City Research Online

City, University of London Institutional Repository

Under the Radar: Industry Entry by User Entrepreneurs

Stefan Haefliger, Peter Jäger, Georg von Krogh, ETH Zurich[*]

ABSTRACT

We inductively develop a model of the commercialization process for new products or services user entrepreneurs undertake when entering an industry while drawing on proprietary technology developed in another industry. Extending the growing field of user entrepreneurship, we identify a two-phase approach to industry entry by user entrepreneurs who start "under the radar" of incumbent firms, gain experience, attract a first potential customer base, and then, in a second phase, engage in commercialization. During this process, a community of fellow users is of major importance for the entrepreneur, serving as a knowledge pool for skills development and experimentation with different commercialization paths. We study a nascent group of firms founded by users of video games who became entrepreneurs on entering the animation industry by producing Machinima, a new film genre characterized by shooting film in video games. We explain how user entrepreneurs gain access to complementary assets (video games) for their new use (shooting film), how they deal with intellectual property issues when using other firms' assets, and how user entrepreneurs combine domain knowledge about film production with their experience in video games and the art of Machinima. Our propositions hold implications for management and policy.

Keywords

User innovation, user entrepreneur, market entry, domain knowledge, intellectual property, complementary assets, Machinima.

---

1. INTRODUCTION

Entrepreneurship, conventionally understood, is a process where opportunity recognition precedes prototype development (Venkataraman, 1997; Shane and Venkataraman, 2000). In the case of user entrepreneurship, however, this process is reversed: users first develop prototypes and, while using and gaining experience with the new design, recognize a potential for commercialization of their product[1] or service (Shah and Tripsas, 2007). Thus, user entrepreneurship can be seen as taking a position within a standing debate in entrepreneurship theory about the discovery or creation of opportunities (Alvarez and Barney, 2005, 2007; Sarasvathy, 2001, 2004) by describing entrepreneurial opportunities as created in use. Generally showing traits of user innovators (von Hippel, 1988), user entrepreneurs derive their designs from existing products or technologies. If commercial value is created in a different industry from that in which the original product was located, we should expect new challenges connected to technology diffusion and knowledge recombination (Geroski, 2000). The aim of this paper is to fill a gap in the fast growing literature on user entrepreneurship, by theorizing about the process of user entrepreneurship as users move from one industry to another in order to commercialize. User entrepreneurs face low opportunity costs and exhibit a high willingness to experiment and high potential to explore commercial opportunities by entering existing markets or creating new ones, especially when the target markets are turbulent and demand is uncertain (Shah and Tripsas, 2007). Usually embedded in a community of users with similar needs, user entrepreneurs operate under favorable conditions: the community plays a vital role in diffusing new designs while user entrepreneurs are granted early access to feedback and information relevant to commercialization prior to firm foundation (Shah and Tripsas, 2007).

Examples of user entrepreneurship have been studied in the fields of sporting equipment (Baldwin et al., 2006; Luthje et al., 2005; Franke and Shah, 2003) and juvenile products (Shah and Tripsas, 2007). Both fields present cases where commercialization occurred in the industry in which the original user activity took place. In the case of juvenile products, dissatisfied parents innovated more sophisticated designs, like a stroller that can be used while jogging, which they eventually commercialized after other parents became aware of its superior performance. In the case of rodeo kayaking, users redesigned kayaks to better perform under extremely challenging

---

[1] To reduce complexity throughout the paper, we use the term "product" to refer to products, technologies, or processes.

conditions. In either case, user entrepreneurs developed new concepts on the back of existing products. They demonstrated and promoted their designs in competitions. In scanning for products that satisfied their needs prior to developing their own, user entrepreneurs gained familiarity with the general market structure and the competitive environment of their industry.

Products and services are fungible in their application. They can be modified, developed, or re-interpreted to be used as a tool or basis for new products in another context (Faulkner and Runde, 2009; von Hippel, 1988). User entrepreneurs may shift the use activity from one industry to another or, to put it differently, diffuse technology across industries through different use (cf. Rogers, 1962). Research has so far neglected this important aspect: user entrepreneurs who develop products based on assets from one industry, which they apply as complementary assets in the industry where they commercialize. Based on a study of the Machinima phenomenon, a new animation genre, and a sample of firms started by users, we develop a new process model of user entrepreneurship across industries. The firms in our sample apply video games as production technology for animation and commercialize their films via online distribution or DVD sales in the animation production industry, a subdivision of the motion picture industry. In the 1990s, user innovators started to record their game play and introduced recording technology to video games, transforming their use (Faulkner and Runde, 2009). With the publication of the first Machinima films, shot in video games, the technology became amenable to story telling that extended beyond the story elements contained in the game. User entrepreneurs publish animated shorts[2] using video games as production technology and create opportunities to commercialize from their experience with Machinima. Figure 1 shows the process of user entrepreneurship in two phases as we observe and develop it in this paper, where an initial user innovation in industry A enables user entrepreneurs to enter industry B, in a first phase, under the radar of incumbents and, in a second phase, to commercialize animated shorts based on the new use of a technology from industry A. For example Rooster Teeth Productions, a Machinima firm in our sample, made use of the game *Halo,* produced by Microsoft/Bungie, to create a Machinima franchise[3] called *Red vs. Blue* under which they publish episodes online. Based on their experience and audience gained, they subsequently sold DVDs, sponsorship access, and merchandising.

---

[2]   Animated shorts are the predominant products while (feature) films appeared rarely, especially early on. Throughout this paper, we use the terms film, animation, and shorts interchangeably.

[3]   Walt Disney pioneered this marketing concept evoking various sources of revenue based on their characters (Wasko et al., 1993; Yoon and Malecki, 2009).
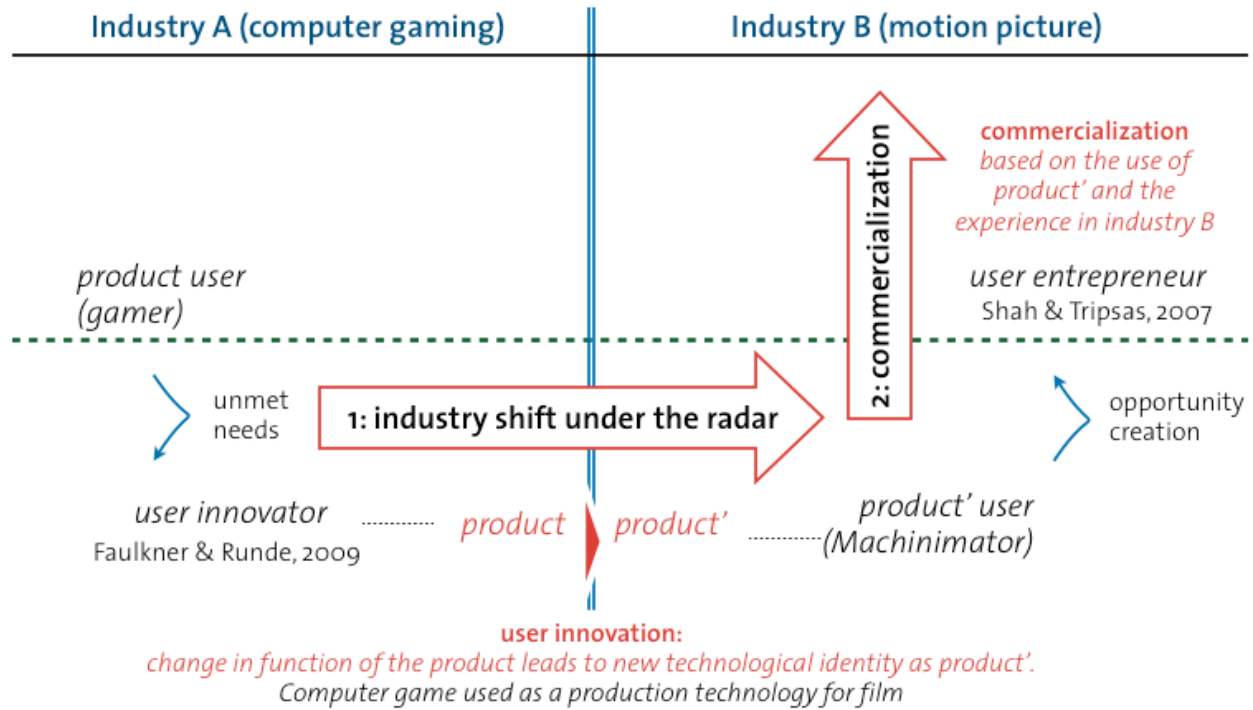
Figure 1: Process of user entrepreneurship in two phases

Products, goods, or services are usually sold or licensed under conditions that restrict their use or application, such as end-user license agreements (EULAs). User entrepreneurs drawing on existing products experience use restrictions as obstacles to commercialization. Relying on third party assets complicates commercialization; intellectual property rights attached to either modified products or assets remain with the original producer and create legal uncertainty for the user entrepreneur (Depoorter, 2009). Companies holding the IP of products affected by such user activity may show tolerance toward the application of their assets (Harhoff et al., 2003); otherwise, permission may be granted through a variety of means, such as research exemption in the field of science (O'Rourke, 2000; Strandburg, 2008), fair use under US copyright law, or the growing practice of (informal) unauthorized use of copyright material (Lee, 2008).

While firms in the industry where the original user activity was located (industry A) may apply and enforce patents or copyright to secure profits in their home market, they might adopt a more lenient position toward others' exploitation of these assets in industries where they do not compete (industry B), especially given the high cost and effort of monitoring and enforcing intellectual property rights (Liebeskind, 1996). Hence, firms may be willing to share selectively

and tolerate the application of specific assets that are core to their "home" market but complementary in other markets, and so provide user entrepreneurs with a foundation to commercialize.

The knowledge needed to commercialize in another industry's markets may extend beyond the knowledge acquired in use and, possibly, beyond the experience available through the community of users (Baldwin et al., 2006). Domain knowledge important to commercialization includes market-relevant education and experience, production techniques, work flows and processes, insights about genres and market demand, and industry-specific marketing knowledge. We study commercialization by user entrepreneurs outside the industry where the products they use originated. This offers new insights into tolerance toward application of IP, opportunity creation by user entrepreneurs in new industries with fragmented markets, and community support across industries. The particular mix of competition, versatility of commercialization-relevant assets across industries, intellectual property rights, and the role of knowledge acquisition raises an important question that we address in this paper: *Under what conditions do users, who apply (selectively shared proprietary) assets from one industry, commercialize in markets of another industry (thus becoming user entrepreneurs)?*

We examine this question in the motion picture industry, which represents an ideal context to study user entrepreneurship, considering Shah and Tripsas' (2007) proposition that markets with high turbulence and demand uncertainty favor user entrepreneurship: besides a huge mainstream market for theatrical film production, several niche markets within the industry are in a state of revolt due to technological advances. Today, major studios show little interest in providing content for the Internet even though there is excess demand for it and customers are willing to pay. Industry analysts have commented that the low profitability of the Internet market, compared to their mainstream business, has meant that major studios have missed the opportunity to develop sustainable business models to serve online customers (Papies and Clement, 2008). This neglect may prove critical as the Internet is gaining in importance as an outlet for media content (Scott, 2004; Yoon and Malecki, 2009). Furthermore, it is till unknown whether theatrical and non-theatrical outlets substitute or complement each other (Eliashberg, et al., 2006). "The development of new delivery systems will in principle open up the market to more effective contestation by smaller independent film production and distribution companies (cf. Leyshon, 2001). Thus, the eventual attainment of film distribution by means of the Internet will no doubt

give rise to a great increase in the amount of cinematic material available to consumers, thereby widening the market and almost certainly making inroads on blockbuster audiences" (Scott, 2004: 58).

The motion picture industry can expect to see new entrants from the video game industry since both industries show similar characteristics and boundaries are blurring (Calantone, et al., 2010; Eliashberg, et al., 2006; Yoon and Malecki, 2009). The animation industry is probably the closest link to the video game industry, in that both share substantial talents (Aoyama and Izushi, 2003; Izushi and Aoyama, 2006). With the increasing digitalization of the value chain, entry barriers to the animation industry are lowering, enabling everyone with a personal computer to participate (Eliashberg, et al., 2006). Internet and animation production technologies overlap (Britton, et al. 2009). Producing animated shorts is considered a point of entry for small studios that might later attract a growing audience. Being able to shift among markets means that these animation studios can eventually move into feature films, as AKOM demonstrated with *The Simpsons* (Yoon and Malecki, 2009).

Our study extends work on user entrepreneurship by defining core constructs and explaining the commercialization patterns of users who create or enter new markets in different industries. Effectual strategies that assume that opportunities emerge when created by an entrepreneur have been positively associated with venture performance (Read et al., 2009). We pay special attention to the strategies users follow to remedy legal uncertainty when applying borrowed assets, the new knowledge they need to acquire, and the support they receive from their community of peers. Based on case studies, we inductively generate a model describing key elements of the strategies user entrepreneurs follow when commercializing products or services in new and economically relevant markets.

After introducing our research design, we describe the relevant cases and present the results of our study in the form of descriptive propositions. We conclude with a discussion of our findings, the implications for research, management, and policy, and outline a future research agenda for user entrepreneurship and strategy.

2. SAMPLE AND RESEARCH DESIGN

Machinima offered an ideal context to explore the research question of this paper because (1) user entrepreneurs could be observed entering the animation industry[4] over the past ten years while the genre was in the process of emerging; (2) the animation industry was traditionally characterized by high entry barriers, leading to "creative" entry strategies; (3) Machinima production involves proprietary software as well as artwork, allowing a nuanced observation of how users manage IP conflicts; (4) users frequently possess advanced gaming skills but need to acquire film production knowledge to sustain a business in the target industry; and (5) users display high variance in their entrepreneurial approaches over time, ranging from product sales to diversification into consulting, software development, and online services.[5]

Our research comprised three phases: case sampling, data gathering, and data analysis. We conducted a multiple, non-embedded case study (Yin, 2003), and gathered data from seven firms within the Machinima community representing the entire population of Machinima-based businesses at the time of this study. We follow an inductive logic to theorize about industry entry and market fragmentation by user entrepreneurs and generate propositions derived from the cases (Cohen, 1980; Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Glaser & Strauss, 1967; Strauss & Corbin, 1990). Theory development on a small sample size has been discussed by March et al. (1991), Eisenhardt (1989), and Siggelkow (2007), while exemplary works with the methodology include Vaughn (1990), Lawrence et al., (2002), and Pervez et al. (2008). Eisenhardt (1989: 545) proposes "a number between four and ten cases to usually work well" and allows for sufficient complexity without creating too much data. Such a sample size allows researchers to describe and analyze the cases in a systematic and methodical manner, leading to thorough contextual interpretation.

---

4 According to the International Standard Industrial Classification of All Economic Activities, Rev.4 (ISIC), software game development (6201) belongs to another industry than motion picture production and distribution (5911, 5912 and 5913, 6020 respectively). The first two digits are sometimes used to denote a specific industry. (See Farjoun, 1994, for a discussion of the relatedness of industries in terms of knowledge, an aspect we use to define complementary assets and show the market entry.)

5 A number of publications (Marino, 2004; Morris et al., 2005; Hancock & Ingram, 2007) cover the topic of Machinima for the general reader.

Sample

The production of animated films used to be restricted to media professionals who could afford the expensive software packages needed. These restrictions led users in the animation industry to produce films with games, inspired by innovative gamers who developed methods to record their game play. Such games are relatively cheap compared to traditional production tools. In addition, most of the in-game assets, like characters and landscapes that resemble actors and scenes, are already available, thus reducing overall production cost and time.[6]

Defined as "shooting film in a realtime 3d environment" (AMAS, see footnote 6), Machinima is (1) a production technology, and (2) the name for the genre. It is deeply rooted in the gaming culture where gamers, early on, experienced the need to record, edit, and distribute proof of their gaming skills on film to demonstrate their proficiency as gamers. Adding story elements to their films (FK—see Appendix for full names and affiliation of interview partners), Machinima users in the animation industry later introduced a new genre that can be clearly distinguished from traditional animation (Mezias & Mezias, 2000; Peretti & Negro, 2007) when they produced low-cost films for themselves or close friends (Morris et al., 2005). The unique characteristics of the Machinima production process enabled users to become entrepreneurs, applying gaming technology in the animation industry as well as related industries, like film distribution and production support. The cases in our sample cover all aspects of the product development and commercialization process.

Every important step in the history of Machinima was initiated and conducted by users who played games and experimented with the Machinima production technology. Some of these users went on to form firms, including Rooster Teeth Productions, the ILL Clan, Strange Company, Machinima.com, Bong + Dern, and Fountainhead Entertainment. Table 1 provides an overview of the samples in this study.

---

6 Estimates of costs alone show that Machinima production amounts to a fraction of animation production. See also an article by
   the BBC http://news.bbc.co.uk/1/hi/technology/7045018.stm (October 26, 2007).

Company	Strange Company	ILL Clan / ESC	Machinima.com	Fountainhead Entertainment	Rooster Teeth Productions	Short Fuze	Bong + Dern
founding year	1997	1997 / 2007	2000	2000	2003	2003	2005
Founder(s)	Hugh Hancock Gordon McDonald	Paul Marino Frank Dellario Matt Dominianni Manu Smith	Hugh Hancock	Anna Kang	Burnie Burns Matt Hullum Geoff Ramsey Jason Saldaña Gustavo Sorola	Dave Lloyd Matt kelland	Chris Burke
Value driver	Consulting/Book	Second Life Media	Web Platform	Music Video/Machinima Tool	DVD/Sponsoring / Merchandising	Machinima Production Tool	Commercial videos
Machinima movies / series	*Ozymandias Eschaton BloodSpell*	*Life Performances Larry and Lenny Tra5hTa1k*	*Pathfinders*	*Zero7 - In the Waiting Line Anna*	*Red. vs. Blue The Strangerhood PANICS 1-800-Magic*	*James Bond: No License*	*This Spartan Life*
Currently producing movies	Yes (to demonstrate capabilities)	Yes	Yes (offering content on their website)	No	Yes	No	Yes
Other non-movie contribution	LithTech Film Producer (Machinima tool)		Forum Webhosting	Machinimation		Moviestorm	
Business with Machinima	Non-movie	Movie	Non-movie	Exit	Movie	Non-movie	Movie
Location	Edinburgh UK	Brooklyn, NY USA	Los Angeles, CA USA	Mesquite, TX USA	Austin, TX USA	Cambridge UK	New York, NY USA
Financing	Bootstrap	Transition to ESC	Advertisement	Self-financed	Self-financed	2.8m USD venture capital	Venture capital/self-financed
Employees	> 2	5 / > 50	8	Undisclosed	6	> 3	2
User Experience	*Hugh Hancock was a Quake Gamer*	*ILL Clan was originally a Quake Gaming Clan*	*(see Strange Company)*	*Game background: affiliation with id Software*	*Avid gamers - did game reviews before (Drunkgamers.com)*	*Produced mobile phone games*	*Halo Gamer*
First release (phase one)	*Eschaton*, 1999	*Apartment Huntin'*, 1997	Platform launched in 2000	*In the Waiting Line*, 2003	*Red vs. Blue* Episodes 1-12, 2003	*James Bond: No License*, 2004	*This Spartan Life*, 2005
Initial commercialization (phase two)	Commissioned machinima based on critical acclaim	Commissioned machinima based on critical acclaim	Advertisement / financed through Strange Company	*Game over* for United Paramount Network	Merchandise for *Red vs. Blue*, 2003	Book publication: Morris, Kelland, and Lloyd, 2005	Commissioned mchinima based on collaboration with the ILL Clan
Revenue model as of 2007	Consulting, book sale	Footage for Second Life (workforce hired by ESC)	Advertisement	Machinima business discontinued	DVD, merchandise, subscription fees	Moviestorm add-on sales through packs	Unclear

Table 1: Sample of Firms for the Cases

Interviewees brought these seven firms, which we later identified as the population, to our attention as predominant examples of Machinima-based commercialization. Thus, we defined "successful" Machinima firms according to informants (Brown and Eisenhardt, 1997). All seven firms had produced Machinima films and won at least one award at an AMAS Film Festival.[7] Three started by producing animation and continued to do so; another three altered their sources of revenue after having produced Machinima; and one firm, Machinima.com, started producing animation later on to supplement their portfolio. Thus, all firms once entered the animation industry. Of the three firms that altered their sources or revenue, one chose to turn away from Machinima. We conducted literal and theoretical replication (Yin, 2003) by considering firms with operations in the animation industry as well as firms that developed alternative sources of revenue different than, but still based on, the Machinima production experience. The fact that user entrepreneurs show a tendency to display their capabilities at championships (Baldwin et al.,

---

[7]   A film festival held by the Academy of Machinima Arts and Sciences (AMAS) dedicated solely to Machinima.

2006), like the annual AMAS Film Festival, provides further confidence that our sample covers the entire population at the time of data gathering.

Within the community, the visibility of Strange Company, the ILL Clan, and Machinima.com was extraordinarily high due to their involvement in the formation of Machinima. Rooster Teeth Productions was the prime example of a firm that generates revenues solely from the production of films and related products common to this industry. Fountainhead Entertainment used to be a Machinima pioneer in producing animation as well as supplying a production tool.[8] It originally focused on a Machinima-centered business and then refocused its activities on mobile phone games. Short Fuze first released the film *Desert Combat: James Bond—No License* in 2004; later, Matt Kelland and Dave Lloyd wrote the first book describing Machinima for the general reader (Morris et al., 2005). As a result of technical problems experienced during the production of their film and their observation of the community's needs, Short Fuze began to develop Moviestorm, an easy-to-use Machinima production tool, for which they received £450,000 in seed funding in 2005, followed by a first round of funding of £950,000 in 2007. *This Spartan Life*, produced by Bong + Dern productions, is an award-winning virtual talk show that received substantial publicity because of its high-profile guests from game companies.

Although the Electric Sheep Company (ESC) hired the workforce of the ILL Clan in 2007, we regard the ILL Clan as a separate entity in our sample for three reasons: (1) the ILL Clan had been producing Machinima since 1997, that is, for most of our observation period; (2) the founders retained their brand and continued to make their existing and new animation products available under this label; and (3) the group continued to produce Machinima for ESC, which operated in virtual worlds such as *Second Life*.

The resulting sample combines all incorporated Machinima businesses that were at least a year old. Their common denominator is the entry of its founders into the animation industry as Machinima users at one point in time, ultimately leading to commercialization. The firms differ in terms of their commercialization activities, financing, size, age, ambitions, and goals. We also included one firm that discontinued its Machinima-related revenue source.

---

8 Machinimation is a real-time 3D filmmaking software add-on representing a modification (mod) of id Software's Quake III Arena.

Data gathering

Data gathering took place in five phases, including both real-time observations and retrospective data (Brown and Eisenhardt, 1997). Desk research delivered insights on how the user community defined itself, who participated, the motives of the different users, and (most importantly) active firms as well as those that had ceased operation. Understanding the phenomenon helped us establish more effective relations with key informants. Hosting Machinima films, we retrieved plenty of information from community websites[9] including the names of the producer, the director, and the year of publication. Moreover, some of the films and credit files provided information about the production process, individuals, and firms involved. Altogether, we read 32 articles, studied a 340-page report on the video game industry, watched more than 100 short films, and browsed roughly 50 web pages to gain a thorough understanding of the phenomenon (for the use of rich information sources, see Vaughan, 1990).

Second, one of the authors participated in a four-day Machinima workshop to conduct field observations and build relations with the Machinima community. The workshop covered the entire Machinima production process and the author created a film to gain first-hand experience of the process.

Third, in November 2006, we identified interviewees from a variety of backgrounds and began semi-structured interviews. This approach allowed us to react to replies and adapt the questions to a candidate's profile. We usually started the interview with questions about an individual's background and education to decide later on whether the interviewee was an objective observer or a key informant on a topic. The initial set of questions, based mainly on desk research, was tested during the workshop. The questionnaire was subsequently refined and tailored to the specific background of each interviewee, based on information taken from online résumés or previous interviews.

Fourth, before entering the second round of interviews we analyzed our preliminary results. Having a general understanding of Machinima and the community that supported it, we focused on user entrepreneurs, some of their legal advisors, user innovators who played an important role during the development of Machinima—people who provided valuable background information, and finally games companies to complement the picture. From February to March 2007 we

---

[9] like www.Machinima.com, www.mprem.com (Machinima Premiere) or www.gamevideos.com

completed seven interviews, one face-to-face, and another six conducted by telephone (see Table A2 in the Appendix for a full list and description of interview partners).

Fifth, another author traveled to New York and Texas and conducted a total of ten interviews and participant observation during a week on site with Rooster Teeth Productions, the ILL Clan, Fountainhead, and an ESC representative. Daily records of working routines, the Machinima production process, and other office tasks were kept; notes were taken while attending meetings, lunch, and evening events (Brown and Eisenhardt, 1997). Five formal interviews were conducted, three of which were recorded on video for later analysis and classroom use. In addition, more than 100 photographs of Machinima working environments were taken during the field trip.

In total we conducted 25 interviews, 21 in English and four in German, each lasting 55 minutes on average. We transcribed 19 interviews (20–30 pages each) verbatim. In addition, we crosschecked relevant information with other interview data or facts from desk research incorporating external links and comments in the text.

Data analysis

We compiled individual case studies, based on the data gathered from the five phases. First, bearing in mind the process of traditional user entrepreneurship from existing literature, the data were pre-screened to derive a common coding scheme (see Appendix). Our interviewees' frequent and unexpected references to IP issues and legal uncertainty indicated that the entire process of commercialization was greatly influenced by the legal aspects of game engine use. Hence, we considered relevant literature in this field to support the coding scheme.

A rough sketch of what industry entry involved supported us in describing the phenomenon to interviewees. We then coded the transcribed interviews using MAXQDA, a software tool for text analysis. While analyzing the interviews, we coded statements in the text, which allowed us to sort and evaluate information. Two researchers working in parallel conducted the coding. After the initial coding, results were merged and the second coder recoded selected interviews, contributing to inter-coder reliability.

Applying an iterative process with an overlap of data analysis and data collection (Eisenhardt, 1989; Glaser & Strauss, 1967), we used the distilled interview data, including the codes and the higher code categories (e.g.: 2 Domain Knowledge, 2.1 Education, 2.2 Work experience, 2.3

Prior Film Production), as well as secondary information, to refine our case studies by gathering additional data whenever gaps were identified during coding. We evaluated the interview data and compared coding of key informants (e.g., director) with objective observers' (e.g., lawyer) views where applicable. We triangulated the findings from the interviews with our observation records (Pettigrew, 1988), independent information gathered from the Internet, image, and video material, and third-party newspaper articles. We produced detailed case write-ups for each firm to cope with the magnitude of data. While structuring and analyzing the within-case data, we checked whether information depicting every construct was obtained for each case. This led us to drop one early construct but to formulate another, enabling further consolidation of the coding scheme. The final case study write-ups facilitated the comparison of all ventures' positions in terms of user entrepreneurship. Searching for cross-case patterns enabled us to extract the general sequence of actions users followed to commercialize their products or services as well as to identify the different stakeholders or stakeholder groups involved in the different phases of the commercialization process (Eisenhardt, 1989). Based on the flow of actions, we derived five propositions and drew up a table summarizing the findings for each (see Table 2). To enhance construct validity, all propositions were compared and discussed in the light of the existing literature. The maintenance of individual case studies during the analysis supported replication across firms. A final working paper was sent to all informants for comments and feedback, which were integrated with the text.

3. TOWARD A PROCESS MODEL OF INDUSTRY ENTRY BY USER ENTREPRENEURS

In this section we present findings on how, in the case of Machinima, users become entrepreneurs who commercialize their products or services based on assets from another industry in a two-phase process. We inductively develop a model from the cases and formulate five propositions (Table 2) to explain user entrepreneurs' behavior and the consequences of their activities (Figure 2, explained throughout the text). We emphasize the interactions between user entrepreneurs and firms that selectively share complementary assets, between user entrepreneurs and their community of peers who exchange knowledge about the application of complementary assets, and between user entrepreneurs and talent from the motion picture industry to acquire domain knowledge. First, we describe the context of industry entry, which occurred in two phases.
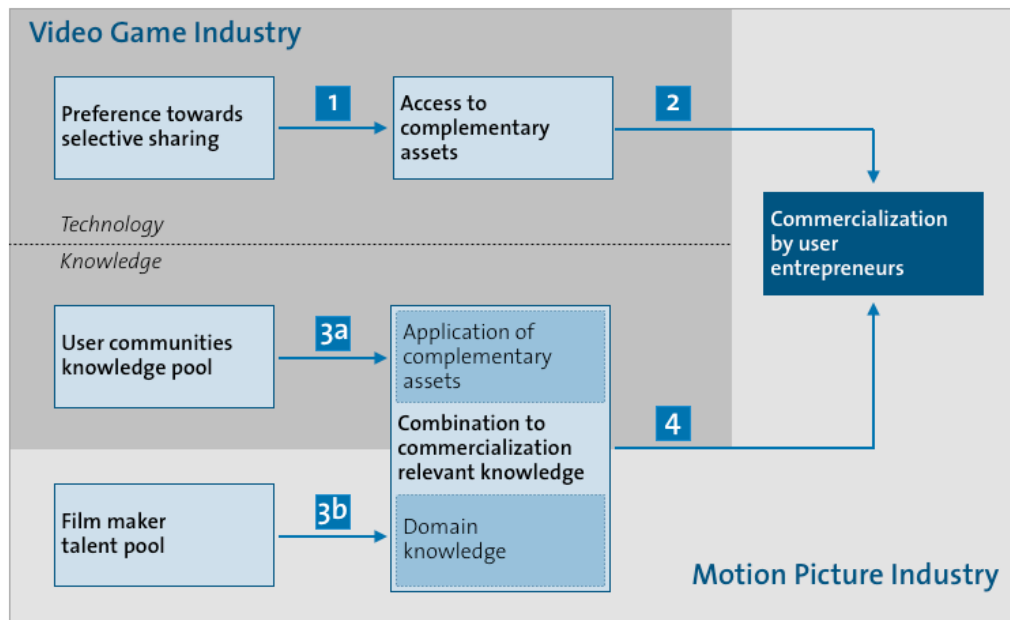
Figure 2: Process model of commercialization by user entrepreneurs across industries

Under the radar of incumbent firms: A two-phase process of industry entry

The first phase of industry entry consists of a lateral move from one industry to another under the radar of incumbents: When first applying video games as tools to produce animated shorts, users emerged from the domain of the video game industry to enter and become producers in the animation industry where they used games as alien production tools—most of them continuing to be avid gamers. Neither companies in the video game nor in the animation industry paid attention to or followed the activities of these "hobbyists" who operated on a very small scale of product development (cp. Depoorter, 2009), which we consider under the radar. At the same time, video game companies were harsh with users who altered or modified video games regardless of the scope of modifications or their commercial intention (AC, CB). The same holds true for film production companies that saw their media assets re-used and or distributed over the Internet.

The following quote from Geoff Ramsey (GR) illustrates how the founders of Rooster Teeth started out to reach an audience from a spare-time activity and moved on to a full-time activity, following the success they achieved in terms of audience and attention received.

> *"Initially we worked in Burnie's spare room in Burnie's house. And it was a small room […] and it wasn't so bad when we were just Burnie and I. But you know, two people*

turning into five people in a room that's maybe […] 250 square feet became pretty cramped, and at some point Red vs. Blue […] became successful enough, where I quit the day job and devoted full time to Red vs. Blue. Burnie eventually did it as well." (GR)

While one might argue that users are not located in a specific industry without commercialization, they nonetheless produce and distribute animation. This compares to cases of open source software, where no commercial intentions may exist but where market share of incumbent software companies is affected. Geoff Ramsey's anecdote provides a typical illustration of the transition from phase one to phase two.

"Machinima was a very cheap way to produce animation or, you know, any kind of narrative, but as it becomes more popular the cost increases. And, unfortunately, the more popular you are the more money you generate … [and the more] bandwidth you're paying for people to be able to watch your series. … So we were always looking for ways to help offset costs. So, I reckon June of 2003, this is around episode 12 of Red vs. Blue, I put a thread in the forums: I said, if I made a Red vs. Blue T-shirt, just a white T-shirt with a logo on it, would you be interested in buying it? And the response was overwhelming. And so I made a T-shirt and people bought it." (GR)

In phase two, user entrepreneurs experimented with various ways to commercialize their ideas. Rooster Teeth introduced merchandising to help offset costs, besides DVD sales, an increasingly popular revenue window in the motion picture industry in times when box office sales do not suffice to break even provided the production costs (Eliashberg et al., 2006; Wasko et al., 1993; Yoon and Malecki, 2009). Table 1 summarizes the activities undertaken by the firms in our sample during under-the-radar entry to the animation industry (phase one) and first opportunity recognition and commercialization strategies (phase two).

It is important to note here is that the user entrepreneurs were the producers as well as the distributors, exhibitors, and the licensees of their own merchandise—roles usually separated along the value chain or at least split into various subdivisions of corporate groups in the motion picture industry. Thus, user entrepreneurs in our case entered several related industries subsequently based on potential business opportunities they recognized during display of their core product, the Machinima films.

Wendy Selzer (WS), of Brooklyn Law School, explained the critical legal situation in which user entrepreneurs found themselves when entering phase two. Here, their foremost concern is the uncertainty regarding a potential legal dispute with the game companies:

"They typically ask that question when they're trying to do … when they move from the non-commercial into the commercial space because another of the factors in the fair use inquiry is whether your use is commercial or non-commercial as well as that somebody is far less likely to sue you if you're just doing non-commercial. Or at once you start making money that they see it as something that they might be getting a cut of. So at that point, you see more of them [user entrepreneurs] asking the question." (WS)

Operating within uncertain legal boundaries, resulting from the copyright restrictions that came with the video games, made access to distribution channels anything but easy. TV networks exerted pressure on user entrepreneurs by passing on the legal clarification regarding copyright infringement (WS). User entrepreneurs in our sample (AK, MK, CB, PM) reported having experienced conservative reactions to Machinima from industry incumbents such as TV networks and film studios. This negative attitude meant they had either to seek alternative sources of revenue or obtain explicit permission from IP holders.

Asset holders' preference for selective sharing of proprietary assets (industry A)

Dependency on video games as complementary assets for animation production (see Teece, 1986) complicated industry entry by user entrepreneurs for a number of reasons. Game engines (movements in 3D space, sound, artificial intelligence, look-and-feel, etc.) and artwork (settings, scenery, characters, skins, textures) represent significant investments by companies in the game industry. Copyright law and EULAs protect these assets, prohibiting any (commercial) application of the acquired video game or the artwork that comes with it. These copyright agreements made it difficult if not impossible for user entrepreneurs to sell their Machinima films directly (see also Marino, 2004; Hancock and Ingram, 2007). Fred von Lohmann (FvL), IP lawyer at the Electronic Frontier Foundation, clarified the difference in copyright for the two main components of a game, the engine and the assets. While copyright on the assets is closely defined and attributed to the creator, the output generated by the game engine is far from easy to classify and thus vulnerable to lawsuits, giving user entrepreneurs little leeway to negotiate with distributors:

"I'm sure a game company would say, 'We own copyrights in all of the graphics that comprise the game, so the character designs, the textures, the landscape arrangements,' you know, all of the graphical elements. I'm sure they would claim that there's a copyright there, and they may also argue that they have a copyright in the engine and the output of the engine is, you know, therefore a derivative work. I think that is a more far-fetched

argument, that argument would quickly lead to the conclusion that Microsoft owns everything that is produced with Microsoft Word, and I think that argument is far fetched but, again, it's not inconceivable. So those are the two elements that are most likely to arise in a copyright dispute: the graphical objects themselves and then the actual … the algorithm—the engine that puts it all together." (FvL)

Using games for animation production thus requires user entrepreneurs to gain legal access to the pertaining assets. Chris Burke of Bong + Dern explained his approach to third-party IP as reaching an agreement with the game company to avoid any risk, despite incurring high transaction costs originating from the negotiations:

> *"Generally the intellectual property rights are always a big restriction, you know, even if the game company is willing to work with you, it's still going to take you six months, sometimes a year to work out something which will allow you to do, what you want to do." (CB)*

Users solved the dilemma of uncertainty in two ways: they either negotiated a contract with the game company who granted use and thus selectively shared game assets for clearly defined purposes, or they remodeled large parts of the game. While the ILL Clan and Strange Company applied specialized tools to "re-skin" avatars and avoid using existing artwork, Rooster Teeth struck a deal, which allowed them to use the artwork from *Halo* for their *Red vs. Blue* franchise. We discuss the advantages and disadvantages of either strategy later. Burnie Burns of Rooster Teeth described their relationship with Microsoft as being grounded in excitement about the possibilities user entrepreneurs discovered, while at the same time showing generosity and interest in a long-term engagement:

> *"[Microsoft] what we found was we found a group of people who really like innovative cool stuff and they saw something that I think they thought was unique and they worked with us and it was really great, it was surprising. I was really amazed and I continue to be amazed at how great they are to us and how much freedom they give us and how long we are able to work with such a big company." (BB)*

Selective sharing by game companies takes different forms: they license assets under creative commons or open source (OS) licenses (such as parts of the *Unreal Tournament* engine released by Epic Games in 1999[10] or the tool set for *Neverwinter Nights* by Bioware); or they close contracts with Machinima producers that allow user entrepreneurs to use the games (engines

---

10 Ports to Linux are available from the Open UT project: http://openut.sourceforge.net/info.php

and/or artworks) for commercial purposes. The game companies' incentives to grant these exceptions to the standard licensing terms include the promotion or advertisement of games through Machinima (AC, BB, FvL, PD). Phil DeBevoise (PD) of Machinima.com reported:

> *"The game publishers recognize this is being a terrific free promotional and marketing vehicle for their games and they are very much, you know, we have spoken to pretty much all of them … are very excited, and very much want to engage the gaming community and have them be, you know, very much invested in their games. Like when they are making Machinima, that's a true act of love and passion. They are working many hours not only playing their game, but they're also making this." (PD)*

Without the game companies' consent, users face the dilemma of producing films without permission to distribute and run legal risks of infringing the copyright or the EULA. To date, no case involving Machinima had been tried in court nor have EULAs with special Machinima clauses spread widely. One game publisher that recently engaged in encouraging its users to produce Machinima under terms of fair use is Blizzard Entertainment, the producer of *World of Warcraft*.[11] In general, the right to produce Machinima under fair use of video games (U.S. copyright law), as users hope, remains uncertain and a sense of frustration about this dilemma is widespread in the Machinima community (voiced by all interview partners).

Another approach was to create large amounts of artwork from scratch. The ILL Clan pioneered this work with their film *Hardly Workin'* for which "we changed the entire look of the game" (PM), accomplished by two members during two years of part-time work. Shooting the film, which involved five people, and integrating the improvisors' dialogs, took a further six months. Creating own assets by modifying the game gave confidence of not infringing any IP rights, as Paul Marino (PM) and Frank Dellario (FD) described:

> *"Quake allowed you to re-skin your characters, that was one of the things that id Software did … that was a very innovative approach to customizing the game and […] we used this feature to do that for our film." (PM)*

> *"Using Quake 2 we then made* Hardly Workin' *which Paul Marino directed and that we created all on our own assets. The only thing we used was the engine. The map, everything we used, we created from scratch, 'cause we said 'Let's get away from other people's IP.'" (FD)*

---

11 http://www.wow-europe.com/de/community/Machinima/letter.html

Four firms in the sample (The ILL Clan, Strange, Fountainhead, Short Fuze) opted for the costly approach of creating artwork themselves. Bong + Dern and Rooster Teeth were the exception, in that they primarily used game assets after negotiating with the game company. Since the contract details between game companies and Machinima producers remain undisclosed, this study cannot conclude whether this involved great cost or whether the companies placed their assets at the disposal of selected user entrepreneurs. However, the evidence shows that support tends to flow from game companies to users, in terms of permission to publish, submit to film festivals, contract work (commissioned Machinima, TV advertisements and game commercials), and feature support. *The Sims 2* features integrated video capturing and Blizzard recently added tutorials for Machinima in *World of Warcraft*. The latest sequel of *Halo* offers a save film feature, which allows players to view and record their game play in retrospect from camera angles they did not use during actual game play. This also demonstrates that the Machinima community, after gaining enough leverage, had a reverse impact on the game companies (compare von Hippel, 1988, on producers who incorporate user innovation).

Thus, we propose (1): *If firms (in other industries) show a preference toward selective sharing of proprietary assets, this positively impacts the user entrepreneurs' access to complementary assets for commercialization.*

User entrepreneurs often first use complementary assets regardless of potential IP infringements (phase one) and *later* recognize an opportunity to commercialize (phase two)—a central finding in the user entrepreneurship process. The failure of asset holders to approve the commercial application of complementary assets may represent a road-block for user entrepreneurs, since access to complementary assets is critical for commercialization, even if access is granted *ex post* (the initial use).

User entrepreneurs' access to complementary assets for commercialization (industry B)

User entrepreneurs need access to a range of complementary assets, including those of game companies, as we discussed in the previous section. We now relate these assets to commercialization. The process of finding and locating relevant assets in the video game industry to match with a story and produce a film is illustrated by Burnie Burns (BB) of Rooster Teeth:

"I think, probably since Red vs. Blue *started, we've never had an idea and then found a game to make the idea work. That's how* Red vs. Blue *started, we had the idea for* Red vs. Blue *and we found* Halo *as the way to do it. Everything else has been where we've had a game with great tools and great Machinima capabilities and then we have found a story to match the theme of the game. We try not to make it about the game but thematically it makes sense, if you are going to have elements in the game already, we want to include them in the story. You can't take a game like* F.E.A.R. *and turn it into a romantic comedy, well you could but you know… It's more of a suspension of disbelief in that case. It's more about just position this. We try to do stories that are believable, within the context." (BB)*

All firms in the sample used and relied on complementary assets such as game engines, tool sets, and artwork stemming from video games, which were incorporated in the production process. In some cases, the artwork even stimulated the innovation process (BB).

Following a different approach, Short Fuze relied on complementary assets they produced themselves: a software product called Moviestorm. The firm's business does not rely directly on the application of game assets but on the user experience associated with them. After seizing the opportunity while active in the animation industry, Short Fuze created a game-like environment for users to shoot films, thus actually supplying complementary assets to users. Matt Kelland (MK) of Short Fuze depicts legal uncertainty as the incentive to create Moviestorm, which substitutes the formerly used video games:

"One of the biggest issues with Machinima is that there is a big debate about copyright issues, because when people are making videos, using games made by professional game companies, they say, well, you know, you're using our sounds, you're using our assets, you're using our animations, our levels and so on. And everybody in the Machinima community is waiting for the first big lawsuit to happen and one of the things we decided was just to move around this by saying, well, we intend to own the engine, the assets, maps and everything so when somebody makes a movie with Moviestorm, they own it. In just the same way that they would own anything they created with Word or Photoshop." (MK)

Fountainhead quickly ceased to commercialize animation despite its access to complementary assets that allowed it to create groundbreaking Machinima early on. Machinima.com stands alone, due to its special role as a web platform supporting the community[12] in various ways, ranging from hosting to education. The remaining four firms, however, lend support to our second proposition by relying on complementary assets for their commercialization strategy.

---

12 Because Machinima.com did not start commissioning films until the end of August 2007, after we interviewed their CEO Philip DeBevoise, we have not considered Machinima.com for some of our propositions.

Thus, we propose (2): *User entrepreneurs' access to complementary assets positively impacts commercialization.*

Proposition two also reflects the two-phase process, since access to complementary assets is provided by user innovators, whom we regard as separate from user entrepreneurs, as well as the game companies' willingness to share these assets.

For completeness, it should be noted that while complementary assets play a crucial role in creating Machinima, they do not replace the creation of original artwork like voice-over and audio effects by user entrepreneurs. The integration of assets, artwork, and potential post-production with the actual shooting requires considerable skill and experience in making Machinima all in areas of domain knowledge, which we turn to next.

Acquisition of new domain knowledge

Critical new domain knowledge for commercialization represents the qualification necessary not only to produce but also to distribute animation shot in video games that appeals to a greater audience. It includes education and experience in cinematography, the creation of a narrative, screenwriting, post-production and editing skills, as well as knowledge of the film business such as marketing, reaching an audience, creating sequels, and sustaining the interest of an audience in film characters and stories—in other words, the creative skills that are crucial to producing any kind of film, including Machinima. The application of complementary assets refers to the users' technical skills at applying and exploiting given features in a video game, such as specialized tools to reshape the appearance of characters, puppeteering, or the capturing of raw video material, basically all functions related to execution.

Friedrich Kirschner (FK), member of the AMAS, explained early approaches to production knowledge exchange as being part of the maturing Machinima community. He describes the interweaving of technology and knowledge about the motion picture industry:

> *"Presenting [Machinima] to the community is less important. […] early on it was about [technology]. That has changed a little today because the community moved to a field that is less concerned with the technology. A few years ago, technology was more central … to consider things from a technical perspective. There were different games one could have possibly worked with. Then pros and cons were discussed, that was definitively important, because back then in the Machinima.com community one didn't come from the game but*

from the wish to produce a movie. And because of that, one could be talked into using another game or at least checking out another game, because it was used as a tool. […] In this regard, Machinima matured a little or at least the community thinks it matured a bit. And this has more to do with how they deal with the newcomers. […] Machinima producers simply don't know anything about the 180-degree rule and cutting and directing in the broadest sense. There, they try to very much catch up and tutorials are written and hints are exchanged and that kind of stuff." (FK, translated from German by the authors)

Knowing each other's work well, users exchanged experiences and opinions during film festivals (AMAS, Sundance, Tribeca, Bitfilm, and others), game conferences, and via online discussion forums (Machinima.com and others). Some even wrote Machinima beginners' books about their specific production knowledge (Hancock and Ingram, 2007; Marino, 2004) or kept regularly updated blogs (FK, PM, FD). Key contributions by community members in the form of tools (Uwe Girlich's Little Movie Processing Center or Friedrich Kirschner's Movie Sandbox[13]) altered the way users worked and frequently facilitated the art of Machinima for new talent. Certain Machinima pieces reverberated inside the community and inspired new work because of their demonstrable feasibility. The way tools were applied was critical for the development process since it would shape the final product and, ultimately, the extent of commercialization. A global community of users sustained discussions about the most effective ways to use tools, both legally and artistically. Chris Burke (CB) of Bong + Dern exemplifies this stimulation of the community with extraordinary contributions:

"Something that really fascinates me is non-narrative Machinima, which is, I guess, what grew out of what used to be speed run and all that stuff [recording of game play]. Things like Warthog Jump. *[…] I think that's fascinating. To me that's something you would never have in any other medium. And some users they watch it and they think, oh it's just some guy messing around, which it is. But there's, I think there's a really … there's like real theory going on behind that." (CB)*

These observations demonstrate that another indispensable aspect of the user entrepreneurship process in this case involved the community of users (Machinimators), which impacted positively not only on domain knowledge from the motion picture industry, but also on the combination of domain knowledge with complementary assets. While the community of Machinimators helped to promote the art of producing high-quality animation and provided the resources to develop and

---

13 http://www.moviesandbox.com/

deepen domain knowledge, it also promoted the integration and application of complementary assets.

Burnie Burns (BB) and Geoff Ramsey (GR) of Rooster Teeth produced the first series of *Red vs. Blue* in their homes while voice actors called in over the phone to contribute their part of the scripts. Later, they recruited friends, some of whom had worked in Hollywood studios, to join the team. Domain knowledge proved crucial when it came to commercialization. Not only did Matt Hullum bring valuable film experience to the team, but the development of the series' characters and epic story elements over 100 episodes, commitment to the web as the preferred channel of distribution, as well as contracts that secured the rights to sell DVDs and merchandise, all represent thorough knowledge about the motion picture industry that few video game users possess.

The case of Fountainhead Entertainment demonstrates the contrary situation. Its founder, Anna Kang (AK), one of the co-founders of AMAS, created groundbreaking Machinima work. Despite critical acclaim, their efforts did not translate to sustained commercial activity in the animation industry, possibly because there was limited industry experience within Fountainhead—their critically acclaimed music video *In the Waiting Line* had been produced with an outside director who was interested in trying new technologies. The other Machinima producing firms in the sample had at least one core member or founder with an education in film or extensive industry experience in film or animation or both.

Despite the importance of domain knowledge, commercializing Machinima seemed to rely on the user entrepreneurs' ability to combine domain knowledge and experience with complementary assets. Users of video games approached animation production in new ways (Lowood, 2007; Marino, 2004) regarding their use of technical tools and cinematography, as Matt Kelland (MK) of Short Fuze commented. The crew at Short Fuze knew that there were important trade-offs when making animation with games or with user experience of gamers. Moviestorm, a game-like animation production environment, caters to users who want to produce Machinima but have little or no film-related education or experience:

> *"As a game player, my preconception is 'I don't have to do anything, the computer just works it all out for me.' And it may not be exactly what I want, but it's good enough and it was easy. Whereas an animator would say, well you have to be able to decide where they*

walk and how they walk and get it all absolutely right, which we say, it actually doesn't matter." (MK)

Our cases demonstrate that a community of users positively impacts on the accumulation of relevant domain knowledge from different industries. We can observe an important distinction between user innovators and user entrepreneurs. User innovators, within a community or by themselves, combine complementary assets (video games) with cinematography skill (e.g. Randall Glass with his film *Warthog Jump*, published in 2002, achieving effects once thought impossible). User entrepreneurs, however, take their animation products one step further and commercialize them in the animation industry. Depending on the user entrepreneurs' origin, the respective other domain knowledge has to be acquired.

To commercialize Machinima, user entrepreneurs need to combine domain knowledge with their skills at applying complementary assets. Consider again the example of Rooster Teeth: the tale of their successful series starts with the discovery of a bug in Microsoft's *Halo* game that allowed them to make their avatars look straight ahead while pointing their guns down. This non-feature enabled the dialogue scenes in *Red vs. Blue*. The deep experience with a video game, the cinematographic skill to exploit this bug artistically to create entertaining products, and the business knowledge of how to market the product need to come together for commercialization. All of our cases show that access to both kinds of knowledge—domain knowledge as well as experience and skills—is necessary for commercialization.

We propose (3a): *The community of users positively impacts on user entrepreneurs' skills at applying complementary assets.*

The ability of all firms to generate revenue could be traced to talent from the motion picture industry, whether by temporary arrangements, hiring, or via the founders. We thus propose (3b): *Access to the talent pool of the target industry positively impacts on user entrepreneurs' acquisition of domain knowledge.*

Note that this finding is compelling in the sense that all but one user entrepreneur followed this course and phase one (under the radar) appeared as a prerequisite for phase two. Understanding how to produce Machinima film and the experience as users of Machinima tools, the insights gained from a community of peers, and the knowledge to be gained in the domain of the animation industry, all contribute to the possibility of entering phase two, commercialization.

In summary, commercialization was impossible, in our sample, without the combined knowledge of the domain of filmmaking and of the application of games as complementary assets to film production. We propose (4): *User entrepreneurs combine domain knowledge with the skills to apply complementary assets to commercialize their products.*

Table 2 gives a summary of the propositions and how they relate to the respective firms, with a short description of how each proposition is supported throughout the cases.

Firm	Strange Company	ILL Clan / ESC	Machinima.com	Fountainhead Entertainment	Rooster Teeth Productions	Short Fuze	This Spartan Life
Proposition 1 *Impact of game companies' preference towards sharing on access to complementary assets*	Use of game engines (e.g. Neverwinter Nights)	Scripting work in *Quake* (LMPC), later engine acquired and creation of own artwork: Low dependence on freely available resources	No direct production of machinima	Affiliation with id Software (producer of *Quake*) and access to development resources	Agreement with Bungie (producer of *Halo* and Microsoft subsidiary until October 2007)	Machinima produced with *Battlefield 1942*, later independent of game companies: Moviestorm consists of entirely new artwork	Agreement with Bungie
Support for P1	+	+	Not applicable	+	+	+	+
Proposition 2 *Impact of complementary assets on commercialization*	Use of existing game engines but creation of own artwork	Use of existing game engines but creation of own artwork	Not applicable	Complementary assets did not lead to horizontal user innovation	Heavy use of existing artwork and game engines for most if not all Machinima	Reliance on in-house complementrary assets (Moviestorm)	Heavy use of existing artwork and game engines
Support for P2	+	+	Not applicable	-	+	+	+
Proposition 3a *Impact of the communitiy on the skills to apply complementary assets*	Pioneering role within the community of machinimators: co-founder of the AMAS	Pioneering role within the community of machinimators: co-founder of the AMAS	Central platform for the machinimator community (distribution and exchange): co-founder of the AMAS	Pioneering role within the community of machinimators: co-founder of the AMAS	Garage approach: outreach only later	Weak link. Investors provide knowledge and industry access	Inspiration and learning from fellow machinimators
Support for P3a	+	+	+	+	+	-	+
Proposition 3b *Talent pool of the target industry as preferred choice for domain knowledge acquisition*	Founders already had the knowledge from the target industry	Founders already had the knowledge from the target industry	Platform attracted members of the target industry to contribute	External director only affiliated for time of project	New team members were hired who worked in Hollywood	Careful balance of management team to include relevant skills	Prior production knowledge from previous engagements
Support for P3b	-	-	+	+	+	+	+
Proposition 4 *Impact of knowledge combination on commercialization*	Education in film and experience in film and audio arts to complement user innovation	Extensive experience in animation to complement user innovation	Growth of the community (machinimators and audience) enabled Machinima.com to reach out	Alliances with film directors, later exit	Motion picture industry experience in the team (e.g. Matt Hullum) combined with user innovation	Moviestorm was designed to enable the simple creation of Machinima by everybody	Education in film and experience in audio arts
Support for P4	+	+	+	+	+	+	+

Table 2: Overview of propositions and grounding in cases

4 DISCUSSION

Our findings relate to the emerging literature on user entrepreneurship which shares with an effectuation view on entrepreneurship theory the perspective that opportunities are created given a set of means (Read et al., 2009), here, the user experience. In this section we discuss where and how our propositions resonate with existing theory or depart from it.

Our finding that industry entry occurs in two phases extends existing work on user entrepreneurship (Baldwin et al., 2006; Shah and Tripsas, 2007) in that it separates the user innovator from the user entrepreneur while describing a coherent process of user entrepreneurship. A user innovator may enable phase one by extending the use of a product or technology (von Hippel, 2005; Faulkner and Runde, 2009), in our case enabling a video game to be used as a tool for animation production. Phase two may evolve without major user innovations if user entrepreneurs draw on an existing innovation for their own use and for later commercialization. Nevertheless, a deep familiarity with the use of the innovation was a prerequisite for commercialization for all entrepreneurs in our sample.

Propositions in the light of existing theory

Proposition 1. Some authors have argued that firms frequently solicit the use of their knowledge assets for a licensing fee (Chesbrough, 2003; Arora et al., 2001). Uncompensated tolerance of asset exploitation has been documented for cases of informal know-how trading (von Hippel, 1987), and in areas where participating firms do not compete directly and find it beneficial to support each other (Henkel, 2006; Dahlander, 2007). User entrepreneurs who deploy proprietary assets depend on the owner's tolerance of the application of these assets for commercialization. Our cases extend previous research on selective sharing and tolerance toward application by demonstrating the potential relevance of assets for user entrepreneurs' entry into commercial marketplaces. They also document a nascent group of firms that contribute to developing a new genre in the industry they enter, which underscores the novelty of their products and the associated risks of IP infringement.

Proposition 2. The innovation literature has so far generated only limited insights into the commercial use of selectively shared assets. We show that selective sharing may apply to different types of asset (game engine, artwork, toolkits, etc.), which in turn represent different trade-offs for the user entrepreneur in terms of gaining access to, or substituting for, the asset. We observe that while user innovators frequently make unauthorized use of copyright work (as described by Lee, 2008), user entrepreneurs display great sensitivity when working with others' copyright-protected work. They either secure owners' explicit permission to create and distribute Machinima using video game artwork, or they completely re-create artwork to avoid conflict over

intellectual property rights. Commercializing with others' assets in a new industry is a facet of the user entrepreneurship process not yet described by the literature.

Proposition 3. An important finding in the user innovation literature is that users tend to organize their innovation projects in communities (von Hippel & von Krogh, 2003; Shah, 2006; von Hippel, 2007). Members of these communities bring their individual domain knowledge to bear on technical problems, share solutions, promote their work, and develop and improve on technology (Franke & Shah, 2003; von Krogh et al., 2003; Jeppesen & Molin, 2003). As users who become entrepreneurs and enter a new industry, the firms in our sample provide a unique opportunity to observe where knowledge is sourced and to distinguish between knowledge of production methods, application or development of complementary assets, and domain knowledge. Little is known about this distinction in the user innovation literature, which is vague about when knowledge emerges from a user community and when it needs to be acquired through hiring, or as part of the founding team.

Within user communities, members share and exchange experience with peers from other knowledge domains (Lee & Cole, 2003; Spaeth et al., 2008). Kogut and Zander (1992) suggested studying how firms combine knowledge from internal as well as external sources for innovation (see also Schumpeter, 1934). Successful innovators need the ability to identify external knowledge as an important input to innovation and commercialization, and must have the capability of combining new and existing knowledge (Alvarez & Barney, 2005; Brockman & Morgan, 2003; Chirico & Salvato, 2008). Users are considered a source of domain knowledge from ideation to complete product development (von Hippel, 1988; 2007; Baldwin et al. 2006; Ogawa and Piller, 2006; Füller et al., 2007); however, production methods are frequently considered proprietary (Henkel, 2006: 962). We identify the types and sources of knowledge combined by user entrepreneurs and propose ways in which a user community provides insights into the production technology for Machinima. By developing and evolving the use of video games for animation production, the community participates in entry into a new industry.

The firms in our sample exchange insights about video games in user communities (Cohendet & Simon, 2007) and hire market insiders to acquire domain knowledge. At the same time, they develop proprietary production knowledge, such as experience in narrative development and plotting, or post-production techniques. Revealing of knowledge by user entrepreneurs depends

on the industry context, in that production tools—the application of game engines for Machinima production—are more liberally shared within the user community than production skills, such as cinematography and story development, key elements for revenue generation in the animation industry.

Proposition 4. When building new ventures in an industry, entrepreneurs need domain knowledge relevant to commercialization (Michael et al., 2002). When entering new industries, domain knowledge about target markets plays a key role in commercializing innovations. The case of Machinima shows that users' experience can translate into an ability to apply tools that serve as complementary assets in a new industry, and that a combination with domain knowledge enables them to commercialize their products. This finding departs from the literature on user innovation and user entrepreneurship, which assumes users' stronghold to be their domain of experience, their access to knowledge generated by their practice as users, as well as their network (Luthje et al., 2005; von Hippel, 2007). Our sample suggests that users' realm of entrepreneurial activity extends beyond the market where initial user innovation could be observed (the video game industry) to include other industries and the creation of new market fragments.

A Summary of Stakeholders and Activities

In exploring the case of Machinima, we studied a new genre and a growing community of film and gaming enthusiasts. Table 3 provides an overview and summary of the stakeholders involved and their activities before and during the phases of commercialization described by our model. User innovation began before the users became entrepreneurs and the stories of their businesses unfolded. Our data cover the beginnings of user innovation in this field and the birth of the genre, since many of the individuals who went on to become entrepreneurs are today considered Machinima pioneers (Paul Marino, Hugh Hancock, Burnie Burns, Anna Kang, and others). They reported their first encounters with the technologies of recording and sharing game play, the creativity these spurred, and the first teams they formed to manage early productions.

In our account of the propositions, some stakeholders' positions were omitted for the sake of brevity. However, more detail about the roles played by the video game companies and the audience may facilitate the testing of our model in other contexts. We convey a comprehensive account of the Machinima case, reaching back as far as possible in its history, to open the

possibility for others to discover and identify nascent markets and industries by recognizing user activity and behavior in terms of knowledge acquisition and re-interpretation of assets.

The columns in Table 3 show critical activities within the two relevant industries, video games and motion picture. The rows follow the stakeholders over time, going from top to bottom, from an enabling phase to user innovation and then to the two commercialization phases covered by our propositions. The relevant stakeholders, apart from user entrepreneurs, include gamers who are forming a community of Machinimators (the lead user community), incumbent firms in the video games industry, and consumers of videos. Shaded cells contain user entrepreneurs' key activities, as described above, and may serve as reference points to compare with other stakeholders' activities.

	Industries / Stakeholders	Video Game Industry (A) Artwork & render engine of game	Motion Picture / Animation (Production) Industry (B)		
			Machinima as production technology (Process) represent *Complementary assets*	Motion picture production skills represent *Domain knowledge*	Machinima films (Product) enable *Commercialization*
Enabling Phase	Video game companies	Offer customizable games under strict terms of use to satisfy customer needs in the video game market			
	Gamers (Lead users)	Experiment with new possibilities and develop skills in handling the game and designing new assets			
User Innovation Phase	User innovators (A) / User (B)	Develop new or modified games by creating new asset base (sometimes referred to as modding)	Re-interpret the meaning of video games to become a complementary asset for animation production resulting in a new production technology: Machinima	Mostly ignorant of cinematography	Produce first game-play recordings mostly to demonstrate the technique without commercial intent Innovate new genre: Machinima
	Video game companies	Stop user innovators from modifying and distributing modified *games* by legal means (cease and desist letters)	Generous, unaware, or careless about the application of their game engines as tools for animation production		
	Lead user community		Users establish Machinima.com as a community platform to disuss their experience. Free revealing of knowledge related to the production technology leads to an improvement of the overall process	Users discuss various topics centred around motion picture production in general to obtain basic domain knowledge about animation production based on Machinima	Publication and exchange of exemplary short films (e.g. Warthog Jump)
Commercialization Phase 1	User entrepreneurs (*under the radar*)		Develop advanced skills and improve process which they still freely reveal and openly communicate to fellow community members	Intensively acquire domain knowlege by either experimenting with the technology (learning through feedback from the community) or hiring people with domain knowledge	**Consistent publication of Machinima series to attract and retain audience; branding; tutorial publications by user entrepreneurs, first attempts at offsetting costs incurred through hardware and bandwidth; attracting venture capital.**
	Lead user community		Supports entrepreneurs with new production technology Establishes official entitiy: AMAS to promote and protect Machinima	Talent from the video production industry discovers the new genre and joins the community previously dominated gamers	Original customer base for entrepreneurial star-ups Provides feedback to new ventures
	Consumers (of Machinima films)			Critical consumption that can result in feedback offered via social software platforms	Provide feedback for further improvement of existing products (innovation relevant feedback like possible story lline changes, etc.) Voice demand for new products and improved business models
Commercialization Phase 2	User entrepreneurs (*becoming visible in the animation industry*)		**Managing legal uncertainty regarding the use of the complementary assets (in-game artwork and game engine use)** **Consult and employ lawyers to assist in negotiations with video game companies**	**Commercialization depends on effective combination of domain knowledge by hiring talent from the motion picture industry**	**Far-ranging commercialization activities from the sale of Machinima to previledged online access as well as diversification into merchandising, consulting, hired work, etc.**
	Video game companies	Maintain strict terms of use for modifications in their home market	Start implementing Machinima tools in games to support Machinima production Provide 'how-to' information and tutorials with games Show tolerance towards application of assets and offer special Machinima licenses	Provide support on online customer community platforms	Enable commercial success by reaching agreements with user entrepreneurs about the commercial use of (their property as) complementary assets Organize competitions among consumers to produce films with their games
	Lead user community		Educate new talent Splits into several sub-communities, Machinima.com as the center of community decreases in importance due to a variety of new platforms and outlets		Joint production on a project basis, sponsored by platforms such as Machinma.com

Table 3: Stakeholder analysis considering the sequence of activities and industries

5. IMPLICATIONS FOR RESEARCH AND MANAGEMENT

Our findings contribute to the literatures on user entrepreneurship and (remotely) strategy, in that we motivate future research on entrants keeping a low profile to overcome entry barriers. Four contributions stand out.

First, a central finding of our study relates to user entrepreneurship. Industry entry by user entrepreneurs could be observed to occur in **two phases** (see Figure 1 and Table 1). This demonstrated that entrants could outmaneuver entry barriers by operating under the radar of incumbent firms before commercializing. Although they were already distributing film, users did not appear as commercial players. Once they had gained a foothold through their audience, users began to commercialize. Their two-phase entry into the animation industry avoided apparent conflict over IP rights by first relying on informal copyright practices (see Lee, 2008), and also avoided large investments in established distribution channels by using the Internet.

Second, our findings contribute to research in **entrepreneurship and effectuation** more specifically. Rooster Teeth produced Machinima in *Halo 1–3*, *Sims 2*, *F.E.A.R.*, and *Shadowrun*. The team' skill in attracting a community of over half a million subscribing viewers and fans resulted in several sources of revenue through their franchises: DVD sales, sponsorship, merchandising with various items, as well as the production of a comic series that features the Rooster Teeth crew as main characters. The comic was available for free through their website and sold in print. The ventures grew around Machinima but developed Rooster Teeth into a web-based entertainment group with artistic products, such as the comic and the communication contents. Rooster Teeth's team learned by experimentally setting up a shop around its brand and around specific characters from its Machinima series. Rooster Teeth's strategy was driven by its creative use of complementary assets. Using another video game led to an all-new series. According to our interviewees, using the team's gaming experience to relate to other gamers in the audience creates customer loyalty and sparks creativity, in terms of customer-generated content on the community site as well as within the Rooster Teeth team (BB, GR). A traditional sitcom around video gaming could fit with the Rooster Teeth's strategy just as well as more Machinima. The point here is not that user entrepreneurs' creativity is unlimited but that their accumulated experience in the production of Machinima, and the gaming culture that the team shares with its audience, are sources of new ideas that can give rise to new opportunities and

ultimately to commercialization. User entrepreneurs search for new applications for assets and skills (their givens) rather than focusing on a predefined target by discarding alternatives, a process that Sarasvathy (2001) terms "effectuation." This process could also be observed in other firms in our sample.

This finding confirms the notion that user innovation rests on the advantage provided by sticky knowledge (von Hippel, 1994) and users' "local" perception of their own and their community's needs. However, it also shows that user entrepreneurs effectively leverage community knowledge for entry into new industries. Studying the user entrepreneur's role in the context of fellow users and consumers echoes the recent call by Rindova and colleagues (2009) to study entrepreneurial activity more deeply to "understand the relationships between change intent and the nature of relationships with other social actors" (2009: 480). We contribute to the body of research on effectuation by delineating the characteristics of a process where entrepreneurs enter a new industry in two phases. Future research may help to predict target industries and entrepreneurial activity based on user innovation and the principal of givens in effectual thought (compare Read et al., 2009).

Third, our theory contributes to a differentiated understanding of the user's role in **technology diffusion**. Users, the Machinimators in our case, have radically changed the use of video games by using them as stage and input for animation production rather than game play. Faulkner and Runde (2009) describe the diffusion of these user-triggered changes in products. Video games contain both technology (the physics engine that creates a basis for the virtual world) and art (the artwork that makes the virtual world visible and allows for the experience of sensations inside the virtual world). The two can be separated, as we demonstrated, and their diffusion follows slightly different paths, given their creators' choices to protect them from exploitation in different contexts. The new context is animation; since the advent of Machinima in the late 1990s, video games have been used for animation production in various ways. Hence, users diffuse technologies across industry boundaries depending on their assessment of the components of the technology, on their own costs of re-creating it, and on the outcome of the negotiations with the owners of the IP rights to the technology, which may in turn be a question of timing.

Fourth, our study raises a few important questions about atomistic versus collective user entrepreneurship and the logic of selective **revealing** (Henkel, 2006). While the user community

of Machinimators was instrumental in diffusing knowledge about the application of video games to animation production, process and business knowledge (sequel and storyline development, distribution channels) were revealed to a far lesser extent. Gamer communities that became Machinima communities preceded commercial efforts, a finding that corresponds to other areas of user entrepreneurship (Baldwin et al., 2006, Shah & Tripsas, 2007). What is new, in our case, is that the choice of industry lies in the nature of the users' activity. We were not observing a few renegade firms that decided to venture into an unknown industry; ours were entrepreneurial users who took innovation one step further and commercialized in the industry most akin to the work they had done: animation. The Machinima community does not discuss game play or extensions of games for gaming's sake but develops ever more sophisticated knowledge that combines the use of games and cinematography, as the quote by Friedrich Kirschner (above) illustrates.

Some limitations apply to this study. First, while the Machinima phenomenon is growing rapidly, generalization of the propositions to areas other than games must be tested in future research. Second, two effects were almost impossible to disentangle and could jeopardize the future applicability of the theory to contexts other than virtual environments: the diffusion of broadband access and advances in distribution technology for media content over the Internet. The popularity of Machinima, and thus the commercial viability of the firms studied, might be connected to the general trend of viewing film over the Internet. Finally, Machinima represents a very recent phenomenon that provides scarce data on the survival of our sample firms (none of which can demonstrate a track record of more than ten years). Game companies could eventually cease selective sharing of engines and tools and venture into the motion picture industry themselves, or the audience could turn away from Machinima. However, given the Machinima firms' diverse sources of revenue, their dependence on game companies is limited. Future research needs to follow up on the phenomenon.

To be continued …

Our analysis covered a number of topics beyond and in addition to the process model, which we cut in favor of length and accessibility (see also Table 3). We thus propose an agenda for future research. Successful industry entry implies a gain in market share by the new entrant at the expense of incumbent firms. To date, Machinima is insignificant compared to the revenues

generated by big players in the motion picture industry. Measuring the market share to justify successful entry thus proves impractical. Machinima represents an emerging genre in film today and user entrepreneurs, entering under the radar, created a new niche in the animation industry, fragmenting existing markets. The new niche is characterized by low barriers to entry, which in turn enable further talent to enter the Machinima market. With the continuously advancing graphical capabilities of video games, the full potential of this market might yet to be unleashed. How this industry will evolve over time, and whether it will capture market share or disentangle from the conventional media markets, remains to be seen. Machinima represents a fertile ground for studying the strategic impact of industry entry and market fragmentation on incumbents as well as new entrants.

The cases demonstrate that learning can occur in phase one, prior to full entry. Hence, important industry entry barriers do not deter user entry and may need reconsideration in terms of their effectiveness for this type of activity (Porter, 1980; Lieberman, 1987). If *de novo* entrants can innovate without entering an industry commercially (users learn by experimenting with products and processes and from peers), learning curve effects could in fact moderate other entry barriers. Opportunity costs of users are rather low, so could offset entry costs, while they rise with commercialization when the user entrepreneur engages in firm foundation. This eventually leads to the question of which entry barriers remain intact during phase one, industry entry, and which during phase two, entry to the commercial marketplace—a question we defer to future research.

Interaction with their customers helped user entrepreneurs to improve their products and correct flaws. Posting Machinima on sites with social software features (such as commenting and rating) allowed user entrepreneurs to read viewers' comments within minutes.[14] Rooster Teeth encouraged short feedback cycles by establishing a dual release structure granting sponsors early access to new episodes. Sponsors' feedback thus enabled the production team to correct flaws prior to the public rollout. Consumer motivation to engage in such activities, as well as the impact of social software features to support these processes, need close examination in order to implement value-adding IT solutions. The nature of this interaction contributes to the continuous blurring of boundaries between the traditionally separated media of film, Internet, and video gaming.

---

14 Season five of *Red vs. Blue* averaged 1,163 comments per episode, the first 50 posts usually arriving within 30 minutes of the episode's release.

Firms in one industry increasingly witness how freely or restrictively shared tools and assets can be used in another industry. This can be both beneficial and detrimental to the core business and thus needs close monitoring. In general, our sample suggests that positive effects dominate for game industry incumbents. Ill-considered handling of IP, whether in the form of a too lenient or too strict position on exploitation of complementary assets in users' target industries, can negatively affect the core business. Game companies might want to take a clear stance and encourage or discourage users from certain practices from the point of product launch. While game companies did this rigorously for their home industry, they largely ignored setting up directives for user entrepreneurs' target industries. These policies can define both the kind of exploitation and possible target industries.

Laws differ about the fair use of IP across countries and create uncertainties for users, as our study confirmed. Users can be frustrated with EULAs and select games based on their availability and flexibility of use. EULAs do not necessarily need to be rewritten, nor will individual contracts and agreements resolve the problem in the long run. Amendments can give certain rights back to users, as happened on Blizzard's *World of Warcraft* site where the company made a 180-degree policy change in 2007 and started to share assets for certain uses selectively. Microsoft issued a similar license in the same year.[15] A recent analysis by Lee (2008) documents the rise of informal copyright practices for user-generated content. This "warming to unauthorized use" (Lee, 2008) includes commercial applications and may, given appropriate and balanced policy (Roquilly, 2010), influence the behavior of both users and entrepreneurs. However, this is an emerging legal practice and the firms in our sample avoided building their ventures on the unauthorized use of copyright work.

Innovation policy needs to take into account the way protected assets can be used across industries. Crucially, the transaction costs to create legal agreements should be lowered so that rights holders have incentives to enter negotiations with prospective entrepreneurs. Today, these incentives frequently point the other way and lead to wholesale decline. Recent Internet technology, such as video compression and distribution, allows new talent to create entertainment products on a broad scale (Eliashberg et al., 2006). Encouraging innovation in this domain calls

---

15 ww.worldofwarcraft.com/community/Machinima/letter.html. An article in *Wired* discussed the license change by Microsoft: www.wired.com/culture/art/news/2007/09/Machinimalicenses

for more flexible and informal copyright agreements, since the current uncertainty may deter user innovators and user entrepreneurs.

REFERENCES

Alvarez, S.A., & Barney, J.B. 2005. How do entrepreneurs organize firms under conditions of uncertainty? *Journal of Management*, 31(5): 776–793.

Alvarez, S.A., J.B. Barney. 2007. Discovery and creation: alternative theories of entrepreneurial action. *Strategic Entrepreneurship Journal* 1(1-2) 11-26.

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

Arora, A., Fosfuri, A. & Gambardella, A. 2001. *Markets for technology: Economics of innovation and corporate strategy*. Cambridge: MIT Press.

Baldwin, C., Hienerth, C., & von Hippel, E. 2006. How user innovations become commercial products: A theoretical investigation and case study. *Research Policy*, 35 (9): 1291–1313.

Britton, J.B.H., Tremblay, D.-G. & Smith, R. 2009. Contrasts in Clustering: The Example of Canadian New Media. *European Planning Studies*, 17(2): 211-234.

Brockman, B.K., & Morgan, R.M. 2003. The role of existing knowledge in new product innovativeness and performance. *Decision Sciences*, 34(2): 385–419.

Brown, S. L., & Eisenhardt, K. M. 1997. The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly,* 42: 1–34.

Calantone, R.J., Yeniyurt, S., Townsend, J.D. & Schmidt, J.B. 2010. The Effects of Competition in Short Product Life-Cycle Markets: The Case of Motion Pictures. *Journal of Product Innovation Management*, 27(): 349-361.

Chirico, F., Salvato, C. 2008. Knowledge integration and dynamic organizational adaptation in family firms. *Family Business Review,* 21(2), 169–181.

Chesbrough, H. W. 2003. The era of open innovation. *Sloan Management Review,* 44(3): 35–41.

Cohen, B. P. 1980. *Developing Sociological Knowledge: Theory and Method.* Englewood Cliffs, NJ: Prentice Hall.

Cohendet, P. & Simon, L. 2007. Playing across the Playground: Paradoxes of knowledge creation in the video-game firm. *Journal of Organizational Behaviour*, 28(5): 587-605.

Dahlander, L. 2007. Penguin in a new suit: a tale of how de novo entrants emerged to harness free and open source software communities. *Industrial and Corporate Change.* 16(5): 913–943.

Depoorter, B. 2009. Technology and Uncertainty: The Shaping Effect on Copyright Law. *University of Pennsylvania Law Review*, 157: 1831–1868.

Eisenhardt, K. M. 1989. Building Theories from Case Study Research. *Academy of Management Review,* 14(4): 532–550.

Eisenhardt, K. M. & Graebner, M. E. 2007. Theory Building from Cases: Opportunities and Challenges. *Academy of Management Journal,* 50(1): 25–32.

Eliashberg, J., Elberse, A. & Leenders, M.A.A.M. 2006. The Motion Picture Industry: Critical Issues in Practice, Current Research, and New Research Directions. *Marketing Science*, 25(6): 638-661.

Farjoun, M. 1994. Beyond Industry Boundaries: Human Expertise, Diversification and Resource-Related Industry Groups. *Organization Science,* 5(2): 185-199.

Faulkner, P., & Runde, J. 2009. On the identity of technological objects and user innovations in function. *Academy of Management Review,* 34(3): 442–462.

Franke, N., & Shah, S. 2003. How communities support innovative activities: An exploration of assistance and sharing among end-users. *Research Policy,* 32(1): 157–178.

Füller, J., Jawecki, G. & Mühlbacher, H. 2007. Innovation Creation by Online Basketball Communities. *Journal of Business Research,* 60(1): 60–71.

Geroski, P.A. 2000. Models of technology diffusion. *Research Policy* 29(4-5) 603-625.

Glaser, B. & Strauss, A. L. 1967. *The Discovery of Grounded Theory*. Chicago, IL: Aldine.

Hancock, H., & Ingram, J. 2007. *Machinima for Dummies.* NY: Wiley.

Harhoff, D., Henkel, J. & von Hippel, E. 2003. Profiting from voluntary information spillovers: How users benefit by freely revealing their innovations. *Research Policy,* 32(10): 1753–1769.

Henkel, J. 2006. Selective revealing in open innovation processes: The case of embedded Linux. *Research Policy*, 35(7): 953–969.

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

Jeppesen, L. B., & Molin, M. J. 2003. Consumers as co-developers: Learning and innovation outside the firm. *Technology Analysis & Strategic Management,* 15(3): 363–383.

Kogut, B., & Zander, U. 1992. Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology. *Organization Science*, 3(3) 383–397.

Lakhani, K. R., & von Hippel, E. 2003. How open source software works: "free" user-to-user assistance. *Research Policy,* 32(6): 923–943.

Lawrence, T.B., Hardy, C., & Phillips, N. 2002. Institutional effects of interorganizational collaboration: The emergence of proto-institutions. *Academy of Management Journal.* 45(1): 281–290.

Lee, G. K. & Cole, R. E. 2003. From a firm-based to a community-based model of knowledge creation: The case of the Linux kernel development. *Organization Science,* 14(6): 633–649.

Lee, E. 2008. Warming up to User-generated Content. *University of Illinois Law Review*, 5: 1458–1548.

Leyshon, A. 2001. Time-space (and digital) compression: software formats, musical networks, and the reorganization of the music industry. *Environment and Planning A*, (33(): 49-77.

Lieberman, M. B. 1987. The learning curve, diffusion, and competitive strategy. *Strategic Management Journal,* 8(5): 441–452.

Liebeskind, J. P. 1996. Knowledge, strategy, and the theory of the firm. *Strategic Management Journal,* 17(Winter Special Issue): 93-107.

Lowood, 2007. *High-performance play: The making of Machinima*. In: Clarke, A. & Mitchell, G. (Eds.) Videogames and art. Bristol: Intellect Books.

Luthje, C., Herstatt, C., & von Hippel, E. 2005. User-innovators and "local" information: The case of mountain biking. *Research Policy,* 34: 951–965.

March, J.G., Sproull, L.S., & Tamuz, M. 1991. Learning from Samples of One of Fewer. *Organization Science,* 2(1): 1–13.

Marino, P. 2004. *3D game-based filmmaking: The art of Machinima.* Scottsdale, AZ: Paraglyph Press

Mezias, J. M., & Mezias, S. J. 2000. Resource Partitioning, the Foundation of Specialist Firms and Innovation: The American Feature Film Industry, 1912–1929. *Organization Science,* 11(3): 306–322.

Michael, S., Storey, D., & Thomas, H. 2002. Discovery and Coordination in Strategic Management and Entrepreneurship. In: M. Hitt, R. D. Ireland, S. M. Camp, & D. L. Sexton (Eds.), *Strategic Entrepreneuship.* Oxford: Blackwell, 45–65.

Morris, D., Kelland, M., & Lloyd, D. 2005. *Machinima.* Course Technology PTR

Ogawa, S., & Piller, F. T. 2006. Reducing the risks of new product development. *MIT Sloan Management Review,* 47(2): 65–71.

O'Rourke, M. A. 2000. Toward a Doctrine of Fair Use in Patent Law. *Columbia Law Review*, 100(5): 1177–1250.

Papies, D. & Clemet, M. 2008. Adoption of New Movie Distribution Services on the Internet. *Journal of Media Economics,* 21():131-157.

Peretti, N., & Negro, G. 2007. Mixing genres and matching people: a study in innovation and team composition in Hollywood. *Journal of Organizational Behavior,* 28(5): 563–586.

Pennington, G. 2006. Television without the TV. *St. Louis Post Dispatch*, February 26: F1.

Pervez, N.G., Tarnovskaya, V., & Elg, U. 2008. Market driving multinationals and their global sourcing network. *International Marketing Review,* 25(5): 504–519.

Pettigrew, A. 1988. *Longitudinal field research on change. Theory and practice*. Paper presented at the National Science Foundation Conference on Longitudinal Research Methods in Organizations, Austin, Texas.

Porter, M. E. 1980. Competitive strategy. Techniques for analyzing industries and competitors. New York: Free Press.

Read, S., M. Song, W. Smit. 2009. A meta-analytic review of effectuation and venture performance. *Journal of Business Venturing* 24(6) 573-587.

Rindova, V., Barry, D., & Ketchen, D. J. 2009. Introduction to Special Topic Forum: Entrepreneuring as Emancipation. *Academy of Management Review,* 34(3): 477–491.

Rogers, E. M. 1962. *Diffusion of Innovations.* Glencoe: Free Press.

Roquilly, C. 2010. The Control Over Virtual Worlds by Game Companies: Issues and Recommendations. *MIS Quarterly*. Forthcoming.

Sarasvathy, S. D. 2001. Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *The Academy of Management Review,* 26(2): 243–263.

Sarasvathy, S. 2004. Making it happen: Beyond theories of the firm to theories of firm design. *Entrepreneurship Theory and Practice* 28(6) 519-531.

Schumpeter, J. A. 1934. *The Theory of Economic Development*. Cambridge: Harvard University Press.

Scott, A.J. 2004. Hollywood and the world: the geography of motion-picture distribution and marketing. *Review of International Political Economy*, 11(1): 33-61.

Shah, S. 2006. Motivation, governance, and the viability of hybrid forms in open source software development. *Management Science,* 52, 1000–1014.

Shah, S., & Tripsas, M. 2007. The accidental entrepreneur: The emergent and collective process of user entrepreneurship. *Strategic Entrepreneurship Journal*, 1: 123–140.

Shane, S. & Venkataraman, 2000. The promise of entrepreneurship as a field of research. *Academy of Management Review,* 25(1): 217-226.

Shane, S. 2000. Prior Knowledge and the Discovery of Entrepreneurial Opportunities. *Organization Science*, 11(4): 448-469.

Siggelkow, N. 2007. Persuasion with case studies. *Academy of Management Journal,* 50(1): 20–24.

Spaeth, S., Haefliger, S., von Krogh, G. & Renzl, B. 2008. Communal resources in open source software development. *Information Research,* 13(1).

Strandburg, K. J. 2008. Users as Innovators: Implications for Patent Doctrine. **University of Colorado Law Review**, 79(46): 467–544.

Strauss, A. L., & Corbin, J. 1990. Grounded Theory Research: Procedures, Canons and Evaluative Criteria. *Zeitschrift für Soziologie*, 19(6): 418 ff.

Teece, D. J. 1986. Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research Policy,* 15: 285-305.

Vaughan, D. 1990. Autonomy, interdependence, and social control: NASA and the space shuttle Challenger. *Administrative Science Quarterly,* 35(2): 225–257.

Venkataraman, S. 1997. The distinctive domain of entrepreneurship research. In *Advances in Entrepreneurship, Firm Emergence, and Growth*, Vol. 3, Katz, J. (ed). JAI Press: Greenwich, CT; 119-138.

von Hippel, E. 1987. Cooperation Between Rivals: Informal Know-How Trading. Research Policy. 16: 291-302.

von Hippel, E. 1988. *The Sources of Innovation.* Oxford: Oxford University Press.

von Hippel, E. 1994. Sticky Information and the locus of problem solving: Implications for innovation. *Management Science,* 40(4): 429–439.

von Hippel, E., & von Krogh, G. 2003. Open source software and the "Private-Collective" innovation model: Issues for organization science. *Organization Science,* 14(2): 209–223.

von Hippel, E. 2005. *Democratizing innovation.* Cambridge. MA: MIT Press.

von Hippel, E. 2007. Horizontal innovation networks – By and for users. *Industrial and Corporate Change,* 16(2): 293–315

von Krogh, G., Spaeth, S., & Lakhani, K. R. 2003. Community, joining, and specialization in open source software innovation: A case study. *Research Policy,* 32(7): 1217–1241.

Waldfogel, J. 2009. Lost on the web: Does web distribution stimulate or depress television viewing? *Information Economics and Policy,* 21(2): 158–168.

Wasko, J., Phillips, M. & Purdie, C. 1993. Hollywood meets Madison Avenue: the commercialization of US films. *Media, Culture & Society*, 15(): 271–293.

Yin, R. K. 2003. *Case study research: design and methods.* Thousand Oaks, CA: Sage.

Yoon, H. & Malecki, E.J. 2009. Cartoon planet: worlds of production and global production networks in the animation industry. *Industrial and Corporate Change*, 19(1): 239-271.

APPENDIX

1 Machinimator Community
   1.1   Personal Relationships
   1.2   Peer Learning
   1.3   Prices / Promotion

2 Domain Knowledge
   2.1   Education
   2.2   Work Experience
   2.3   Prior Film Production
   2.4   Hobby Experience

3 Preference Towards Revealing
   3.1   Engines
   3.2   Assets / Artwork
   3.3   Filming Features

4 Complementary Assets
   4.1   Gaming Experience
   4.2   Social Software Platforms
   4.3   Games / Engines
   4.5   Machinima Tools
   4.6   Assets / Artwork

5 Tolerance Towards Exploitation
   5.1   Licensing / Copyrights
   5.2   Contracts
   5.3   Support / Forums
   5.4   Sponsoring / Festivals

6 Learning
   6.1   Beta- / Pre-Releases
   6.2   Viewer Feedback
   6.3   Accumulation of Experiences

7 Horizontal User Innovation
   7.1   Product (UI-Story)
   7.2   Published Movies
   7.3   Diffusion (Distribution)
   7.4   Related Products
   7.5   Commercialization

Table A1: Coding Scheme

Interview date	Initials	Name	First Name	Company	Country	Profession	Duration [min]	Face to face
Sept. '06	J.B.	Baur	Jonas	Grundy UFA	D	TV Producer	120	x
Sept. '06	K.K.	Kuitenbrouwer	Klaas	Mediamatic	NL		45	x
Sept. '06	D.v.G.	van Gils	Daniel	KmerBlauwLicht	NL		30	x
11.01.07	A.B.	Bailey	Anthony	Amazon	UK		82	
28.11.06	D.R.	Riedel	David	Meowan	D	Student	37	
12.12.06	H.H.	Hancock	Hugh	Strange Company	UK	User-Entrepreneur	35	
28.11.06	J.H.	Hielscher	Jonas		CH	Student	53	
13.12.06	M.J.	Jahrmann	Margarete	HGKZ	CH	Professor	49	x
05.12.06	F.K.	Kirschner	Friedrich		D	User-Entrepreneur	73	
02.03.07	C.B.	Burke	Chris	Bong + Dern Productions	USA	User-Entrepreneur	103	
23.03.07	A.C.	Corcoran	Andrew	EA Europe	CH	VP Strategic Planning	78	x
28.03.07	P.D.	DeBevoise	Philip	Machinima.com	USA	CEO	40	
15.03.07	M.K.	Kelland	Matt	Short Fuze	UK	User-Entrepreneur	42	
13.03.07	H.L.	Lowood	Henry	Stanford University	USA	Lecturer	53	
01.03.07	I.M.	Moon	Ingrid		USA	Consultant	60	
28.02.07	F.v.L.	von Lohmann	Fred	Electronic Frontier Foundation	USA	Lawyer	46	
03.04.07	B.B.	Burns	Burnie	Rooster Teeth Productions	USA	User-Entrepreneur	52	x
27.03.07	F.D.	Dellario	Frank	ILL Clan / ESC	USA	User-Entrepreneur	85	x
04.04.07	M.H.	Hullum	Matt	Rooster Teeth Productions	USA	User-Entrepreneur	29	x
30.03.07	A.K.	Kang	Anna	Fountainhead Entertainment	USA	User-Entrepreneur	51	x
31.03.07	P.M.	Marino	Paul	Academy of Machinima Arts & Sciences	USA	User-Entrepreneur	63	x
05.04.07	J.P.	Paffendorf	Jerry	Electric Sheep Company	USA	Chief Futurist	40	x
03.04.07	G.R.	Ramsey	Georff	Rooster Teeth Productions	USA	User-Entrepreneur	36	x
03.04.07	J.S.	Saldaña	Jason	Rooster Teeth Productions	USA	User-Entrepreneur	30	x
27.03.07	W.S.	Selzer	Wendy	Brooklyn Law School	USA	Lawyer	65	x
02.04.07	G.S.	Sorola	Gus	Rooster Teeth Productions	USA	User-Entrepreneur	28	x
						Count	**25**	**14**

Table A2: Interview Partners