Glaser, B., Strauss, A. (1967). *The Discovery of Grounded Theory*. Aldine Publishing Company.

Grandadam, D., Cohendet, P., Simon, L. (2013). Places, spaces and the dynamics of creativity: the video game industry in Montreal. *Regional Studies*, 47(10): 1701-1714.

Hanzawa, S. (2004). The Japanese Animation and Home Video Game Industries. *Japanese Journal of Human Geography*, 56(6): 587-602.

Izushi, H., Aoyama, Y. (2006). Industry evolution and cross-sectoral skill transfers: a comparative analysis of the video game industry in Japan, the United States, and the United Kingdom. *Environment and planning A*, 38(10): 1843-1861.

Johns, J. (2005). Video games production networks: value capture, power relations and embeddedness. *Journal of Economic Geography*, 6(2): 151-180.

Langley, A. (1999). Strategies for theorizing from process data. *Academy of Management Review*, 24(4): 691-710.

Livingstone, I., Hope, A. (2011). *Next Gen: Transforming the UK into the World's Leading Talent Hub for the Video Games and Visual Effects Industries*. NESTA.

Lorenzen, M. (2004). *Localised Learning and Cluster Capabilities: Organization of Knowledge and Constitution of Regional Competitive Advantage*. Edward Elgar.

Lorenzen, M., Mahnke, V. (2004). Governing MNC Entry in Regional Knowledge Clusters. In Mahnke, V., Pedersen, T. (Eds.), *Knowledge Flows, Governance and the Multinational Enterprise: Frontiers in International Management Research*, Palgrave Macmillan, pp. 211-225.

Lorenzen, M., Mudambi, R. (2013). Clusters, Connectivity and Catch-up: Bollywood and Bangalore in the Global Economy. *Journal of Economic Geography*, 13(3): 501-534.

Lorenzen, M., Mudambi, R. (2015). Clusters and Global Innovation: The Role of Connectedness and Connectivity. In Filippetti, A., Archibugi, D. (Eds.), *The Handbook of Global Science, Technology, and Innovation, Chapter 10*, Wiley-Blackwell, pp. 216-227.

Malecki, E. J. (2010). Global knowledge and creativity: new challenges for firms and regions. *Regional studies*, 44(8): 1033-1052.

Martin, C. B., Deuze, M. (2009). The independent production of culture: A digital games case study. *Games and culture*, 4(3): 276-295.

Maskell, P., Bathelt, H., Malmberg, A. (2006). Building global knowledge pipelines: the role of temporary clusters. *European Planning Studies*, 14(8): 997-1013.

Maskell, P., Lorenzen, M. (2004). The cluster as market organisation. *Urban Studies*, 41(5-6): 991-1009.

Miles, M. B., Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage Publications.

Mudambi, R. (2008). Location, control and innovation in knowledge-intensive industries. *Journal of Economic Geography*, 8(5): 699-725.

Mudambi, R., Swift, T. (2012). Multinational enterprises and the geographical clustering of innovation. *Industry and Innovation*, 19(1): 1-21.

Murphy, P., Pauleen, D. (2007). Managing paradox in a world of knowledge. *Management Decision*, 45(6): 1008-1022.

Newman, J. (2013). *Videogames*. Routledge.

Nouri-Nekoei, M., Rantisi, N. M. (2012). The Enduring Significance of Economic Factors for the Attraction of Creative Workers: The Case of Montreal's Video Game Industry. *Northeastern Geographer*, 4(1): 1-16.

Owen-Smith, J., Powell, W. W. (2004). Knowledge networks as channels and conduits: The effects of spillovers in the Boston biotechnology community. *Organization science*, 15(1): 5-21.

Parker, R., Cox, S., Thompson, P. (2014). How technological change affects power relations in global markets: remote developers in the console and mobile games industry. *Environment and planning A*, 46(1): 168-185.

Pilon, S., Tremblay, D. G. (2013). The geography of clusters: The case of the video games clusters in Montreal and in Los Angeles. *Urban studies research*, 2013: 1-9.

Planells, A. J. (2015). Video games and the crowdfunding ideology: From the gamer-buyer to the prosumer-investor. *Journal of Consumer Culture*, 0(0): 1-19.

Plum, O., Hassink, R. (2014). Knowledge bases, innovativeness and competitiveness in creative industries: the case of Hamburg's video game developers. *Regional Studies, Regional Science*, 1(1): 248-268.

Rugman, A. M. D'Cruz, J. R. (2000). The theory of the flagship firm in cooperative strategy. In Faulkner, D. O., de Rond, M. (Eds), *Cooperative Strategy: Economic, Business and Organisational Issues*, Oxford University Press, pp. 58-61.

Salen, K., Zimmerman, E. (2004). *Rules of play: Game design fundamentals*. MIT press.

Saxenian, A. (2006). *International Mobility of Engineers and the Rise of Entrepreneurship in the Periphery*. United nations university. World institute for development economics research (UNU-WIDER).

Schwartzman, H. B. (1993). Ethnography in organizations (Vol. 27). Sage.

Scott, A. J., Storper, M. (Eds.). (2005). *Pathways to industrialization and regional development*. Routledge.

Storz, C. (2008). Dynamics in innovation systems: Evidence from Japan's game software industry. *Research Policy*, 37(9): 1480-1491.

Storz, C. (2012). The diversity of innovation patterns in new industries. In Daniels, P. W., Ho, K. C., Hutton, T. A. (Eds.), *New Economic Spaces in Asian Cities: From Industrial Restructuring to the Cultural Turn*, Routledge, pp. 102-116.

Storz, C., Riboldazzi, F., John, M. (2015). Mobility and innovation: A cross-country comparison in the video games industry. *Research Policy*, 44(1): 121-137.

Swords, J., Wray, F. (2010). The connectivity of the creative industries in North East England–the problems of physical and relational distance. *Local Economy*, 25(4): 305-318.

Teipen, C. (2008). Work and employment in creative industries: The video games industry in Germany, Sweden and Poland. *Economic and Industrial Democracy*, 29(3): 309-335.

Tschang, F. T. (2007). Balancing the tensions between rationalization and creativity in the video games industry. *Organization Science*, 18(6): 989-1005.

Van de Ven, A. H. (1993). A community perspective on the emergence of innovations. *Journal of*

Engineering and Technology Management, 10(1-2): 23-51.

Van de Ven, A. H., Garud, R. (1989). A framework for understanding the emergence of new industries. *Research on technological innovation, management and policy*, 4: 195-225.

Van Maanen, J. (1979). The Fact of Fiction in Organizational Ethnography. *Administrative Science Quarterly*, 24(4): 539-50.

Vang, J., Chaminade, C. (2007). Cultural clusters, global–local linkages and spillovers: theoretical and empirical insights from an exploratory study of Toronto's film cluster. *Industry and Innovation*, 14(4): 401-420.

Yin, R. K. (2013). *Case study research: Design and methods (5ᵗʰ edition)*. Sage Publications.

Yoon, H., Malecki, E. J. (2010). Cartoon planet: worlds of production and global production networks in the animation industry. *Industrial and Corporate Change*, 19(1): 239-271.

Zackariasson, P., Walfisz, M., Wilson, T. L. (2006). Management of creativity in video game development: A case study. *Services Marketing Quarterly*, 27(4): 73-97.

Zackariasson, P., Wilson, T. L. (2012). *The video game industry: Formation, present state, and future (Vol. 24)*. Routledge.

Zaheer, S., Lamin, A., Subramani, M. (2009). Cluster capabilities or ethnic ties? Location choice by foreign and domestic entrants in the services offshoring industry in India. *Journal of International Business Studies*, 40(6): 944-968.

Table 1. Core creative clusters and their key characteristics

	London area	Los Angeles area	Montreal area	San Francisco area	Tokyo area
Cluster specialization	Console	Operations	Console	Operations	Operations
	Mobile	Console	PC	Mobile	Console
		PC	Mobile	Online	
Policy support	Tax incentives on all essential expenditures	-	Tax incentives on salary expenditures	-	-
Cross-fertilization with other industries	Advertisement	Film and entertainment	Computer graphics	Software	Manga and anime
	Design			Venture capital	
		Music	3D and special FX		Electronics
Geographical and cultural success factors	Proximity to European markets	Bridge between North American, South American and Asian markets	Bridge between North American and European markets	Bridge between North American and Asian markets	Proximity to Asian markets

Table 2. Main studios established in the core creative clusters

	London area	Los Angeles area	Montreal area	San Francisco area	Tokyo area
Anchor firms	Eidos (Square Enix) Rocksteady (Warner Bros. Interactive Entertainment)	Activision-Blizzard Disney Interactive Sony Interactive Entertainment Warner Bros. Interactive Entertainment	Electronic Arts Ubisoft Warner Bros. Interactive Entertainment	Activision-Blizzard Electronic Arts Disney Interactive LucasArts Sony Interactive Entertainment	Konami Namco Bandai Sega Games Sony Interactive Entertainment Square Enix
Main local studios	Criterion Games (Electronic Arts) Lionhead (Microsoft) Media molecule (Sony) Playfish (Electronic Arts) Sports Interactive (Sega Games) Wonderland Software (Zynga)	Double Helix Games (Amazon) Heavy Iron Studios Insomniac Games Infinity Ward (Activision-Blizzard) Naughty Dog (Sony) Obsidian Entertainment Riot Games Treyarch (Activision-Blizzard)	Behaviour Interactive Budge Studios Frima Hibernum Ludia (Fremantle Media) Red Barrels	2K Games (Take-Two Interactive) Cryptic Studios (Perfect World) Crystal Dynamics (Square Enix) Maxis (Electronic Arts) Machine Zone Sledgehammer Games (Activision-Blizzard) Zynga	1-UP Studio (Nintendo) ArtePiazza Atlus Game Freak Marvelous AQL Matrix Software Polyphony Digital (Sony) Syn Sophia
Notable franchises	Burnout (2001) Batman (1986,	Warcraft (1994)	Tom Clancy's (1998)	SimCity (1989)	Dragon Quest (1986)

(+15 million copies sold)	since 2009				
		Spyro The Dragon (1998)	Prince of Persia (1989, since 2003)	Diablo (1996)	Final Fantasy (1987)
		Medal of Honor (1999)	Far Cry (2004)	NBA 2K (1999)	Metal Gear (1987)
		Tony Hawk's (1999)	Assassin's Creed (2007)	WWE 2K (2000)	Sonic the Hedgehog (1991)
		Ratchet and Clank (2002)	Just Dance (2009)	The Sims (2000)	Tekken (1994)
		Call of Duty (2003)			Pokémon (1996)
		God of War (2005)			Gran Turismo (1997)
		Guitar Hero (2005)			Yu-Gi-Oh! (1998)
		Uncharted (2007)			Winning Eleven/Pro Evolution Soccer (2001)

Table 3. Significant quotes from our interviews

"People come to chapter meetings to speak with their peers and share their knowledge. It is the same for GDC in San Francisco or for the MIGS here. They show up and they are like 'hey man, I did this and did that and this is how it worked for me so how did it work for you? Am I doing it right or wrong?' They are creative people so they are naturally open and inclined to share what they know. This goes back to the passion and the sense of 'we are in this together'. We are discovering and creating this art form all together." (Interviewee A)

"If you go to GDC or MIGS, there are people competing against each other in the market place. But they go there to share what they know and they know they are going to come back with many things instead." (Interviewee A)

"We are competing on the level of creative expression but with the burden of trying to make our medium work. So, we thought we would take away the burden through sharing and we can be more efficient and compete on the basis of the creative efforts." (Interviewee B)

"People who work in video games are relatively young. They are people who grew up together, made their careers together, but there is a great turnover between the video game studios, so after a while we realize that we have worked with a lot of people and that makes a network that exists on the outside." (Interviewee C)

"Some companies don't want to share their source code and don't want to release nothing. For me they are missing an important element. The value is in the knowledge and the unique ways workers create something. It's normal not share what makes us unique, but we would all benefit from sharing knowledge about what slows us down. It will make us all go faster!" (Interviewee B)

Figure 1. The formal/informal and local/global dynamics of innovation