

# PATTERNS OF INTERACTION INFLUENCING INNOVATION IN THE VIDEO GAME INDUSTRY

Hrafnhildur Jónasdóttir

Westerdals – Oslo School of Arts, Communication and Technology,  
Faculty of Technology

## ABSTRACT

*The video game industry (VGI) is a highly creative and fast-paced industry where innovation is a necessity to stay ahead. The innovation processes in the VGI are not rigorously explored and often treated like a “black-box”. Much attention has been towards game design and function, on the product innovation, not on the process. In this paper, patterns of interaction supporting innovation in the VGI are investigated through an engaged scholarship approach through interviews and observations with video game companies and informants in Norway. The findings show there are four identifiable patterns of interaction influencing the innovation process by reinforcing or hindering it. By understanding how the complex VGI environment and its actors interact, the company can increase its innovation capability and thereby its competitive advantage.*

Key words: Innovation process, patterns of interaction, video game industry

## 1. INTRODUCTION

For a company to be competitive in the market today it needs to improve their process and develop new products and services. With increased focus on national and international competition, innovation in companies has received more attention. It is no longer a question *if* companies should innovate, but *how* they should innovate (Figueroa and Conceição 2000; Iden et al. 2013). It is however difficult to recognise how innovation is supported in a company. Although extensive research has been done on the subject of innovation in organisational context and in areas of product development, business models, process and service innovation, less is known about how innovation is reinforced through interaction between internal and external actors (Håkansson 2013; Selander et al. 2010). As innovation rarely comes from one individual, but is often the result of collaboration between teams and companies it seems essential to understand how these interactions influence innovation.

In this paper, Norwegian game development companies and the industry are explored with the intention to understand how patterns of interaction among actors can support or hinder innovation. The literature to date is not comprehensive on the complex dynamics of innovation in game development and industry settings as well as the interaction between actors to support the innovation (Considine and Lewis 2007; Edwards 2000; Edwards et al. 2005; Hotho and Champion 2011; Selander et al. 2010). This leads to the research question addressed in this paper: *What patterns of interaction characterise the innovation process in the Norwegian video game industry?* The exploratory nature of this paper will provide an early attempt at understanding the VGI, how the actors interact and its influence on the company’s innovation process. This is done through an engaged scholarship approach (Van de Ven 2007) with companies and key informants in the Norwegian VGI.

## 2. PRIOR RESEARCH

In today’s rapidly changing markets, companies are forced to respond to the needs and requirements of users. Effective innovation management is thus imperative for the industry. This can only be improved on the basis of a better understanding of barriers to and impediments of this process (Hotho and Champion 2011). By leveraging cooperation with external companies by harnessing the power in the environment, companies can co-evolve their capabilities and roles to create additional value (Williamson and Meyer 2012). The knowledge of interaction processes, their patterns and how these create innovations,

productivity and distribute profit is limited and in some aspects missing (Håkansson 2013). Much of the innovation process in organisations has been treated like a “black-box” according to Fagerberg (2006), leaving what happens inside this box to scholars of different fields to explore. Miles and Green (2008) present the concept of hidden innovation in creative organisations. In their reports for NESTA (2006, 2007, 2008) “hidden innovation” is innovation not captured or recognised by traditional indicators such as research and development (R&D) spending or number of patents. The influence of innovation on organisations and its processes have largely been ignored (Alha 2011; Edwards 2000; Lee 2010). It is therefore important to identify, describe and analyse interactions and patterns of interaction influencing innovation and their consequence for companies, the industry and the society at large (Håkansson 2013).

## **2.1 The Video Game Industry**

The VGI is a highly creative and fast-paced industry, requiring competent and complex teams of programmers, designers, artists, musicians, producers, testers, and project managers (Bygstad and Waal 2013). An increase in demand of video games from all ages has led to industry growth. The video game industries’ economic significance is recognised worldwide (Hotho and Champion 2011). It has changed the way we play, learn, teach and work. Video games are no longer just for kids, but played by people of all ages. The average age of game players in 2013 was 30 (ESA 2013). With the increasing portability of games available on consoles and handheld devices such as mobile phones and tablets, new markets emerge and reaches a diverse user base. Changes in markets and the competitive strategies of large companies have increased the pressure on smaller companies to focus on innovation, innovation capabilities and innovation management (Hotho and Champion 2011). Innovation plays a big part in the long-term success of the video game industry, as game publishers and hardware engineers design products that meet the needs of segments of the population (Wesley and Barczak 2010). However, the innovation process in the VGI is not rigorously explored. Much attention has been towards game design and function, on the product innovation, not on the process (Kultima et al. 2011). Innovation in the VGI, as in many other industries, occur in different areas such as technology, business models, processes, product and management. The challenge being the great difference between companies in how they approach innovation, and if innovation is even a part of the company’s goal or strategy. There are many actors entwined creating dynamic relationships affecting a multitude of areas. Technology is constantly shifting, organizational strategies are changing, and policies are altering the game. Companies in turbulent industries such as the VGI are likely to undergo frequent changes triggered by external opportunity and internal strategic response (Hotho and Champion 2011).

Identifying which factors lead to successful innovation in an industry is challenging and something many researchers have strived to do. There is no one common measure of success, and success is a composite of a number of subjective and objective measures (Balachandra and Friar 1997). According to Balachandra and Friar (1997), four broad categories from marketing strategy can aid in structuring information to provide a better understanding of a phenomenon. These categories are *market*, *technology*, *environment*, and *organisation*. These categories are used systematically throughout this paper with a closer look at the Norwegian VGI.

## **2.2 The Norwegian Video Game Industry**

The video game industry in Norway is small and young with an increasing number of start-up companies that fight to break through and become successful. There is estimated about 100 active game development companies in Norway with a varying degree of production and revenue. This is an increase of 35, 61% since 2012 (Jørgensen 2014). This increase is a result of industry veterans as well as newly educated developers establishing indie companies (small independent companies without significant financial support of a video game publisher or other outside source) with their own productions. With such a rapid growth it becomes evident that competition for market establishment increases and so does the need for new and innovative ideas which are crucial to a company’s survival (Fagerberg et al. 2006). There are many challenges in the Norwegian VGI, not just for the individual companies, but also for the industry as a whole.

### **2.2.1 Market**

The main feature is whether the new product is entering an established market or is an innovative product for which there is no established market (Balachandra and Friar 1997). When it comes to the Norwegian VGI, the market is currently not large enough to satisfy a growing industry. Establishing a strong market with international competition and generating capital through this market is challenging. Marketing and sales are done differently in the VGI as computer games are commercial software, not sold to companies,

but to individual gamers in a global market, at retail prices. Success is mainly measured in number of copies sold, preferably in millions (Bygstad and Waal 2013). Meeting customer needs both nationally and internationally is challenging. Supply and demand in this industry is very difficult to predict (Jørgensen 2009) and when it comes to analysing the market it usually leads to small, incremental innovations rather than major innovations (Balachandra and Friar 1997).

### 2.2.2 *Technology*

In the VGI, technology provides tools for both development and distribution of games. Game consoles experience an accelerated rate of technological change, such as processing power, peripherals and user interface. The development practices and processes have been influenced greatly by the digital revolution (Bakhshi and Mateos-Garcia 2010). New forms of distribution through the internet becomes a necessity for Norwegian game developers so they can reach out to national and international markets where they can earn enough money to be self-reliant (Jørgensen 2013). In a small market like Norway, creating their own distribution and publishing platform is vital as many games are published in Norwegian and thus do not reach the international market. This results in more control over distribution and ownership of the company and their product (Jørgensen 2009). New funding platforms such as crowdfunding through Kickstarter (Kickstarter 2014) and early access on Steam (Steam 2014) provide sources for additional income as well as verification from users and the market throughout the development process.

Successful product development depends on the degree of innovativeness (Balachandra and Friar 1997). The more innovative the product the higher the risk of failure. Many incrementally innovate to avoid this and to meet the customer demand. An important part of the computer game industry is also linked to the development and sale of electronic components such as video game consoles and graphics cards, with a very close connection between the development of hardware and software in all areas of the industry. The connection between hardware and software also emphasizes that the games industry is not a unified industry, but consists of different industries with different technological and economic solutions (Jørgensen 2009). The software (game) determines what consumers are going to play; the hardware (console, PC etc.) determines how they play it.

### 2.2.3 *Environment*

The environment consists of a number of different aspects, such as political and social factors, public interest in the product, and social acceptability of the product (Balachandra and Friar 1997). In a white report from the Parliament (2007-2008), an initiative to strengthen the VGI in Norway is expressed, but with a focus on Norwegian culture and language aimed towards children and young adults. One of the main public funding organisations, the Norwegian Film Institute (NFI), operating under the Ministry for Culture, provides as much as 75% funding for game development as long as the product meets three of the four criteria for a cultural product (NFI 2014). Small start-up companies benefit greatly from the financial support from NFI as it provides enough capital to get started (Jørgensen 2013).

Another financial actor is Innovation Norway, which is currently the agency gaming companies often turn to for additional and more market-oriented support. Innovation Norway has various schemes that contribute to innovation and the development of competitive enterprises in the Norwegian sector (Jørgensen 2013). These two organisations together provide game development companies with enough capital to begin production, though not enough to become self-reliant. This requires a sustainable income and investments and is what many game developers struggle with. Interacting with users is a large part of the video game industry not only as knowledge providers, but also as financial supporters through social media platforms such as crowdfunding, wiki/forums, blogs and playtests, the companies interact with users, receive funding and valuable information pertaining to interest of the product. Kickstarter is an example of such a platform, a funding platform for creative projects (Kickstarter 2014). Every project is independently crafted while friends, fans and total strangers offer to fund them in return for rewards (Moreau 2014). Another form of interaction happens through usability testing, which is a critical part of the R&D process as video games are interactive artefacts, and consumer satisfaction and technical performance are not established until tested by users (Bakhshi and Mateos-Garcia 2010). Though many authors have analysed the difficulty of getting good information on customer needs for innovative products in potential markets because customer preferences may not be known by the customers themselves (Balachandra and Friar 1997).

### 2.2.4 Organisation

The Norwegian game industry is mostly comprised of small companies with an average of 5-10 employees (Jørgensen 2014). The teams often work in open workspaces providing ease of communication among the different team-members and visual stimulation through artwork and models (Nandhakumar et al. 2013). There is often a twin leadership between the director (responsible for the game product) and the producer (responsible for the project), who will have to work out the compromises between economic and artistic priorities (Bygstad and Waal 2013). Cadin and Guérin (2006) state that any organisation that intends to innovate and benefit from its innovations need to act organically to stimulate innovation in an efficient manner, but also act mechanistically to be able to make use of its innovations. This creates conflicting interests between management and developers where the creative dimension and routines for commercial utility collide (Hotho and Champion 2011). The companies work iterative to experiment with new ideas and produce or modify technologies necessary to deliver them (Bakhshi and Mateos-Garcia 2010).

### 2.3 Summing Up

From the prior research, it is shown that there are four important categories, *market*, *technology*, *environment* and *organisation*, which aid in structuring information to understand a phenomenon. These categories have been used here to structure information pertaining to the Norwegian video game industry showing specific challenges to the industry. What is unclear in previous research is how such a creative and volatile industry deals with the interaction processes, their patterns and how these create innovations, productivity and distribute profit. Further, this paper will present the applied methodology in chapter 3, and thereafter chapter 4 presents my findings. Chapter 5 presents the discussion and chapter 6 the conclusion and thoughts for further research.

## 3. METHOD

For the purpose of this project, an exploratory qualitative study was done in order to obtain as much data as possible within a complex subject over a short period. The research question *What patterns of interaction characterise the innovation process in the Norwegian video game industry?* requires an approach where the data reveals a problem in need of further research. The engaged scholarship approach was chosen for this purpose. It is a participative form of research for obtaining the different perspectives of key stakeholders (researchers, users, clients, sponsors, and practitioners) in studying complex problems (Van de Ven 2007).

### 3.1 Data Collection

Data was collected through semi-structured interviews with several informants in the Norwegian video game industry and observations were done at two of the four companies where notes were taken and questions were asked during the observation. Semi-structured interviews were completed with management on two or more occasions with each company. As seen in Table 1, the first step in the data collection process was to identify which video game companies were currently most active in Norway. Active in this context was defined through information from the Brønnøysund Register, a Norwegian government digital register, the Norwegian Film Institute (NFI), and Joingame, a national resource network funded by the Norwegian Research Council, which gave an indication of funding amount, times funded, years active, profitability and membership status in Joingame. By crossing this data, a list of most active companies as of 2013 was generated. An email was then sent to the top ten companies as well as approaching the ones attending the Norwegian game expo, Spilleexpo. Interviews and observations were then done with the companies and informants interested in the study. This was done in intervals during fall 2013 and spring 2014.

<i>Step</i>	<i>Description</i>	<i>Output</i>
1	Generate list of most active video game companies in Norway	List of most active companies
2	Send general mail to potential video game companies	
3	Attend Spilleexpo to talk to Norwegian indie game companies	Summary
4	Interview key people in the companies contacted and other relevant informants	Transcripts
5	Observe companies during work on game projects	Field notes

Table 1 Steps to data collection

### 3.2 Case Selection

The four companies selected for this study were from the list of top ten most active companies in Norway at the time as described in the above section. They are of different sizes and with vastly different projects. This provided the study with a broad base of information that could give a broader visual of the industry rather than having very similar companies in the selection.

Company A is a small independent game development studio founded in 2002 with more than 15 employees working on a range of video games for several platforms such as mobile, PC, XBOX, Playstation and Nintendo. The studio has released more than 10 games and are currently working on two new games. They have received funding from NFI about seven times and in the total amount of about 7 000 000 NOK.

Company B is a small independent game studio consisting of a team of around 10 people varying from project to project. The company was founded in 2009 and has released one game for the iPad so far with two games in the making. They have received funding through NFI 7 times in total about 4 000 000 NOK.

Company C is a small independent game studio with seven employees and was founded in 2010. They have released two games on PC, Android and iOS and are currently working on one new game. They have received funding from NFI two times in the total amount of about 400 000 NOK.

Company D is a small independent game studio founded in 2012. There are about 12 people that make up the core of the company and several hired for work on specific projects. They have yet to release a game, but have two in the making. They have received funding through NFI four times in the total amount of about 4 500 000 NOK.

### 3.3 Data Analysis

Field notes and transcribed interviews were analysed using data displays (Miles and Huberman 1994) and findings were discussed with informants to gain practical understanding of a complex topic in accordance to the engaged scholarship method (Van de Ven 2007). The five steps shown in the table below were followed to analyse the data material and answer the research question. The interviews were transcribed and the field notes summarised. The text was then placed in tables and coded to identify similarities and differences among the responses. These codes were then conceptualised and arranged into the four broad categories revealing the patterns of interaction.

<i>Step</i>	<i>Description</i>	<i>Output</i>
1	Summarise data from interviews and observations	Initial matrix
2	Code interviews and observations	Table with key points
3	Draw concepts from code	Groups of data
4	Create broad categories from groups of data	Early theory
5	Elaborate theory with explanations in subject area	Patterns of interaction

Table 2 Steps to data analysis

## 4. FINDINGS

This section presents the findings from the interviews and observations done. The four categories of *market*, *technology*, *environment* and *organisation* are used to categorise the findings.

### 4.1 Market

The greatest challenge in the Norwegian video game industry is generating capital and establishing a strong market with international competition. Observing market trends and the success and failure of other companies can provide the game development companies necessary information to make decisions on unknown factors. As the market moves quickly it becomes important to pay attention to what works, how it works and understand why it works. In this study, the companies observed other companies, which give indicators to what the market wants and how to successfully market the products to potential users through for instance a crowdfunding campaign. As one of the project managers stated:

*“We learn from others' mistakes.”*

One of the CEOs stated:

*“There is also a lot of networking on social media platforms where we discuss everything from business models, technology choices, good and bad partners. Then we learn from one another.”*

The Norwegian VGI is small, consisting of small indie companies with little impact on the international market. To become a viable industry, the companies need to provide games that create international interest. One programmer stated:

*“I follow a lot of what's going to happen and when the new consoles come out, and what I hope is that we here in Norway may be included in the new console generation. Right now we are not a part of it and we are currently very far behind absolutely everyone in the industry so we'll see if we can come up with a whole new generation. Try to be more relevant in the market.”*

## **4.2 Technology**

Technology in the video game industry is vast and ranges from tools to develop games to the technology displaying the game. In this case, technology is split into two broad categories; development platforms and console platforms. A development platform as mentioned here is a middleware used to develop a game. The findings show that many companies develop their own technology in combination with mainly Unity as a platform. As tools for developing video games have become less expensive and more user friendly, many companies invest in middleware which is suitable for their purpose and create modules to customise its use. This provided that the standardised platform is flexible at its core allowing external modules to interact. As one project manager stated:

*“When it comes to technology we buy all of the tools through Unity. But then we find something that is not made before, then we must make it.”*

The CEO of one company presented their own development platform, which had been their main tool for a decade, but stated that an integration with a middleware was planned in the near future.

*“We created a framework that is modular. We have added more as new technologies have come with new platforms and features. The platform is extremely stable, compatible and with little bugs. It worked perfectly, but we see that we cannot get things instantly up and running such as Unity with immediate results. Our next innovative step in technology development is to create a parallel project with Unity and see how we can make it compatible with our existing tech. If we get it to work then the doors are open and we can achieve anything!”*

A console platform is a device that outputs a signal to display a game, such as PlayStation, Xbox and Nintendo, but also PC and mobile platforms. The console platforms set the standard for what video games can do. Findings show that when new consoles or technologies are introduced to the market it provides innovation possibilities for the game developers.

*“Innovation to me means that you get access to new technology that can be used, such as Oculus Rift that has managed to innovate and create something new. New consoles enables developers to do new things.” – Programmer*

*The vast amount of consoles from PC, Playstation, XBOX, and mobile, reaches a larger user base from casual to seasoned gamers and provides an increased room for innovation.*

## **4.3 Environment**

The environment in the video game industry consists of several external and internal actors that interact and affect each other. This section is therefore split into three sub-categories: users, game development companies, and government and financial institutions.

### **4.3.1 Users**

The term users is a wide term covering different groups of people. In this case, a user is a consumer and gamer. The findings show that involving users in the development process is challenging. The companies find it difficult to distinguish between quality information important to the product and “white noise” which has little or no value for the product in the end. Platforms such as forums, wikis and social media provide

game developers with indicators of what works and what does not, but the amount of data provided by users can pose a problem, as analysis can be time consuming. In order for this type of information to become useful for a company, it needs to dedicate a large amount of time and resources to gather and analyse the data. This is not always profitable and the data is not always reliable. Another way the companies gather information through users is by involving them in the research and development phase where tests, such as alpha- and beta-test, provide indicators of what works and what can improve in the game. A programmer stated:

*“I think companies listen to players, but as a company you have to be very careful because players normally don't know what they really want and the players that scream are normally the ones that are unhappy. So you might follow their opinions, and alienate everyone else.”*

Crowdfunding through platforms such as Kickstarter and early access has quickly become a popular way of generating additional income over night. The users invest both time and money into projects they want to see finished and this investment gives the backers a personal relationship with the development company. This influences the production as a sense of obligation towards the backers is created through this relationship. However, according to one of the game directors crowdfunding might be reaching its peak as less users are backing projects and now are waiting to see results from the developers.

*“Crowdfunding has invested a lot in the gaming industry, but there has not been many products released yet. The crowd wants to see results, but it often takes one to two years before the games are finished ... so the crowd becomes disappointed and will not invest in new projects.”*

One of the project managers stated that this might not be the case as there is an increase in projects and the backers become more spread.

#### 4.3.2 Video Game Companies

There is a strong collaborative culture in the game industry both internally in the company as well as externally. In the Norwegian game developing industry, companies and individuals share knowledge, technology and resources. As the Norwegian video game industry is small, the companies develop quite different games and therefore are often not in direct competition. This might alter as certain companies become more established and gain higher market positions.

To strengthen the industry, the companies seem to share knowledge and resources. One of the companies in the study hired another game development company to work on their project to increase the skills and knowledge in a specific department. Another company openly encouraged employees to work on external projects on their own time as it benefited the company in the long run through increased knowledge and skills. As stated by the CEO of one of the companies:

*“An idea is not worth anything unless it is used by others.”*

A programmer stated as well:

*“It's a strange situation; we must help each other to kick start the industry in Norway.”*

Outsourcing parts of the production such as animation, sound, testing and localization is common as it is less expensive and enables the company to benefit from external competence. This is a pure hire for skill job, freeing up valuable time and resources in the company, which directly applies to the project. Though it was expressed by several of the companies that they would prefer to have most, if not all, resources in-house.

#### 4.3.3 Government and Financial Institutions

The Norwegian VGI struggle with establishing a strong market with international competition, which can generate sustainable profits. Despite public funding programs such as NFI and Innovation Norway, it is still a struggle to generate enough capital to fund an entire project. The amount the subsidy scheme granted by NFI is meant to cover the initial start-up phase of a project, from idea to finished prototype. To fund the remainder of the project to release, the companies need to invest time and resources to raise capital through private investment and external investors.

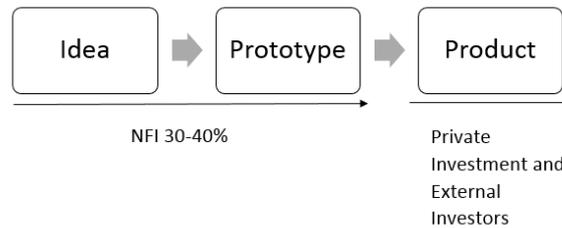


Figure 1 Example of funding of a project from idea to release

As there is currently a large focus on the Norwegian video games being culturally influenced and presented in the native language in order to receive funding, it can become difficult to reach international markets. These policies can therefore hinder innovative productions necessary for the industry to strengthen and grow. A solution seems to be alternative distribution and publishing channels. Also funding through alternate channels such as Kickstarter can provide the necessary capital to publish the games. This requires a great deal of resources and time to market the potential game to users, yet there is no guarantee of the success of the campaign. This can greatly halt the development process and even kill a project. One of the game director's commented:

*"The biggest challenge when it comes to innovation is to raise enough capital to create what we want to create. Half of the resources goes to obtain additional capital."*

This illuminates the difficulties Norwegian game development companies have to efficiently manage resources for larger projects. According to the project manager:

*"The more time you spend on a game the more it costs and it is risky to put all your eggs in one basket. Therefore, we have two other short projects that we are working on."*

#### 4.4 Organisation

The companies participating in this study had different roles in management, but in general, it consisted of producer, director, and project manager. One person could inhabit all roles or they could be divided between several people. This depended on the size of the company. Management's main role was to set goals and communicate a clear vision for the project, guiding the teams in the development process. The goals and deadlines create boundaries to keep the team on track and working towards a common vision. Yet the development teams are given a lot of freedom to experiment with new tools and techniques and work across designated roles contributing to the final product. Failure is often not seen as a negative event and is encouraged as it leads to new knowledge and learning benefitting the company. It also provides room for interpretation and individuality from each member of the team, resulting in creativity and innovation. However, this can also hinder innovation in the company as miscommunication and interpretation can lead to undesirable results in the game unless tightly managed. As stated by a CEO at one of the companies:

*"We are not very rigid, but we have phases and deadlines we relate to, it is quite an organic process. The team feels ownership and this is important so that everyone takes responsibility for the results."*

A project manager from a different company expressed:

*"I do not oppose change, but I think it is impossible to design a game on paper. Many things happen along the way and it is a long process. As the project manager I try to facilitate change rather than oppose, but question the choices."*

The teams of developers consist of highly technical and creative people collaborating in open environments. It is a complex mixture of programmers, artists and designers that interact and influence each other, sharing knowledge beyond their designated roles. As the video game industry in Norway is quite small the competition for skilled people in the industry is hard. Many of the senior developers in the industry acquired their experience from Funcom, the largest game development company in Norway, and have now set out to start their own game development studios or joined existing ones. Newly educated people are also recruited. The teams are often self-driven and feel ownership of the projects through complications with

communication across teams or knowledge groups where misunderstandings occurred was common. One of the design directors stated:

*“Those who have worked with game development before are very self-driven and take control of things, while those hired directly from school are more uncertain. The team is very self-driven except the artists. They found it difficult to organize. We had external artists and our own. It differed very between who understood what was going to be made and those that did not.”*

An interesting observation was that most of the companies did not express having a clear innovation strategy or goal; this was inherent in their culture and considered to “just happen”. When asked about their approach towards innovation, a common answer was: *“We do not have a goal to innovate, but we do it anyway.”* The process of innovation is seen as a natural part of the creative environment and development process. It is not necessarily a conscious part of the strategy of a game development company, but a result of the organic process and interaction between management and developers. This is enhanced by the flat structure and open boundaries of the companies leading to knowledge crossing between knowledge groups such as programmers and designers. One of the project managers explained it as:

*“Creating something is a driver. Not economically motivated. It’s the combination of all the talents of the group that makes it interesting. Progress and seeing it turn into a working game is motivating.”* – Project manager

## **5. DISCUSSION**

In this section the four broad categories, market, technology, environment and organization, are discussed in the context of interactions to provide an answer to the research question, *What patterns of interaction characterise the innovation process in the Norwegian video game industry?* First, a table summarising the interaction and patterns within each category is presented followed by a discussion of each.

### **5.1 Patterns of Interaction**

The findings reveal several challenges occurring between different actors in the game development companies. These problems can be presented into four broad categories highlighting a pattern of interaction explaining the causal effect they have on each other and on the innovation process of the company. In this paper, the definition of patterns of interaction is a combination of Christopher Alexander’s (1977) definition of pattern and Wikipedia’s (2014) definition of interaction, resulting in: *“A reusable solution to a commonly occurring problem between two or more actors that interact with one another in a given context.”*

According to McGee (2007) designing patterns requires identifying conflicting problems (human concerns), recognising a feature that resolves the problems, and specifying the Pattern’s context (the when or where that this Pattern is appropriate). The table below addresses these three sections in correlation to the interactions within each category.

Category	Problem	Pattern	Context
Market	If the market cannot sustain a growing industry, the industry will halter.	Therefore, take advantage of social web platforms to generate value and establish relationships with potential users in national and international markets.	When companies are dependent on the international market.
Technology	If a company only relies on own technology then the development process might be hindered and the product will not reach the users.	Therefore, combine own technology with leading standardised technology to be flexible and productive.	When there is rapid technology change influencing the development process.
Environment	If a company does not interact with external actors, the company might lose valuable and costly information to respond to the volatile market.	Therefore, interact and build relations with external actors to position the company and the product in the market.	When smaller companies are trying to establish in an uncertain market.
Organisation	If the company does not have clear management presence providing boundaries and goals in the process, the teams might lose focus and development halter.	Therefore, have clear roles, set boundaries and clear goals to guide the teams, but let the daily process be flexible and organic.	When the organisational environment is highly creative.

Table 3 Patterns of Interaction

## 5.2 Market

Changes in markets and the competitive strategies of large companies have increased the pressure on smaller companies to focus on innovation, innovation capabilities and innovation management (Hotho and Champion 2011). Developing products that are innovative and generate interest in the market is challenging. According to the findings, the greatest challenge in the Norwegian video game industry is generating capital and establishing a strong market with international competition. Despite public funding programs such as NFI and Innovation Norway, it is still a struggle to generate enough capital to fund an entire project. One wishes that private investors were increasingly active to support the industry, either through loans or fund. Innovation Norway is an important actor in that regard (Jørgensen 2009). Alternate funding through social platforms such as Kickstarter can provide game development companies with the necessary capital to publish the games and extend to an international user base that can increase the likelihood of publication. Once the funding goal is achieved, the platform transforms into an information channel between the game development company and the backers providing the company with a platform to market the game, reaching backers across the world. However, using these platforms requires a great deal of resources and time to plan and implement the campaigns, yet there is no guarantee of the success of the campaign. This can greatly halter the development process and even kill a project if the company is completely reliant on the funding. It is therefore essential that the games provide something new and innovative that can drive the marketing and generate interest of potential backers.

## 5.3 Technology

A technological interaction between console manufacturers and game development companies is defining as console manufacturers are dependent on the availability of compatible games, while the success of game developers and publishers depends on the installed base of compatible consoles (Dietl and Royer 2003). When new console technology is introduced on the market, it creates innovation possibilities for the game developers. The vast amount of consoles from PC, Playstation, XBOX, and mobile, reaches a larger user base from casual to seasoned. It shows therefore a connection between internal technology developed by

the company and that of standardised technology developed and distributed by external companies. However, regulations and standards set by the consoles can hinder development of innovative games. With the rapid development of console technology, new standards are introduced quicker than the production of one possible game. Forcing the game developing company to adjust accordingly or risk losing their market position for that game.

A combination of standardised development tools, such as Unity, and technology developed within the game development companies are common. As tools for developing video games have become less expensive and more user friendly, fewer companies develop entirely their own tools. Instead they invest in a “platform product” (Baldwin and Woodard 2009) which is suitable for their purpose and create modules to customise its use. This provided that the standardised platform is flexible at its core allowing external modules to interact. In this case platform providers can hold dominant positions in the industry, but they also face the challenge of managing the evolution of the platform by cultivating an effective ecosystem of enablers and complementors (Basole 2009). Findings show that the game development companies adjust to this evolution through a combination of standardised platform technology and technology developed in-house by the company. This provides flexibility necessary to adjust to changes in external technology as well as keeping stability in the development tools. Shaping the modules surrounding a stable core of the system.

#### **5.4 Environment**

Knowledge sharing interaction among companies is shown to result in competitive advantage and significantly influence innovation (Enkel et al. 2009; Miller and Côté 2008; Schilling and Phelps 2007). Findings show there is a strong collaborative culture in the game industry both internally in the company as well as externally. In the Norwegian game developing industry, companies and individuals share knowledge, technology and resources with little competitive focus between the parties. This is to strengthen the growing industry and might alter as certain companies become more established and gain higher market positions.

Another external interaction is between the game development company and the users. Users are often involved in the research and development phase where tests, such as alpha- and beta-tests, provide indicators of what works and what can improve in the game. This interaction with the users ensure to some degree the success of the game in the market as video games are interactive artefacts, and consumer satisfaction and technical performance are not established until tested by users (Bakhshi and Mateos-Garcia 2010). Technology platforms such as the internet has created new ways for companies to interact with users, through forums and company websites. These provide an arena for users to communicate their wants and needs towards the games and the company as well as giving the companies the ability to respond. However, these arenas are mostly a one-way street where users provide information and the companies collect what is of relevance as defined by the companies themselves. In order for this type of information to become useful for a company, large amount of time and resources need to be dedicated to gather and analyse the data. This is not always profitable and the data is not always reliable. However, this form of interacting with customers is an important element to understanding the innovation process (Miller and Côté 2008)

#### **5.5 Organisation**

The VGI is a highly creative and fast-paced industry, requiring competent and complex teams of programmers, designers, artists, musicians, producers, testers, and project managers (Bygstad and Waal 2013). Findings show that development teams work towards clear goals set by the management in each project. These goals are facilitated from management to the teams throughout the projects and adjusted in each iteration to adapt to the changes and new knowledge gathered. This process is flexible and provides room for interpretation and individuality from each member of the team, resulting in creativity and innovation. However, this can also hinder innovation in the company as miscommunication and interpretation can lead to undesirable results in the game unless tightly managed. A balance is necessary between an organic strategy to stimulate innovation and mechanical strategy to be able to make use of its innovations (Cadin and Guérin 2006). As pointed out in the findings, innovation is not necessarily a conscious part of the strategy of a game development company, but a result of the organic process and interaction between management and developers.

## **6. CONCLUSION AND FURTHER RESEARCH**

In this paper, the question posed was *What patterns of interaction characterise the innovation process in the Norwegian video game industry?* Based on a qualitative study through engaged scholarship with four game development companies and key informants, four patterns of interaction are identified within the categories *market, technology, environment and organization*.

By identifying these patterns, it can provide an understanding of how the complex industry and its actors interact, as well as identify how the innovation process is reinforced or hindered. By fostering the four identified patterns of interaction, the company can increase its innovation capability and thereby increase competitive advantage.

### **6.1 Limitations**

There are some limitations to this study. First, the study only looks at four game development companies and a small selection of informants, which cannot represent the entire industry. It can be used more as an introduction to possible patterns for further study in the Norwegian VGI. It would also be interesting to do similar studies in other countries for comparison.

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