

Erno Vanhala

THE ROLE OF BUSINESS MODEL IN COMPUTER GAME DEVELOPMENT ORGANIZATIONS

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Abstract

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The computer game industry has grown steadily for years, and in revenues it can be compared to the music and film industries. The game industry has been moving to digital distribution. Computer gaming and the concept of business model are discussed among industrial practitioners and the scientific community. The significance of the business model concept has increased in the scientific literature recently, although there is still a lot of discussion going on on the concept.

In this thesis, the role of the business model in the computer game industry is studied. Computer game developers, designers, project managers and organization leaders in 11 computer game companies were interviewed. The data was analyzed to identify the important elements of computer game business model, how the business model concept is perceived and how the growth of the organization affects the business model.

It was identified that the importance of human capital is crucial to the business. As games are partly a product of creative thinking also innovation and the creative process are highly valued. The same applies to technical skills when performing various activities. Marketing and customer relationships are also considered as key elements in the computer game business model. Financing and partners are important especially for startups, when the organization is dependent on external funding and third party assets. The results of this study provide organizations with improved understanding on how the organization is built and what business model elements are weighted.

Keywords: Computer games, startups, business model, organization, grounded theory, case study, survey

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It seems that this crazy – and awesome – life wanted me to go the whole way and now my journey has reached the point where I am graduating as a Doctor of Science. The years within this university have been the best years of my life – so far. I would not change a day of it, but it is still quite a relief that this work is finally finished.

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Writing a PhD thesis gives one a book as a concrete result but it also gives so much more. It helps one to find himself and to observe the world through the lenses of science and skepticism. The following two quotes are there for me to remember not to take the easy way but the way that is the most beneficial – for me and for mankind.

"Croyez ceux qui cherchent la vérité, doutez de ceux qui la trouvent" – André Gide

"You must always believe you will become the best, but you must never believe you have done so." – Juan Manuel Fangio

Lappeenranta, October, 2015

Erno Vanhala

List of publications

- I. Vanhala, E., Smolander, K., 2013. What do we know about business models in software companies? - Systematic Mapping Study. IADIS International Journal on WWW/Internet, 11(3), pp. 89–102.
- II. Vanhala, E., Kasurinen, J., 2014. The role of business model and its elements in computer game start-ups. In ICSOB 2014 - The 5th International Conference on Software Business. June 15-18, 2014, Paphos, Cyprus.
- III. Vanhala, E., Kasurinen, J., Smolander, K., 2013. Design and innovation in game development; observations in 7 small organizations. In ICSEA 2013, The Eighth International Conference on Software Engineering Advances. 27.10. - 1.11. 2013, Venice, Italy.
- IV. Vanhala, E., Kasurinen, J., Smolander, K., 2015. Evolution of computer game developer organizations, Journal of Advances in Management Research Vol. 12(3), pp. 268 - 291.
- V. Vanhala, E., Saarikallio, M., 2015. Business model elements in different types of organization in software business, in review for International Journal of Computer Information Systems and Industrial Management Applications (IJCISIM).

In this thesis these publications are referred to as *Publication I*, *Publication II*, *Publication III*, *Publication IV* and *Publication V*.

Contribution of the author to the publications

- I. Made the research plan, gathered articles for a review, analyzed them and wrote most of the article.
- II. Made the research plan, designed the interview sessions, collected the data, analyzed it and wrote most of the article.
- III. Participated in analyzing the data, wrote parts related to business sides of game development in the theoretical background and the corresponding findings.
- IV. Made the research plan, designed one round of interview sessions, collected the data from them, analyzed it and wrote most of the article.
- V. Participated in developing the research plan, gathered half of the data, analyzed it and wrote half of the article.

Symbols and abbreviations

AHP	Analytic Hierarchy Process
B2B	Business to Business
B2C	Business to Consumer
BMC	Business Model Canvas
BMF	Business Model Framework
F2P	Free-to-Play
GDD	Game Design Document
CEO	Chief Executive Officer
HTML5	Hypertext Markup Language, version 5
IAP	In-App Purchasing
IT	Information Technology
NES	Nintendo Entertainment System
P2P	Pay-to-Play
PC	Personal Computer
TRIZ	Teoriya Resheniya Izobretatelskikh Zadatch (theory of inventive problem solving)

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Appendix II: Theme-based questions for the interviews

1 Introduction

The computer game business has grown to significant business in revenues and surpassed the music and movie industry (Statista 2014d; Statista 2014b; Statista 2014c). From 1996 to 2013 the entertainment software industry increased its revenues from \$2.6 billion to \$22.41 billion in the USA alone (Entertainment Software Association 2014b; Entertainment Software Association 2015). In Finland, the revenues have increased from 40 million euros in 2004 to 250 million in 2012 (Hiltunen et al. 2013) and even 1.8 billion in 2014, although the metric is not 100% compatible (Neogames 2015). The industry has been constantly in the news headlines and the growth rate of the computer game industry was 9% in 2013 (Galarneau 2014), which illustrates the fact that the computer game markets have not yet saturated. Although the first digital games were created already in the 1950s the computer game industry was born in the 1970s when the first coin-operated gaming machines and home video game consoles were introduced (Kultima 2009; Entertainment Software Association 2012). Even though the very first games were merely technology demos made by engineers, the coin-operated machines started the game business where digital games produced revenue for the developers. During the first decade of digital gaming the game companies manufactured gaming machines that were heavy, expensive and did not have much programming. The first home video game consoles were released in the 1970s (Entertainment Software Association 2012), and since then the industry has moved from selling dedicated physical gaming devices to selling games in plastic packages and further to fully digital distribution. Digital sales surpassed physical sales in USA in 2014 (Entertainment Software Association 2015).

The change in technologies and platforms has also changed the business models. Instead of programming games, finding someone to publish and distribute them in plastic boxes the industry allows today both bigger industrial players and smaller independent, privately owned companies to build their games and release them in global virtual game stores. The appearance of hundreds of ready-to-use game engines (e.g. Unity or Construct 2) (Lewis & Jacobson 2002) has shortened the time needed to create a game. This has also led to a situation where competition is hard, as app stores have hundreds of thousands of games available.

Scientific research on computer games has increased in this millennium, but it is still recognized as a young domain when comparing to for example software engineering, not to mention welding and ship building; research is required in fundamental issues like requirements analysis and programming tools (Ampatzoglou & Stamelos 2010; Kanode & Haddad 2009). The current research is reported to lack the empirical – industry practitioners – point of view in business model research (Valtakoski & Rönkkö 2010).

Although the computer game industry, its tools and business models have experienced changes, the value games create has stayed almost the same. Serious games, such as learning and health-care games have been developed, but excluding these, the value of the game is in the fun side – they provide entertainment (Boyle et al. 2012; Kanode & Haddad 2009).

In this thesis the role of the business model in present startups and established companies is studied. The thesis consists of a series of empirical studies focusing on computer game organizations and the role of the business model in the computer game industry. The overall research question is “*What is business model, its elements and their roles in computer game development organizations?*” With this question, the role of the business model is aimed to be defined in the computer game context. The aim is to shed light on how the business model of computer game companies is formed and how it differs from the conventional software business. This is achieved with a series of qualitative studies based on data collected in computer game organizations of various sizes and ages. For validation a quantitative study is also conducted. As the study observes the computer game companies from the business model perspective, also the concept of business model needs to be clarified. There is no clear definition for the business model concept (Al-Debei & Avison 2010; Schief & Buxmann 2012), and thus, this study examines the current literature on the business model and summarizes it.

The contribution of this study is threefold: 1) the business model concept is described in the field of the computer game industry. This includes both a literature review and data gathered in the field. In addition to a systematic literature review, 40 individuals in 12 organizations were interviewed to gain knowledge from practitioners; and 2) the

elements of the business model of computer game startups are identified and discussed. This is done through analyzing interview data; and 3) the elements and their roles in the computer game business are discussed in detail and computer game startups are compared with established game companies and other IT organizations.

This thesis is divided into two parts: an introduction and an appendices including five scientific publications and theme-based questions for the interviews. The introduction consists of six chapters. Chapter 2 introduces the research background and the key concepts necessary for understanding the following chapters. Chapter 3 describes the research goal and methodology in detail. This includes the research perspective, philosophies, methods, and the overall research process. Chapter 4 summarizes the publications, which are presented in the appendix 1, with short descriptions and relations to the whole. Chapter 5 combines the results, and discussion of the theoretical and practical findings is presented. Also the limitations of the research are discussed. Chapter 6 concludes the thesis by summarizing the results and proposing future research ideas and topics.

2 Computer game industry and business models

This chapter presents the scope of the study by describing the relevant history of the topic, concepts and their definitions. Based on scientific literature, the chapter describes software industry and its characteristics; computer game industry and how it differs from conventional software industry; and what a business model is and what its relation to the computer game industry is.

2.1 Software industry

The software industry is a rather young area of industry. The mankind has built bridges and houses for thousands of years, but the first software were created in the 1940s and 50s when the wires in early computers were replaced with punch cards and programming languages. The term software engineering was first used in 1968 (Shaw 1990). The early computers were used in universities making it possible to study software engineering from the very beginning.

The size of software has grown enormously since the first pieces of software. This has led to a development of different process models like the waterfall or spiral model and agile development (Dybå & Dingsøy 2008; Wasserman 1996). At the same time the development has moved from one place to distributed development – global software engineering (Portillo-Rodríguez et al. 2012).

The software industry has specialties that the conventional brick and mortar industry does not face. The software industry is moving from products to services, which are intangible (Chesbrough & Spohrer 2006), meaning that they can be delivered through online marketplaces, and thus, the logistic costs are basically non-existent. The cost of copying is close to zero, which means that every project solves a new problem as the already solved problems can be solved again with an existing software solution. As the industry is moving from products to services (Cusumano 2008), the revenues are generated from monthly/yearly fees instead of upfront licence fees. An example of this kind of a shift is the comparison of Microsoft Office as a stand-alone software and Office 365 with Office Online tools, which is a service run in the cloud. The first one generates profit once and the latter monthly/yearly, depending on the billing period. The software industry has changed over the years, the business has evolved and keeps evolving at a fast pace.

2.2 Computer game industry

To understand the computer game industry, it is necessary to understand first what games are. Whether one is talking about traditional or digital games, one talks about a system that has explicit rules which will lead to different outcomes every time the game is played (Crawford 1984)¹. A game differs from a movie or a novel in storytelling, where the game has no linear story, but every story is built upon the player's actions (Vorderer et al. 2003): "a story [is] static where a game is dynamic" (Crawford 1984, p. 11). Building a computer game is hard work, and the tools, concepts, requirements and platforms have changed dramatically in the last 30 - 40 years (Blow 2004).

2.2.1 Evolution of the computer game industry and business

The commercialization of computer games started when the first home video game consoles were released in the 1970s (Entertainment Software Association 2012), and in the 1980s home computers and special gaming consoles like Nintendo Entertainment System (NES) began to conquer space from the living room. During this change, newly founded game companies started to release games on these new platforms, like Commodore 64, Amiga, PC and NES.

During the 1990s, the game industry kept growing and started to be socially accepted as a hobby – or even as an occupation. For example, Blizzard's StarCraft (released in

¹ With these specifications it can be argued whether Calvinball – a fictional game presented in Calvin and Hobbes cartoons – is really a game or not as it has rules that can be applied only once ever (excluding the rule that defines that rules can be applied only once).

1998) became popular in South Korea and tournaments were shown on TV. Game strategies were also studied to improve real life training (Lewis et al. 2011), and game network traffic was studied to improve network architectures (Claypool et al. 2003). The first games for mobile phones were launched and for example PC games could be bought in normal supermarkets instead of specific computer shops.

In the 2000s, gaming was considered as a mainstream hobby, and the game industry overtook the music industry in business turnover (Table 1). Digital distribution also saw daylight when the network bandwidth increased and mobile phones gained more performance. The introduction of Steam, AppStore and Google Play increased the digital distribution and introduced new business – and especially revenue – models.

The diffusion of mobile phones first brought out simple games (e.g. Snake by Nokia) available for every phone owner in the late 1990s. Mobile phones got color screens in the mid-2000s and could run Java-based applications. Mobile operators and third party digital markets sold small Java games that were installed through PCs. Apple introduced its App Store in 2008, and the users of iPhone could buy applications and games, and these apps would be downloaded directly to the phone and be installed there automatically. This soon exploded the mobile game markets and introduced various new successful mobile game companies like Rovio Entertainment, Supercell and King. It is now reported that both Apple’s App Store and Google’s Google Play have over one million apps to download (Statista 2014a).

Table 1. Global revenues of different entertainment industries

Data source	Video game industry	Music industry	Film entertainment industry
Statista (Statista 2014d; Statista 2014b; Statista 2014c)	\$101.62bn (2014)	\$47.4bn (2014)	\$88.3bn (2014)
BigFishGames (Galarneau 2014)	\$76bn (2014)	-	-
Gartner (Gartner 2013)	78.9bn (2012)	-	-
IBIS World (IBISWorld 2015; IBISWorld 2014)	-	\$15bn (2014)	\$92bn (2015)
IFPI (IFPI 2013)	-	\$15bn (2013)	-

Computer game engines have matured in a way that the content, game logic and rendering engine are separated, allowing thus the building of different games with the same engine. The game engines have evolved to be modular and adaptive, so that they are also used as scientific research tools (Lewis & Jacobson 2002). It was reported already in 2002 that over 600 commercial game engines existed in at that time (Lewis & Jacobson 2002). Using existing components, such as a game engine, can make the development process faster (Folmer 2007), and therefore game engines like Unity have

gained popularity. Some companies are specialized in developing game engines, some making physics engines, and some creating artificial intelligence to be utilized in games (Kanode & Haddad 2009).

When computer games became socially acceptable, it also meant that the games could be played by anyone. The gaming culture was male-dominated in the beginning but gained diversity where for example in the casual gaming segment females represent a half of the players (Casual Games Association 2007) and almost two thirds of the players are adults. According to statistics, the average age of a gamer is 31 (Entertainment Software Association 2014a). These issues have created wider customer segments and thus allowed the game designers to focus on a more specific gamer segment compared to the industry of the 1980s where the gamer population consisted of young males.

The revenue sources of the computer game industry evolved from selling physical devices to selling games in physical boxes. The next step was digital distribution where the only physical item the gamer has is the gaming device, the game itself is bought digitally online. Figure 1 illustrates this change from the conventional process of selling physical game boxes through retail stores to digital distribution. Profit distribution has also changed, as a publisher or a distributor is no longer required as the retailer takes care of the distributing process and the developer organization itself can handle the marketing. In reality, not all developers have the marketing competence leading to the utilization of a third party marketer, which can also be a publisher, such as Microsoft or Valve.

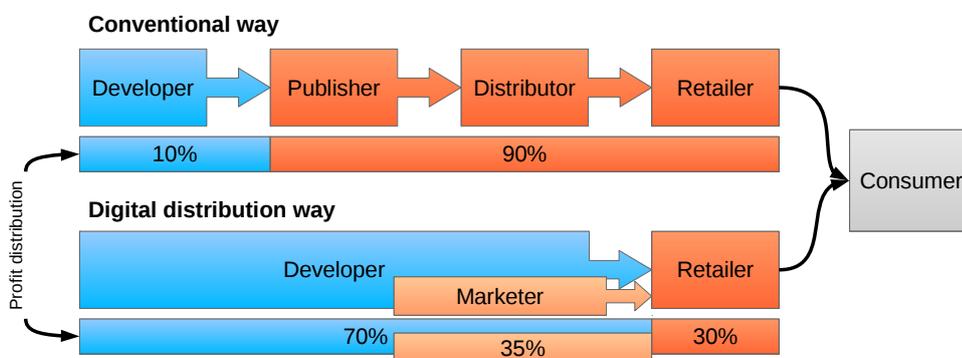


Figure 1. Business logistics and profit distribution of a game in traditional and digital distribution ways (Hiltunen et al. 2013)

2.2.2 Current status of the computer game industry and business

The increase of mobile gaming has generated new games and game companies focusing on games that require only fast gaming sessions. These games are built with third party game engines and tools that allow developers to deploy the game on several different platforms (e.g. iOS, Android) at the same time. Organizations have differentiated themselves to work with tasks like game engines and physics engines (Kanode & Haddad 2009). A music artist can make sounds and music to several games developed by different companies. Graphical assets can be bought on online markets or one can use freely licensed material or form a partnership with a third party art studio.

Kanode and Haddad (2009) describe how game development is divided into pre-production and actual production. In pre-production a game design document (GDD) is created to illustrate the game concept, and it can include the craziest ideas ever made (Alves & Roque 2007; Callele et al. 2005). This can mean for example a storyboard, a concept artwork, paper prototypes or even a game prototype, as the game making tools enable fast prototyping. The GDD is very informal and changes when the game is put in the production phase (Alves & Roque 2007; Callele et al. 2005). The computer game industry requires innovation and creativity, as the games need to be entertaining. There are various ways to improve the innovation and creative process, and companies are putting effort into generating new successful game ideas (Kultima 2009; Kultima & Alha 2010). The GDD includes these creative ideas and is used to concretize the ideas. Alves and Roque (2007) also argue that the GDD is only useful for the organization that has written it, as other stakeholders would interpret it differently. Callele et al. (2005) investigated how the transition from pre-production to the production phase can be a source of many failures. In the actual production phase the game is created, tested and put on the markets. Lee et al. (2006) define the testing and marketing phase as post-production. The testing phase of a computer game differs from conventional software testing, as usability and user experience are weighted as the most important testing tasks and the testing can also change the product in the end of the development stage (Kasurinen & Smolander 2014).

Blow (2004) argued in 2004 how game engines can cost \$600 000 and developers have to think carefully whether the engine can do all the necessary tasks. Since 2004, several open source (e.g. the Phaser HTML5 game framework) and freemium game engines (e.g. Unity) have lowered the costs, and this has also been noted in research articles mentioning that the price of the tools are not considered a problem – even for startups (Kasurinen et al. 2013).

The computer game industry has grown to be one of the biggest industries globally. It has already passed the music industry in revenues, and the film industry has similar figures to the computer game industry according to the various sources presented in Table 1. The growth rate has been more than seven times the growth rate of the entire economy during 2005 - 2009 in the USA alone (Entertainment Software Association 2014b).

The business has also changed in relation to revenue models. While the pay-to-play (P2P) model was dominant for the first 30 years of game business, the free-to-play (F2P) model has gained popularity recently. Digital distribution has made it possible to innovate new revenue models instead of the old "selling game packages" model. In the P2P revenue model, the only income is received when the game (e.g. StarCraft 2) is sold, and when the game does not sell anymore the game company does not get income, although the game might require updates. Free trial versions of games are provided so that the gamers can test the game before they decide whether to buy it or not. The subscribe-based games (e.g. World Of WarCraft) change this, as besides the game, the customer needs to pay a monthly fee to get access to the virtual world. The F2P – also known as freemium – model removes the initial and monthly payments and relies only on optional payments. The basic idea is that getting the game is free and after that a part of the customers produce income by using money to buy virtual goods inside the game (Hiltunen et al. 2013). Although also shareware games were free to download and copy, the completely game was not free and no virtual goods were sold; only the complete game was the one being sold (Camper 2008). Advertising inside the games has moved from static banners and product placement to a dynamic content where the advertising seen inside the game can vary, for example, between different geo locations, marketing campaigns and languages (Entertainment Software Association 2014c). These models can also be combined so that the game is provided with advertising and one can upgrade to an ad-free version with a small amount of money. Advertising can also appear in F2P games.

The F2P model with in-app-purchasing (IAP) has gained both negative and positive publicity (Hiltunen et al. 2013). From customers' point of view, it provides free games, so one will not lose money if the quality is not as expected. On the other hand, although the game is free it might still require in-app-purchasing for the gamer to succeed in it. For example, the levels can be so hard that the gamer is required to buy virtual goods to help in the playing. The increase in the utilization of F2P has been fast (Wu et al. 2013; Casual Games Association 2013). The level of so called casual gaming, which means short gaming sessions here and there with mobile devices, has been growing hand in hand with the number of mobile devices.

2.2.3 Current status of computer game research

The computer game industry has grown, and according to a systematic review conducted by Ampatzoglou and Stamelos (2010), also scientific research on the topic has increased. In their review study, Ampatzoglou and Stamelos (2010) list more than half of the studies published in 2008 or later. Games have been studied from various perspectives. For example, they have been studied from the enjoyment point of view (Vorderer et al. 2003), where it is argued that the game has to be challenging enough but not too hard to provide the best possible enjoyment. Games have been studied from the point of view of engagement in a game (Boyle et al. 2012), the expectations from development tools have been researched (Kasurinen et al. 2013), and how gaming can be utilized outside the original context has been illustrated (e.g. gamification and serious games). Pedreira et al. (2015) have mapped the current literature on gamification, which means “incorporating game mechanics and elements, thus making that task more attractive” (Pedreira et al. 2015, p. 157), concluding that the research is in an infant state. Connolly et al. (2012) came to the same conclusion when they studied serious games, which are games that are used for example in education and health-care. These new angles to games are topics that have just now gained popularity among researchers and there is a lack of high quality journal articles about the issue (Connolly et al. 2012; Pedreira et al. 2015). Recently Melcer et al. (2015) made a bibliometric study going through over eight thousand articles and collecting keywords and publishing forum from them. Their findings illustrate 20 major research themes and how research has clusters of articles and forums of specific topic, such as technical research; journals and conferences have focused on a narrower topic than just “computer games”. Melcer et al. (2015) argue to be one of the firsts to present research on computer game research community in such an extensive way. Although the study researched computer game research with wide perspective, it lacks the business side.

These arguments underline the youth of the field; although the computer game industry has existed for half a century, the research on business models and development techniques lacks behind. New special gaming concepts like serious gaming make no exception.

2.3 Specialty of the computer game business

Computer games are like software: they are intangible products, and basically every project and product is new, as existing products can be copied virtually without any costs. This means that the manufacturing costs are close to zero, whereas the design, development and marketing costs make up the price tag.

It can also be noted that when using digital distribution, also the distribution costs are virtually non-existing. As the distributing of mobile applications and games is completely digital, the business model has to be developed to suit this, and it modifies the weighting of the business model elements. Games are not tightly segmented to strict geo-locations but aimed at global markets, as the gamer population is spread all over the world.

Although game companies make market research and have discussion with players, games (excluding e.g. serious games) are still built without complete prior knowledge of customer needs (Alves et al. 2007). This is logical in sense that games are providing surprise factor and games are basically always products, instead of projects to be used by only one stakeholder (Alves et al. 2007).

When the game business is compared to other creative fields like music, movie or book industry, similarities and dissimilarities can be found. Kanode and Haddad (2009) and Alves et al. (2007) mention that computer game engineering combine various disciplines, such as programming, art and music. Together they form entertainment. Callele et al. (2005) point out how the creative element in computer games requires extensiveness from conventional requirement engineering; the non-functional requirement “fun” is important in a computer game. Overall, computer game development is considered less strict and more artistic (Murphy-Hill et al. 2014).

On one hand, the gaming, music, book and movie industries are moving towards fully digital distribution and thus share similarities, but on the other hand the game industry is the only one that updates the product after it has been released. Products can even be released as “half-done” in some platforms or countries and thus get initial feedback, which is used to improve the later full-scale release.

Publication II points out that creating computer games is in a way opposite to conventional software development. A quotation illustrates this: “[conventional software] tries to minimize the time a user needs to spend. With games we try to maximize the time spent, and still keep it entertaining” (Chief Executive Officer [CEO], Case G, see Table 5). This quotation illustrates the specialty of the computer game business and why it is worth studying. Games are played because they give enjoyment (Boyle et al. 2012; Vorderer et al. 2003; Ampatzoglou & Stamelos 2010) – not because they improve the business or reduce the costs.

2.4 Business model

Although the concept of the business model has been mentioned in the literature since Norman’s Management for Growth in 1977 (Hedman & Kalling 2003; Valtakoski &

Rönkkö 2010), the research and interest towards the concept has increased since the mid-1990s. The dot-com bubble in the beginning of this millennium brought the term to general discussion: companies were started and marketed because they were expected to develop highly profitable business models, and that led investors to invest in them (Teece 2010; Richardson 2008). Although the bubble burst, the concept of the business model stayed in the general and scientific discussion and the concept was included in scientific research (Osterwalder & Pigneur 2002; Teece 2010). Business models have been argued to be the first step in requirements engineering when developing software systems, and without a functioning business model, the innovation would not deliver and/or capture the intended value (Gordijn et al. 2000; Teece 2010). These ideas bind the business model concept to software engineering and underline the importance of understanding that building a software company is, besides building software, also building a business model.

2.4.1 Definition of the business model

The definition of the business model concept has been anything but unambiguous (Al-Debei & Avison 2010; Shafer et al. 2005; Schief & Buxmann 2012). Shafer et al. (2005) have done a review of relevant studies and found that there is at least 12 different definitions for the concept of the business model. The articles included in their study also listed 42 different elements – building blocks – of business models. Al-Debei and Avison (2010) selected 22 studies offering a scientific definition for the business model concept. Schief and Buxmann (2012) identified eight core publications discussing the business model concept in the software industry context.

Both Al-Debei and Avison (2010) and Shafer et al. (2005) argue that numerous researchers have taken too narrow a view on the definition of the business model concept and an overall – more abstract – view has not been in the focus. Shafer et al. (2005) also point out that the lack of considering all the elements of the business model led to the situation which caused the burst of the dot-com bubble. Although companies had a large customer base or an innovative revenue model the business model as a whole was not considered.

The business model literature has discussed various aspects of the concept. Timmers (1998) argues that the business model should include a description of the architecture for the product, service and information flows, potential benefits, sources of revenues and marketing strategy. This is one of the earliest definitions of the concept defining it through its elements. Hedman and Kalling (2003) add the customers and competitors to the list of elements, and do not discuss marketing as an individual element. Johnson et al. (2008) argue that the concept is formed from four main elements: customer value proposition, profit formula, key resources, and key processes. There is no mention of competitors, but for example metrics are added to the key resources. On the other

hand, Weiner and Weisbecker (2011) list competition as a part of the business model domain and do not mention metrics. This short comparison illustrates how the concept of the business model has evolved and transformed within the last 15-20 years.

Although it may seem that the research on business models is a wild field with no single thread or consensus, the situation is not so incoherent, as central elements can be found when several studies are considered as a whole. Table 2 presents 20 definitions for the business model concept defined in the literature. The list has been combined from previous studies (Al-Debei & Avison 2010; Shafer et al. 2005), modified and extended to illustrate the transformation and improved definition of the concept.

Table 2. Definitions and elements of the business model in different studies (combined from Al-Debei and Avison 2010 and Shafer et al. 2005)

Study	Definition	Elements
(Timmers 1998)	“Business model is an architecture for the product, service and information flows, including a description of the various business actors and their roles; and a description of the potential benefits for the various business actors; and a description of the sources of revenues.” (p. 4)	An architecture for the product, service and information flows, potential benefits, sources of revenues + marketing strategy
(Linder & Cantrell 2000)	“An operating business model is the organization’s core logic for creating value. The business model of a profit-oriented enterprise explains how it makes money. Since organizations compete for customers and resources, a good business model highlights the distinctive activities and approaches that enable the firm to succeed – to attract customers, employees, and investors, and to deliver products and services profitably.” (p. 2)	Pricing model, revenue model, channel model, commerce process model, internet-enabled commerce relationship, organizational form, value proposition
(Gordijn et al. 2000)	“Who is offering what to whom and expects what in return.” (p. 41)	Business actors, offering, activities, relations between these elements
(Alt & Zimmermann 2001)	“Business models determine participation of partners, channel conflicts, and revenues etc.” (p. 2)	Mission, structure, processes, revenues, legal issues, technology
(Van der Vorst et al.	“It is essential to focus on the value proposition of the initiative; that is, the	Value proposition, roles, processes, functionalities,

2002)	underlying purpose for which the participants in the b-web are working together to create competitive advantage. “ (p. 125)	applications, characteristics
(Dubosson-Torbay et al. 2002)	“A business model is nothing else than the architecture of a firm and its network of partners for creating, marketing and delivering value and relationship capital to one or several segments of customers in order to generate profitable and sustainable revenue streams.” (p. 7)	Product innovation, customer relationship, infrastructure management, financial aspects
(Magretta 2002)	“Business modeling is the managerial equivalent of the scientific method – you start with a hypothesis, which you then test in action and revise when necessary.” (p. 5)	Customer, value, revenue logic, delivery process, pricing
(Chesbrough & Rosenbloom 2002)	“How you make money.” (p. 533)	Value position, market segment, value chain, cost structure, profit potential, value network, competitive strategy
(Camponovo & Pigneur 2003)	“A business model provides a description of the roles and relationships of a company, its customer, partners and suppliers, as well as the flows of goods, information and money between these parties and the main benefits for those involved, in particular, but not exclusively the customer.” (p. 4)	Utilizes elements from Dubosson-Torbay et al. (2002).
(Hedman & Kalling 2003)	“The model integrates firm-internal aspects that transform factors to resources, through activities, in a structure, to products and offerings, to market. The logic is that in order to be able to manage industrial forces and serve the product market, businesses need activities, resources and input from the factor market (capital and labour) and the supply of raw material. “ (p. 53)	Customers, competitors, offering, activities and organization, resources, supply factor and production input, longitudinal process
(Rajala et al. 2003)	“We combine product development, marketing, sales, revenue logic, services and implementation into a cohesive framework describing the generic elements of business models in the software industry.” (p. 1614)	Product strategy, revenue logic, distribution model, service and implementation model
(Andersson et al. 2006)	“A business model is created in order to make clear who the actors are in a business case and	Actor; resource, feature, right; event, transfer, conversion;

	explain their relations, which are formulated in terms of values exchanged between the actors." (p. 483)	processes, interfaces, exchange, transaction and transformation; commitment, claim, contract and agreement; value activity; value proposition
(Kallio et al. 2006)	"The means by which a firm is able to create value by coordinating the flow of information, goods and services among the various industry participants it comes in contact with including customers, partners within the value chain, competitors and the government." (pp. 282-283)	Product development, sales and marketing, servicing and implementation, value creation, customer base, Government technology, relationship between operators and suppliers
(Chesbrough 2007)	"A business model performs two important functions: value creation and value capture. First, it defines a series of activities, from procuring raw materials to satisfying the final consumer, which will yield a new product or service in such a way that there is net value created throughout the various activities. ... Second, a business model captures value from a portion of those activities for the firm developing and operating it." (p. 12)	Value proposition, target market, value chain, revenue mechanism(s), value network or ecosystem, competitive strategy
(Janssen et al. 2008)	"A business model reflects the core business of an organization and is useful to describe (and even prescribe), the organization from the perspective of its main mission, and the products and services that it provides to its customers. ... A business model can [also] be viewed as a collection of organizational roles, the system functionalities, detailed description of a mechanism, and relationships among parties."(pp. 204-205)	Mission, logic, description of products and services, channels, position of organizational network and relationship with other agencies, description of future evolvment
(Johnson et al. 2008)	"A business model, from our point of view, consists of four interlocking elements (customer value proposition, profit formula, key resources, key processes) that, taken together, create and deliver value." (p. 60)	Customer value proposition, profit formula, key resources, key processes
(Osterwalder 2010)	"A business model describes the rationale of how an organization creates, delivers, and captures value." (p. 14)	Customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key

		partnerships, cost structure
(Weiner & Weisbecker 2011)	“A business model is an abstract description of a company’s business logic and provides an aerial view on several elements of a business, like value proposition, target customers, revenues stream and processes.” (p. 21)	Value approach, market interface, products & services, value creation & capabilities, financial domain
(Zott et al. 2011)	“[A] business model [is] ... a new unit of analysis, as a system-level concept, centered on activities, and focusing on value.” (p. 1037)	Value proposition, revenue model, network of relationships
(Schief & Buxmann 2012)	“Business models describe the strategic direction of a firm and have significant impact on the success of innovations.” (p. 3328)	Main categories: strategy, revenue, upstream, downstream, usage

Table 2 illustrates how the definition of the business model has changed and the focus has moved from one part to another over the years. All the studies also mention elements, components or similar concepts as the building blocks of a business model. The most often listed elements are value proposition -related (12 hits), revenue (9 hits), key resources / processes (9 hits), and customers (6 hits). Based on these ideas, the definition for the business model concept in this thesis is the following: *business model defines who is offering what to whom, with what resources the offering is produced and what is expected in return.*

Based on the definitions by for example Chesbrough and Rosenbloom (2002), Osterwalder (2010) and Weiner and Weisbecker (2011), the definition of the business model can be drawn as the framework presented in Figure 2. The business model presents the value an organization generates for its customers. The customers provide income or some other value back to the organization. The organization uses this income to hire or buy resources to build products that generate value for the customers.

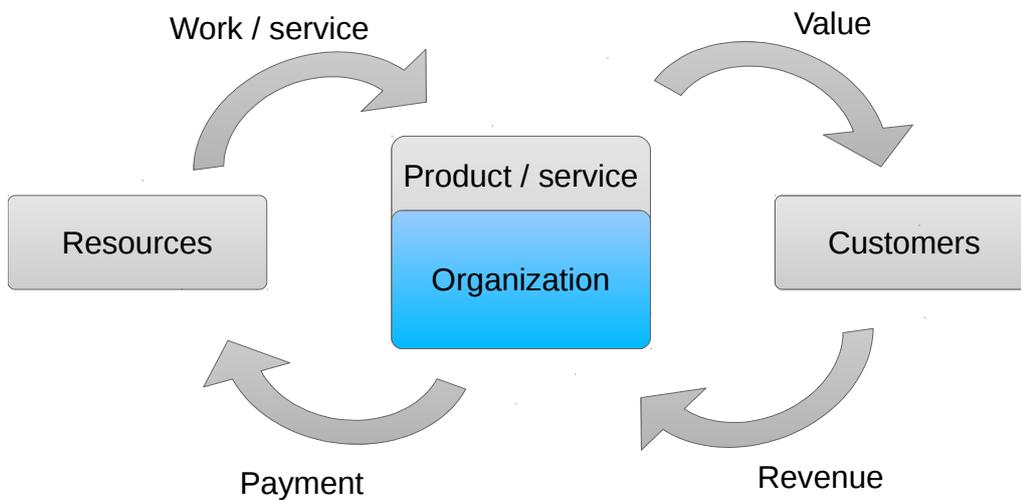


Figure 2: Simplified framework to define business model concept (based on Chesbrough & Rosenbloom 2002; Osterwalder 2010; Weiner & Weisbecker 2011)

It should be noted that there has been discussion on whether or not the concept of the business model actually exists. On one hand, there is research that argues that the business model is not a remarkable concept (Porter 2001) or how software business should be seen in the light of a research discipline (Käkölä 2002; Rönkkö et al. 2010), and on the other hand some studies – mainly recent ones – have recognized the concept (Al-Debei & Avison 2010; Magretta 2002; Osterwalder et al. 2005). In this light the study of business models is a study of a concept of which existence the scientific community still argues about.

2.4.2 Placing the business model concept in the business research context

Al-Debei and Avison (2010) position the concept of the business model between business strategy and business processes. They argue that the business model concept intersects with the other two concepts but is still an individual concept. Business strategy is high-level organizational decision making that, according to Zott et al. (2011), emphasizes the role of customers less than the business model. Business processes include more concrete activities done in the organization (Gordijn et al. 2000). Gordijn et al. (2000) define the business model as answering the questions of who, what and with whom, and the business process model as answering the more concrete question of how. The business model is positioned between business strategy and business process, where some parts, like value proposition, exist near business strategy and some, like key activities, are positioned in the business processes end (Al-Debei & Avison 2010; Morris et al. 2005). The concept of the business model includes customers but their role varies between individual elements.

Sainio & Marjakoski (2009) focus on the revenue logic and argue that it is one element of the business model. They position both the revenue logic and the revenue model inside the business model and argue that the logic is strategic and the model operational. Weiner and Weisbecker (2011) define the business model as an abstraction of the business logic. This definition differs from that of Amit & Zott (2001), who argue the revenue and business model to be two distinct concepts. This illustrates the development of the business model concept, as the same researchers argued ten years later that the revenue model is a part of the business model (Zott et al. 2011). Knowledge about the concept has increased during the years although consensus has not yet been achieved. Yip (2004) states that the term business strategy has been used for over 40 years describing both business strategy and business model issues, and argues that the concepts should be separated.

The business plan is also related to the business model, and the terms are sometimes used interrelated. Morris et al. (2005) argue that the business model has elements from the business plan, but the plan is wider than the business model. A business plan is used when entrepreneurs seek funding from banks, venture capital funding or business angels (Mason & Stark 2004). Mason and Stark (2004) state that different funders require a different kind of business plan. When presenting their business plans entrepreneurs need to be able to sell their business ideas (Chen et al. 2009; Foo et al. 2005). This also questions the difference between a business plan and a business idea. It seems that when presenting business they are used interrelated, but when the business is presented on paper it is question of a business plan (Chen et al. 2009; Foo et al. 2005).

Alvesson (1999) has defined the business concept in a similar way than the business model was defined ten years later. According to him, the business concept includes elements like marketing, analytical internal organization and overall image. In addition, Osterwalder et al. (2005) state that the business model shows how the elements of the business concept fit together. In this light the business concept can be positioned in the same way as the business model, and it can be argued that they discuss the same phenomenon, at least to some extent.

Business cases are also recognized as related to the business model concept (van Putten & Schief 2012). It is discussed that when the business cases of a company do not follow the business model of the company, it may be time to change the model (van Putten & Schief 2012). In this study business cases represent an abstraction of company's operations, whereas the business model is described as an implementation of a strategy. The business cases should illustrate the business model, and if that is not the case, the model should be revised.

The business logic includes formal or informal statements – business rules – of how the business is done (Wang & Wang 2006). According to Sneed (2001), the business logic can be in the source code or in the head of a programmer. This means that the positioning is the near business process concept. Sneed (2001) illustrates this with a case where the business logic is retrieved from the source code.

The business model has also similarities to the concept of value chain developed by Porter (1998). Porter (2001, p. 12) argues that “[t]he definition of business model is murky at best”. His arguments emphasize strategy and competitive advantage. Chesbrough (2007) states that the best business models tie other organizations to the same value chain. As the definition of the business model has changed and it has become more complete, Chesbrough (2007) positions the value chain as one element of the business model. Morris et al. (2005) also argue that the concept business model builds upon ideas of business strategy, and most directly the value chain concept. Peppard and Rylander (2006) state that a value chain could be updated to value networks where different value systems exist between each entity in the network.

Based on analysis presented, Figure 3 illustrates the abstract positioning of various business model -related concepts. As can be noted, these definitions are overlapping and conflicting with each other.

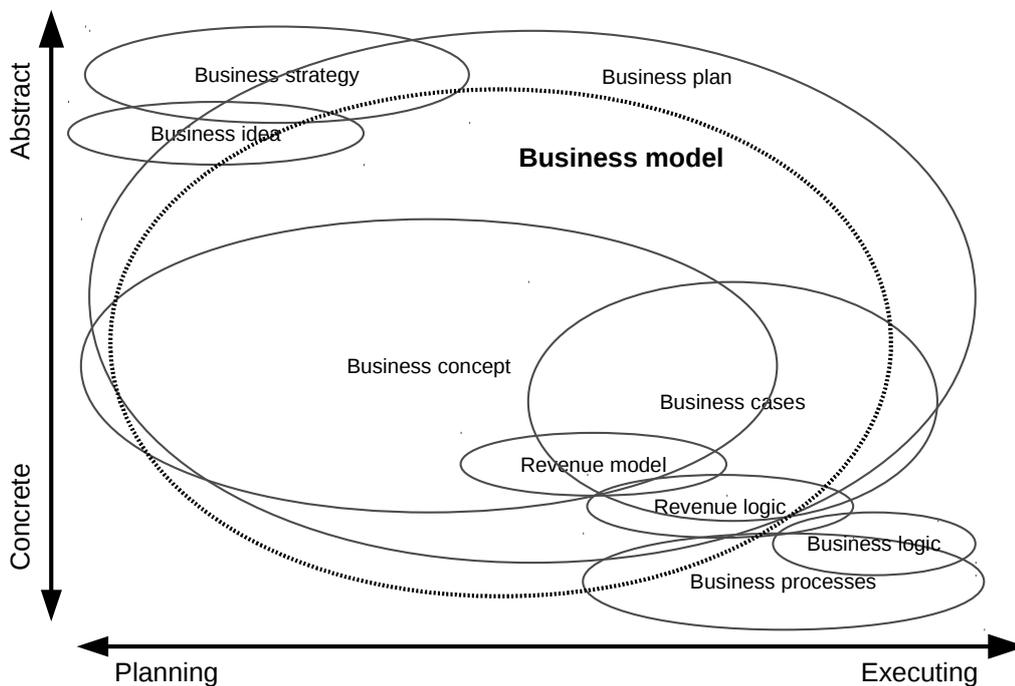


Figure 3: The relationship of different terms related to the concept of business model

As the business model concept has not been defined unambiguously, also its positioning has challenges. As argued, the concept of the business model has been positioned between the business strategy and business processes (Al-Debei & Avison 2010). Besides this “vertical” differentiation, the business model can also be considered working on the “horizontal” level where it helps to narrow the gap between planning and executing, as the business model comes soon after the business idea. It has been stated that the business model is the first step of requirement engineering (Gordijn et al. 2000), and thus it is positioned before the actual development. Business model can be considered as similar concept to the business plan, although business model seems not to be so broad as a concept, nor does it elaborate the topic so widely. Even though the business model is presented as a broad concept in the Figure 3, the reason behind this is mainly the novelty and ambiguousness of the concept. For example, the concept of business strategy has been studied for decades and its positioning is not as blurry as business model’s.

Although there are boundaries for how to position the business model concept, the boundaries are not clear. The crossing points of the different concepts are still foggy and overlapping exists. In this thesis, business model is positioned as a concept that

on one hand fills the gap between the business strategy and business process, and on the other hand helps both the planning and executing phases, depending on the business model element under consideration.

2.4.3 The importance of business models

Whether or not companies realize it, they have a business model (Teece 2010). The business model can be extracted from all the executed businesses even if it is not documented or discussed knowingly. Magretta (2002) considers the business model as managerial equivalent to the scientific method. In this process, the business model is started from a hypothesis, which is then tested and revised when necessary. In this view, the weight of the business model concept is great, as the scientific method has proven to be successful in improving mankind. In addition, Favaro and Pfleeger (2011) argue that innovation management and business analysis have replaced conventional activities like requirement engineering. They also argue that business models play an important role in changing the standards of software industry, entitling their article "Software as a Business".

Chesbrough (2007) argues that the cost of an innovation has increased, and it is not enough to base innovations on research and development but also the business model element should be included in innovation. This means in the current state of economic development that an innovation may not be enough to generate revenue. It requires a functioning business model to support the innovation. Chesbrough (2007) builds a six-type business model framework (BMF) where the Type 1 organizations have no process to manage their business model and Type 6 business models are adaptive and tie other organizations to the same value chain. With this framework companies can verify where their business models stand compared to the whole potential and define steps that would lead to improvements. Shafer et al. (2005, p. 207) also argue that "[b]usiness models provide a powerful way for executives to analyze and communicate their strategic choices". The business model is considered a way to analyze, build and improve the business the company is doing; in essence the software industry is business.

2.5 Definition of a startup

In their systematic mapping study of software startups, Paternoster et al. (2014) point out that the majority of the studies have been published in this millennium. It seems that both the business model literature and startup literature have gained popularity after the change of the millennium. A startup has been defined as a company that is in its early stages and is moving from the idea and prototype phase to embark operations and secure financing (Sutton 2000; Paternoster et al. 2014). According to

Sutton (2000), a startup is not a synonym to a small or an established company, but Crowne (2002) defines the startup phase as the period between the initial plan and the first release. It has been said that startups are particularly innovative (Paternoster et al. 2014), they have limited resources and can be under the influence of several sources as the organization is still forming and storming (Sutton 2000).

Paternoster et al. (2014) claim that their study provides the first systematic exploration of software startup research. They also argue that there is a lack of research on primary studies in software development in the context of startups. The startup business is fluctuating and just over half of them survive the first year of existence (Peña 2002; Paternoster et al. 2014). Startups have been studied for example from the perspective of intellectual capital (Peña 2002), personal factors of the business founders (Frank et al. 2007), and survival (Åstebro & Bernhardt 2003).

As a summary, startups can be defined as young companies without operating history rather than established ones with experience, and rather small than large. They apply rather ad-hoc methods than systematic processes and utilize rather new emerging technologies than old and proven ones.

2.6 Computer games and business models

As mentioned earlier computer games have been studied for years, but the research could be broader. The increase of gaming – especially mobile gaming – has also increased the research on the topic lately. Although computer game companies build products with creative design and innovative game mechanism, in the end the industry is still doing business.

The growing computer game industry gives the business model research an angle that has not yet been studied thoroughly. The research is beneficial for both the computer game industry and the scientific community. Knowledge on the topic has increased, which subsequently provides improved models and metrics for examining the computer game business. The industry has faced quick changes in business models and research on the topic would benefit the newcomers in the industry as they could get on the right track from the beginning.

3 Research goal and methodology

In this chapter, the research goal is introduced and the research methodologies applied in the study are explained. This chapter also discusses the reasoning and selection of the research approaches, and describes the data collection process.

3.1 The research problem

The main research goal is to investigate the business model elements and their roles in computer game organizations. This goal is divided into six sub-questions (Table 3) where the steps include the definition of the business model concept, description of the elements it consists of, analysis of the organizational growth and comparison of the computer game startups to established organizations.

The first and second sub-questions address the problem of how the concept of business model is defined in the literature (1 in Table 3) and how industrial practitioners define the concept (2 in Table 3). To understand the role of the business model concept fully both views need to be considered.

The third sub-question focuses on the elements through which computer game startups define their business model. The fourth question continues this by describing that the computer game business has its own particularities. These two (3 and 4 in Table 3) sub-questions bring out the particularities that have not been studied previously.

The fifth sub-question concentrates solely on the growth process of a computer game organization. Although business model research has not discussed growth widely it is considered relevant, as business models are studied in both very small and young organizations and older and larger ones.

The sixth and final sub-question focuses on how the business model varies between computer game development organizations and other information technology (IT)-related organizations.

The first three sub-questions provide answers on how the business model is defined, and the last three sub-question addresses the topic extensively on organizations of different sizes and ages.

Table 3: The research sub-questions and the publications they are addressed in

	Sub-question	I	II	III	IV	V
1	How is the concept of the business model used and defined in the literature?	x				
2	How is the concept of the business model used and defined in the computer game development industry?		x			
3	With what elements do computer game development startups define their business models?		x			
4	What are the particularities of the computer game business?		x	x	x	
5	What issues exist in the growth management of computer game development organizations?				x	
6	What is the role of the business model in computer game development, and other, organizations of different sizes and ages?					x

Although the computer game industry has expanded to include health-care games and games used in teaching, this thesis concentrates on traditional games that are played for fun. The aim of the games is to provide an entertaining experience, not heal one's muscles or teach how to calculate differential equations. Even though these so-called serious games are important, they are out of the scope of this study.

3.2 Research perspective

Numerous different research approaches and methods exist in the scientific domain (Järvinen 2004; Wilson 2004; Easterbrook et al. 2008; Orlikowski & Baroudi 1991). In (Järvinen 2004) classification, the research approaches are divided into mathematical approaches and approaches that study the reality. The latter is then divided further into research stressing the utility of innovations that can be studied by evaluating and building approaches. The second sub-approach to studying reality is studying what the reality is. This is then divided into analytical and empirical approaches. The empirical approach can then be divided into theory-testing and theory-creating approaches. The taxonomy is presented in Figure 4.

The classification of research approaches is useful for understanding how different problems and research tasks require different approaches. Formal problems can be solved with formal – mathematical – techniques. The world we are living in is rarely formal but informal in many ways, and thus methods studying the reality are more suitable when studying real-life phenomena.

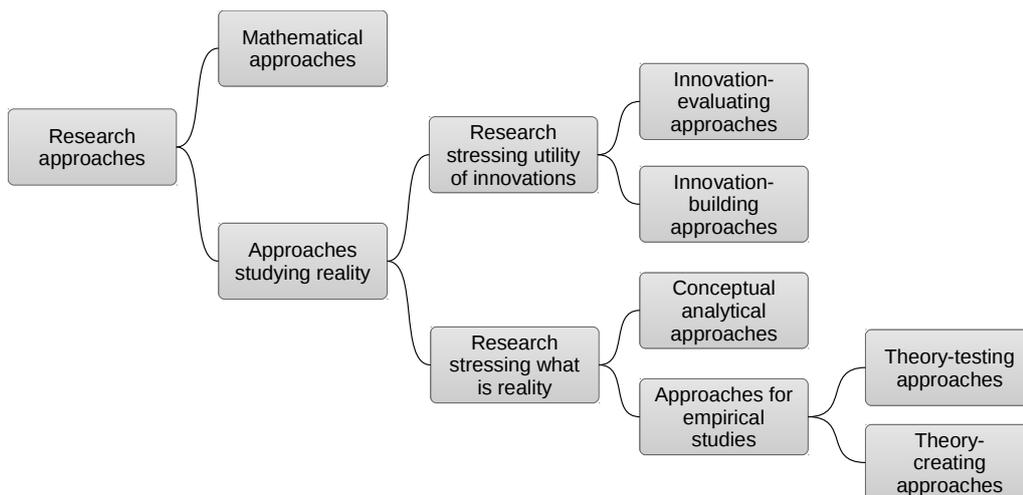


Figure 4: Taxonomy of research methods (Järvinen 2004)

Considering (Järvinen 2004) classification, this thesis falls under the type of research stressing what the reality is, as the aim is to study a concept that has lacked scientific research. The classification of this thesis goes to the deepest level presented by (Järvinen 2004), to the theory-creating approaches, as the aim is to find new theories and models through empirical studies. As there is also discussion on how suitable business model canvas is when working with computer game business models, a theory-testing approach also exists.

Wilson (2004) claims that all research methods are based on observation. He divides these observations into direct and indirect ones, which are then divided into imposed and emergent sub-categories where the difference is in the data collection – whether it will be handled statistically or not. Figure 5 illustrates this division.

Similar to research methods, also observation can be done in multiple ways. Direct observation requires the researcher to spend time with the work place / community / tribe and observe the phenomenon under study. This requires time and can generate a huge amount of data (e.g video recordings or notes). Indirect observation is faster to conduct widely as it can consist of for example surveys or interviews.

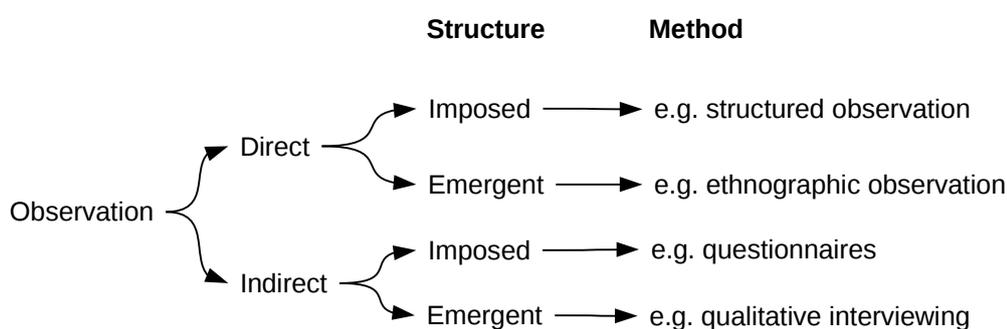


Figure 5: Observation categories (Wilson 2004)

As this thesis consists of case studies and Straussian grounded theory research, it is positioned as indirect and emergent.

3.3 Research philosophy

As this study is qualitative, it is suitable for describing underlying philosophical epistemologies. Chua (1986) has presented three epistemologies: positivist, interpretive and critical. This classification has also been used by Orlikowski and Baroudi (1991) and Myers and Avison (2002). Easterbrook et al. (2008) have added pragmatism to these philosophical views.

Positivist research is generally based on the assumption that the reality is objectively given and it can be observed and measured without the observer affecting the observed phenomenon (Myers & Avison 2002; Orlikowski & Baroudi 1991; Easterbrook et al. 2008). Positivist studies aim at testing theories and increasing the understanding of phenomena (Myers & Avison 2002). The problem with positivist is reductionism, as the phenomenon is studied in isolation from its context (Easterbrook

et al. 2008). Easterbrook et al. (2008) suggest that the researcher should think thoroughly whether laboratory experiments produce correct results or the study should reflect a real-life environment.

Interpretive – also called constructivist (Easterbrook et al. 2008) – research abandons the assumption that organizations are static and accepts the assumption that the relationship between people, organizations and technology are constantly changing (Klein & Myers 1999). Interpretivists do not emphasize theory verification but understanding how different people and actions make sense (Easterbrook et al. 2008; Myers & Avison 2002). Interpretive research also separates itself from positivism by only interpreting reality, not discovering it (Orlikowski & Baroudi 1991).

Critical research seeks to challenge the existing perceptions (Easterbrook et al. 2008), brings critique to the status quo, and aims at removing contradictions from organizations and society (Orlikowski & Baroudi 1991). Critical theorist experience research as a political act because knowledge – gained through research – improves different society groups and fortifies the existing ones (Easterbrook et al. 2008; Myers & Avison 2002).

Pragmatic research goes with the engineering approach, as it applies whatever methods are suitable to gain practical knowledge rather than abstract knowledge (Easterbrook et al. 2008). Pragmatists emphasize consensus on the researched issues to overcome the problem of relative truths, as people have different views on what is useful for them (Easterbrook et al. 2008).

Wilson (2004) argues that researchers have prior knowledge -based ideas to structure research, Myers and Avison (2002) continue by arguing that researches have assumptions about what forms valid research and what are suitable research methods. These ideas are also supported by Seale (1999). According to these views, positivist philosophy is hard to reach. Easterbrook et al. (2008) present that positivist research trusts in controlled experiments and uses also surveys and case studies, whereas interpretive research weights ethnographies and uses case studies, as well as surveys. Critical research relies on case studies, however Easterbrook et al. (2008) argue that action research would fit the critical research philosophy best. As pragmatic research is less dogmatic compared to other epistemologies, it utilizes mixed methods.

This thesis falls mainly into the category of interpretive study, as the research has been carried out by analyzing data concerning real-life phenomena and natural environments, instead of laboratory experiments. It also utilizes the pragmatic view in the sense that from the beginning the aim was to focus on the industry view instead of an abstract academic one. It was not possible to use the positivist research angle as there were no clear theories to utilize as a starting hypothesis, which is required in positivist research (Myers & Avison 2002). The study also utilizes the multimethod

paradigm, supported by pragmatism, as different methods were suitable for the different phases of the study.

3.4 Research methods

In this section the research methods used in the study are introduced and described. In the end of this section the use of multi-method research is justified.

3.4.1 Systematic mapping study

Systematic mapping study was used to identify the research gap. As Petersen et al. (2008) explain, systematic mapping study produces a map that can be for example a table, a diagram or a chart. Kitchenham and Charters (2007) describe systematic mapping study similar to a systematic literature review, but it does not necessarily require a read-through of articles.

The systematic mapping process suggested by Petersen et al. (2008) is utilized in this study. The process is presented in Figure 6. It includes steps starting from the definition of research questions and search of keywords. After the searches have been conducted from selected databases, journals and/or conference articles that do not meet the criteria are filtered out. The articles are then classified and a systematic map is built of the extracted data.

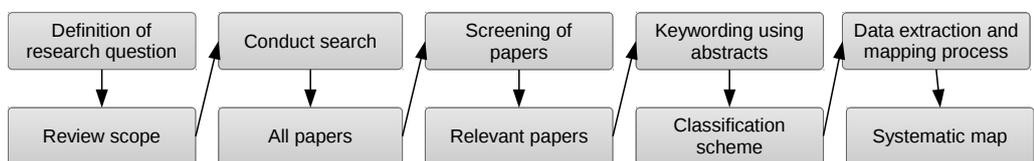


Figure 6: The systematic mapping process (Petersen et al., 2008)

3.4.2 Multiple case study

Case study is a common research method in information system research (Myers & Avison 2002). Easterbrook et al. (2008) divide case studies into exploratory and confirmatory ones. Gable (1994) and Eisenhardt (1989) categorize the purposes of description, exploration, prescription, theory testing, and theory building. According to Gable (1994), the strengths of a case study include research in a natural environment, the researcher's ability to understand the nature and the complexity of the process, and the fact that information can be gained rapidly. Qualitative data, for example interviews and observations, are used while seeking understanding of the

problem investigated (Gable 1994; Easterbrook et al. 2008). Case studies can also be divided into single case and multiple case studies (Eisenhardt 1989). In this thesis, case study method is utilized in the exploratory sense for theory building from multiple cases.

Various frameworks have been developed for conducting a case study (e.g. Eisenhardt 1989; Gable 1994; Meyer 2001). Eisenhardt (1989) describes an eight-step process of how to build a theory from the case study. The process includes defining of research questions, selecting the cases, crafting instruments and protocols, entering the field, analyzing the data, shaping a hypothesis, unfolding the literature, and reaching closure. Gable (1994) illustrates a more extensive framework, which takes care of multiple case studies and also adds survey-conducting to the same framework. Easterbrook et al. (2008) argue that case studies are open to interpretation and researcher bias, and thus it is recommended to use an explicit framework.

3.4.3 Analytic hierarchy process

The analytic hierarchy process (AHP) provides a way to ease the decision making and makes it formal and systematic (Vaidya & Kumar 2006). AHP is not limited to any specific task but it has been used in various areas, such as selection, evaluation, benefit-cost, priority, development, resource allocation, decision making, and forecasting (Vaidya & Kumar 2006; Alidi 1996; Babic & Plazibat 1998; Sarker et al. 2009). AHP does not limit the number of criteria or attributes either (Chen & Wang 2010), but makes it possible to compare N candidates with M attributes. As the number of calculations increases when the number of candidates and/or attributes increases, there exist dedicated software and spreadsheets to handle the data. With small amounts of data, the matrix calculations can be done by hand.

According to Chen and Wang (2010) and Vaidya and Kumar (2006), the process is described as follows, as the AHP includes several steps. First the goal is set. For example, it is possible to rank presidential candidates or places for vacation. In the second step, criteria for the candidates are set. The criteria can have the same weight, but they can have various weights, and these weights can also be decided with the AHP. The third step is to compare every candidate against each other with every criterion and decide which one is more important. If the candidates are equal, value 1 is set. If candidate A is more important, values 3, 5, 7 and 9 are used. If B is more important, values 1/3, 1/5, 1/7 and 1/9 are used. The bigger – or smaller – the value is, the more important one is over the other. Even numbers can also be used if the gap between odd numbers is considered too harsh. This generates matrices from which eigenvalues are calculated. The calculated eigenvalues are the ones used in the decision making. The bigger the value, the more important is the criterion.

The actual decision making is done on the basis of the final eigenvector. This can be used in for example prioritization or selection. In conclusion, the AHP provides key numbers gained from systematic comparison and mathematical calculations to be used in the decision making.

3.4.4 Grounded theory

The use of the grounded theory has increased in information system research after its introduction in sociology in the 1960s (Hughes & Jones 2003; Locke 2001). The grounded theory seeks to develop theory that emerges from data collected on a phenomenon through systematic analysis (Myers & Avison 2002; Strauss & Corbin 1990). The grounded theory can be used in two ways. The Straussian discipline focuses more on systematic categorization and analysis, whereas Glaserian approach focuses on passive observation (Strauss & Corbin 1990; Glaser 2002). In this thesis, the Straussian discipline is utilized, and the Glaserian method is not discussed. The Strauss-Corbin approach was considered suitable as some of the research data was already collected and thus more effort could be put on the analysis.

The coding process includes open, axial and selective coding, which are the key steps in grounded theory research (Strauss & Corbin 1990; Locke 2001). The role of open coding is reading through all the data and identifying all the key points that for example an interviewee talks about. This is done by coding words, sentences and paragraphs with terms presenting the issue at hand. The codes are then categorized to larger groups to include main categories and sub-categories. In axial, coding connections between categories and sub-categories are analyzed and built. The important part is to note what the categories and sub-categories are and how they are linked to each other. Axial coding is done after open coding but it can also take place at the same time as open coding (Strauss & Corbin 1990). Although both these phases use the term "coding" it has to be noted that the actual task is different between the first two steps. The last step is selective coding, where the core category is identified and defined. The core category can be a category that has been identified already in axial coding, but it can also be a more abstract category that presents the "central phenomenon around which all the other categories are integrated" (Strauss & Corbin 1990, p. 116). According to Locke (2001), the final step is to write the theory and publish it. With grounded theory, it has to be remembered that "the aim is not to discover *the* theory, but *a* theory" (Heath & Cowley 2004, p. 149), meaning that in the beginning the researcher has little knowledge on the topic, and the data can lead to numerous directions.

3.4.5 Multi-method research

This study relies on multiple methods, as not only one research method was recognized as suitable to handle different phases of the study. Multi-method research has been carried out for years, but according to Mingers (2003), only one of five studies utilize more than one method. The mixed method is a special case of multi-method research, where both qualitative and quantitative methods are used (Esteves & Pastor 2004). Frameworks exist (e.g. Teddlie & Tassahakori 2006) that are considered suitable when the research includes mixed methods. This study utilizes various qualitative methods, thus implementing the multimethod paradigm.

3.5 Research process

The research process was divided into four phases (Fig. 7). In Phase I, a systematic mapping study was conducted to review the scientific literature and to gain knowledge of how the computer game business and business models had been studied so far. Based on the current status of business model research and the gaps in it, Phase II could be formed.

A research gap was identified while reviewing the existing research in Phase I, and in Phase II it was studied how the business model of a computer game startup is constructed. Before Phase II started, prior research in a research project was also studied. This included testing standards, requirement engineering and overall game development techniques. In this stage the project had not considered the business side and the research gap found in Phase I was adapted to the computer game environment. Phase II resulted in the identification of business model elements that required a closer look in Phase III.

In Phase III, computer game organizations were studied deeper and their innovation and growth processes were described. A study of the innovation process was considered relevant, as the computer game industry is considered to differ from the conventional software industry. A similar issue is the growth process, as it requires for example talented persons from various fields such as programming, graphical designing and marketing.

Phase IV concluded the research with a study where the previous findings of the computer game industry were compared to different areas of the software business, mainly telecommunication organizations.

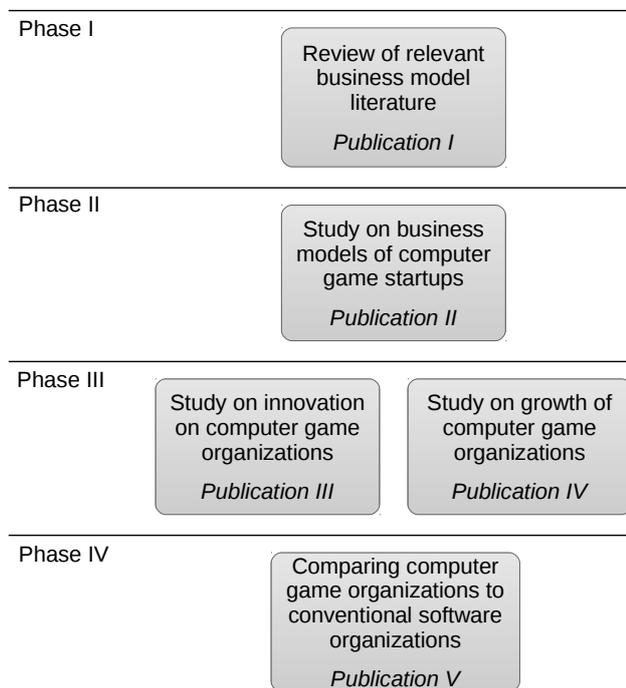


Figure 7: Research process and phases

3.5.1 Data collection

The data related to the computer game business was collected through a series of semi-structured interviews, described in Table 4. Rounds one through four were held in cooperation with other thesis workers, and rounds five and six were focused only on this thesis. The first interview rounds focus on software engineering aspects and give background to the game business from the engineering point of view. The later interview rounds focus increasingly on the business sides, including topics such as financing and business modeling. In total, 12 organizations participated in the study, and 40 individual interview sessions were held between the years 2012 and 2014. These interview sessions generated 38 hours and 17 minutes of data, which was transcribed and analyzed. Seven individuals in two departments conducted the interviews, and interview questions were validated by these persons in two research organizations.

Table 4: Data collection rounds and themes

Round	Data collection method	Interviewee / survey respondent	Description	Main themes of the interviews
1	Semi-structured interview with 7 organizations	Team leader or project manager	The interviewee was responsible for the management of the development of one product, or one phase of development for all products.	Development process, test process, quality, outsourcing, development tools, organizational aspects.
2	Semi-structured interview with 6 (+1*) organizations	Developers, lead programmers or testers	The interviewee was responsible for the development tasks, preferably also with the responsibilities of software testing activities.	Development process, test process, development tools, development methods, quality.
3	Semi-structured interview with 8 organizations	Upper management or owners	The interviewee was from the upper management, or a business owner with an active role in the organization.	Organization, quality, marketing, innovation and design process, development process.
4	Semi-structured interview with 7 organizations	Lead designer or art designer	The interviewee was a game designer, or a managerial level person with the ability to affect the product design and selection of the implemented features.	Development process, design and innovation, testing, quality.
5	Semi-structured interview with 7 organizations	Founder, owner or upper management	The interviewee was responsible for decision making in marketing and financial aspects and had power to influence the long-term strategies.	Customers, partners, business models, marketing, human resources, organization. (Design, development and test processes for new organizations were also asked about when the organization participated in the interview for the first

				time.)
6	Semi-structured interview with 5 organizations	Upper management and/or project manager	The interviewee was responsible for the management of game designs and had knowledge on the customer relationship of the company.	How customers participate in the game development process and how they can build an identity inside the game.

* The interview themes were discussed during later rounds with other representatives of the organization

Some of the organizations ceased to exist during the research period and were thus unavailable for rounds five and six. Also, as round five focused on startups, it was not relevant to interview large organizations that had existed for years. The interviews were held face to face in a location preferred by the interviewee. Two interviews in round six were executed over the phone, as that was considered the best way to reach the interviewees working in other cities than the interviewer, and because of scheduling problems, traveling was not an option at the time. Table 5 describes the interviewed case organizations, their main figures and how they participated in the interview rounds.

The aim at selecting case organizations was to get in contact with different aged and sized companies. Due to traveling cost issues it was possible to select only Finnish companies. Similarly when interviewing individuals inside the organization different roles were targeted to gain wide level of understanding on what the company does and how the organization is formed.

Table 5: Description of the interviewed organizations.

Case	Release platforms	Organization age*	Production team size	Maturity, number of released games	Rounds participated					
					1	2	3	4	5	6
A	PC, game consoles	More than 5 years	Large	Established, more than 10 released products	X	X	X	X	NR	X
B	Mobile platforms	Less than 2 years	Small	Recent startup, less than 5 released products	X	X	X	X	N/A	
C	Game consoles, PC	More than 2 years	Large	Established, less than 10 released products	X	X	X	X	NR	
D	Mobile platforms, PC	More than 2 years	Medium	Recent startup, less than 5 released products	X	X	X	X	X	X
E	Mobile platforms	Less than 2 years	Small	Recent startup, less than 5 released products	X	X	X	X	N/A	
F	PC	Less than 2 years	Medium	Recent startup, less than 5 released products	X	X	X	X	N/A	
G	Browser games, mobile platforms	Less than 2 years	Small	Recent startup, less than 5 released products	X	N/A	X	X	X	X
H	Mobile platforms, PC	Less than 2 years	Small	Recent startup, less than 5 released products	N/A	N/A	X	N/A	X	X
I	Mobile platforms	Less than 1 year	Small	Startup, developing its first product					X	N/A
J	Mobile platforms	Less than 1 year	Small	Startup, developing its first product					X	X
K	Mobile platforms, browser games	Less than 1 year	Small	Startup, developing its first product					X	N/A
L	Browser	Less than 2 years	Small	Startup, less than 15 projects done (no games)					X	NR

X = Participated in the interview round, N/A = Organization not available for an interview, NR = Organization was not relevant for the interview round, empty = organization was not reached due to various reasons (e.g. organization ceased to exist or it had not been founded yet), * Organization age at the time of fifth interview round in the spring 2013 (except Case L, 2014). Small = < 8 person, Medium = 8 – 20 and Large = >20.

Case A is a computer game company formed over 5 years ago and it has created several titles that have gained world wide popularity on different platforms, such as PlayStation, PC and mobile. The company can use over one hundred people during the creation of a new title although it has only 20 to 30 persons it is payroll.

Case B was founded by students and the first game project was a graduating project, which led to a first real game. The company has released games on PC and mobile platforms.

Case C is a company founded by the owners of the Case A company to create a new brand under which to test different genres and experiment on the new concepts. Case C has its own development team, management and resources, although they share the premises with the Case A.

Case D is a young company that has got its foothold in the business. They have created a working game type and brand over the title series. Although they have little less than ten person working on game development they have managed to build a process where they produce one polished and highly successful title per year.

Case E was a small company that focused on mobile games. They ceased to exist during the research project.

Case F was founded by a programming teacher to fulfill his own dream. The game development team was formed from students. The company ceased to exist.

Case G decided to develop their games with HTML5 technologies and straight from the beginning they produced multiplayer games where the catch has been to play against real persons. The core team is very small but the academic background and award winning game designer have given their games an easy-to-play reputation in their segment.

Case H started as a normal computer game startup but later decided to produce serious games for health-care domain. Their games help injured people to heal faster and give regular feedback to health-care district.

Case I started by students developing their first mobile game during the last year in university. The company persons had several years of experience in gaming and also in working with other game companies.

Case J created its first game demo on a local game jam event and it was considered so fun that they ended up developing it further to actual mobile game. The organization is small and is formed around a lead designer and a skillful graphical artist.

Case K was also formed around graduating students. The core team consisted of the most talented and hard-working students from a bigger group. The company did not take off and ceased to exist.

Case L was interviewed for Publication V and although it does not work within computer game industry it has been a successful startup and has also worked with Case H in health-care projects. The bulk of the company personnel are university students, or recent graduates.

3.5.2 Data analysis

Handling the interview data in a qualitative study can be hard for a researcher or even a researcher group. As this thesis included 38 hours and 17 minutes of interview data, which was transcribed to text for analysis, it was decided to analyze the data with the qualitative analysis tool Atlas.ti (Atlas.ti 2015), which provides ways to analyze and code the data in text files.

Phase I included a systematic mapping study where articles were read and an illustrative “map” was built over the findings from existing studies. No special analysis tool was used, and bare spreadsheets were considered sufficient for the task.

In Phase II the fifth round interview data was analyzed with Atlas.ti and coded. Although the study itself was a case study, the coding provided a systematic view of the data. Besides coding, the analytic hierarchy process (AHP) was used to rank the findings.

In Phase III, the data gathered from interviews was used. All the interviews were coded with Atlas.ti and the grounded theory was utilized.

Phase IV compared the data from the fifth interview round to similar data gathered in another study conducted by Saarikallio and Tyrväinen (2014). In both cases the data was coded and analyzed.

3.6 Summary

Chapter 3 described the research problem, methods and process used in this thesis. Table 6 summarizes the phases of this study.

Table 6: Summary of the study phases and their methods

Phase	Data collection method	Data analysis method	Research sub-question	Publication
I	Systematic literature review	Systematic mapping	How is the concept of business model used and defined in the literature?	Publication I
II	Semi-structured interviews	Multiple case study and analytic hierarchy process	How is the concept of business model used and defined in the computer game industry? With what elements do computer game startups define their business models? What are the particularities of the computer game business?	Publication II
III	Semi-structured interviews	Grounded theory analysis	What issues exist in the growth management of a computer game organization?	Publications III, IV
IV	Use of existing semi-structured interviews from two studies	Multiple case study	What is the role of the business model in computer game development, and other, organizations of different sizes and ages?	Publication V

4 Overview of the publications

This chapter presents an overview of the publications included in this thesis. The actual publications are enclosed as an appendix 1 and contain the results in full detail. This chapter discusses the findings of the publications and their relation to the whole.

4.1 The status of software business model research – Publication I

4.1.1 Research objectives and results

In this publication, a systematic mapping study on software/game business models is presented. The aim was to go through all the relevant research that has been carried out on the topic. The interest was on the industry side, not the academic point of view, but of the 32 accepted articles only 18 were industry data -driven. The findings included a note on how the research has been carried in this millennium. Figure 8 illustrates the division of articles in years 1996-2013.

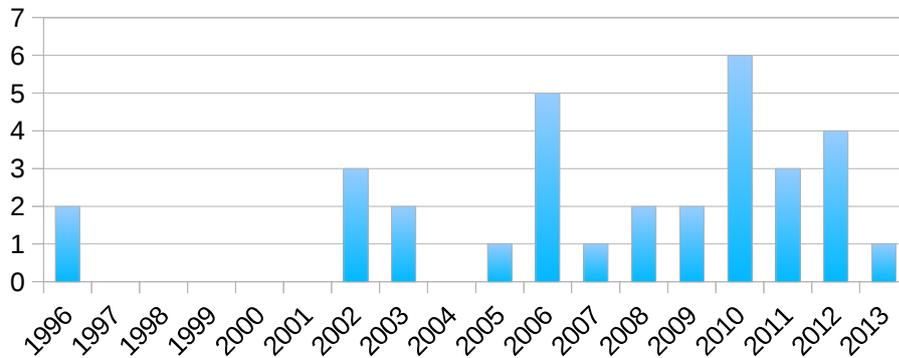


Figure 8: Number of accepted papers per year

The articles were categorized by their type and topic. The type axis included three terms: industry data -driven article, theoretical article validated within an industry / data gathered indirectly from industry, and a theoretical article. The topic axis had six terms: business model in software development, success factors and features of software companies, expanding business, tools and concepts to model business, pricing and cost structure, and scientific discussion. Several articles discussed cloud computing and the open source phenomenon but also other topics were discussed.

The overall view was that the studies were of a high level, and no articles describing the utilization of the business model deeply were found. It was also found out that the business model had not been defined unambiguously but various definitions existed, mixing the business model concept with terms like business logic, revenue model and business strategy.

4.1.2 Relation to the whole

The result of the Publication I showed how the concept of the business model required deeper research. Even the concept needed to be defined more thoroughly and the lack of studies done within the software and game industry revealed a research gap. This encouraged us to begin the research project on the computer game business, which eventually led to this thesis.

4.2 Key elements in the computer game startup business model – Publication II

4.2.1 Research objectives and results

Publication I revealed a gap in how software business models are studied from the practitioners' point of view. The starting point of this publication was to gather data on how computer game startups experience their business model.

The very first interview with the CEO of the first case company illustrated the problem with the business model concept: the practitioners' view was not in line with the academic definition. For the interviewed game organizations, the term business model meant a revenue model and/or a business plan. In deeper discussion more elements were identified and their relations started to be formed. In the end, nine elements were listed to form the business model of a computer game company. Table 7 presents these elements and their weight, generated by the analytic hierarchy process.

Table 7: Ranking of business model elements based on the analytical hierarchy process

Rank	Element	Weight
1	Human capital	0.314
2	Marketing	0.142
3	Financing	0.118
4	Key partners	0.113
5	Customer relationship	0.109
6	Key resources	0.059
7	Key activities	0.057
8	Innovation process	0.053
9	Customer segment	0.035

The study showed how human capital dominates as the most important element. This is not surprising as the computer game business has little if any logistic needs, and nor are the material costs high. Marketing was recognized as being important, but it divided opinions as, for example, one organization had outsourced it to the publisher and for them the key partners were the second most important element. As this study focused on startups, the financing part included using personal savings, getting grants

and other financial support to run the first year or two. Bank loans and venture capitalists were also mentioned. The aim was to start to gain revenue from products after they had survived the first years. The free-to-play model was the dominating revenue model but pay-to-play was also used. Licensing and outsourcing the work to someone else were also listed as revenue sources. The key partners included the publisher, asset acquisition and other organizations in the same field. Customer feedback usually changes the product, and the organizations had put an effort to listening and serving the customers as well as they could. The customer segment, on the other hand was not considered as an important element, as the digital distribution of games had simplified the customer segmentation process, and all organizations aimed at global markets. As the computer game field is creative the key activities include, besides coding, testing and modeling, also innovating new game concepts and drawing fancy graphics to support the overall feeling of the game.

To put the findings in one sentence, a quote from the study can be used: “the only thing that matters is the human capital” (CEO, Case G). This illustrates the view of startups on what is important for them to carry on their business.

4.2.2 Relation to the whole

This publication introduced the business model elements that computer game companies utilize in their business. It was found out that the business models in computer gaming have differences in comparison to, for example, the business model canvas. To the whole, this gave the base view on the important elements in the computer game business; the stepping stone for this thesis.

4.3 The role of business and innovation in computer game organizations – Publication III

4.3.1 Research objectives and results

This publication focused on design and innovation in the computer game business. As the computer game industry has a lot of similarities to the movie and music industries the innovative design is also an important element in the overall business. The innovation process was also noted as one of the business model elements in Publication II. This study set out to research how game studios design their products and how they innovate and make business.

First of all, it was found that “game design is driven by economic factors”, meaning that although the designers want to make a game they love, they still consider profit over innovation. This culminated in the way that startups developing their first

product were even more focused on making a financially successful product than the most innovative one. After the company has gained a foothold in the business it can work on more creative games. This behavior was also confirmed in this study.

The game design itself was formed around ideas found in existing games, success stories and culture like movies. It was found that most game designs are based on concepts created by individuals rather than teams. After the design is accepted, a prototype is produced and the concept is tested. The overall design process was considered ad-hoc and no formal methods were found.

4.3.2 Relation to the whole

This publication shed light on how game design takes place in computer game organizations and how the business side is present from the beginning. To the whole this adds the information that business and design are related concepts, and computer game organizations aim at being financially successful instead of publicly well known.

4.4 Formation and growth of computer game organizations – Publication IV

4.4.1 Research objectives and results

Publication IV focuses on researching how a computer game organization is formed and what kind of people it includes. The collected data represented organizations in the very beginning of their life-cycle on one hand, and on the other hand organizations in a stage where they had already published globally distributed games on several platforms varying from PlayStation and PC to mobile phones and tablets. The study identified a phase model of computer game organizations presented in Figure 9.

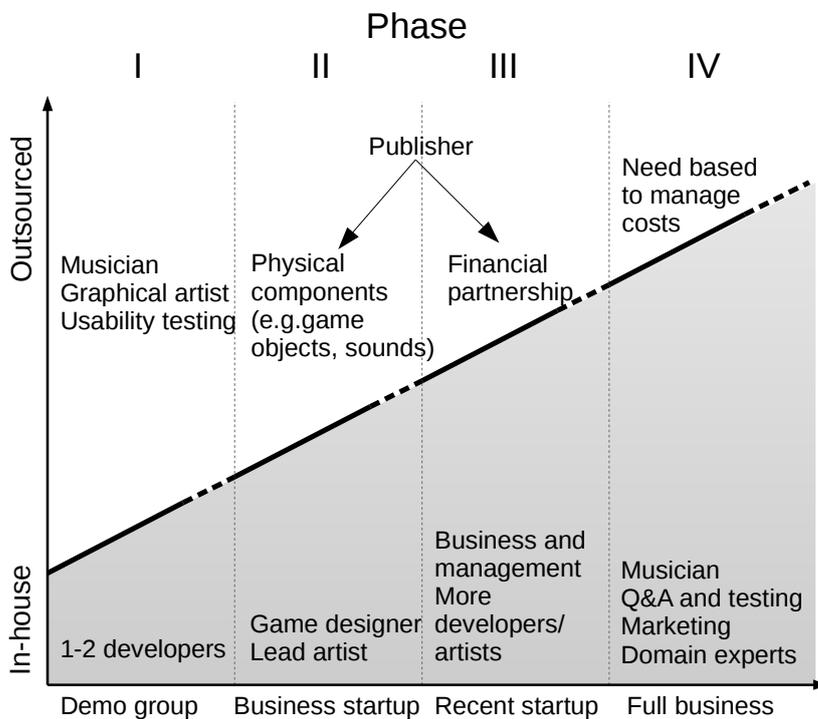


Figure 9: Phases of organizational growth in the computer game industry

Outsourcing plays a role in developing games, and in the study, a minority of the organizations had a dedicated musician or even skills to do music and sound effects. This was the most commonly outsourced work. An organization is generally formed around a small core team including 1-2 developers. To be able to start business, the organization needs to be fortified with a game designer who creates a balanced game logic, as well as a lead artist who creates the graphical look of the game.

When the first game is ready and it is time to publish it, the organization moves to the second phase where they are really in the business and real revenue and cost streams start to flow. Although the first game may not generate an extensive revenue stream, it still positions the company brand in the industry field. Marketing was considered important in Publication II, and in Phase II marketing is often done by the publisher or the platform owner. The organization itself may not have any experience in marketing and it can be learned in-house or the whole concept can be outsourced to the publisher. In this phase a partnership is also formed with for example an art studio, which can produce game graphics and other graphical arts in case in-house competence is not available.

In Phase III the turnover has increased and the products generate revenue to be used in funding the sequel products. Another developer team can be started. The organization is not led by the developers but by a full-time CEO leading the business. The CEO can be hired from outside or he or she might have grown from the in-house workforce. Partnership is still done with stakeholders like the publisher, art studio and third party musician.

In the fourth and final phase, the organization is self-sufficient and large enough to have for example a musician or sound effect engineer in its payroll. Similarly, marketing can be done in-house and domain experts can handle for example the latest game console generation equipment. Outsourcing is used when it is considered cost efficient.

4.4.2 Relation to the whole

This publication looked into the human resources of a computer game organization and identified four phases of growth with different needs for employees. To the whole, this study emphasizes the importance of human resources in the computer game business – especially in the starting phases. It also gives insight into how a computer game organization can be led to grow and what kind of mindsets are required in steps to the next phase.

4.5 Differences between startups and established organizations – Publication V

4.5.1 Research objectives and results

In Publication V, the differences between established and startup software organizations are discussed. Also the size and business type are different. The objective was to study how these issues reflect the emphasis on the business model elements.

Existing data was utilized in Publication V. The computer game startup data presented in Publication II was analyzed with data from seven additional organizations. As the data in both studies was compatible with the business model canvas framework (BMC) (Osterwalder 2010), it was decided to use it as the framework to help in the analysis. The usability of the BMC itself was also discussed.

Key Partners Startups identified other organizations as partners while established medium sized organization recognized other division as partners.	Key Activities B2B organization used personal communication to reach customers. Established ones measured productivity and had analytical way of building business while computer game organizations focused on innovation and artistic way of doing things and built brand and IPR from the beginning.	Value Proposition Game startups chose a general industry value proposition : to provide entertaining experience and aim to maximize time spent with the product. B2B vendor aim to minimize time required by automating processes .	Customer Relationship B2B is often offering dedicated personal assistance . Games try to go for self service , community building, and collect anonymous user data.	Customer Segment While B2B Telco vendor considers segmentation as important, B2C game vendor sees the segmentation as a cost .
Key Resources Established organizations identified people as role-based whereas in game organization people were generalists . In medium sized organization the level of management was increased while startups used only coffee table management .	Cost Structure Established and medium sized organization had larger organizational structure , which produced costs.	Channels B2C game organizations used existing reseller channels, not building their own.	Revenue Streams Most of the startups were trying to get external funding whereas B2B Telco organizations revenue was earned with maintenance .	

Figure 10: Findings of Publication V presented in a business model canvas. The most important elements are highlighted with a different color

Figure 10 presents the findings in a business model canvas. The key activities and key resources were considered as the two most important ones. This was mainly due to the importance of human capital in software industry. The established larger organizations recognized people as role-based workers, whereas smaller startups had only generalists, and the overall working process was rather ad-hoc compared to the more systematic processes and measurements done in the larger and older organizations. This was also reflected in the cost structure, as a bigger organization requires more management.

The business-to-business (B2B) organizations considered segmentation important and wanted to get good customer references. Computer game business-to-consumer (B2C) organizations considered segmentation as a cost when they needed to do translations to their products. Also getting references was different, as they were game reviews and feedback by gamers in app stores. This showed the value of the game, thus playing the role in B2C organizations. Similarly, B2B organizations offered personal assistance to their customers, whereas computer game companies provided self service via community building (e.g. discussion forums or Facebook groups).

The value propositions were different, as the aim of the game is to offer an entertaining experience, and the game companies want to maximize the time the customer spends with the product. The non-gaming companies wanted to do the opposite: automate the processes to save the customers' time.

When comparing the key partners in these different organization types, the biggest finding was the fact that startups were in close contact with other similar

organizations and even considered some of them as partners. In established bigger organizations, other divisions were considered as partners.

Startups relied heavily on external funding and were only just building their revenue models, which utilized the most common practices existing in the industry, such as free-to-play revenue model. The other organizations considered maintenance to be their source of revenue.

Publication V also discusses the validity of BMC. The BMC framework has been designed to be abstract enough to suit basically every business area. When studying the software industry, the framework does not weight the human resource enough, which in this thesis is identified to be the key element in the software business. Similarly, in the gaming startups, a partner giving financial support is positioned in the revenue stream slot, but as it can also provide marketing help, it is positioned in key partner slot as well.

It can be argued that although BMC provides a good starting point for analyzing and building business models when the building or analyzing process goes deeper, it is necessary to do some adjustments to the elements presented in the framework.

4.5.2 Relation to the whole

Publication V compared the computer game business to the conventional software business with the business model canvas framework. The relation to the whole is two-fold. Firstly, differences between the game business and conventional software industry were identified. Secondly, the role of business model frameworks was discussed, as the BMC and other frameworks cannot satisfy the needs when an industry is observed thoroughly.

5 Discussion

This chapter presents the results of the individual studies as a summary and discusses their theoretical and practical implications. After that, the limitations of the study are presented and the contribution of the thesis evaluated. In the beginning, the research question *“What is business model, its elements and their roles in computer game development organizations?”* was set, and this chapter presents answers to this question.

5.1 Theoretical contribution and implications

5.1.1 Business model concept

As the concept of the business model in the computer game industry had not been studied extensively (Publication I), this thesis shed light on how the academic view and industrial perspective are not in line with each other. As the business model concept itself has been under broad discussion and rapid evolution it is clear that the academic and practitioners’ views are different.

The business model concept is often defined through the elements it includes, and this thesis showed how this is problematic when the general elements are hard to find. The popular business model canvas (Osterwalder 2010) framework was not found completely suitable for presenting the business models of computer game startups. This leads to the question of how abstract the business model framework should be to be universal – if it should be even presented as such.

To present the business model through its elements seems to have challenges when comparing the business models of different industries where different elements have greatly varying weights. Even the elements can vary, as argued in Publication II where human capital was raised as the dominant element, but it was not separated out in other studies.

A similar issue is raised when comparing the logistics of the brick and mortar business to fully digitally distributed mobile games. Both of these can be put under for example the element channel, but the meaning of the element is quite different, as the first scenario can include physical logistics problems of a sub-contractor in another continent and the second one only the selection of virtual app stores made by the developer company or a partner, such as the publisher. The physical logistics problem can also exist in the computer game industry when games are provided in plastic boxes, but for example mobile games are fully digitally distributed.

In section 2.4.1, the abstract concept of the business model was defined on basis of the literature. The model is suitable for the computer game business as well, but it does not take account of the special needs of intangible products and digital distribution. A figure of the computer game -focused business model concept is presented in section 5.3.

5.1.2 Growth process

The growth of organizations has been studied for years, but the computer game industry has not been in the focus of the research. The main finding in Publication IV was the identification of four phases (demo group, business startup, recent startup, and full business) that computer game organizations go through when they grow. Although some phase, or stage, models have been developed during the years (cf. Greiner 1972; Churchill & Lewis 1983), the one presented in Publication IV recognized the very beginning of the organization as the first phase. In the demo group phase the organization does not exist as a legal entity but only as a group of people with the same interests and goals. As creating computer games does not require special hardware or manufacturing space, large investments are not required in the beginning.

The first phase in the industry field producing intangible products is different in the software engineering world compared to the brick and mortar business where initial capital is required to start a business. In a way this emphasizes the importance of creativity over physical material in the computer game industry. The limiting factor for growth is not material (e.g. machines) but merely human capital and/or financing.

5.2 Practical contribution and implications

When this study was started, one of the aims was to be – besides theoretically – also practically useful to the computer game industry. Thus the study collected data directly from industry practitioners to get findings beneficial to the industry itself.

5.2.1 Aspects of the computer game business

All the case organizations recognized that they were doing business, not only games that were fun. Different reasons, such as a personal dream, layoffs, the idea of being one's own boss and continuation to education had driven people to form an organization. Some said that games were the only thing they were interested in, some had dreamed about making games for years, and some wanted to do something instead of being unemployed. Although the organizations varied in size and years in business, they were all building business models around their products. The balance between the importance of revenue and fun fluctuated, but the aim for all was the same: to establish a revenue-generating business in the field and gain success.

In Publication III, evidence was found that the longer the organization had been in the field, the more it could focus on games that represented the dreams of the designers. The startups were concentrated more on creating games that could provide them revenue in any way. This led to important finding presented in Publication II where it is argued that startups get most of their financing from other streams than revenue from the actual product. Grants, venture capitalists and loans from banks were mentioned besides using personnel's own savings. The startups were wrestling with financing issues at the same time when they were creating their firsts products and learning to use the tools and platforms.

The organizations that were in Phase I or II (presented in Publication IV) had no dedicated CEO, but one of the developers acted as one. A dedicated CEO was a wanted member for startups, as the startup CEOs considered it challenging to both lead the company and do development at the same time.

The organizations were fighting with the problem of building revenue models that could generate income but would not decrease the interest of the gamers. This was seen even more important when utilizing the free-to-play model. The dilemma is building a game that is both fun and at the same time attracts gamers to make in-app-purchases. To be able to build financially sustainable business this problem needs to be resolved.

5.2.2 Innovation process

As presented in Publication III, the innovation process is more an ad-hoc-based than a systematic process, as also confirmed by Callele et al. (2005). This is good to note when moving from other industry fields to the game industry. It is relevant to discuss whether gaming or other artistic fields are a place for a systematic innovation process or not. Other industry fields have already utilized systematic innovation creating. For example Samsung introduced Teoriya Resheniya Izobretatelskikh Zadatch (TRIZ), a tool to help in problem solving and inventing, in 1998, and have reported to have benefited from its use (Kim et al. 2005). No evidence of this kind of systematic thinking was found in this study. Rather, it was reported that ideas for games come in dreams or while playing other games.

It can be argued that the designing of games has something to learn from the non-artistic industry. Research on innovating game ideas and design games with methods like TRIZ or lateral thinking (de Bono 1995) could provide interesting results. The software industry is young overall, and the game industry is even younger. As the industry has been growing fast during the last decade, it may adopt more formal processes over time. Although it was out of the scope of this study, it would be interesting to study the systematicness of innovation process in computer game organizations of different ages.

5.2.3 Growing organization and crises

Besides the theoretical contribution of the first phase of a computer game organization, Publication IV also gave practical insight into the growth of a computer game organization (Table 8). The role of outsourcing was identified as significant in all the phases except for Phase IV, where it was only need-based to manage costs (see Figure 9 in section 4.4.1).

Right partners were considered important when the startups were building and releasing their first products. Being able to get high quality graphics and sound effects from day one will ease the growing pains of a startup. Game developers may not be experts in marketing or the overall business side, and thus partners being able to do this are considered important.

Table 8: Phases of a computer game organization as presented in Publication IV

	Characteristics	Crisis
Phase I <i>Demo group</i>	People with programming skills decide to create a game over an idea. No money is involved yet but merely “a dream is coming true”.	The first crisis emerging is the need for talent. If the required talent for creating graphics, sound effects and game design is not found, the organization breaks up.
Phase II <i>Business startup</i>	The company exists as a legal entity and the first product is released. Funding is mainly external. Possible partnerships are formed to help releasing and marketing.	In Phase II the crisis of business is met. The best channels for publishing and marketing are needed and a revenue model generating profit is required.
Phase III <i>Recent startup</i>	The organization is ready to expand its business and can start with another development team. The games produce revenue which is used to fund the next games.	The dream to make their own games and fulfill their creativity is under risk if the organization is too dependent on third party component providers and partners. Thus the crisis is independence.
Phase IV <i>Full business</i>	The organization has grown big enough to engage all the necessary workforce. Outsourcing is done when it is cost-efficient. The organization works on several different titles.	The data did not cover a crisis in Phase IV, but it is speculated that when the organization grows to having hundreds of workers, organization-related issues may become problematic.

Growth does not take place without crises (Table 8). It requires talent to be able to release a game at all, and if the talent and skills are not found, the dream will not last long. The crises are not limited only to human resource issues, they also include other elements of the business model. When the game is finished, it should start to generate revenue. As digital distribution and the free-to-play model have changed the revenue streams, the revenue model has become a more important part of game design. If the revenue model does not start to generate enough income, the organization phases a crisis and exits the market.

Game development is recognized as an artistic field where individuals can satisfy their creativeness. If the business is too dependent on partners, there is a risk that game ideas will not come from the developers and designers. This kind of partnership may break the core team, which can lead to the breakdown of the whole organization.

The growth of a computer game organization is different from the growth of a conventional software organization, as it includes creative issues. The role of the revenue model is also bigger, especially in mobile gaming compared to the

conventional software industry. The change from software to service is also changing this.

5.3 Key elements of the business model of a computer game organization

To present the findings in a simple format, a figure illustrating the business model of a computer game company has been drawn. The main findings of this thesis are presented in Figure 11. An abstract business model definition was drawn in Section 2.4.1, but it did not take the specialty of the computer game industry into account. In Figure 11, the left side presents the resources that make it possible to create a game. As the key partners were seen important in the beginning, but later on their role decreased, they are presented with a dotted line. The key partners can help both in funding and in actual work, such as marketing or creating sound effects.

As human capital was identified as basically the most important element in the computer game business model, it is related to the key activities – especially to the innovation and creative process, which is important in creative industry. The key activities are also related to the customers, as customer relationships were considered important in the game business.

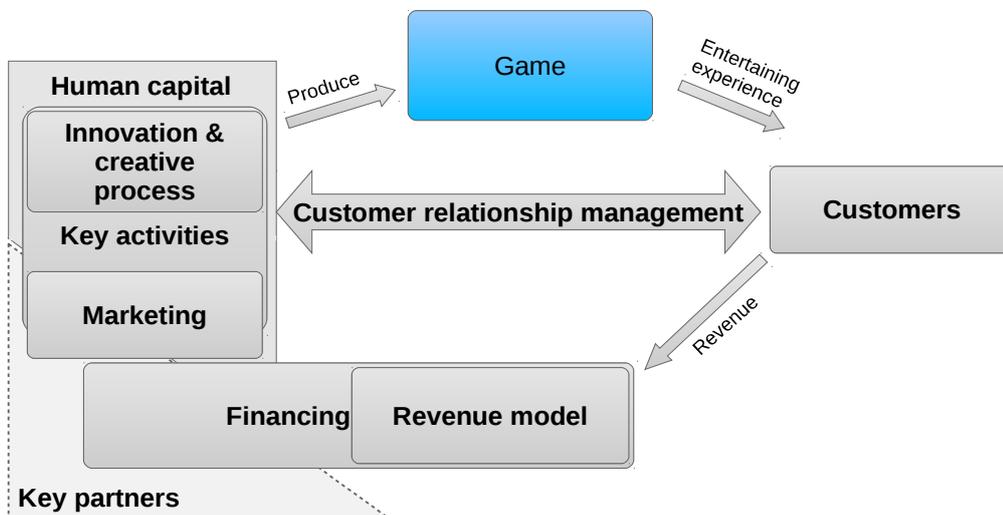


Figure 11: The recognized elements (in bold) and their relationships (not in bold) in the computer game business; game itself is highlighted in blue as it is the product

The role of the financing element is twofold. On one hand in the beginning the computer game company puts effort into getting external funding to be able to release the first games and create a name in the business. On the other hand, it also includes the revenue model part, meaning the development of a revenue model that will generate income from the games. The role of external funding decreases as the revenue generated from the games increases when the company grows and gets a foothold in the business.

This thesis has concentrated on games as products that offer an entertaining experience as a value proposition. This underlines the autonomy of the computer game organization. Instead of ordered projects, the organizations design their own dreams as products.

The customers' role is also considered important for various reasons. When using the free-to-play model the customers – gamers – are divided into two parts: the paying ones and the ones who provide the mass to support the game when it is a multiplayer one. If the game does not utilize the F2P model, the gamers can pay directly or via in-game-advertising contracts. The gamers also provide ideas, feedback, bug reports and viral marketing via social media.

5.4 Limitations of the research

No scientific study can be carried out without threats to validity and limitations of some kind (Kitchenham et al. 2002; Norris 1997), and this work is no exception. Although all studies have limitations, it does not mean that it is impossible to be prepared for them. Qualitative research has been described to have some weaknesses, including inability to manipulate independent variables, risk of misinterpretation, lack of capability to randomize, lack of controllability, lack of deductibility, lack of repeatability, and lack of generalizability (Gable 1994; Easterbrook et al. 2008). Several guidelines have been created to help empirical research (e.g. Kitchenham et al. 2002; Maxwell 1992). Maxwell (1992) has identified five types of validity threats that are related to qualitative research – descriptive validity, interpretive validity, theoretical validity, generalizability and evaluative validity. Maxwell (1992) does not argue that these would be perfect categories, but as his categories were based on the work of many other researchers it was considered suitable to use them to validate this thesis.

Descriptive validity

By descriptive validity Maxwell (1992) means that for example case descriptions are accurate in the sense that researchers report on things that exist, and not make findings up. As data collection in this study is made from series of interviews, one has

to remember that this method is not without its problems (Parry 2003; Hammersley 2003). Although interviews can have more than one interviewer, it is often situation where only two persons exists and they both have their own aims. Hammersley (2003) argues that interviewees have more potential to be affected by bias and error than researchers as they have not been for example trained observers and they have their own problems and concerns in addition to the interview. In the end Parry (2003) mentions how the aim of a qualitative study is not to represent population statistically but to understand the phenomenon under research.

In this thesis this issue was tackled by having multiple persons participate in the interview sessions on several occasions, and thus the descriptions could be – and were – validated by other researchers. The same happened when the interviews were transcribed as they were read through by other researchers not present in the interview sessions. Also several persons from companies were interviewed to gain broader picture on how the organization is formed and functioning. In the end the data is still generated from qualitative interviews and its shortcomings should not be dismissed.

Interpretive validity

Maxwell (1992) defines interpretive validity by asking what the findings mean for the studied instances. The interpretations need to illustrate findings and meanings that actually exist.

The research should have no researcher bias, but as researchers have always some ideas derived from prior knowledge (Wilson 2004; Kitchenham et al. 2002; Maxwell 1992) this is not commonly reached and other methods are required to produce valid research. As this thesis consists of five individual scientific research articles produced with co-authors, the research bias has been decreased with in-house and anonymous peer-review. In addition, Kitchenham et al. (2002) mention a problem of “fishing for results”, meaning over-analyzing the data as long as the desired results are found. This problem exists in both quantitative and qualitative studies where data is analyzed. In this thesis, the problem of interpretive validity was tackled mainly by using several researchers to verify the findings. During the data collection phase, in total seven researchers participated in the collection process, and three in the writing process thus reducing the possibility of “fishing for results”. Also the analytic hierarchy process was utilized, and as it abstracts the decision making from qualitative data to quantitative numbers (Chen & Wang 2010; Vaidya & Kumar 2006), it can be considered as a tool to improve group decision making and the comparability of data.

Theoretical validity

According to Maxwell (1992), theoretical validity goes beyond the concrete description discussed in the two previous categories and addresses the theoretical constructions that the researcher creates in the study. Maxwell (1992) argues that besides description and interpretation, the study also provides an explanation and theoretical validity that means validity as a theory of the phenomenon.

In this thesis, theories were first drawn from qualitative data and the findings gained through the grounded theory and case study methods. These theories were built and discussed with several researchers and then compared to other industry areas in Publication V.

Also, to be able to provide a good theory, the case organizations were selected to represent various areas of the computer game industry in gaming platforms, organization sizes and maturity levels. This enhanced the theoretical validity of the results and also their generalizability.

Generalizability

Generalizability means how broadly the findings and theory can be extended (Maxwell 1992). Maxwell (1992) argues that the generalization of qualitative research is harder than the generalizability of quantitative research, as qualitative studies are not usually designed to allow systematic generalization. Lee and Baskerville (2003) have created a generalizability framework to categorize generalizability to four different scenarios where generalization can start from empirical or theoretical statements and can lead to empirical or theoretical statements.

When considering the generalizability framework (Lee & Baskerville 2003), it can be argued that this thesis has mainly generalized from data to description and from description to theory. The first one is used in case studies and the latter is the base idea of the grounded theory. It can also be argued that when using the existing theoretical findings, such as the business model concept, this thesis could also have discussed the issues from theory to description and from concepts to theory presented by Lee and Baskerville (2003). Still, this played a minor role, as the biggest results were generated from empirical findings.

As this thesis was carried out as a qualitative research, it might not be generalizable to a wide extent. The findings in this thesis concerned the game industry creating entertaining games and are relevant in that context. If applied and extended to other areas, the findings should be taken merely as guidelines or recommendations.

All the case organizations are Finnish and were able to use financial support from different Finnish funding agencies and other similar sources. This may not be possible

in every country, as each society has different systems of supporting entrepreneurship. Although all the case organizations are of Finnish origin, they have partnerships with companies in different locations around the world. Also, as Finnish domestic markets are minor, companies tend to head to global markets and produce games that do not cover the Finnish market segment only (Hiltunen et al. 2013). It is still noteworthy to underline that all the cases are Finnish and it might set some bias to the study. The research would benefit from several replicated studies in other countries considering for example financial support factors.

Although the case organizations were producing games on almost every platform the mobile games were the most common ones. This might also raise some bias issues. Business models vary between different platforms and thus the mobile gaming segment is somewhat overrepresented. Although the use of F2P model has also increased in other segments than mobile gaming, it would be beneficial to have larger sampling including organizations, which are not working with mobile game titles.

Evaluative validity

The last item in Maxwell's (1992) list is evaluative validity, but according to Maxwell, qualitative researchers do not put effort into evaluating things in their studies. The discussion on whether or not the findings presented in this thesis are meaningful is based on self and group evaluation and evaluation by the scientific community. It is hardly reasonable to study "nonsense" and get it published. The findings presented in this thesis are based on real-life phenomena and produce both descriptions and theories to be utilized by industry practitioners and scientists. The reported findings do not take a stand on how things should be but merely report on how things are.

6 Conclusions

This thesis utilized empirical research to study the role of the business model in the computer game industry. This chapter summarizes the contributions and outlines aims for future research.

6.1 Contributions and summary

The study was limited to organizations providing entertaining computer gaming, and serious gaming, such as health-care and learning games, were excluded. The thesis was divided into four phases. The first phase consisted of a literature review to find out the level of existing research. The second phase gathered information on business model elements in computer game startups. In the third phase, topics like innovation and the growth of the organization were studied further. In the fourth phase, the previous findings were compared to data collected from another IT research project.

As this study can be considered one of first – if not the very first – considering business models in computer game development organizations, it provides new knowledge on how computer game organizations and their businesses work. It introduced several topics that can be studied further. The research provided findings for the scientific community and practical knowledge for industrial parties. The following list summarizes the findings (the three most important findings are in bold):

- Research over the business model concept has been ambiguous and there is no one unambiguous definition for the term.

- From the software engineering – especially computer game development – perspective, business model research has been limited at best.
- **For computer game industry practitioners the business model concept means a business plan and/or revenue model, whereas the scientific interpretation is wider.**
- Computer game startups valued human capital over everything else. Also marketing, financing, key partners and customer relationship were considered important. Key resources, key activities, the innovation process and the customer segment were identified as other elements of the business model, but their importance was considered less significant.
 - The actual game development includes programming, testing, building graphics and sounds, and designing game logics.
 - **Games should provide an entertaining experience and the idea is to maximize the time a gamer spends with the game.**
- The computer game company is usually founded by 1-3 persons who can do programming, design a game logic and story, and draw graphics. Sound effects and music are outsourced to partners. Publishing can be done in-house or a partnership can be formed with a publisher, who can also do marketing.
- **When computer game organizations grow they face different phases and crises until they are self-supporting. Four phases were identified: demo group, business startup, recent startup, and full business. The demo group phase where the organization is not yet a legal entity seems to have been dismissed in the scientific literature.**
- Computer game organizations argue that external influence cannot dictate their game design, although they value external funding.
- Designing games is an ad-hoc process with fast prototyping. The organization uses individuals to design games and group consensus.

In summary, the computer game industry is a mixture of the software industry (e.g. programming and testing) and entertainment industry (e.g. fancy graphics and sounds and a spellbinding story). It also turns around the value proposition of the conventional software industry as the aim is not to minimize the time spent with the software but to maximize it. These issues reflect the differences in the business models as well. The software industry is moving towards fully digital distribution, and for example mobile gaming has already done that. This is different from the brick and

mortar industry, which requires physical logistics. The free-to-play model has changed the way how gaming generates revenue, as only a small part of the gamers pay. The challenge is to build profitable game logics and a revenue model. The level of growth the industry is witnessing will provide interesting opportunities for research for years to come.

6.2 Future research objectives

As noted in Section 5.4, this research has presented initial and original findings for business model research in the computer game industry. As the qualitative data was gathered only among Finnish companies and computer gaming is a global phenomenon it would be interesting to compare the data to similar data collected for example in Southern Europe or even in South America or Asia. It would also be interesting to see how the location and society issues affect the computer game business. Especially funding schemes might be different in different countries.

Computer game companies cannot live without their customers – gamers – and this thesis has just scratched the surface of that topic. The customer relationships and the role of the gamers in the development of games would require more research. Especially how gamers are handled and how they can build their digital identity in the game world would provide an interesting topic for research.

The research over the topic would benefit greatly from a large survey study including respondents from several continents to verify the results of this study.

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Appendix I: Publications

Publication I

What do we know about business models in software companies? - Systematic Mapping Study

Vanhala, E., Smolander, K., 2013. IADIS International Journal on WWW/Internet, 11(3), pp.89–102.

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WHAT DO WE KNOW ABOUT BUSINESS MODELS IN SOFTWARE COMPANIES? - A SYSTEMATIC MAPPING STUDY

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ABSTRACT

The concept of business model has been mentioned in the scientific research from 1970 onwards. The weight of business model research has increased since mid 90's, especially after the burst of the dot-com bubble. Business model itself is positioned between business strategy and business processes concepts and it is an abstraction of firm's business logic. Business model describes firm's basic value propositions, revenue streams, customers and key resources. In this article we present a systematic mapping study of the research on software business models; how the concept is applied in literature and what kind of empirical studies have been conducted. We found out that the business model concept is not well-defined in the context of software business. The definitions of business models include varying relations to other similar concepts, like revenue model, business logic and business process. Another finding was that there is very little, if any, research done deep in the industry level to show how firms utilize business modeling and how they see the concept itself. These issues require further research.

KEYWORDS

Business model, software business, success factor, systematic mapping study

1. INTRODUCTION

Software companies, like any others, are doing business by providing value to their customers. As technology itself has no value (Chesbrough, 2007; Luoma et al., 2012), companies need to be able to create and capture value through an effective business model. The concept of business model captures how company functions and create value (Wirtz et al., 2010) and it describes, for example, company's value proposition, its activities, customer relationship,

revenue model and resources (Osterwalder, 2010; Valtakoski and Rönkkö, 2010) and it is a critical thing to the success in the digital world (Johnson et al., 2008; Schief and Buxmann, 2012). Business models are required when establishing new companies, but also when existing companies are expanding to an unknown market territory (Johnson et al., 2008) or when one wants to learn and implement successful concept of another business area (Waldner et al., 2011). Companies can even go with different business models during their life-cycle.

As start-ups are discussed at present in public debate, we wanted to study how software business models are studied and how the actual concept of business model is defined and how we could in the future support start-ups in their business development. We found out in the early stages of the study that the extent of research on this topic is limited and, for example, although business models in general have been studied and literature reviews exist (e.g. Zott et al., 2011), no systematic literature reviews or mapping studies have been conducted regarding business models in the software industry. This systematic mapping study analyzes existing literature on software business models, builds a systematic map and gives an overview of the topic to establish a solid base for future research.

2. RESEARCH PROCESS

The research process followed the guidelines given by Kitchenham and Charters (2007), Engström and Runeson (2011) and Petersen et al. (2008). The aim of a systematic mapping study is to identify a research gap and, as Petersen et al. (2008) advice, to classify and map the found articles. Petersen et al. (2008) suggested the systematic mapping study to follow the process presented in Figure 1.

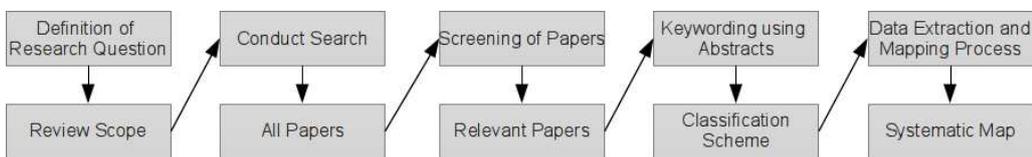


Figure 1. The Systematic Mapping Process (Petersen et al., 2008)

The process starts with the definition of research questions and based on them the search keywords are created and the actual search conducted from selected databases, journals or conferences. After that articles that do not meet the research question are filtered out. Articles are classified based on keywords found mainly from the abstract. Based on the data extracted from the articles, a systematic map with, for example, figures and tables is built to illustrate the results. (Petersen et al., 2008)

The main motivation for this systematic mapping study is to get insight on how widely business models of software companies have been studied and from what point of view. We have also noted that in literature (Chen and Wang, 2010; Hienerth et al., 2011) success factors have been discussed in such an extent that we decided to use them as a part of the research questions as they can help the management of a company, for example, to monitor business (Soini et al., 2006).

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Based on these reasons the following research questions were set:

- RQ1: *How has the use of business models in software business been studied?*
- RQ2: *What kind of relationships are there between success factors and business models of software companies according to the literature?*

We used the following six scientific databases: ACM DL, IEEEExplore, Science Direct, SpringerLink, EBSCO, and ABI/Inform. These databases gave a very representative and relevant set of articles related to software business models. They include both engineering and business-related perspectives to the published research.

We used the following selection criteria for the articles: 1) the article has to be software business related, 2) the article has to be peer-reviewed, 3) the article has to be written in English, and 4) the article has to be available in full text (not only abstracts).

All the selections were done by the first author of this paper and the first three searches were conducted between 2012-11-15 and 2013-02-15. The fourth search round was done in September 2013.

3. SEARCH

The actual search was started by deciding the search keywords. Searching Google scholar with keywords *software business model* reveals over 2 million results, but only 317 for "*software business model*" (notice quotation marks). This led us to select a search phrase with quotation marks because they can produce a more accurate set of search results from the databases that can be checked quickly. It was also possible to experiment with different keywords and then find a better combination for the next search round.

The results of the first search provided only 114 papers (see Table 1). Their title, abstract and keywords were analyzed and only 12 papers were considered as relevant. The rejected papers did not discuss software business, were too technical or otherwise they were not relevant to the research questions.

The second search was then done with the search phrase *software business "success factors"* in title, abstract, or keywords and it produced 88 results (see Table 1), but only 3 of them were considered as relevant after reading the title, abstract and keywords. The rejected articles covered topics like health care, management and technical enterprise resource planning implementation and these were not seen as relevant. We considered this as a step back and decided to continue by developing the first search criteria.

The third search phrase was formulated as *software "business model"*. The search was done from title and abstract. The keywords part was dropped out as not all papers had author based keywords or they were not available in the database. This search produced the widest range of articles (see Table 1). 29 out of 375 were considered as relevant, based on the title and abstract.

After these three search rounds we thought that the increasing computer/mobile game industry might give us an additional point of view. Thus we replaced the term *software* with the term *game* and used *game "business model"* search phrase in the fourth search round. This round was also search from title and abstract, except in SpringerLink where we could only utilize the search from title as the search engine had been slightly modified. The fourth round was also challenging as quite a few good-sounding articles were available only behind a paywall. Six out of 115 articles (see Table 1) were considered worth complete reading.

Table 1. Results with search keywords round 1 (R1) "software business model" from all fields, (R2) software business "success factors" from title-abstract-keywords, (R3) software "business model" from title-abstract and (R4) game "business model" from title-abstract

	ACM DL	IEEEXplore	Science Direct	SpringerLink	EBSCO	ABI/Inform	Σ
(R1) Accepted / Found	1/9	4/23	1/16	4/40	1/15	1/11	12/114
(R2) Accepted / Found	0/9	1/32	2/25	0/2	0/2	0/18	3/88
(R3) Accepted / Found	4/31	16/199	6/75	1/11	0/15	2/44	29/375
(R4) Accepted / Found	1/12	2/33	2/14	0/16	1/30	0/10	6/115
Σ	6/61	23/287	11/130	5/69	2/62	3/83	50/692

Table 2 shows how the searches produced overlapping results. In the end we had 44 unique relevant papers in the set.

Table 2. Matrix showing the overlapping of the three different searches

Search number	1	2	3	4
1	12	0	5	0
2	0	3	1	0
3	5	1	29	0
4	0	0	0	6

After these searches 692 titles and abstracts were read and 44 papers were selected to be read through entirely. These 44 papers were categorized as listed in the Table 3.

Table 3. Data collected in the articles used in this study

	Accepted	Not accepted	Σ
Data collected from industry	18	2	20
Data gathered indirectly	5	3	8
No data	9	7	16
Σ	32	12	44

32 of the papers read entirely were accepted. Most of these papers include some empirical part with new data collected from industry or from the publicly available information.

Not all the articles were accepted in our study. The reasons for rejection of an article are listed in the Table 4. 12 out of 44 articles were considered as not useful in this study.

Table 4. Rejected articles

Reason	Number of articles
Not related to business models or software industry	6
Not relevant to this study	6

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Half of the rejected papers were rejected because they were not related to software business models. Business modeling may also be related to more technical areas, such as database design or requirements engineering, but we did not see these areas relevant. The second half of the rejections were done because papers were considered not suitable as, for example, the article described a study that was still in progress, the article was too shallow, or the article was not relevant to the our research questions.

Five out of 44 papers were written before year 2000 (see Fig. 2). The publication year was not limited by any criteria. Publication years of the papers indicate the same that was mentioned by Lai et al. (2006), Zott et al. (2011) and Wirtz et al. (2010): most of the research around business models has been carried out after the burst of the dot-com bubble. In this sense we are studying a subject that is quite new as a research topic.

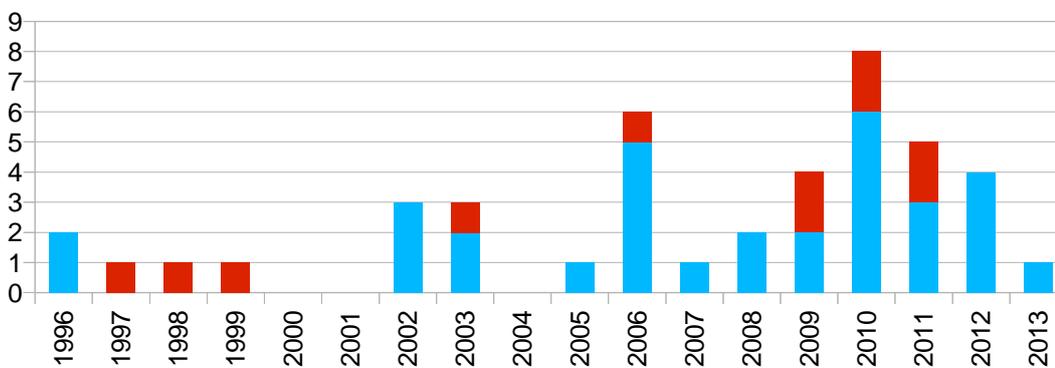


Figure 2. Accepted and rejected papers per year. Light blue indicates accepted and dark red equals rejected paper

10 articles out of 32 accepted ones had authors with a Finnish origin. This was rather surprising as they cover circa 31% of our accepted papers. The business model concept has been studied widely across the globe (Morris et al., 2005; Zott et al., 2011), but our research seem to indicate that software has drawn the attention of Finnish researchers.

4. FINDINGS

The articles found had topics varying from success factors and globalization to modeling with UML and to the transition from a software product to a service. None of the articles were systematic literature reviews or mapping studies, which leads us to argue that, according to our knowledge; this is the first systematic mapping study on software business models. The following table (Table 5) includes all the accepted articles and gives their basic information.

Table 5. Accepted articles

Main issues studied	Research method	Data collected	Type	Reference
Characteristics of business models	Constructive research	No	Conference article	(Asfoura et al., 2008)
Success factors in Austrian software business	Empirical survey	From industry	Journal article	(Bernroider, 2002)
Open source business models and industry's view towards openness	Empirical survey	From industry	Journal article	(Bonaccorsi et al., 2006)
Business model elements and success factors	Delphi study	From industry	Journal article	(Chen and Wang, 2010)
How two application service provide (ASP) companies failed to differentiate their products and services	Multiple case study	From industry	Conference article	(Desai et al., 2003)
Exploring the open source and proprietary software and presenting "both source" business model	Exploration and constructive research	No	Journal article	(Hemphill 2006)
User-centric business and its success factors	Multiple case study	From industry	Journal article	(Hienerth et al., 2011)
E-content price modeling	Discussion paper	No	Journal article	(Jagannathan and Almeroth, 2002)
Links between business models, strategy and processes are critical to competitiveness	Empirical survey	From industry	Conference article	(Kontio et al., 2005)
Software business research and software innovation	Discussion paper	No	Conference article	(Käkölä, 2002)
Business model driven pattern	Constructive research	No	Conference article	(Li and Mou, 2010)
Discussion of SaaS from both business and technical point of view	Discussion paper	No	Conference article	(Liao, 2010)
Clustering software-as-a-service (SaaS) and application service provider (ASP) firms based on business model elements	Cluster analysis	From industry	Conference article	(Luoma et al., 2012)
Investigation of the role of open source in the business models of two companies.	Multiple case study	Only from official company statements and published economy literature	Conference article	(Munga et al., 2009)
Categorization of critical risk factors	Case study	From industry	Conference article	(Nahar et al., 2012)
Finnish software companies' business models and entry models	Multiple case study	From industry	Journal article	(Ojala and Tyrväinen, 2006)
Transition from software product to service	Case study	From industry	Conference article	(Olsen, 2006)
Article discusses open source and proprietary software and proposes a model to evaluate the profiting	Discussion paper	No	Journal article	(Pykäläinen, 2007)

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conditions				
Investigation of relationship between a firm's capability to react to industry wide trends and its service business model	Empirical survey	From industry	Conference article	(Rajala and Westerlund, 2012)
How Chinese gaming companies have developed their business models	Multiple case study	From industry	Conference article	(Ren and Hardwick, 2008)
Globalizing US firms to foreign countries	Empirical survey	From industry	Journal article	(Roberts and Senturia, 1996)
Discussion whether or not software business is its own research discipline	Discussion paper	No	Conference article	(Rönkkö et al., 2010)
Revenue logic of software companies on strategic level	Exploratory study	From industry	Journal article	(Sainio and Marjakoski, 2009)
Built a business model framework and confirmed it with 10 software companies	Constructive research	For validation only	Conference article	(Schief and Buxmann, 2012)
Top management views on monitoring internal success factors	Empirical survey	From industry	Conference article	(Soini et al., 2006)
Re-engineering software from old version to new one	Experiment	From the implemented project	Conference article	(Tsangaris et al., 1996)
Using UML for business modeling	Constructive research	No	Conference article	(Tyndale-Biscoe et al., 2002)
Business models in Finnish software industry, why others succeed better than others	Cluster analysis	From industry	Conference article	(Valtakoski and Rönkkö, 2010)
How to implement cross-industry innovations	Case study	For validation only	Conference article	(Waldner et al., 2011)
Designing a framework to support the design of business models	Constructive research	From industry	Conference article	(Weiner and Weisbecker, 2011)
"4C" Internet business model typology to be used while utilizing business models	Constructive research	From industry	Journal article	(Wirtz et al., 2010)
How to calculate revenues in free-to-play games	Constructive research	For validation only	Journal article	(Wu et al., 2013)

The most surprising finding was how the concept of business model has yet not been defined in such an extent that researchers would use it similarly. Now every research article defines in detail what is a business model, what parts are included and what are excluded. Some researchers define business model with just one sentence (e.g. Valtakoski and Rönkkö, 2010), while others find even 20 elements in five groups (e.g. Schief and Buxmann, 2012). Clearly there is room for a more standardized definition.

Despite of being defined in many ways, the actual meaning of business model has also been interpreted in many different ways. Käkölä (2002) mentioned the term *business model* in the title, but the article itself stated that it outlined *business strategies*. Weiner and Weisbecker (2011) describe how a business model is an abstraction of business logic. In addition,

Osterwalder and Pigneur (2002) describe three levels of business: strategy, model and process. In contradiction Schief and Buxmann (2012) put strategy inside the business model concept. Sainio and Marjakoski (2009) state that the revenue logic is a strategic part and the revenue model is operational. In addition, it is stated that the revenue model equals a pricing strategy and the revenue logic is mentioned being one element of a business model. It seems that the concepts of business strategies, models, processes are mixed and researchers are using these terms in a disordered way.

It is argued that business model is not such a thing that can be developed and left as it is (Hienerth et al., 2011; Olsen, 2006). In a way, a business model is in the state of a constant flux as changes, for example, in technology or legislation, can make current business models obsolete and open a room for new ideas, companies and business models (Hienerth et al., 2011; Olsen, 2006; Tsangaris et al., 1996; Valtakoski and Rönkkö, 2010). Additionally Ren and Hardwick (2008) point out how revenue model of smaller companies need to change when the big player changes its own model.

Cloud computing and software-as-a-service are also covered in the articles (Liao, 2010; Luoma et al., 2012; Nahar et al., 2012; Olsen, 2006). Valtakoski and Rönkkö (2010) present a discussion how different business models perform in different circumstances, how the service and product-based business differ (Kontio et al., 2005; Luoma et al., 2012) and what happens when transitioning from a product to a service (Olsen, 2006). The change from the product-based software business to the service-based is not just new protocols, processes and techniques. Besides these technological parts it is also a jump to new markets and learning to take the basic steps there (Olsen, 2006). This requires a different business model and an understanding of how to build a business model to generate both value to customers and revenue to the owners. Luoma et al. (2012) argue that a more holistic business model is required when software-as-a-service is studied.

Open source business models are also discussed in several articles (Bonaccorsi et al., 2006; Hemphill, 2006; Munga et al., 2009; Pykäläinen, 2007; Rajala and Westerlund, 2012). Open source business models are being taught even in universities and their commercial use is increasing (Munga et al., 2009). As the open source phenomenon has reached commercial interest, also hybrid business models have been discussed in the literature (Bonaccorsi et al., 2006; Hemphill, 2006; Pykäläinen, 2007). This means that software developers use both open source and proprietary pieces of software (Pykäläinen, 2007). A software company can also license its products with a dual license model where the same product is available as open source (as free and libre) and also as a commercial software that one can buy (Hemphill, 2006).

We also noticed that there has been discussion whether the software business itself should be one research discipline (Käkölä, 2002) or not (Rönkkö et al., 2010). These kind of conflicting views indicate that the software business has drawn researchers' attention.

The research includes also a discussion whether software development differs from conventional manufacturing, like building ships or cars. Ojala and Tyrväinen (2006) argued that software differs as it is intangible and has a short product life-cycle. In addition, Jagannathan and Almeroth (2002) noted that the cost of replication of software is almost zero.

To summarize all the articles in one table (Table 6), or *map*, we decided to categorize the articles from two points of view: the type of the article and the topic it covers. The type was based on the empirical approach in the article, whether the article included data gathered from industry. The classification of topics include the business model in general, success factors, expanding business, tools and concepts, pricing and costs and also one paper was a pure scientific discussion.

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Table 6. Matrix showing how the articles are related to different topics

Type \ Topic	Business model in software development	Success factors and features of software companies	Expanding business	Tools and concepts to model business	Pricing and cost structure	Scientific discussion
Industry data driven article	<i>Cloud computing:</i> (Luoma et al., 2012; Olsen, 2006) <i>Open source:</i> (Bonaccorsi et al., 2006; Hemphill, 2006; Rajala and Westerlund, 2012) <i>Other:</i> (Desai et al., 2003; Valtakoski and Rönkkö, 2010)	<i>Cloud computing:</i> (Nahar et al., 2012) <i>Other:</i> (Bernroider, 2002; Hienerth et al., 2011; Kontio et al., 2005; Soini et al., 2006)	(Ojala and Tyrväinen, 2006; Roberts and Senturia, 1996)	(Weiner and Weisbecker, 2011)	(Ren and Hardwick, 2008; Sainio and Marjakoski, 2009)	
Theoretical article validated within industry / Data gathered indirectly form industry	(Tsangaris et al., 1996; Wirtz et al., 2010)	<i>Open source:</i> (Munga et al., 2009) <i>Other:</i> (Chen and Wang, 2010)	(Waldner et al., 2011)	(Schief and Buxmann, 2012; Tyndale-Biscoe et al., 2002)	(Wu et al., 2013)	
Theoretical article	<i>Cloud computing:</i> (Liao, 2010) <i>Other:</i> (Asfoura et al., 2008; Käkölä, 2002; Li and Mou, 2010)			<i>Open source:</i> (Pykäläinen, 2007)	(Jagannathan and Almeroth, 2002)	(Rönkkö et al., 2010)

The research of business models in the field of software covers articles that describe a business model or models and how they are used in the software business. Desai et al. (2003), for example, compared two companies and their problematic entrance to the application service provider (ASP) business. Rajala and Westerlund (2012) studied how changes in the industry are managed with different business models. Valtakoski and Rönkkö (2010) studied how various business models perform differently in different scenarios. In general the articles in this topic group argue that business model matters – whether it is online or offline, cloud or mobile. (Tsangaris et al., 1996; Valtakoski and Rönkkö, 2010; Wirtz et al., 2010).

The second topic group contains articles that are focused on success factors. These may be important inside the company (e.g. satisfaction of employees) (Soini et al., 2006) or may also have effect outside the company (e.g. user-centric design) (Hienerth et al., 2011).

Two articles covered expanding the business. Ojala and Tyrväinen (2006) described how 8 small Finnish companies expanded their business to Japan through different entry modes related to their business models. Roberts and Senturia (1996) compared 19 US firms that went overseas. They underline that the business model is important for the globalization strategy of the company. Besides these two articles, Waldner et al. (2011) discuss how business models of

different industry could be implemented in another one. Their example is adapting service-based business model of computer games to the music industry.

Four articles introduced tools and concepts to be used when modeling business. Weiner and Weisbecker (2011) designed software for building business models, Tyndale-Biscoe et al. (2002) used UML to model business and Schief and Buxmann (2012) built their own framework for designing, describing or analyzing a business model of a software company. Pykäläinen (2007) proposes a model for describing profit conditions. The model consists of three factors: ideology, type of technology and complementary assets.

Four articles covered pricing and cost issues. Sainio and Marjakoski (2009) found out that the more established the software company is, the more independently it can carry out its business model and benchmark its revenue logic and revenue models. In addition (Ren and Hardwick, 2008) studied how Chinese game companies have refined and innovated their business model during this millenia. Jagannathan and Almeroth (2002) argue that an Internet business model should include the following determinants: transaction model, pricing strategy, customer behavior, distribution resources and competition. Their article discusses how these determinants affect revenue and how models of conventional markets cannot be applied in the Internet but more dynamic pricing is recommended. (Wu et al., 2013) developed a model to be used when calculating profit on online games. Their ideas are based on the increased use of free-to-play revenue model where the actual income is coming from advertising and in-application purchasing.

Rönkkö et al. (2010) argue that software business is not its own research discipline. The purely theoretical article is a part of an academic discussion and it gives an overview of how the software business is studied.

5. DISCUSSION

In the beginning we set two research questions: RQ1 - *How has the use of business models in software business been studied?* and RQ2 - *What kind of relationships are there between success factors and business models of software companies according to the literature?* After reviewing literature we have found out that the software business models have been studied only on a high level and we did not find articles deeply describing how companies utilize business modeling. Few studies (Kontio et al., 2005; Rajala and Westerlund, 2012; Valtakoski and Rönkkö, 2010) report how companies utilize and design business models, but from our point of view it seems that origins of this information could be even more deeply from industry. Although two articles (Ren and Hardwick, 2008; Wu et al., 2013) discuss innovating and refining revenue models, these studies did not focus on how companies are able to improve and analyze their business model as a whole.

For the second research question we found studies (Bernroider, 2002; Chen and Wang, 2010; Hienerth et al., 2011; Soini et al., 2006) describing success factors in the software business. For example, Chen and Wang (2010) describe six elements of a business model and 20 related critical success factors. In their study they categorize different success factors under different business model components. Bernroider (2002), Hienerth et al. (2011), Soini et al. (2006) all describe internal success factors in their studies and they argue that “soft” factors (e.g. employees) seem to be more important than “hard” ones (e.g. financial). Based on this

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we may conclude that there is a relation between success factors and the business model, but the relation is still unclear and requires more research.

We found out that the present scientific literature has no consistent definition of what is included in a business model. We also saw the term used in different contexts and in numerous ways with other similar terms, like business logic and business strategy. These concepts require further research on how we can use them in a more unified manner, for example, what is the relation between a business model, business logic and business strategy. We also need to deepen the knowledge on how companies may benefit from business models in their strategic business development activities.

Also it was not clear how software business is separated from traditional brick and mortar business. Although there has been discussion if software business is its own research discipline or not (Käkölä, 2002; Rönkkö et al., 2010), we are not sure whether the business model of a software company emphasizes the same factors than, for example, the business model of a shipyard or a car manufacturer.

6. LIMITATIONS

In our study we collected articles from six scientific databases. This does not, however, cover all articles published, and therefore we might have missed some useful information. We tried to select the databases covering both engineering and business sides to get a selection of articles as wide as possible. We concentrated only on peer-reviewed journal and conference articles. This excludes books, white papers and other non-peer-reviewed articles.

Our search keywords were limited to software business and for example content creation was not searched. Also we only searched for *model*, not for *modeling* (or *modelling*), which might have limited the search results as we don't know exactly how search engines in different databases work.

7. CONCLUSION AND FUTURE RESEARCH

We found out that we are working on an area that has no clear picture of itself. The concept of business model has not yet been defined in such an extent that the research community could use a uniform definition for it. Discussing about business model can mean discussing about business strategy or about business logic.

We also found some evidence of how company success factors are related to the business model and how different business models produce different results in companies' ability to compete. We also noted that there was very little research done with software industry to gain knowledge on how companies are actually modeling their business.

These results mean that we still need to define the concept of the business model thoroughly to be able to position the research in the correct category. This study also suggested that the business model and its design are relevant issues when software companies are doing their business.

In our future research, we are going to interview software companies and study how they utilize business models and how they model their business. Another target we aim at is to establish a common way to define the software business model concept, its related concepts and their connections based on existing literature and empirical data.

We also aim to study how software business differentiates from other business areas. The current literature does not give a clear picture of how we can utilize the business model concept nor do we need to do adaption between different factors of the model, which is yet another thing we are going to study in the future.

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Publication II

The role of business model and its elements in computer game start-ups

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The Role of Business Model and Its Elements in Computer Game Start-ups

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Abstract. In this multiple case study we interviewed six Finnish computer game start-ups to find out what elements are included in their business models. We identified the key elements and used the analytical hierarchy process to rank the elements. We found out that computer game start-ups see their business model as a synonym to a revenue model and/or a business plan. In an in-depth analysis we identified nine key elements (human capital, marketing, key partners, financing, customer relationship, key activities, innovation process, key resources and customer segment) that have operative importance for these companies. These elements are the building blocks of a business model in the computer game start-up domain. The findings provide improved knowledge on how the business models of game start-ups could be constructed.

Keywords: business model, computer games, start-ups, multiple case study, analytical hierarchy process.

1 Introduction

Business models are useful in modern business environments as they allow organizations to understand where their value comes from and how the company in general operates. However, in our earlier study [1] we found out that very little research has been conducted on the role of business models in software companies that could explain their special features and compare their business models to those of other fields, such as mechanical or food industry. Some studies have defined the concept of a business model [2], [3] and some have made observations on software business [4], [5], but there seems to be a lack of research that observes the business model from the software company's point of view instead of categorizing software companies based on their business models. Recognizing this we dived into the business of six computer game start-ups and studied their business models.

These companies build technological solutions, products, not to solve problems, but to give value to customers in other ways, mostly by providing entertainment and experiences. Revenue is not generated directly by the technological solution nor by the experiences offered, but by the business model generating revenue from

technology and experiences [6]. As the business varies, it is also probable that the business model must contain variation in parts, relationships and their weighting.

The overall definition of a business model can be described for example by how it captures the way a company functions and creates value and delivers value to the customer and how it converts the customers' responses into profit [7]–[10]. We have already noted [1] that the definition is ambiguous, and different researchers still see the concept of the business model in a different way.

In this study we aim to answer three questions, which have been touched by the literature but not yet adequately answered [1]. The first question “*How do computer game start-ups define the business model?*” digs into the issue of the concept of business model being young, and thus, as the definition of the term is still somewhat unclear [1], [11], the companies may understand it in various ways. With the second question “*What are the elements of the business models of computer game start-ups?*” we aim to identify the pertinent parts that the managers consider as the elements of their business model. The final question is “*How are the elements of computer game business models prioritized?*” On the basis of interviews, we prioritize the elements.

2 Related Research

There has been a lot of discussion of what a business model is, what parts are included and what are not. A common definition is still to be found [11]. Researchers have positioned the concept of business model between business strategy and business processes [2], and it is argued that the business model fills the gap between the two. On one hand, business strategy is a more abstract way to position an organization in the business, and on the other hand, business processes work within the operational level with more detailed ways of doing business. This segmentation is also supported for example in [3], [12], [13]. A business model is more concrete than just the decision to use segmentation, differentiation or cost leadership as parts of the business strategy proposed by [14], yet it is not as concrete as the concept of a business process, which includes detailed processes like management and operational processes. The business model is not a process, but merely description of the steps and key items [11], [15].

Several studies which define business models identify elements that are characteristics to this concept [3], [4], [11], [16]. The variety of elements is great, but the most commonly used ones include for example value production, customers and the revenue model. The variety of included elements has changed during the years, and for example in 2000 it was mentioned in [17] that a business model and a revenue model are complementary but distinct concepts. In more recent studies, the definition has lived on and the revenue model has been included as one element of the business model concept [11]. As the business model concept is closely related to the concepts of revenue logic and revenue model, Sainio and Marjakoski [13] argue that the revenue logic is a part of the business model, and the business model describes who pays and what he gets in return. They position the revenue logic at the strategic level

and use the concept of the business model when describing the steering done at the operational level. Some studies use the term component [3], [11], [18] while some talk about elements [4], [16]. They all still talk about the same thing: parts that form the business model.

The business model concept has been studied in several business areas - like health-care [19], airline business [3] and software business [4]. Software business differs from the other business domains in many ways, as it builds intangible products and services that a user cannot experience directly but through user interfaces [20]. In our literature study [1] we concluded that there were several articles available describing particular areas of the software business, for example, revenue and pricing issues, how the software-as-a-service paradigm is changing the business, what open source and mixed source mean to the business model and what are the difficulties when a software company is expanding to overseas. However, it seemed that no studies existed describing how software companies understand the business model concept, its elements and its use in daily operations.

3 Research Process

In this study we follow the multiple case study research method [21], [22] and the framework developed in [21]. The case study has six steps: defining the strategy, reviewing the literature, developing the case study protocol, conducting a pilot case study, conducting a multiple case study, and developing a conceptual model. Our research strategy is determined by the 3 research questions presented above. Reviewing the literature was already done in our previous study [1]. The development of the case study protocol included the decision to use interviews as the data gathering method and the design of an interview guide. We conducted a pilot case study and determined that the protocol was sound. The analysis produced a conceptual model, which is presented in Section 4. To guarantee the validity of the results, we followed principles derived from [21]–[23]. This included for example choosing the data collection procedures (we used interviews), data analysis methods (we used coding) and avoiding being biased (we had more than one researcher present at most of the interviews and conducting the analysis of the collected data).

In the analysis we used the analytic hierarchy process method (AHP), which is widely used in decision making [24]. AHP has been used in various areas, such as selection, evaluation, benefit-cost, priority, development, resource allocation, decision making, forecasting, medicine, and quality function deployment. Alidi [25] used AHP to measure the initial viability of potential industrial projects. Babic and Plaxibat [26] used AHP to rank companies according to their business efficiency, and Sarker et al. [27] used AHP to find out the relative importance of various types of agility in information system development. The characteristics of AHP include suitability to problems with multiple criteria and attributes [28]. Hafeez et al. [29] determined the key capabilities of companies using AHP with both quantitative and qualitative data. In this study we use AHP in a similar way – as a tool to prioritize results based on qualitative data.

3.1 Data Gathering and Analyzing

We collected and analyzed data from six Finnish computer game start-ups. A majority of them developed mobile games, but there were also experiences in developing PC/Mac, browser and serious games. The study uses data from three interview rounds. The interview rounds one and two provided us with 931 minutes of interview data for background material, and the third round with 507 minutes of data especially aimed for this study. The first round of interviews included team leaders or project managers, the second round upper management or the owner, and the third one interviews with upper management. In most of the interviews, only one company representative was present, but in two occasions there were more than one person from a company. In total nine persons were interviewed. Information of the companies is presented in Table 1.

The actual interview questions were peer-reviewed within the research group before the interviews were conducted. The questions were open-ended, which enabled also free-form discussions during the interviews. The interviews were sound-recorded and transcribed. The focus of the interviews in the first round was to understand the operational level of software development. The second round focused on marketing, innovating and financing, and the third round focused completely on business issues like customers, revenue models, value propositions, and cost structures.

In this study we have built the interview questions over the ideas of the business model canvas (BMC) developed by Osterwalder et al. [30]. This means that the nine elements (key partner, key activities, key resources, value propositions, customer

Table 1. Description of the organizations.

	Case A	Case B	Case C	Case D	Case E	Case F
Size of the organization	4 persons	4 persons	8 persons	3 full time, 1 part time	4 persons	3 persons
Relatedness to games	Makes games	Makes games	Makes games	Makes games	Makes serious games	Makes games
Number of released games	1st one being developed at the moment	First two being developed at the moment	2	1	2 projects being developed at the moment	1st one being developed at the moment
Years in business	Less than 1	Less than 1	Less than 3	Less than 2	Less than 2	Less than 1
Platform / Customer segment	Smartphones	Smartphones, tablets, browser games	Smartphones, tablets, desktop computers	Browser games, smartphones	Browser games, smartphones	Smartphones

relationships, customer segments, channels, revenue streams, and cost structure) of BMC were used as the “seed categories” for the interview questions. These categories were modified during the question set-up to be more suitable for the software business, and also new categories appeared. For example, the weight of the channel category of BMC was decreased and the roles of customers and partners increased, as we saw them more important for computer game start-ups. Our final interview themes included six topic groups for the questions: customer; key partners and resources; business model and value proposition; cost structure, modeling and marketing; organization and industry; and reasons why the company was started. These six main topic groups were covered in the questionnaire with 3 to 7 question items in each group. The final questionnaire form is available online at <http://www2.it.lut.fi/projects/SOCES/library>.

4 Elements of the Business Model

The topic groups were based loosely on the business model canvas [31]. However, the results indicate that the case organizations emphasize different topics from the ones highlighted in the business model canvas. Some elements match, but some are less important than described in [30].

It was asked from the organization how they have modeled their *business*, to get a rough idea on what they thought about the topic. Case E (interviewed as 1st in the 3rd round) answered that “*Always when things change and such. To be an entrepreneur it is always like going from one crisis to another, but we analyze and go through it.*” When asking what tools they used for modeling we got the answers *spreadsheet* and *3rd party analyzers*. After other interviews we understood that the spreadsheet was used to calculate different *revenue model* possibilities, as Case F put it: “*If we put the price like this, and selling is like that, we see how much operating loss we get*”. 3rd party analyzers meant that some public funding partner had required a *business plan* to be supplied with the application letter. So, for these organizations the term *business model* was used to mean a *revenue model* and/or a *business plan*. As the concept of business model in software business is yet to be defined unambiguously [1], we saw that these kinds of interpretations are likely to pop up. This meant that we needed to analyze carefully whether the interviewed case organization talked about the same issues with the same terms than we did. In this study we research business models, not just revenue models or business plans. Although the organizations saw the business model as a narrower issue, we understood their sentiments on a broader scale than just a revenue model.

Another issue to note is the term *customer*. Traditionally companies have been doing business with customers who give them income. With the free-to-play revenue model, games have players who do not give any (direct) revenue to the company. In the free-to-play model the game is distributed free of charge to anyone with a compatible game system. The revenue is gathered through, for example, traditional

online advertising, cross-game advertising, and especially in-app-purchasing, which means that the players can for example use the normal weapons provided with the game or spend money to purchase better weapons or unlock advanced features. This creates the dilemma of who is the customer: all players or only those players who give income? When discussing this with the game companies they saw all the players as their customers – whether they pay or not. Case E saw health-care organizations as well as end-users as their customers. If they put their application to app stores, customers are also gained from there. Because of this, we define the term customer to include all the gamers, not just the ones who pay.

Let us consider two elements of the business model canvas [31]: value proposition and channels. In the computer game context all game companies described the value they offer to players as an *entertaining experience*. The overall goal of many conventional utility-producing software systems is to save time or enhance the efficiency of the user, whereas the game business has the opposite goal. The manager of Case D summarized this phenomenon: “[*traditional software*] tries to minimize the time a user needs to spend. With games we try to maximize the time spent, and still keep it entertaining.” This is one of the areas that separate the game business from the conventional software business. The whole value proposition is turned upside-down, and to find similar value propositions, the music, movie and television industry are closer to the game industry than the conventional software business.

In this study we do not concentrate on the value proposition as it was so obvious for the companies – with the slight exception of the serious game maker Case E, which builds entertainment experience but also aims at health-care savings through rehabilitative games. This study concentrates on the business model elements that enable the entertaining experience, as described below with each individual element.

Another different element is the channel used to deliver the product to the customer. The brick and mortar business needs a physical channel to push products to customers, whereas the software industry is moving towards a completely digital distribution of software. For example, mobile games and other apps are purchased and installed via platform-specific digital stores such as Apple’s App Store (smartphones) or Valve’s Steam (PC workstations). This reduces the time game developers need to use for planning and designing the delivery channel for their products.

4.1 Description of Individual Elements

We used the ATLAS.ti software to code the interviews and the identified nine business model elements that rose from the data. These elements are the parts that enable business for the case organizations and thus impact the producing of the entertaining experience of the game for the customer. Descriptions of the identified elements are presented in Table 2.

Table 2. Descriptions of the indentified elements

Element	Description
Customer relationship	The customer relationship element includes all the communication and data collection that takes place with the customer. There are two ways to collect feedback. Firstly communication, where the company discusses with its customers in Facebook, blogs, forums or any other media that allow communication. Secondly, companies collect indirect feedback through their games; what parts of the game are used most, what are not used. All the efforts aim to improve the product and the experience for the customer. The customer relationship element is also used to improve revenue generation methods.
Customer segment	The customer segment denotes how the organization invests to find the best possible way to reach the customers and what kind of persons there are in the target group. In the area of computer games, and especially in mobile games, this means mostly selecting the platform that provides the highest profit for the money spent on development. It also includes research on customer behavior and market segments.
Financing	Financing is a key area in business, and it means getting external funding (e.g. venture capital or loan from a bank) and direct revenue from the product to run the business. As the cases were start-ups, they mentioned both external funding and building a revenue model to generate revenue from the games. Some companies also mentioned an aim to build a brand from their game characters to start getting revenue from merchandising.
Human capital	Human capital means the people working directly in the company. People can work full-time or part-time. All the companies pointed out how important their workers were. Many mentioned how the company was especially formed around their key persons.
Innovation process	In a previous article [32] we examined how these companies innovated and were creative; meaning what methods they utilized to produce creative parts, like new game concepts and characters. We learned that they saw innovation as an important element in the game business, but the methods they utilized were mostly ad-hoc brainstorming, and no structured methods were used.
Key activities	Key activities mean operations that are required to produce a product. A game company has several key activities. In addition to developing and programming, also graphical designing, 3D modeling and usability testing were mentioned. In some cases also music and sounds were key activities when they were done in-house, but some outsourced it as they did not have resources to do them by themselves.
Key partners	Key partners include the parties that help the organization to, for example, produce and publish the product. This means, for example, outsourced arts, music and sounds. Some cases also listed the publisher as their key partner, but not all as some had the aim to publish games by themselves.
Key resources	Key resources mean the assets the organization sees important and could not manage without. The most important resource was the human capital, but also other things were mentioned. As the organizations mature, they gather intellectual property (e.g. brand, game characters). Even the development tools were seen as key resources, as the companies had invested in them. Hardware was not considered as a key resource.
Marketing	Marketing means all the actions an organization does to get more visibility for their products. The case organizations valued marketing, and in this study marketing includes how companies aim to advertise themselves and their games, what kind of research is done on the topic and with what kind of budget the marketing could be done.

4.2 Ranking of Elements

We used the Analytic Hierarchy Process (AHP) to rank the found elements on the basis of their importance. The AHP consists of several steps. The main idea is to compare alternatives based on a set of criteria to reach out a goal set beforehand [24], [28]. The goal can be for example choosing the best candidate to vote in presidential elections. After the goal has been set, there are probably alternatives already available, as there is usually more than one candidate for the presidency. Then the decision about the criteria, such as age, opinion about climate change and gun laws is made.

After the initial requirements have been set, a comparison is done. In this study the comparisons were done by the authors of this article based on the gathered data. Comparisons mean that every alternative is compared to each other according to every criterion. This means that there will be $N*(N-1)/2$ comparisons done with every criterion, where N means the number of alternatives. In our case this means $9*(9-1)/2=36$ comparisons per criterion. The comparison is done with numbers 1, 3, 5, 7 and 9. 1 means equal importance and 9 absolute importance, 3 (moderate), 5 (strong), 7 (very strong) being between these opposites. It is also possible to use numbers 2, 4, 6 and 8 if the jump between, for example, 3 and 5 is seen too large. Invert values are used to show the importance on the opposite side.

Based on these comparisons $N \times N - 9 \times 9$ in our case – matrixes are produced and their eigenvector is calculated (Tables 3 and 4). On the basis of these eigenvectors and the weights of criteria, the final value can be calculated by multiplying these two. These values are used when the actual decision making (e.g. prioritizing) is done. The weight of a criterion can be calculated through the same process as the eigenvectors for the criteria. We have used equal weight for each criterion.

Table 3. Matrix produced from Case A data.

	IP	F	CR	CS	M	KP	KA	KR	HC
Innovation process (IP)	1	1/3	1/3	3	1/5	1/3	3	1/5	1/7
Financing (F)	3	1	3	3	1/5	1	3	1/3	1/5
Customer relationship (CR)	3	1/3	1	3	1/5	1	3	1/3	1/5
Customer segment (CS)	1/3	1/3	1/3	1	1/7	1/5	1/3	1/7	1/7
Marketing (M)	5	5	5	7	1	3	5	3	1/5
Key partners (KP)	3	1	1	5	1/3	1	3	1/3	1/5
Key activities (KA)	1/3	1/3	1/3	3	1/5	1/3	1	1/5	1/5
Key resources (KR)	5	3	3	7	1/3	3	5	1	1/5
Human capital (HC)	7	5	5	7	5	5	5	5	1

Table 3 is a 9x9 matrix which shows how Case A sees Financing as moderately more important (3) than the Innovation process and strongly less important (1/5) than Marketing.

After a matrix has been formulated, it is then squared several times to get more accurate results. In our case, after four multiplications we got three static decimals to eigenvectors, which are presented in Table 4.

Table 4. Eigenvector calculated from the matrix presented in Table 3.

Innovation process	0.038
Financing	0.075
Customer relationship	0.058
Customer segment	0.020
Marketing	0.205
Key partners	0.070
Key activities	0.031
Key resources	0.137
Human capital	0.365

These values are now the weights of different elements for Case A. The same calculation was done to every case and the total values were calculated by multiplying the eigenvalue matrix with vector $[1/6 \ 1/6 \ 1/6 \ 1/6 \ 1/6 \ 1/6]^T$.

AHP does not limit the number of alternatives or the criteria. The criteria can also be divided into sub-criteria if needed. With a consistency ratio and a consistency index it is also possible to check whether the judgment is valid [27], [28]. The process of calculating consistency is described thoroughly in [33].

All the case organizations saw themselves as start-ups, but with some elements they had different weights based on their experiences in the field. The overall ranking and importance is shown in Table 5. Each weight reflects the importance of the specific element, and the weights are relative to each other.

Table 5. The ranking of business model elements based on the analytical hierarchy process. The three most important elements are highlighted with inverted colors and the least important in gray.

Rank	Element	Weights						
		Case A	Case B	Case C	Case D	Case E	Case F	Total
1	Human capital	0.365	0.318	0.267	0.265	0.350	0.317	0.314
2	Marketing	0.205	0.085	0.035	0.114	0.202	0.209	0.142
3	Financing	0.075	0.203	0.135	0.135	0.056	0.107	0.118

Table 5. (continued.)

4	Key partners	0.070	0.157	0.185	0.089	0.112	0.068	0.113
5	Customer relationship	0.058	0.050	0.099	0.235	0.122	0.091	0.109
6	Key resources	0.137	0.039	0.086	0.027	0.024	0.038	0.059
7	Key activities	0.031	0.075	0.095	0.042	0.035	0.062	0.057
8	Innovation process	0.038	0.056	0.055	0.054	0.030	0.086	0.053
9	Customer segment	0.020	0.017	0.042	0.040	0.069	0.022	0.035

Based on the empirical data, the most important element was human capital. The companies argued that *“people are the only thing that matters”*, (CEO, Case A) and *“people are the only resource a game company can have”*, (CEO, Case C). No other element was seen as important, and this is natural as it is a question of intangible products and start-up companies.

There was some variation between the case organizations as regards marketing. For example, most of the organizations saw marketing as an important element that they had no experience and skill of. *“We have been going with the idea that we are unknown – invisible – and we don’t have marketing know-how. The first games are exported to different countries via a publisher, who then gives us the coverage”*, (CEO, Case D). However, the oldest organization, Case C, described it as an element that was no longer important. *“In the beginning we had lot of marketing and we had our own marketing manager... But now we have noted that in the end marketing plays quite a small role... maybe even more important [than cross-promotion] is the word-of-mouth.”*, (CEO, Case C). Mobile game marketing was seen a bit as a black hole as there was no guaranteed way to get a game to become the editor’s choice or to any similar promotion position. This led Case C to scale down the marketing efforts. They also trusted their publisher and had already gained success with games, which is something that the other case organizations were still aiming at.

Financing was another element that the companies saw differently. Case B had the most unique way of funding. Where the other organizations had been using personal savings, getting grants and financial support, Case B had chosen to take a loan from a bank: *“To our joint stock company we are applying for a loan... approximately two times 30k euros... so that we can pay a salary to ourselves from the beginning”*, (CEO, Case B). None of the other organizations mentioned anything about loans, but trusted that they would be able to survive with support money to gain revenue from their games. Free-to-play was the dominating revenue model. Only Case E, which made serious games, mentioned that they were going to license their products to health-care organizations. The rest utilized free-to-play at least to some extent. Some used the best of both models, as Case C described *“Both games started as pay-to-play [later free-to-play] and they also had the in-app-purchasing option straight from the beginning”*, (CEO, Case C).

Key partners were also seen important, as for instance only three of the case companies mentioned that they could actually do the whole game with their own resources, and one of the organizations, Case E, mentioned that *“we would outsource if we had the money”*. Most of the companies outsourced at least music and sound. The publisher was also seen as a key partner, but some companies were considering not using a publisher in their future projects. Yet, key partners were not thought as important as the core employees of the companies. The main sentiment in the companies was that they would try to improve their own output, and beyond that, outsource the rest of the work. *“Voice-overs have been purchased from the US”*, (CEO, Case C). *“We have an art studio [partner] in Bulgaria... ..from them we get high level graphical assets”*, (CEO, Case D).

Also customer relationship divided opinions. For example, Case B, which had not yet released anything, had not thought about getting customer feedback and steering their game development towards the gamers' ideas: *“We do not see it as a problem [understanding customers]... when we get something out, we need to take opinions and getting feedback from blogs and forums”*, (CEO, Case B). Case D saw customer relationships as more important and said that they were going to answer the gamers' questions and had already implemented some of the ideas which they had got from the gamers. *“When our users give comments, feedback or questions, we answer every one of them”*, (CEO, Case D). Case E, which worked with serious gaming, told that for them customer relationships were important, as they needed to be in close connection with medical staff and be able to discuss with doctors and other health-care people to be able to push their games to health-care use. *“We keep close contact with health-care divisions. We have been discussing and negotiating with all the responsible directors and have had meetings with physiotherapists... [through these discussions] we get those pilot patients”*, (CEO, Case E).

With the exception of Cases D and E, all the other had decided to use third-party tools to build their games. Most commonly this meant full game engines, such as Unity 3D. Their idea was to be able to build games in rapid progression, spending months rather than years in development. *“The first version was a plain C++ OpenGL. After that we tried the C++ and Marmalade combo. It made possible for us to have multiplatform software, it abstracted all the interfaces. It was awkward, too. So, after one year of thinking we have now done with Unity in two months more than all the previous work combined”*, (Developer, Case A). Case D had a slightly different approach as they build browser-based games that communicate with a back-end solution, which was seen as one of their key resources. *“We have now developed it for more than a year, so it [backend solution] is our key resource”*, (CEO, Case D).

All the case organizations mentioned the same kind of key activities, including developing a game, drawing graphics, testing the game, promoting the company, and getting grants. User testing was mentioned in many cases as the most important testing activity. As the games needed to provide good experience, the testing feedback from users was considered very important, and was mentioned several times. *“The first step is to press the play button in Unity... ..but a developer can be blind to his work, so the next step is to compile it to a test device and give it to someone who has no money involved in it”*, (CEO, Case A).

The innovation process is discussed in detail in [32]. Generally innovation and creativity are needed when building a game that gives a customer an experience. The case organizations had their own ways of supporting creativity. They used for example idea pitching and brainstorming where all the members of the company had the possibility to tell about their ideas, and subsequently, if the idea was considered feasible, a prototype could be built.

The customer segment was seen very straightforward for the case organizations, as the application store of the target platform (for example Apple's App Store) was the most important release channel, with the exception of Case D and Case E. Case D used HTML5-based technologies and had built their own back-end solution to support their browser-based games and a broader customer segment. Case E developed health-care related games which limited their customer segment, but they had also thoughts of selling their serious games in app stores. *"In the mobile world the basic app could be offered for free, but not our advanced thing. Not a chance, since it has all the hardware and other things"*, (CEO, Case E). Case E also saw the customer segment as more important than the other companies, as it needed to work with different health-care organizations to find customers.

4.3 Summary of the Findings

In the beginning we set three research questions: *"How do computer game start-ups define the business model?"*, *"What are the elements of the business models of computer game start-ups?"* and *"How are the elements of computer game business models prioritized?"* We found answers to all these questions.

For the first question we found out that the game companies described the business model slightly differently than what they actually applied in their daily operations. They described marketing and financing as the key parts of their business, but in the analysis the human capital emerged as the most important element – yet it was not identified through talking about *business*, but instead through *key resources*. We interpreted that the companies used the term business model when talking about their revenue model. As the academic literature includes for example the technical platform or channel [4] as elements of the business model, it seems that there is a distinction between the academic and practical definition of the term.

The importance of human capital was significant. As this study has focused on start-ups, it is clear that a company is focused heavily on the persons who founded it. Several company leaders said that people were the only thing that really mattered, and for example specific development tools, which may have cost thousands of euros, were not seen as important, although they would ease the development and fasten the release of the game.

Today's computer games, especially for mobile platforms, are more and more delivered through digital stores. We did not find any evidence that the companies had difficulties in delivering their games. App Store and similar digital software markets ease the delivery process significantly compared to the situation where software is delivered with physical packages. The problem was not in delivering the game but in reaching the awareness of gamers.

For the second research question we identified 9 elements. Human capital, key marketing, key partners, financing, customer relationship, key activities, innovation process, key resources and customer segment were seen as elements that enable business leading to the entertaining experience of a computer game.

As an answer for the third research question we prioritized the elements with the analytical hierarchy process and found out that the start-ups considered human capital as the most important element of their business model. Marketing and key partners were also considered important.

5 Discussion

This article concerned the application of business models in game industry startup-companies. In the literature we find numerous articles describing the elements of the business model; for example [3] gives an extensive list of these articles. The elements of the business model were gathered from several different industries, and a few studies [4], [16] which described the business model elements used in the software industry were found. Yet, we did not find all of these elements in our studied organizations. We identified nine elements from game companies, which were similar to the identified elements mentioned in previous studies, but even then they were not a complete match. This supports our view that we cannot describe the business model concept by its elements without taking the business domain into account. Our opinion is that we can discuss business models in two ways: A) by using the more abstract concept positioned between the concepts of business strategy and business processes, as presented in [2], [3], or B) by defining the elements that are used in that specific business model. The latter can be very specific, as even not all software business models include the same elements. According to our view, for example the conceptual framework presented in [2] is too abstract to be utilized by start-ups. In this study we concentrated only on computer game start-ups and thus the findings can be applied in the computer game industry and to some extent in other software business, as the computer game industry has similarities with the traditional software industry. It seems that it is not possible to define the concept of business model comprehensively with the elements discovered in previous studies, or at least different elements have very different weights in different business areas. For example, in this study we found out that the distribution channel is not important for computer game companies. The channel is something that does not have to be concentrated on at the moment when Apple's App Store and Google's Play store dominate the mobile markets. On the other hand, human capital and key partners were seen as important elements, but for example Schief and Buxmann [4] do not mention these in their framework.

Besides the theoretical findings presented in this article, the aim was also to help computer game start-ups. This article provides knowledge on what are seen as important elements in the starting computer game business. This may give new ideas to other start-ups, who might not have noted all the issues presented in this article.

We studied six computer game start-ups in Finland. This means that the sample size was small and homogeneous. However, all the companies were aiming at the

international markets with their products, the companies covered different release platforms and genres, and were developing games as their main source of income, so the companies did have variance and were representative organizations of the games industry. We had four different interviewers to avoid interviewer bias, two people conducting the data analysis to avoid observational bias, and the article was discussed extensively with three people familiar with the data to avoid personal bias. Although the findings were consistent throughout the study, further research is required for a better validation of our findings. In addition, the results of qualitative studies should be considered as suggestions or practice-based recommendations outside their original scope and environment.

6 Conclusion

In this study we observed six computer game organizations and how they had built business around their software products – games. All organizations were start-ups and they were still small in size and had limited experience in the field of software business. We performed a multiple case study to find out what the organizations were doing in practice. We used the analytical hierarchy process to prioritize the key business model elements found in the data.

We discovered nine elements that are crucial when starting a computer game business: human capital, marketing, key partners, financing, customer relationship, key activities, innovation process, key resources and customer segment. We found out that the case start-ups weighted the human capital as the most important element in their business. Their understanding of the concept of a business model was greatly focused on the revenue model and was not in line with the academic version of the concept. The organizations also considered for example the distribution process as straightforward and did not see it as an important part of their business, as described in previous studies. Our assessment on this observation is that this feature is a unique part of the mobile game business, and is different from the traditional brick and mortar industries, even from most areas of the software industry.

This led us to the more theoretical finding that the business model as a concept is not completely defined with elements that are transferable between different areas of industry. For each industry, business models are comparable only in specific cases, like mobile games, where all the organizations utilize similar elements.

Our future research will focus on the validation of the weights of the computer game business model elements with a larger number of organizations and studying the key elements more thoroughly.

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Publication III

Design and innovation in game development; observations in 7 small organizations

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Design and Innovation in Game Development

Observations in 7 Small Organizations

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Abstract—Design and innovation of game software is considered to be a creative task, which also involves methods from software development. But how do the game organizations actually design their products and innovate? The objective of this paper is to understand how game products are designed, what factors affect the design process and how game designers innovate. This study observed and analyzed seven game-developing organizations to allow comparison of their used design methods, design objectives and sources of their innovation. Based on our study, the game organizations regardless of their size are generally driven by the business factors, such as expected sales, in product design. Even though several organizations promote innovation and creative design, the business practicalities require the organization to prioritize to products that have high profit expectations. The findings indicate that the game development organizations acknowledge originality and creativity in their product design, but their major objective in the design work is to confirm marketability and business potential of the product.

Keywords- Game design, innovation process, game industry, design restrictions

I. INTRODUCTION

Game development is a creative field of industry. Its software development tasks are also a means of expression [1], meaning that the development and design work is much more than just collecting and realizing the functionality and quality criteria for the new product. Unlike conventional software, game products do not have the requirement to fulfill a certain purpose and do it efficiently. Instead they are required to provide entertainment and keep the player interested in the product.

However, there are also studies on the game industry that see game development as comparable to normal software design and development [2, 3]. In some occasions, the promotion of creative chaos and informality may even be a publicity stunt to maintain an illusion that the game business is more relaxed or artistic, or at least less money-centric than conventional software development [1]. In the development of new products for popular, existing franchises this can be considered to be somewhat true, since there are established markets and a customer base for a certain type of product. However, in the development of new concepts, trends and franchises there still is room for innovation, since the game markets thrive for novelty factors and products, which offer something new to the user experience. This innovation and

design for novel concepts is especially thriving in small and medium-sized game studios that are still searching for their first breakthrough product and trademark franchise [1].

In this paper, we study the innovation processes and design principles in small and medium sized game developing software organizations. The objective of this paper is to identify how game developers design their products, what factors affect the design in practice and what is the source of innovation in these organizations. Overall, the research questions were “*How game studios design their products*” and “*How game-developing organizations innovate and make business?*”. Our research group interviewed 27 professional game developers from seven game developing organizations to observe how game developers innovate and design game products. These 27 interviews were conducted with several stakeholders in the organizations, game designers, developers, project managers and upper management, to gain a comprehensive view into the game organizations and to understand how these organizations innovate and design in game development.

This paper is also related to our earlier studies on game developing organizations and innovation. In the earlier publications, game organizations have been studied from the viewpoints of technical infrastructure [4], organizational processes [5] and application of new technologies [6].

The rest of the paper is structured as follows: In Section 2, a number of related studies are introduced and assessed. In Section 3, the applied research methods are introduced and the results are presented in the Section 4. Section 5 discusses the study observations and Section 6 closes the paper with conclusions.

II. RELATED RESEARCH

Game business has been a growing area of industry for the last decade [7], regardless of the economic turbulences in other global business areas. This has driven up the number of game studios in many countries such as United States [7] or Finland [8], and increased the demand for new products and novel concepts.

Game design has been addressed in a number of publications. For example, a study by Blow [2] has identified the increasing complexity of game products during the last ten years. Due to increased processing power of the game platforms, the game products are able to simulate more sophisticated concepts, and at the same time allow more complex designs for new products. In addition of increased

computing power, the game industry has also developed a fairly stable environment of well-known release platforms. The major shareholders, such as Sony or Microsoft are influential enough to form a de-facto industry standard [9].

Dymek [10] discusses the sources of innovation and the relationship between the software and game industry. The usual problem with the development models in the game industry is that the models overestimate the technology needs of game products, because the game industry is usually associated closely to the software industry. From the viewpoint of the game industry, games are cultural products that in the design process resemble more interactive movies than software [10]. However, Kanode and Haddad [3] have identified the most common problems in game development projects and point out that the most common problems are related to project management and development processes. The creative work is mostly used to develop the design for a game concept, and then later applied to refine the design "to find the fun". Callette et al. [11] agrees with Kanode and Haddad, mentioning that the development of a game design document is the most important design-phase work.

Kultima and Alha [1] identified seven profiles for people working in the games industry. The most common profiles were called "Instrumentalists" and "Artists". The instrumentalists were people who were able to identify useful or interesting characteristics in the applied platforms. The artists were the more common type of innovators; their drive to work in the game industry was based on the need to create something new. Interestingly, the third most common group was the "Nihilists", who had a negative view on innovation. Almost every sixth interviewee was very critical towards innovativeness of the game industry, or innovation for the sake of innovation.

From the business viewpoint the game industry has gone through a paradigm shift from arcade video game halls to massive multiplayer online games and mobile games [12]. In games, new business and revenue models have been recently taken into use, including free-2-play or in-game advertisement models [13-17].

Computer gaming industry is also special in the sense that it can implement advertising embedded in games as value-adding parts [14]. Especially this is seen in sport games, where, for example, football players have real team outfits with sponsor tags on them. Gamers' attitudes towards advertising is also more permissive than those of the people who do not play games [18]. This has made it possible, for example, to develop the free-2-play business model [19, 20], where games can include advertising and in-game purchasing can be done to monetize the game.

Traditionally in games, there has been a game package to buy, but currently digital distribution has started to eliminate this expense. Vanhatupa [21] claims that browser-based games can be offered for free and still get a steady long-term revenue stream by selling extra features and/or advertisements. This means that besides actual games, game companies always need to develop a working business model to monetize their ideas and technological innovations as technology itself has no value [22].

Overall, it seems that the game design is strongly related to the development of novel concepts and innovation for new ways to use the existing systems [2, 9]. The game industry sees itself more creative than "traditional" software industry, but in practice it seems that the most of the creative work is done when establishing new brands and franchises, and that the creative needs of game development are not that critical as expected [1,3,11]. On the business side, new technologies and business models cause further development needs for the ways how games are developed [19,21,22].

III. RESEARCH METHOD

The software process including the design, development and testing of a commercial product is a complex phenomenon, which has varying approaches even with seemingly similar organizations [23]. Acknowledging this, we decided to pursue empirical qualitative analysis by applying the grounded theory method [24-26]. We considered Grounded theory suitable for discovering and analyzing the activities done during a software project, as it observes and describes real-life phenomena within their social and organizational context. According to Hughes and Jones [27], the method suits well to these objectives.

Our approach is in accordance with the Strauss and Corbin [24] approach and in the process of building a theory from the case study research, we followed guidelines as described by Eisenhardt [28]. The interpretation of the field study results was completed in accordance with principles derived from [29] and [30].

A. Data Collection

The initial strategy for the population criteria and selection was based on our prior research experiences on conducting industry-wide studies on software industry in general, made by our research group [for example 23, 31]. We carried out four interview rounds in our study (Table 1) with four different interviewee groups; project managers, game developers, upper management and game designers. The sample of the interview rounds consisted of seven game development organizations selected from our research partners and supplemented with additional volunteering organizations to achieve a heterogeneous group of different target audiences, development platforms and organizational histories. Overall, 27 interview sessions were held during the spring, summer and fall of 2012 by seven researchers from two research laboratories.

The 7 organizations in the study group were small to medium-sized professional game companies. Five of the seven were either recent business startups or new companies (less than five published products) and two were more experienced organizations with more than five published titles. The selection of the cases was based on the polar type selection [28] to cover differences between organizations; the cases included different target platforms and different sizes of development projects. In practice, the organizations were selected from a number of volunteering research partners and supplemented with additional organizations. These organizations varied (Table 2) from newly started mobile game developers to browser-based games, PC games

offered through digital distribution and even included an established developer with products in the retail stores. The smallest organization in the focus group was a startup with three persons; the largest organization included several hundred people that contributed to the product development. All of the participating organizations were commercial companies, with game development their main source of income.

The objective of this approach was to gain a broader understanding of the practice of and to identify the general factors that affect the design and innovation work. To achieve this, our research team developed four questionnaires that included questions on themes such as design methods, development processes, quality, business models and innovation. Before the first interview round the questionnaire was peer reviewed within the research group to check for sanity, and between the interview rounds some follow-up-questions were added to collect more details and test observations. All of the complete questionnaires are available at <http://www2.it.lut.fi/project/SOCES/>.

The interviews contained semi-structured questions, and the whole sessions were tape-recorded for qualitative analysis. Typically, an interview lasted for approximately one hour and they were arranged as face-to-face interviews with one or two organization participant and one or two researchers at the location selected by the interviewees. As we wanted to test and further flesh out our initial findings and observations from the earlier rounds, the interview rounds were conducted in order; for example the interviews with the second round interviewees started only after all first round interviews were conducted. Because of this and scheduling problems, we were unable to interview one representative during the second interview round, but the round-specific topics were discussed with the organization representatives on the latter interview rounds.

The decision to interview project managers during the first round was based on our aim to gain a better understanding of the operational level of software development. We wanted to see whether our observations and experiences from [23,31] the software industry were applicable in the game industry context.

The interviewees in the second round were selected from a group of developers or programmers, who directly contributed to the software product and had experience with the technical details of the developed product. To gain more

insight into the technical infrastructure, the interview topics in this round were heavily focused towards programming techniques, process activities and applied development tools.

In the third round, the focus of the interviews was to collect more general data on the company beyond the development process of the products. During this round additional themes beyond the software development such as marketing, innovation and financing were collected to better understand the context in which the game industry operates. In the fourth round, the focus was on the creative aspects of the game development, in the design work. During this round the interviewed employees were game designers, or management-level personnel with the ability to affect the final design of the developed product.

The interview rounds, interviewee roles in the organization and study structure are summarized in Table 1, and the participating organizational units are summarized in Table 2.

B. Data Analysis

The grounded theory method contains three data analysis steps: open coding, where categories and their related codes are extracted from the data; axial coding, where connections between the categories and codes are identified; and selective coding, where the core category is identified and described [24].

The objective of the open coding was to classify the data into categories and identify leads in the data. The process started with “seed categories” [33] that contained essential stakeholders and known phenomena based on our prior studies in this context. Seaman [33] notes that the initial set of codes (seed categories) comes from the goals of the study, the research questions, and predefined variables of interest. In our case, the seed categories were derived and further developed from our prior studies on software industry. Our selection for the seed categories included general phases of the software processes such as design, development, testing and project management, and common terms and stakeholders such as financiers, customers, project personnel, software tools and quality; areas and concepts which should exist in software development but which are not too restrictive or descriptive to bias the collected data. These seed categories were also used to define the themes for the questions in the questionnaire. The final data collection instrument, a series of open questions, included topics such as development process, test processes, tools, quality, design

TABLE I. INTERVIEW ROUNDS AND THEMES

Interviews	Interviewee	Description	Main themes of the interviews
Qualitative interview with 7 organizations	Team leader or project manager	The interviewee is responsible for the management of the development of one product, or one phase of development for all products.	Development process, test process, quality, outsourcing, development tools, organizational aspects.
Qualitative interview with 6 (+1*) organizations	Developer or tester	The interviewee was responsible for the development tasks, preferably also with the responsibilities of software testing activities.	Development process, test process, development tools, development methods, quality.
Qualitative interview with 7 organizations	Upper management or owner	The interviewee was from the upper management, or a business owner with an active role in the organization.	Organization, quality, marketing, innovation and design process, development process.
Qualitative interview with 7 organizations	Lead designer or Art designer	The interviewee was a game designer, or managerial level person with the ability to affect the product design and selection of the implement features.	Development process, design and innovation, testing, quality

* Interview themes discussed during later rounds with other representatives of the organization

process and finances, weighted between rounds based on the roles of the interviewees.

In open coding, the classified observations can be organized into larger categories. New categories appear and are merged because of new information that surfaces during the coding. For example, our initial concept of infrastructural problems being a seed category was abandoned as the coded interview data proved that the process problems were more related to personnel and management, technical issues having little to none observations in the study group. Similarly, several observations in different categories and issues which emerged from the data formed the coding for our data. Overall, at the end of the open coding, the number of codes was 172 codes with 1574 individual observations, collected from over 1400 minutes of recordings from 27 interview sessions.

The objective of the axial coding, which starts when the categories start to emerge and runs somewhat parallel with the open coding [24], is to further develop the categories by looking for causal conditions or any kind of connections between the categories. In this phase, the categories and their related observations were becoming fixed, allowing the analysis to focus on developing the relationships between larger concepts. In this phase, the categories formed groups in the sense that similar observations were connected to each other. For example, codes such as “Design process: refining designs”, “Development process: knowledge transfer” and “Problem: Documentation/knowledge transfer related to design” formed a chain of evidence of how the organization documented and refined their product designs and what problems the designers and developers had with this approach. By following these types of leads in the data, the connections between categories were identified and made.

The third phase of grounded analysis, selective coding, is used to identify the core category [24] and relate it systematically to the other categories. The core category is sometimes one of the existing categories, and at other times no single category is broad or influential enough to cover the central phenomenon. In this study, the examination of the core category resulted to the category “*Overall Objectives of the Innovation and Design in Games*”, which is an umbrella category explaining the observations related to design work, innovation and long-term objectives the organizations have.

The core category was formed by abstracting the categories and most important issues as none of the existing categories was considered influential enough to explain the entire phenomena. For example, we observed that the primary method of design work was based on one individual, who made the decisions based on group work, and that in all organizations the objective of the development work was in economic aspects, not in artistic presentation or other non-economic issue even though these topics were discussed in some organizations. In addition, the most important limitation was resources, specifically time, not the release platform or available tools. Additionally, we also observed that the most important source of innovation was previous experience with game products, and somewhat surprisingly the other cultural sources such as folklore or literature were

TABLE II. DESCRIPTION OF THE ORGANIZATIONS

	Release platforms	Production team size ¹	Maturity, amount of released games
Case A	PC, game consoles	Large	Established, more than 10 released products
Case B	Mobile platforms	Small	Recent startup, Less than 5 released products
Case C	Game consoles, PC	Large	Established, Less than 10 released products.
Case D	Mobile platforms, PC	Medium	Startup, developing first product
Case E	Mobile platforms	Small	Recent startup, less than 5 released products
Case F	PC	Medium	Startup, developing first product
Case G	Browser games	Small	Startup, developing first product

¹Amount of people contributing to the released product, size by SME not used to a large degree. We adjusted the core category “*Overall Objectives of the Innovation and Design in Games*” to include all of the categories and observations, which discuss the objectives of the design work in organizations before the actual development starts, the sources of innovation in the organization and the overall effect the marketing and financial aspects have on the game product design work.

IV. RESULTS

In this section we discuss the analysis results. The categorized observations and main findings are presented in Table 3, and the connections between the categories in Figure 1. After explaining the main categories we introduce the findings on game design methods and innovation and the effect of business aspects on the game design. Finally, we discuss the implications of the results.

A. Categories

The core category, *Overall Objectives of the Innovation and Design in Games*, is a composition of several categories, which all discuss the design work, innovation or aspects that affect the design work or innovation. The categories were formed inductively from the interviews. They explain the relationship between the design objectives and innovation process, or the effects of business practices affecting the product-related decisions. These selected categories describe how our case organizations approached design process and how business factors affected the product design.

The category *Objectives of the design phase* summarizes the most important objective the organization has for the design work. In most organizations the objective was on exploring the game concepts and testing that the potential new product could be marketable, fun to play and with proof-of-concept prototypes, doable with the target platform.

The category *Design method* describes how the organization designs their new products. *Vision* means that the organization has lead game designers that draft the first concept based on their own ideas. *Idea pitching* means that the organization applies open sessions where employees can pitch their ideas, and the most liked ideas are further studied.

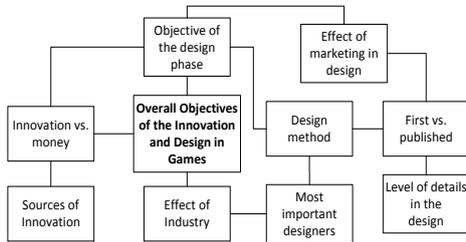


Figure 1: The main relationships between the study categories; the lines represent categories which share related features.

Brainstorming means that the development team organizes dedicated design sessions, in which they make the first designs for potential new products as a group effort. *Prototypes* mean that the organization develops crude prototypes to explore their new concepts and decide which prototype to develop to a full game based on their look and feel. *Pen and paper* means that the organization has designers or artists, which create mock screenshots and concept drawings to flesh out concepts which may be based on personal ideas or a group effort.

The category *First vs. published* product indicates the amount of differences between the typical first functional prototype of a game product and the final outcome. *Major changes* indicate that the game may have large changes in the design, including genre, theme, release platform or main marketing features. *Minor changes* indicate that the changes are only related to the smaller features, such as amount and type of game content, game mechanics, changes in creative writing or control scheme. In Case G this category was divided to technical and game design, since their game had only minor changes content-wise, but underwent drastic changes in the technical solution.

The category *Level of details in the design* describes the amount of details in the initial design, which is used to start the development of an actual product. *Functional prototype* indicates that the organization develops a proof-of-concept prototype, which has all of the intended main features of the game to assess the feasibility of the product design. If the design is considered usable and marketable, then the development team starts to build an actual product. *Basic gameplay elements* mean that the organization designs a functional concept with the basic features, story elements, themes and characters with some technical studies on concept feasibility. *Core features and concept art* is one step towards simple draft documentation; the main features and some concepts for theme and creative aspects are drafted but usually no programming work is done.

The category *Effect of industry* describes the ways the organization considers the games industry in general to affect their product design, marketing approach or business models. Case organizations A, B, C, D and F considered the industry to affect mostly on the required features of the game; customers expect some abilities such as hand gestures or platform-specific functionalities which demand the designers to cater to these expectations. Cases C, E and G also mentioned that the industry affects their business model, either by forcing the organization to constantly update their products (Case C) or by opening new market segments or revenue models such as free-2-play [20].

The category *Most important designers* indicate in the project-level who in the case organization actually leads the design work for new product. *Producer* indicates that in the organization the design decisions are ultimately made by the project manager, who supervises the designers, developers and game artists. *Lead designer* means that the organization has a separate role for the person who makes the decisions on designs and can dictate what features are included and

TABLE III. OBSERVATIONS FROM THE CASE ORGANIZATIONS AND CATEGORIES RELATED TO THE FINDINGS

	Case A	Case B	Case C	Case D	Case E	Case F	Case G
Objective of the design phase	Make something that sells, marketable in near future	Concept demo on technology, game mechanics	Test if the concept is fun	Good mechanics, game that sells	Test mechanics for concept, something that is fun.	Design of own thing, things selling are old six months	Design something we are very good at making
Design method	Idea pitching, prototypes, brainstorming	Vision, brainstorming	Vision, Idea pitching, prototypes	Vision, pen and paper	Brainstorming, prototypes, pen and paper	Prototyping, Vision	Vision
First vs. published	Major changes	Minor changes	Major changes	Major changes	Minor changes	Large major changes	Large technical, minor design
Level of details in the design	Functional prototype	Basic gameplay elements	Functional prototype	Core features, concept art	Basic gameplay elements	Core features, concept art	Basic gameplay elements
Effect of industry	Enforces features	Publisher sets requirements	Enforces upkeep, adding new content	Changes to design	New customers, business models	Stabilizing effect on designs	"Marketing dictates success"
Most important designers	Producer	Lead designer, team	Producer	Lead designer	Team	Management	Lead designer
Innovation vs. money	Money first, then innovation	Money first, then innovation	Innovation, hopefully money	Money first, then innovation	Money first	Money first (free2play)	Money first, then innovation
Effect of marketing in design	"We design fun, management handles sales"	"Has to be profitable"	"Make fun demo and sell it"	"Business first"	"Business first"	"Good game sells"	"Finances has to be taken into account"
Sources of innovation	Movies, other games	Success stories, industry trends	Success stories	Prior experiences, old games	Platform possibilities, old games	Movies, books, TV, games, "portfolio of stuff"	Prior experiences, competition analysis

excluded from the product. *Team* indicates that the decisions on game design are made by the entire development team, with more or less democratic system of discussions and voting. *Management* indicates that the design is directly overseen by the management above the development team, and deviations from the original design have to be accepted by them.

The category *Innovation vs. money* describes whether organization units are aiming to build financially successful business or are motivated by developing their creative idea into a product and “hoping” it can produce income. All the companies, except Case C, are going with the philosophy money first, where they first build products that generate profit and after that start building their dream products.

The category *Effect of marketing in design* describes how the marketing aspects affect the game design. Cases A, C and F considered the design work to be separated from marketing, indicating that the most important objective of design work is to come up with a creative and fun concept, with management or marketing focusing on how to sell that design. In other case organizations the design starts with a market study on what could be a financially feasible product, and based on the market study the product is designed and developed so that it fits the target audience.

Finally, the category *Sources of innovation* describes the main sources of innovation and ideas for the designers. Cases A, B, C, D and G named the other, earlier success stories of the games industry as one of their most important sources of innovation, meaning that the organization did markets studies such as “what sort of games sell” and “why did this game become success”. Other usual sources for innovation and ideas were prior gaming experiences and old games in general.

B. On design process, design objectives, innovation and business

The organizations shared two common features in the design work. First, all organizations based their design work on economic issues, placing financial success over critical success. In other way, all organizations expressed that should they choose between highly innovative and memorable but financially adequate and financially successful but forgettable product, they would aim for the financial success. Secondly, all organizations considered that the available resources, mostly time, was their most limiting design factor. As the case organizations had to plan their product publications within a foreseeable timeframe – usually 3-12 months –, in all organizations the design, development and testing tasks did not have much excess time to fine-tune the technical implementation or user experience beyond an acceptable level of quality.

“... after all, there really is very limited amount of time to do surprisingly large amount of tasks.” – Case B, Lead Designer

“I don't think that there really are [technical] restrictions to creativity, it's just that there are limited amount of people.” and “...”too few people, too little time, too little money.” – Case E, Lead Designer

Besides these two observations, our analysis also yielded six main findings describing how the game organizations do design and innovation work. In following, we will introduce these findings one by one.

1) Game product design is driven by economic factors.

In most organizations the game design is strongly related to the financial potential of the game product. Even if the game industry in general is seen as a creative industry, the product design follows mostly economic principles. In all organizations with the exception of Case C, the organization considered the profits to be more important than innovation.

“It is nice if the critics and people like your game, or if it is a review hit, but it may not translate into profits. If I had to select between [money and publicity] I would definitely go with money.” – Case E, Project manager

“I would like to make a game that has cultural impact, or at least is very well known for artistic merits. However, first we need to have significant financial successes...” – Case D, Upper management

In most organizations the tradeoff between innovative and money-making products was that the organization needed money first to build innovative, experimental products later. This approach also affected the design objectives. In cases A, B, D, E and F the organization was designing their products based on the marketing potential or business-first approach. In case C and F the organizations were geared towards more innovative design. These organizations considered that well-made games sell themselves, so a good design makes a game easy to sell. Case A expressed similar sentiments, but ultimately held financial potential as the most important design objective.

“Our strategy is based on our analysis on what is going on, what are the most potential, growing areas, and where it is most likely to get our investment to resources back.” – Case A, Project manager

Cases F and G had additional considerations for their product design. In Case G, the product design was examined with proof-of-concept prototypes to ensure that the product was possible to develop for the target platform. In Case F the design focused heavily into doing “own thing”. As it takes at least six months to develop a game, any product resembling the themes and concepts of the current top-selling products would be “old news” and a past trend when released.

“If we look into the best seller list of [platform] right now, they probably no longer sell in six months.”...“When our game after months and months of development is released, it is nothing new or exiting. That is why we should do something different.” – Case F, Lead designer

2) Design relies on prototypes, which test out potential game concepts

Game organizations heavily rely in the prototyping approaches in their designs. In Cases A, C, E and F the organization did design work by studying the game concept with varying degrees of prototypes. This approach was applied to ensure that the created design also worked in the actual implementation.

“We make a prototype to test if the concept is actually fun to play with and ensure that it has the needed potential.” – Case C, Project manager

The two organizations that had already released a number of games, built functional prototypes as the first design version (Cases A and C). The organizations that were building their first product relied merely on concept art and a list of core features (Cases D and F). This may indicate that early start-ups do not yet have the skill to build a working prototype, and therefore they focused on concept art only.

"We started by simply thinking what sort of control mechanics are used in mobile games, based a simple design on top of that and with pen and paper, tested, thought out and developed a first build." – Case E, Project manager

3) *Most game designs are based on a concept innovated by individuals*

The design work in the development of new products was heavily focused on one or few individuals in the organization. In Cases B, C, D, F and G the first concept of a new game product came from a designer, or a person who came up with an idea that was feasible to implement. After the initial idea, Cases B and C worked in teams to flesh out the idea, whereas in Cases D, F and G the design was still in hands of one or few individuals.

"I am responsible for [making design decisions]. I have to do the final call, since groups simply do not sometimes have that ability." – Case B, Lead Designer

"I make the decisions, but usually based on the group input" – Case D, Upper Management

In Cases A and C the design work started with an idea pitching event, where each individual could propose new ideas for new products. Case A was more geared towards making a communal decision within a group to select the best concepts, whereas Case C relied more on the work of the individuals to convince the group to their game concept.

"When someone gets an idea, they can show their ideas on these concept cups." ... "If enough people like it we take it forward to design." – Case C, Developer

In all organizations with the exception of Case E and – to a lesser extent Case F – the product design and decisions on included and excluded features was the responsibility of one named person. In Cases B, D and G this person was a lead designer, who in all cases was also the person responsible for making the first design. In Cases A and C the design changes were managed by the game producer, a project manager, who made the decisions on what the product should include and exclude.

"We sit down and have a team discussion once in a fortnight to see where we are and discuss new ideas. After these sessions the producer goes through the ideas and what can be included and what not, and includes feasible stuff to the next sprint." – Case A, Upper Management

The Cases F and B are exceptions to the strong creative control observed in other studied organizations. In Case F the upper management had a direct control over the aspects of the developed games. In this organization the creative control was outside the development team. However, the upper management was also responsible for designing new products for the organization. In Case E the design work and change management was done as a group effort. The design was changed only if everyone or at least most of the development team approved the idea. The first idea was

developed in brainstorming sessions, explored with prototypes and fleshed out as a group effort. Unlike Case B, which had similar activities in the design (pre-production) phase, Case E did not have a separate lead designer or decision maker for creative aspects at any stage.

"With our first game, we really did not have specific planning phase, we simply went as a group and decided to do something simple, something like a proof of concept for our team being able to make games." – Case E, Project manager

"We just brainstorm within our development team, there really is no further magic to [design work]." – Case E, Upper Management

The most important designer in the project was also related to the age of the company. Cases A and C had been in the business longer and they reported that their most important designer is the producer, whereas the smaller and newer companies did not report that such a person even existed. This is a bit similar as with functional prototypes in finding 2. The early start-ups had not yet grown big enough to have their own producers.

4) *Design and innovation are ad-hoc processes*

The Cases report various design and innovation methods, like idea pitching, brainstorming, group work and pen and paper. Yet, none of the cases report that they have used more formalized ways of design, like lateral thinking [34,35] which can be used also as a tool to build completely new ideas. Although brainstorming can be considered as a more formal method [35,36], its whole potential was not used by the organizations as interviewees did not explain any systematic use of the method.

"Personally my ideas are born when I have slept overnight and I am driving a car by myself and I have some time to think." – Case G, Upper management

The companies relied more on ad-hoc innovation, which could be because they were not aware of the more formal methods. As for these methods, brainstorming and idea pitching can be seen as semi-formal methods. In idea pitching the new idea has to be presented with maximum of three slides and after that decision is made whether functional prototype is build or not.

Cases A, B and C mentioned "game concept day" or "proto day" as a day when developers discuss and develop new concepts and prototypes. This can also be seen as semi-formal method as the aim is to produce new ideas.

"If these ideas are developed further, there is reward given." – Case A, Upper management

One interviewee mentioned a reward system as a motivational factor in the innovation process. Its usefulness is unclear, but Case A had been in the business for some time, this system seems to work at least to some degree.

5) *Sources of innovation are mostly in existing game products and success stories*

The most important sources for innovation and ideas for new products were old games released for older generation of game systems and popular, successful game products of the current markets. All interviewed game designers indicated that they used their past experiences with game systems and old games as one of their source of innovation.

“Our newest game is inspired by this old game from the 90’s... it basically was the initial model for our design. We made our thing on top of that.” – Case D, Lead Designer

Beyond prior experiences with games, some of the case organizations did actual market reviews and analyzed success stories. In Cases B, C, F and G the organization paid close attention to the business, analyzing why some games were successful and what sort of features the current successes had incorporated. Case E added also technical point of view into these analyses.

“We know about markets enough because we took our demo to [industry convention] and talked with people. We met over 30 people from the industry to understand what publishers look for”... “Now we know that we are doing the right thing.” – Case G, Upper Management

“With our prototypes we also test out to see if the technical solution is capable of doing what we want it to do.” – Case E, Project Manager

Besides success stories, existing products and competition analysis, other sources for innovation in product design were movies, books and other popular media. The only popular media that was mentioned several times as a source of innovation was summer blockbuster movies.

“...Also movies, we use movie references really too much.” – Case A, Lead Designer

6) Start-ups are business-driven in game industry

Six out of seven case organizations described their ideology as “money first” (see Table 3). We can argue that these companies have understood that technology itself has no value [22], as it is the responsibility of the company to monetize the technology. In addition four out of these six “money first” organizations described their marketing/finance design as “has to be profitable”, “business first” or “finance has to be taken into account”. The one organization that had the philosophy of doing “innovation, hopefully money” wanted to “make fun demo” and then sell it. With these opposite philosophies we saw that money played the most important role for almost all cases.

In addition to the rows innovation vs. money and effects of marketing in design, money and selling are also listed in three cases in objectives in the design phase. Although this paper focuses on design and innovation we also observed that selling, business and money were important issues for almost all the companies. For example, Case D goes with “money first”, “business first” and its design objective is “game that sells”; they are going with business-driven development where the aim of software development is satisfy business requirements [37]. Case C, as an opposite, goes with “innovation”, “make fun demo and sell it” and its design objective is to “test if the concept is fun”. Although Case C has a different attitude than the rest of the organizations, it has still managed to establish itself.

In Figure 2 we present seven case organization units and both their number of released products and their business-drivenness. The latter is calculated from Table 3 by using rows objectives in the design phase, innovation vs. money and effects of marketing in design. If business/money is mentioned as a first thing 1 point is gained. If it is mentioned

as second thing 0.5 points are gained. If it is not mentioned, no points are gained. Maximum is three points.



Figure 2: Number of released products from Cases and their business-drivenness

The Cases D, F and G are all making their first product and they are also business-driven as the lowest score among them is 2. On the other hand the rest of the companies have already released at least one game and among them the highest score is 2. As several cases described that they first aim to make profit and after that produce games they really want to do. Our observations support the concept that newly established game companies are more business-driven and think more about money whereas companies who have already released successful products can concentrate more on other than immediate economic issues.

“I would like to make a game that is a landmark... But first I aim that we can do economic success, which would give us economic freedom which would give us freedom to ourselves to do artistic game.” – Case D, project manager

V. DISCUSSION

In this work the core category is the *Overall Objectives of the Innovation and Design in Games*. Based on our observations, the game products are designed with creative processes comparable to movies or any other artistic creation, but games are not intended to be art for art’s sake, they are designed and intended to be commercial products which generate income. All game developers interviewed in this study considered themselves to be doing more or less creative work, but in all organizations the most important objective in product design was in commercial success.

The concept that games are designed based on business aspects can also be observed from the viewpoint of design principles. In some organizations the most important design aspect was in developing “fun” product, but in the long run the organization was still aiming at commercial success. When faced with the dilemma of selecting between a commercially successful but forgettable and critically acclaimed but commercially adequate product, all interviewees selected the commercially successful product. In all organizations marketing and marketability had at least some effects on the product design. In Cases B, D, E, F and G the financial aspects dictated the products the organization was developing, and even in the larger Cases A and C, the product had to have a clear audience and a reasonable expectation for profit before the product would advance from a proof-of-concept prototype onwards.

Considering the research questions, “*How game studios design their products*” and “*How game-developing organizations innovate and make business?*”, the results indicate that the design process is usually led by one individual, who uses the team input as suggestions. The initial concepts are heavily influenced by the “vision” of the new product, and the decisions on which designs mature from proof-of-concept prototypes to fully developed products is usually dictated by the potential for revenue. The common source for innovation in game development seems to be legacy games, experiences gathered from other game products and movies. The marketing and business aspects also heavily affect the innovation process.

None of the organizations used formalized methods when developing new ideas and concepts. The methods used were merely ad-hoc and ideas “just emerged” rather than were systematically developed, with a few exceptions of “proto days” and team brainstorming. In addition, companies seem to be more business-driven when they are starting up and establishing their position. After that they can be more innovative and concentrate less on monetizing ideas.

In grounded theory study, there are threats to validity. As the method of data collection was based on semi-structured interviews, threats such as personal bias caused by the researchers or questionnaire are valid concerns. For example, a study by Whittemore et al. [38] lists integrity, authenticity, credibility and criticality as primary criteria for validity in qualitative studies. The aim is to describe the observed phenomenon and the applied approach with enough details to warrant that the analysis process has been critically designed, unbiased and faithful to the data. Similar considerations have been expressed by Morse et al. [39]. The nature of the qualitative studies requires the presentation to constantly verify the collected data and analysis results to achieve the necessary rigor for a trustworthy qualitative study.

In our study, the validity concerns have been addressed with several precautions. The data collection instruments were developed by seven researchers from two different research groups. Before the first interview round, the data collection instrument was peer-reviewed for sanity and neutrality within the research group. The instruments were further developed during the data collection, and the data collection itself was conducted by six researchers. For this study, the data analysis was conducted and discussed by three researchers, with conflicts resolved with discussions during meetings. To minimize the bias caused by the release platforms, business types or interviewee roles, the interviews were collected from different types of interviewees, and the case study organizations were selected to represent different areas of game industry in business maturities, sizes and business platforms. In any case, these qualitative results are valid only in this environment, and beyond the scope of this study these results should be used as recommendations or indications of possible organizational activities.

VI. CONCLUSIONS

We have introduced our grounded theory study on the game developing organizations. We observed seven game developing organizations by interviewing 27 industry

professionals encompassing different roles such as project managers, developers and game designers. Our results suggest that game design and innovation are closely related to the economic aspects of the game industry. The design objective is to generate income with development projects that are considered feasible for economic success. In many organizations the creative game design work is done by one person or a small group of people who have creative control over the project, although in some cases group decisions also have influence. The main sources of innovation in game design seem to be in the existing game products and industry success stories, with some novel concepts taken from popular media, mostly from movies.

The organizations in our study had different attitudes towards business and innovations. Whereas most of the organizations wanted to build their business on a business-driven model, one organization pushed successfully ahead with creativity, innovation and fun. It seems that start-up organizations are business-driven in the beginning because they need to establish their position and secure their future in the industry.

The results of this study can be used to understand the business practices and development processes of the game industry. In future work, the business modeling methods and effects of marketing to the development processes should be addressed in more detail to study how much influence the business decisions have on the development in practice.

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Publication IV

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Publication V

Business model elements in different types of organization in software business

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Business model elements in different types of organization in software business

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Abstract: The business model concept has been discussed widely during the current millennium. On one hand most of the discussion is not academic in nature and on the other hand the industry practitioners have been rarely included nor have their voice been heard in the academic studies. This has led to differences in definitions of the business model concept between academic studies and the thinking of industry practitioners. In this study we dive into practitioners' views and investigate how they fit to business model canvas, a tool that is now popular in business practice. We also investigate how different types (in terms of age and size) of organizations working on different software business fields utilize the business model concept in their own ways. The findings showed variation in how different organizations promote different elements of the business model as more important and how the elements included different content even within the software business domain. We also demonstrate some of the similarities that prevail in software business, such as people being the key resource, regardless of the field or type of business.

Keywords: Business model, software business organizations, established vs. entrepreneurial, startups, B2B vs. B2C, business model canvas

I. INTRODUCTION

The business model concept has gained more and more popularity in the scientific literature in this millennium. It can be used in multiple scenarios, like designing a new venture or analyzing and developing an existing business further. The goal of this study is to investigate business model as a useful theoretical construct in both cases and look into the differences and similarities that arise from the different viewpoints on the concept.

The existing literature has been discussing the definition of business model [1], [2] and its usefulness for the software industry [3], [4]. The role of business model concept has been studied in various studies in various industry fields (e.g. [5]–[7]). The current research lacks the organizational point of view discussing how the business model concept is

understood by the industry practitioners and how the organization can utilize the business model to help their business [8], [9].

In this study, we concentrate on focal firms, which are working in the software business domain. We compare the role of business model for startup organizations – the ones in their early stages moving from idea to product and improving operations and securing financing [10], [11] – to organizations that have been in the field for years. Besides the organization age, we also compare the size of organizations from micro entities to small entities being part of medium sized organization. As the third comparison unit we used the business type and field. The aim of this study is to identify how people consider the concept of business model in different sized and aged organizations doing different type of business in different software industry fields.

The current scientific literature has been arguing over the definition of business model concept [1], [3] and the uniform definition is yet to be found, although competent frameworks and models have been developed. In this study we dive into an investigation about how industrial practitioners experience these models.

Based on these ideas we build our research question as following: *How is the organization or business type reflected in the emphasis of the business model elements in software firms?*

In this study we select a new perspective where we compare the business models of organizations having differences in size and age of organization, and field and type of business. This study is combination and extension of earlier studies by the authors. See [12], [13] for reports on the individual findings. This paper focuses on reanalyzing the data and comparing the findings from this new perspective.

II. RELATED RESEARCH

Information technology is still a special industry due to the speed of technological development. Baden-Fuller and Haefliger [14] have pointed out that technology development facilitates new business models. Therefore it is particularly interesting to consider software business as the environment in which business model research can provide new insights.

Business model can be considered as a combination of three streams, the value stream, the logistical stream and the revenue stream. This viewpoint presented by Mahadevan [15] considers the value stream as identifying the value proposition, the logistical stream identifying the choices made about the supply chain, and the revenue stream identifying the plan of how the business generates revenues. Business models also reflect the operational and output systems of the company and they capture the way the firm operates and creates and delivers value to customers and mutually converts received payments to profit [16]–[19]. The overall definition of business model could be described: to define who is offering what to whom, how the offering is produced and what is expected in return.

Especially in the fields of information technology and software business the concept of business model has given a powerful and much used tool for analyzing, developing and understanding businesses more thoroughly. Business model has been suggested to reside in the middle ground between business strategy and business processes [3], [17]. The concept of business strategy is identified as a more abstract way of positioning an organization in the business field and business process is categorized as a more operational level with its detailed descriptions of operations. This segmentation is also supported for example by [6], [20], [21]. The concept of business model should not be thought of as a process, but merely description of the steps and key items [22], [23].

Some scientific studies use the term component [1], [6], [23], while some talk about elements [7], [24] when they refer to building blocks of a business model. They are still talking about the same thing: parts that form the unique business model as the concept of a business model is more of an umbrella term to these various sub-parts. In this article we have chosen the term element to describe what combines to a business model.

Shafer et al. [25] have suggested that business model elements should be classified into four primary categories: strategic choices, the value network, creating value, and capturing value. In this paper we take the stand that strategic choices do not belong as part of the business model concept, but should be discussed as part of strategy instead. Thus, we do not include it as an element.

Numerous studies defining the concept of business model identify elements that are characteristic to this concept [6], [7], [23], [24]. There exists variety in both number and definition of elements, but the most commonly used ones include for example value production, customers and the revenue model.

Table 1 summarizes the existing literature of business

models and lists the different elements found in various studies. While there is a difference in the wordings and which parts are considered more important to include in the business model, there is still an emerging consensus that similar elements are included in the concept of business model.

Study	Elements
Timmers [26]	an architecture for the product, service and information flows, potential benefits, sources of revenues + marketing strategy
Alt and Zimmerman [27]	mission, structure, processes, revenues, legal issues, technology
Rajala et al. [28]	product strategy, revenue logic, distribution model, service and implementation model
Shafer et al. [25]	strategic choices, the value network, creating value, capturing value
Chesbrough [29]	value proposition, target market, value chain, revenue mechanism(s), value network or ecosystem, competitive strategy
Al-Debei and Avison [3]	value proposition, value architecture, value network, value finance
Osterwalder and Pigneur [30]	customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, cost structure
Weiner and Weisbecker [24]	value approach, market interface, products & services, value creation & capabilities, financial aspects
Schief and Buxmann [7]	main categories: strategy, revenue, upstream, downstream, usage

Table 1. Elements of business model in different studies

Recently a summary of business model elements presented by Osterwalder et al. [31] has gained popularity. Their business model canvas (BMC) offers a summing-up of most of the elements that are discussed in the literature as essential parts of the business model theory. This paper takes the BMC element division as the main theoretical framework under investigation, because it is now quite well known in industry in Europe. A quick Google trends search with the term "business model canvas" reveals the trend continues and is gaining popularity.

There are various ways to conduct research relating to business models. Research sub-domains can be divided into definitions, components, taxonomies, representations, change methodologies, and evaluation models [32]. This paper focuses on contributing to the elements (components) area of research as the goal is to compare how the elements are recognized in differing types of software business organizations.

The business model concept has been studied in various business areas – like health-care [5], airline business [6] and software business [7]. Software business has its own

peculiarities not found from other fields of business as it builds intangible products and services that a user cannot experience directly but only through user interfaces [33]. In a systematic literature study conducted by Vanhala and Smolander [9] it was concluded that there were several articles available describing particular areas of the software business, for example, revenue and pricing issues, how the software-as-a-service paradigm is changing the business, what open source and mixed source mean to the business model and what are the difficulties when a IT company is expanding to overseas. The study conducted by Vanhala and Kasurinen [12] shined a light on how startups recognize the business model concept, but their study was limited only to this area and no comparison of startups and established organization doing business was found.

As stated earlier, the current paper agrees with the BMC [30] understanding of the business model concept and considers the following elements: value proposition, customer segment, customer relationship, channel, revenue stream, cost structure, key resources, key activities, and key partners. Conceptually we argue that a business model is described through a description of these sub-concepts and their interactions.

III. RESEARCH PROCESS

This study follows an adapted version of the multiple case study research method [34], [35] and the framework developed in Gable [34]. In the framework six steps are presented: defining the strategy, reviewing the literature, developing the case study protocol, conducting a pilot case study, conducting a multiple case study, and developing a conceptual model. The strategy is determined by our research question presented earlier. The literature was reviewed in the Related research section, besides the original articles [12], [13], and the computer game business model literature has been systematically reviewed by Vanhala and Smolander [9]. As this study relied on existing interview data, the case study protocol was build on over the idea that interview themes from two individual study match each other. The analysis produced a conceptual model, presented

in the Findings section. To guarantee the validity of the results, we followed principles derived from Gable et al. [34]–[36]. This included for example choosing the data collection procedures (we used thematic interviews), data analysis methods (we used coding) and avoiding being biased (we had more than one researcher discussing the interviews and conducting the analysis of the collected data).

Data was analyzed using qualitative content analysis method with three analytical procedures of summary, explication and structuring as suggested by Kohlbacher [37]. The transcribed interview data was summarized to key themes in order to capture the main ideas from the interviews. Themes were grouped based on the theoretical framework and described in the light of the framework. Structuring of the data was based on comparing the results across the different organization and business types.

A. Data Collection

The data was gathered through semi-structured interviews totaling twenty-three people in business unit, account management or technical management positions as well as CEOs and owner managers. All interviews were recorded and transcribed. Some details were clarified by additional short discussions to avoid false interpretations. On some cases there were more than one interviewer present and they could discuss the interview topics later on, in order to avoid any misunderstandings.

We wanted to compare different types of organizations and this lead us to choose the firms so that they included both startup and established organizations, medium-sized and micro-sized ones, and organizations with different business types and field. This enabled us to compare them and find differences that could lead to interesting findings. We chose micro-sized companies and small organization units being part of a medium-sized organization, because they are quite close to each other but distinct enough to improve the likelihood of finding differences. It is easier to study the business model in a more manageable sized organization. In large organizations things like processes, organization structure and competitive strategy are likely to become more relevant and we therefore consider business

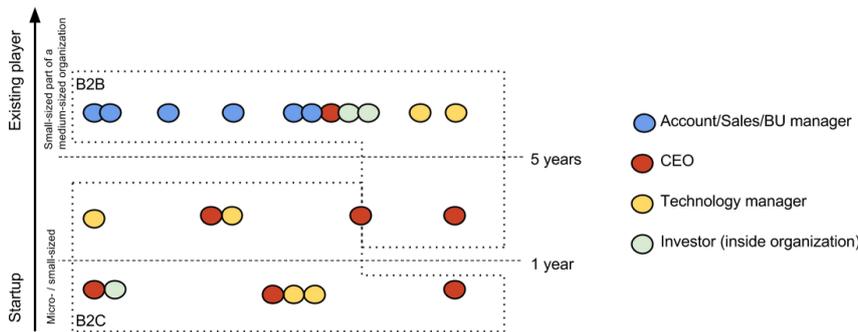


Figure 1. Positions of interviewed persons reflected to age of the organization they are working in. Markers side by side imply they are part of the same organization.

model in that context a less interesting target of research.

The current multiple case study takes a new analysis viewpoint and is therefore original research although the data is based on two distinct data sets gathered in 2012 and 2013, and which were partially reported in previously published studies by the authors Saarikallio and Tyrväinen [13] and Vanhala and Kasurinen [12]. The report by Saarikallio and Tyrväinen [13] only utilized the revenue related interview material from the data set, and rest of the data was unpublished. The multiple case study conducted by Vanhala and Kasurinen [12] focused only on startup organizations thus lacking the more general approach to business models in other types of software businesses. As this shortcoming was already noted by Vanhala and Kasurinen [12], the study required an extension. For the current research we combined the two original studies with the case organizations found in both. The themes in both interviews were identical. Both interview sets utilized the same theoretical framework as the basis of data collection thus enabling the use of a combined data set. One additional interview was conducted in autumn 2014 to further enrich the data. The role of the informants and the age of their organizations are presented in Figure 1.

Table 2 presents the case organizations and their key statistics. Organization can be defined as a carefully constructed system, that has the task to reach the goals it has been set [38].

	Size* of an organization	Years in businesses	Field of business	Released products / Finished projects	Type of business
Case A	3	<1	Mobile games	The first one being developed at the moment	B2C
Case B	4	<1	Mobile and browser games	The first two being developed at the moment	B2C
Case C	4	<1	Mobile games	The first one being developed at the moment	B2C
Case D	3+1 half-time	<2	Browser and mobile games	1	B2C
Case E	8	<3	Mobile and PC games	2	B2C
Case F	4	<2	Serious games for health-care purposes	2 projects being developed at the moment	B2C / B2B
Case G	2	<3	Browser-based software	More than 15	B2B
Case H	25	>5	Telco vendor		B2B
Case I	5	>5	Telco vendor		B2B
Case J	8	>5	Telco vendor		B2B

Case K	2	>5	ERP vendor	B2B
Case L	3	>5	Telco vendor	B2B
Case M	5	>5	Telco vendor	B2B

Table 2. Description of case organization.

B. The selected elements for comparison

The themes of the semi-structured interviews were on both original research projects based on elements presented in business model canvas (BMC) presented by Osterwalder and Pigneur [30]. The business model canvas is therefore the underlying framework for this study. Based on the interview forms we compared the questions and found out that the answers provided data to be utilized in this study. Table 3 illustrates the interview questions compared to BMC elements. Some of the questions differ, because of the domain of the interview. The questions were selected to elicit the thematic discussion only and are the starting point of discussion about the theme not the only thing asked.

Comparison criteria	Specific data collection questions in established business model study	Specific data collection questions in startup business model study
Channels	How are we reaching our customer segments now?	What are the ways/platforms used in delivering games to customers?
Cost structure	What are the costs in the business model? Which resources or activities cost the most?	How would you describe your cost structure?
Customer relationships	What type of relationships do our customer segment expect us to establish and maintain with them?	How do you maintain customer relationship?
Customer segments	Who are your most important customers?	Who is your customer?
Key activities	What key activities does the business model require?	What are the most important key activities you do in your company?
Key partners	Who are your key partners? Who are your key suppliers? What resources or activities do you get from partners?	What/who are your key partners?
Key resources	What key resources do your value propositions require?	What are your key resources?
Revenue streams	For what value do the customers pay? How do they pay? How much does revenue stream contribute to overall revenue?	What do you base your revenue stream on? Which party is the main source for income?

Value proposition	What value do you produce to the customer? What problems do you help to solve? What customer needs do you fulfill?	What is that what you give to the customer?
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Table 3. The comparison criteria used in this study to map differences and similarities of business model viewpoints.

IV. FINDINGS

We went through the data and utilized business model canvas [30] as our framework when comparing the organizations. Table 4 presents the themes that were identified from individual studies. The identification was conducted by coding the transcribed interviews and interpreting the outcome of the coding by each researcher by himself. After that the differences were discussed between conductors of the original studies and differences are presented in Table 5.

Business model theme	Themes emerging in established organization interviews	Themes emerging in startup organization interviews
Key partners	Data center services, software tools, hardware, licenses, IT support, service level agreements chaining, software development skills, monitoring and maintenance	Publisher, outsourcing (both ways) partners (art studios, musicians, marketing), companies in the same building, B2B contacts
Key activities	Customer relationship management, managing the people, contract and financial activities, software development, software delivery, system maintenance, support activities	Innovating game design, programming, testing, graphical designing, 3D modeling, music and sound producing, getting funding, communicating with customer
Key resources	People (developers, analysts, administrators, account managers), money, contracts, customers to provide requirements, code, hardware	People, intellectual property (brand), office, computers, special software
Value propositions	Flexibility, outsourcing, reducing capex, staff reduction, time-to-market, securing revenue, customer tailored products and services, tools for customer service, sales, invoicing	Providing entertaining experience, on serious gaming: to improve the healing process/ to provide reduce cost to health-care organizations; to provide services that improve the business of a client (B2B)
Customer relationships	Dedicated personal relationship handled by account manager, business analyst, project manager, and service manager. Relationship stage dependent cost of maintaining the relationship. Sales cost is very low. Disagreement on the depth of relationship, some considered it a partnership, some supplier relationship.	Getting direct and indirect feedback from customers (discussing with customers), discussing with physically present testers
Customer segments	European greenfield retail mobile virtual network operators, e-invoicing and	geographical segmentation, translations

nts	staffing companies	
Channels	Personal relationships and contacts, customer specific ad hoc channels, good customer reference	Towards customers: app stores, word-of-mouth; from customers: social media, app store feedback fields, discussions with a client
Cost structure	Salaries of development people, service people, general people; servers, license costs, data center rent; office space rent, tools, computers, software	Salaries, rent, computers, special software
Revenue streams	Service/maintenance/hosting fee, licenses, deliveries, consulting, development	Income from selling products (pay-to-play), income from advertising and in-app-purchasing (free-to-play), grants, outsourcing work

Table 4. Themes emerging from interviews

Business model theme	Differences and themes
Key partners	In the larger organization other organization units were sometimes categorized as partners, information sharing was more open in small ones, backend server hotel was identified as partner in the older organization and as a resource in the startup
Key activities	The startup had the acquisition of finance as a special feature, managing the people did not come up in any of the startups, neither did they have any metrics, there was the difference of business analyst vs. innovation (&feedback), artistic tendency vs. efficiency & functionality, calendar invites vs. morning coffee
Key resources	Human capital is the most important resources for all the organizations. Older organizations view people more as role-based, whereas startups have generalists. The computer game startups focus on building a brand, and IPR are important. In B2B customer is the product owner and contracts are mentioned as key resources. IPR is less important for B2B, because the main portion of money comes from changes, not an existing product.
Value propositions	It seems a new organization tends to take the general value proposition in the field of business and that is it. Inside older organizations the thinking is sourced from a much larger palette when considering what is our value proposition. There is an interesting difference, because the goal of a game is to get customers to spend as much time as possible, and in comparison other software is targeted to speed up or automate a process, which is especially true in B2B vendors.
Customer relationships	The customer relationship was done almost completely online in computer games business and indirect data was collected from games. B2B organization had more intimate relationship with their customer as they used phone and had physical discussion. As organization grows older it can have dedicated person to handle customers.
Customer segments	In the case of a young organization the customers were considered as a whole. Segmentation was based mostly on a technical platform. In the established organization there was a tendency to think about positioning in the industry and how to find their own segment. For the startups segmentation was more as a cost due to translation expenses and such.
Channels	Here the bigger contributing factor is most likely the B2C vs. B2B difference instead of organization age.

Cost structure	Although salaries were the biggest cost in all cases, there was more division into e.g. development team vs. service/maintenance team in larger organizations. Managerial structure was bigger in older organizations.
Revenue streams	None of the new organizations had innovated their own revenue model.

Table 5. Identification of emerged differences and themes from different organization groups.

In the cases under investigation, the source of the differences in the business model elements can be identified to arise from three dyads of differences within the cases. Those are the established vs. startup difference, business to business vs. business to consumer orientation and micro vs. small to medium sized organization. In addition there are differences which arise from the field of business (games, telco vendor, serious games for health-care, web software product).

Key partners were recognized differently between our startups and established organizations. Within the established organizations other organization divisions were identified as partners whereas the startups mentioned other companies in the same building as partners. People in established organization felt that the in-house knowledge is a major player but in the startup employing only few persons the partnership is bond with other companies sharing the same office space and coffee table. Among the bigger organizations data center service providers and software tools and platform vendors (to some degree also open source community) were sometimes considered as partners while startups mentioned back-end solutions as resources.

Key activities was one of the most distinct elements. The founder groups of startups were concentrating on developing their products, supporting funding and communicating with customers. They had issues of getting funding, which had already solved out in the established organizations. The processes of established organizations were more formal and for example managing the people was listed as one key activity. This was not necessary in startups atmosphere as the whole workforce shared the same coffee table and all the management could be done there. Startup computer game organization did not either utilize any metrics to measure productivity or presence of people while established organizations were relying at least attempting to measure the worked hours. The same happened also with Case G, which was doing B2B. Although they did not have any systematic process to measure hours they needed to charge something from the customer and thus they had some hour accounting.

The established organizations included a business analyst role, whose task is to gather software requirements from the customer. Startups did not have these kind of people but they relied on innovative game designers and feedback from customers. Regarding the key activities element, the startups operated in a more artistic way which they considered effective operation mode. Still, the startups did have innovation days, so there was an initial innovation process forming. The clear difference is that with established

organization there was a bigger role for a specific person discussing with the customer, and that person received customer needs directly. Within the game companies their artistic tendency is visible in activities. Requirements are not gathered from customers, but all features are more or less the product of a creative process. Thus the difference boils down to innovation vs. requirements gathering as a key activity.

Informants in both – startups and established organizations – valued their people as the most important key resource. The difference was that in established organizations people had more specific and defined roles whereas startups only had people that did certain required tasks. Basically in the startups the whole workforce was capable of developing the product and no special analysts, administrators or account managers existed. People in the established B2B organizations argued that contract negotiations with their customers are important as the contract is identified key resource that enables income. For B2C startups contracts were not made with customers instead intellectual property rights were identified important and the brand building was started as soon as the company was founded.

The value proposition in computer game startup was straightforward: to provide an entertaining experience. Organization managers did not consider any other value they were providing but concentrated on providing entertaining games. The startup (Case F) working with health-care organization was aiming to provide products that would cut the time it takes patients to get back in fit after physical injury. This leads to reduced costs for their customers – health-care organizations. The B2B startup (Case G) aimed to give simple and fast service so that customer needs to spend as little as possible to bureaucracy. For the established organizations value propositions varied. The B2B model is clearly identified as customer tailored products are mentioned as one of the main value the organizations produce. Also several different ways to provide value were mentioned. In our cases startups take the general value proposition of the industry instead of developing their own whereas established organizations have pondered the value proposition more and want to stand out from competitors through it.

The field of business affects how the value proposition is constructed. Typically software is built with a goal to minimize the time user needs to spend with the task but as pointed out by Vanhala and Kasurinen [12] computer games try to do the opposite; to maximize the time spent and still keep it entertaining.

In the established B2B organizations customer relationships were handled through dedicated personnel in different levels of business collaboration. Some of their customers identified them as a partner and some identified them as a supplier. B2C startups handled their customer relationship through getting direct feedback via online services and indirect data collected from customer sessions. The only physical form of communication was when they had the opportunity to give a test device with their game to

some random potential user.

In the established organizations customer segmentation is valued and it played a role in their business model while computer game startups did only geographical segmentation through translations of games. In the established organization deep discussion were held about how the organization finds best segment for its products. It was part of their business model as an improvement element, whereas computer game startups mentioned segmentation – translation – as a cost. They were developing products for global markets.

As established organizations were working with B2B projects their main channels to reach customers were personal and customer specific while computer game startups, with B2C model, were mainly reaching customers through online media like app stores and social media. The role of customer references was recognized important when doing B2B projects also with the B2B startups. In the B2C organizations the feedback in the app stores plays a role as it shows the value of the product.

The cost structure element of business model mostly consists of labor cost which is often the case as software industry produces intangible products. Besides labor cost, companies had also costs from hardware, software licenses and office rent. The difference between established organizations and startups was the diffusion of cost between different human resource groups. The established and larger organizations divided the costs into several groups whereas startups had just general labor cost. The amount of organizational structure increases when organization grows and creates different levels of management and supporting services.

Various revenue streams were found from business model of established organizations. Revenues were based on service, maintenance and hosting fees and also licenses, deliveries, consulting and development. Computer game startups based their revenue streams on generally used models: selling games, selling in-game material and advertising. CEOs of startups also mentioned that they have built their products with money gained from grants and had done some work for other companies too. The difference found was the fact that none of the startups – neither B2C nor B2B – had innovated new revenue models whereas the established organizations had built several individual revenue models and linked them as they would fit best. The B2B model gained revenue from maintenance and changes to software while B2C earned income directly or indirectly from the products.

A. Mapping Organizational Differences

In addition to Table 5, Table 6 presents the mapping of the organizational differences based on the different elements presented in BMC. We found differences emerging from the business type and field, from the age of organizations and from the size of organizations.

Business type and field	Age of the organization	Size of the organization
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Channels			
Existing reseller channels to reach customers	B2C, Games		
Cost structure			
Increased amount of organizational structure		Established	Medium
Customer relationship			
Dedicated personal assistance	Telco vendor		
Self-service (sometimes community)	Games		
Anonymous data is collected from games to respond the gamers' problems	Games		
Customer segments			
The importance of segmentation	B2B Telco vendor		
The cost of a segmentation (translations)	B2C, Games		
Key activities			
Personal communication to reach customers	B2B Telco vendor		
Measurements on productivity	B2B Telco vendor	Established	Medium
Innovation and artistic way of doing things	Games		
Analytical way of building business	B2B Telco vendor, games		
IPR is important	B2C, Games		
Building/marketing brand from the beginning	B2C, Games		
Key partners			
Other organizations are identified as partners	Games	Startup	Micro
Other division are identified as partners		Established	Medium
Key resources			
People as role-based		Established	Medium
People are generalists		Startup	
Different levels of management			Medium
Management done in a coffee table		Startup	Micro
Revenue streams			
Dependency on external funding (grants, venture capital, loan)		Startup	
Revenue is earned with maintenance	B2B Telco vendor		
Value propositions			
Industry level general value	Games	Startup	

proposition	
To provide entertaining experience (to increase the time spend with the product)	Games
Software aims to automate processes	B2B Telco vendor

Table 6. Concepts emphasized within business model framework categories mapped to type and field of business, age of organization and/or size of an organization.

Business type and field that the analyzed case organizations were involved in gave rise to multiple differences. In case of the B2B Telco industry part of the revenue was earned through maintenance, the goal of the developed software was to automate business processes or operative processes, customer segmentation was considered very important, personal communications was the main way to reach customers and measurements on people's productivity was collected.

People in organizations, involved in the games industry, were identified as more artistic and the aim of games was the opposite to B2B products that were aimed to improve efficiency and shorten the time spent in specific task. The aim of games was to provide entertaining experience thus increase the time spent with the game.

The games industry organizations had some tendencies that are considered to arise from their involvement in the B2C product business. As the games industry organizations typically target global markets, they tended to view segmentation as a cost, not a customer strategy. The cost is mostly related to translation expenses. The interviewed organization representatives also stressed the importance of IPR which was not considered as important in service business. The product based business and consumer market combination also lead the organization to focus on marketing and building a brand from the start.

It seems that the age of the organization tends to have an effect on differences in business model as well. We noticed that the startup organizations tend to create partnerships with other small organizations, there is a dependency on external funding, people who work there tend to be more of a generalist in their work roles, and the little specific management there exists is generally conducted informally around the coffee table. On the other hand in established organizations the people in the investigated organizations identified other divisions of the organizations as partners, the amount of organizational structure was larger, productivity statistics were measured, and people identified themselves with specific roles in their work. For example a role could be a tester, programmer, agile coach, project manager, service manager, and such.

Size of the organization was also one culprit for the observed differences. Small organizations tended to view other organizations as potential partners, not so much rivals. Management was conducted very informally and in an unstructured way. Informants in medium sized organization viewed other parts of the organization as partners. This is

related to the fact that the amount of structure in the organization was larger in comparison. There were more levels of management and productivity metrics were measured. Size also increased the likelihood of people having a self image of themselves where their organizational role mattered more than in smaller businesses.

B. Summary of Findings

In the beginning we set out to answer research question *how is the organization or business type reflected in the emphasis of the business model elements in software firms?* We found answers to this question. The software business industry relies on human capital, which was also noted in this study. The human capital is the single most important key resource that enable the success of business. Our study fortifies the idea that startups work with more ad-hoc method [39] and the level of systematic working and bureaucracy increases when organization gain years and grow that also increases the cost structure. On the other hand for example Davis et al. [40] have modeled optimal organization structure amount and suggested that for established organizations in unpredictable environments, such as software business arguably tends to be, it is beneficial to decrease structure of the organization to gain flexibility, and for new organizations with little structure the need for building some structure is essential. According to our findings computer games are mostly being sold through existing channels and no new investments are needed. On the other hand B2B seems to require more specific channels and personal contacts. The brand building and IPR were present at the beginning when game organizations developed their products. The role of segmentation is also different between B2C and B2B type of business. Whereas B2B business is focused on certain industry domain or sector, the B2C business tries to gain as much customers as possible. To gain larger customer base it requires translations, localization and marketing, which increase initial costs. One interesting finding is the reliance of external funding of computer game startup. The external funding was not present in B2B startups but with computer games external funding was a major player in the beginning. The Figure 2 summaries the findings in business model canvas and illustrates how the findings center around key activities and key resources.

Key Partners Startups identified other organizations as partners while established medium sized organization recognized other division as partners.	Key Activities B2B organization used personal communication to reach customers. Established ones measured productivity and had analytical way of building business while computer game organizations focused on innovation and artistic way of doing things and built brand and IPR from the beginning.	Value Proposition Game startups chose a general industry value proposition to provide entertaining experience and aim to maximize time spent with the product. B2B vendor aim to minimize time required by automating processes .	Customer Relationship B2B is often offering dedicated personal assistance . Games try to go for self service , community building, and collect anonymous user data.	Customer Segment While B2B Telco vendor considers segmentation as important, B2C game vendor sees the segmentation as a cost .
Cost Structure Established and medium sized organization had larger organizational structure , which produced costs.	Key Resources Established organizations identified people as role-based whereas in game organization people were generalists . In medium sized organization the level of management was increased while startups used only coffee table management .		Channels B2C game organizations used existing reseller channels, not building their own.	
		Revenue Streams Most of the startups were trying to get external funding whereas B2B Telco organizations revenue was earned with maintenance .		

Figure 2. The findings presented in business model canvas. Two most special fields are highlighted with different color.

V. DISCUSSION

A. 5.1 BMC for software organizations – improvement ideas

Although the original Business Model Generation book [30] describe also software companies like Skype, we argue that utilizing BMC should include the idea that different elements have different weights in different industries. BMC could be the starting point, but it cannot be considered as a perfect tool for modeling software business. It could be speculated that BMC reflects better fields of business creating concrete products where for example concrete channels and logistics need to be built when delivering products to customers.

We also found out that there exists concepts that are hard to put under one element. The organizations in our study discussed that for example a venture capitalist can be identified as a revenue stream as it provides money. It can also be identified as a resource as it is used in a process to develop a product. Finally it can also be recognized as a partner when the relationship is close and in addition to money also other form of collaboration is done. Similarly some gamers in the customer segment are also part of the key resources when they spend time on giving feedback, improving ideas and even developing content to a game.

The BMC model [30] does not account for external funding as part of the revenue stream element. The findings in this study suggests that this is a very important element of business model that comes up in practice especially in the startup case. This probably exists also in other domains than just software industry, but as software industry is building intangible products it also has different cost structure. For example, Saarikallio and Tyrväinen [13] have suggested a refined model of revenue stream, where it is divided into three sub-elements which are the source, reason and method

of revenue. Venture capitalists fit within this model as they are the source of the money stream. The reason is not a product or service, but a stake in the whole company due to belief in the success potential of the firm. The method is an equity or sometimes debt investment. This shows that in some cases a refined model is more applicable than the more general revenue stream construct and demonstrates the need for re-evaluating parts of the business model construct further.

All investigated cases considered people as the most important resource. This is most likely a common phenomenon in the information technology industry. As the software industry is manufacturing intangible products [33] the human resource component raises to be one of the most important elements in the business model regardless of the size or age of the organization or type or field of business. The same conclusion can be indirectly derived from the software engineering research, where it has been noted that the quality of people is the largest success factor [41]. Thus, because software development is an essential part of a business in IT industry, it can be inferred that the business model reflects this same phenomenon. Our empirical findings are in line with this conclusion.

Based on earlier research by Vanhala and Kasurinen [12] the human capital stands out as the most important element and for example in the case of computer games the channel and customer segment elements were not seen that important. Because the current study also indicates human capital as a very important area, it could suggest that human capital could be promoted to a main element in business model instead of being sub-element of key resources when we are discussing the software industry.

We found out that customer references were important to both B2B and B2C, but in B2C organizations it wasn't possible to choose the references so easily for marketing

purposes, because the app stores allow both positive and negative feedback. Thus, it could be argued that B2B references are easier to control, whereas B2C requires more quality assurance and marketing efforts.

The findings indicate that organizations involved in established B2B field measured worker productivity, but the startup B2C game organizations did not. It could be argued that the need to collect statistics on people's productivity is more natural in service business, because increasing productivity would translate directly to more profit and the extra capacity can be used to sell more to existing customers. Also as organization grows the processes improve and thus the measuring is introduced to organization work-flow. On the product side the link between profit and productivity of people is not as direct. Other things like quality of the product and marketing effectiveness can be said to have more impact than how productive people are. This would be an interesting avenue on which to conduct further research.

Our contribution to scientific community is the research of business model concept and business model canvas in software industry domain. We argue that the current research has decreased the ambiguousness of the business model concept. There is still more work to do as for example startups are not discussed thoroughly. We also argue that BMC is a suitable tool to analyse business model, yet it has its own flaws especially with the human capital driven business manufacturing intangible products or services. This requires further research and maybe even some improvement to BMC framework.

B. Managerial Implications

This study has presented multiple differences in business model usage and understanding in the context of B2B vs. B2C, established vs. startup organization, as well as micro vs. medium-sized organization. It can give a practicing manager a good understanding of the new business model learnings she might be facing when focusing on new kinds of businesses. One example could be changing position from running a startup to leading an established business unit. Another example is doing the reverse when a manager wants to leave the corporate side and become an entrepreneur. When facing these issues we recommend that the manager thinks thoroughly how the ad-hoc working versus measuring productivity is handled. With right choices the motivation of workers can be significantly higher than when selecting incorrect methods to lead the organization. Managers should also note how different customer relationship is between B2B and B2C business and how different organizations utilize different channels when reaching customers.

The environment change requires new kind of business model understanding and this paper gives insight on the differences and gives help in adapting management style for the new situation. The management tasks and ways vary because one correct way to do management and leadership was not identified.

C. Limitations of The Study

When discussing and analyzing qualitative data there are

some threats to validity and generalization of the study. For example Robson (2002) classifies these threats: observational bias, researcher bias and reactivity. We had three different interviewers to avoid interviewer bias, two people to conduct the data analysis to avoid observational bias and this study has been discussed extensively with four people familiar with the topic and the data to avoid personal bias. As we combined two individual studies, it produces issues when the original aim of both studies has not been exactly the same. But as we utilized BMC in the both studies we argue that they are comparable and thus this study is valid in the sense of interview data. As this is a qualitative study it is only valid in this context and it should be considered as suggestions or practice-based recommendations beyond this scope.

This study has a couple of limitations. First of all it addresses only software business organizations based in Finland. All of them were targeting the global business, thus we can argue they present wider aspects of industry than just Finland. Still, we realize that broader view would provide improved results. In this sense we are merely opening discussion for the topic. Secondly in our study we are comparing B2B to B2C, startups to established organizations and micro/small organizations to medium sized one. We understand it diffuses the data widely, but we argue that the key findings are relevant and we merely miss some other issues rather than find non-existing ones. Thus, the presented results could be a subset of the results available through a sequel study with a larger sample.

VI. Conclusion and Future Work

In this study we reported differences in business models in different information technology organizations. We noted several differences emerging when organizations are different aged or sized and their business type or field varies. Our study noted the importance of human capital as a key element of a business model and how people in older and larger organizations work role-based while in startups they are more generalists. Brand building and external funding are important among computer game startups whereas personal contacts to customers were seen important in our B2B cases. Also different management needed in different contextual businesses. The software startup manages its daily life around coffee table and utilizes ad-hoc methods while established organizations had more formal processes and increased bureaucracy; key processes of software organization varies during the life cycle of the organization. This leads us to argue that the weight of business model elements vary between different software organizations so that especially managers need to understand the issue when switching from organization to another.

This study has also pointed out the difficulties of applying one concept of business model into varying organizations: we had difficulties to interpret where should be put venture capitalist as they were key partners while giving advices, revenue stream when providing money and they can also be categorized as key resource when they provide input to the

development process. If we want the business model theory to become a generic conceptual tool that it has the potential to become, it is very important to consider the environment in which the concept is applied and notice the varying details arising from those environments. We have pointed out some areas where it is not unambiguous how to categorize the data into the traditional business model elements. This suggests there still is a need for further clarification and refinement of the business model concept.

This study concentrated only on software business related organizations. We would be interested in comparing our findings with findings from other fields of business.

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Author Biographies

First Author Erno Vanhala is a PhD student at the Lappeenranta University of Technology, Finland. He graduated as Master of Science in engineering and has since published international research articles on topics such as computer game business, innovation in game development and requirement engineering aspects. His current interest in the academic field include computer game start-ups and their business models. Besides business issues he is also mesmerized by the open source phenomenon and web-based software. He is also merited teacher, having received several awards on teaching different software engineering topics.

Second Author Matti Saarikallio has graduated as Masters of Science in engineering from Aalto University, Finland, and started his PhD in University of Jyväskylä, Finland. He is heavily involved in the software industry and has found for example a computer game company.

Appendix II: Theme-based questions for the interviews

SOCES – Software Development in Creative Ecosystems

Round 1 Interviews: Team leaders / Project managers

Topic 1: Key figures

Q1: In your terms, explain what you do in your organization and how your work is related to game development.

Q2: How large is the organization you are working in? How many people work on this organization? How many people work in the company? How many people, including those from outsourced or outside organizations, contribute to your product?

Q3: What kind of games do you develop? Large-scale games (i.e. those requiring specialized game consoles) or smaller-scale games (i.e. those that can be played through the internet or with mobile systems) and what is your target market? PC market, Internet, consoles, or other?

Topic 2: Development process and Creativity

Q1: How does your organization develop a new software product like full game or expansion disc/DLC, What are the phases of this process? Do they differ between different types of products? How long does it take to develop one major product in your organization? Please describe your development process in a nutshell.

Q2: How do you decide on what product to make next? Who are involved in the creative process? Who decides on the themes, rules or concepts included to the game?

Q3: ISO/IEC 29110 defines the following activities as a part of the project management (see Figure 1):

- Project planning; requirements and plans are created to guide the work
- Project plan execution; product is developed as planned
- Project assessment and control; the execution is assessed and controlled to steer the work towards preferred results.

- Project closure; product is delivered, needs for changes assessed, asset and tool reuse is decided upon.

How does your organization reflect to these activities? How much in your development is planned beforehand, how much does your project plan change during the development process? How do you address the change if it occurs?

Q4: ISO/IEC 29110 defines the following phases for software development (see Figure 2):

- Software Implementation Initiation: Resources are reserved
- Software Requirements Analysis: What needs to be done is decided
- Software Architectural and Detailed design: The product is designed
- Software Construction: The product is built.
- Software Integration and Tests: The product is tested and finalized
- Product delivery: The product is released to customers/publisher

How does your organization reflect to these phases? Does your development method follow some certain model? *In general, how formal is your development process?*

Q5: Name two strengths and two possible weaknesses in your development. Why are these things strengths or weaknesses?

Topic 3: Test process

Q1: How is your software tested? What activities are done to test your software? Who decides when the product is tested enough? *Please describe the test process of a typical software product in your organization.*

Q2: What is the main objective of your testing work? *(Find the most important bugs or release a non-broken product or something else?)*

Q3: How large percentage of your testing work is planned before actual testing work? *Do you do explorative testing? In your opinion, does this test plan work?*

Topic 4: Quality

Q1: How do you decide on the required quality of your software? How do you communicate this quality requirement to other stakeholders? In your opinion, does this approach work?

Q2: Does the required (or intended) quality change during the project? Why?

Topic 5: Process development

Q1: What changes are you currently experiencing and what is causing them? (e.g. growth of your business, product changes, changes with the customer/target market, analysis of project feedback data or any other such reasons) Has the change been sudden or anticipated (i.e. managed/unmanaged?) In your opinion, is this change good, bad, neutral?

Q2: What are the current trends in the game industry that affect your work, and how? How are you addressing them?

Q3: Do you do process development? Do you collect metrics on your process? What metrics/why not?

Q4: Have you used some formal process development method (SPICE, TMMi, CMMi, TPI etc...)? What would it require for your organization to do formal process development (or certification program or comply with a standard)?

Topic 6: Outsourcing

Q1: Do you do outsourcing? What kind of assets or resources do you acquire from outside? How large percentage of your game is developed primarily “in-house”?

Topic 7: Knowledge management, Tools and Services

Q1: What software tools do you use in your development and testing? In your opinion, are they good enough or is there something that could be better? Is there any tool or service, which you currently would like to have but are unable to acquire?

Q2: Name up to three most important abilities required for game development project. Where can these abilities be learned or acquired?

Q3: Is cloud computing in any way applicable for game development in your organization? If yes, how are you utilizing it? What are the advantages and disadvantages? If not, why not?

Q3b: What aspects of your work (development and/or delivery of gaming products/services) are/would be most affected by cloud computing? How?

Q4: Do the terms “gaming-as-a-service” and “gaming-on-demand” mean anything to you? Please describe.

Topic 8: Other

Q1: In your opinion, is your work creative work which also has software development components or software development work with creative components? Why?

Q2: If you had to choose, which in your opinion is more important, to make a financially successful, or high quality game? Why?

Q3: Is there something you would like to add to this interview? Something you think is relevant but was not asked, or something that needs to be emphasized?

SOCES – Software Development in Creative Ecosystems

Round 2 Interviews: Programmers and testers

Topic 1: Key figures

Q1: In your terms, explain what you do in your organization and how your work is related to game development.

Q2: How large is the organization you are working in? How many people work in your project? How many people directly affect your work, how many are affected by your work?

Q3: What is the target platform of your products?

Topic 2: Development and ISO/IEC 29110

Q1: How does your organization develop a new software product like full game or expansion disc/DLC, and what are your activities in this process? Do they differ between different projects? How long does it take to develop and test one major product?

Q2: How do you decide on what to do next? Who are involved in these decisions? In your opinion, does this approach work?

Q3: Do you participate on the game design process, or have the ability to affect the decisions made on the game design? Overall, how large effect the design documents have on your work?

Q4: ISO/IEC 29110 (see last page) defines the following activities as a part of the project management:

- Project planning; requirements and plans are created to guide the work
- Project plan execution; product is developed as planned
- Project assessment and control; the execution is assessed and controlled to steer the work towards preferred results.
- Project closure; product is delivered, needs for changes assessed, asset and tool reuse is decided upon.

ISO/IEC 29110 defines the following phases for software development:

- Software Implementation Initiation
- Software Requirements Analysis
- Software Architectural and Detailed design
- Software Construction
- Software Integration and Tests
- Product delivery

In your opinion, how does your organization reflect to these phases? In general, how formal is your development process? Would you change something in your current development process?

Q5: Name up to three strengths and three possible weaknesses of your organization. Why are these things strengths or weaknesses?

Topic 3: Outsourcing

Q1: Do you use outsourced resources? What kind of assets or resources do you work with? In your opinion, do these assets affect your work?

Topic 4: Test process

Q1: How is your game tested? What activities do you do to test your software? Who decides on test objectives (i.e. when the product is tested enough)? In your opinion, is the applied approach working? Why?

Q2: In your opinion, do you have enough resources (time/people/etc.) to develop and test your product to a satisfactory degree? In your opinion, how large portion of the "optimal" amount of resources do you have in development and in testing tasks?

Q3: How large percentage of testing work is based on the plans or documentation? Do you do explorative testing? Does this test plan work/cover all the important parts that should be tested?

Q4: What you consider to be the main objective of your testing work? (*Find the most important bugs vs. release a non-broken product*)

Topic 5: Quality

Q1: How do you decide on the required quality of your software? How is this requirement communicated in your organization? In your opinion, does this approach work?

Q2: Does the required (or intended) quality change during the project? Why?

Q3: Are there tasks that are required to be done by some external stakeholder such as publisher? If yes, what activities do these tasks include?

Q4: Name up to three changes in your development or test processes which would enable better quality or otherwise improve the organization.

Topic 6: Tools

Knowledge Transfer

Q1: How do you share information? E.g. Do you use wikis? Email? Post-it notes?

Q2: What kind of information is shared? E.g. Technical specifications, Game Design Document etc.? In your opinion, do you get enough data to work with on development or testing tasks? What sort of data do you find most useful in your tasks?

Q3: How is communication between the team members done? Do you have instant messaging tools for it e.g. Messenger, Google Talk, Skype etc.? How much information is shared just by talking with people, compared to using some messaging tool?

Preproduction

Q1: Describe the tools you use in preproduction phase. For example, do you generate game design document? Do you make prototypes and if so, what kind (paper/software)? How do you consider these designs or prototypes affect the production most (quality-wise, efficiency-wise etc.)?

Q2: Do you feel that the tools you use support innovation or creativity? Is it easy to test ideas with the tools you use?

Development

Q1: Describe the tools you use development phase to make the actual game. Do you reuse material from preproduction (e.g. Software prototypes)?

Q2: Do you have any sort of asset manager and if so, what kind?

Q3: How is content added to the game? Are there utilities for writers and artists to add content or is it solely up to the programmers?

Q4: Is cloud computing in any way applicable for game development in your organization? If yes, how are you utilizing it? What are the advantages and disadvantages? What aspects of your work are most affected by cloud computing?

Q5: Do the terms “gaming-as-a-service” and “gaming-on-demand” mean anything to you? Please describe.

Work support and management

Q1: What kind of work support tools do you use? How do you keep track of tasks? If there is a need for a change in the product, how is this documented and communicated?

Q2: Do you collect metrics on your process? What metrics/why not? Do you use any benchmarking programs in your development? Do you get information on performance spikes or overall data? How useful benchmarking programs are in optimizing the game performance?

Q3: How do you track project milestones? Do you use any tool for that?

Closing questions about tools

Q1: Name two good features of the tools you're using. Is there any room for improvements?

Topic 7: Other

Q1: Name up to three most important abilities required for game developer. Where can these abilities be learned or acquired?

Q2: In your opinion, is your work creative work which also has software development components or software development work with creative components? Why?

Q3: If you had to choose, which in your opinion is more important, to make a financially successful, or high quality game? Why?

Q4: Is there something you would like to add to this interview? Something you think is relevant but was not asked, or something that needs to be emphasized?

InnoVire & SOCES, round 3

Interview date and place:

Interviewee name and position:

Interviewee background: who, from where, why working in the game industry etc.

- What sort of office do you work in, does it have place (meeting rooms, break room) for creative discussions, what kind of supervisors, how is the dress code.

Organization

- 1. Background**
 - a. Year the company was founded
 - b. Annual revenue (year 2011)
 - c. Amount of employees, amount of foreign employees.
 - d. Amount of men and women in the management. Description of responsibilities for women managers.
 - e. Average age of employees in management
 - f. Amount of financially successful product against amount of published products in total.
 - g. Does your company operate internationally?
 - h. Target platforms and languages for the games.
- 2. Is the organizational structure of your organization hierarchal and formal or flat and informal?**
 - a. Are the decisions made centrally (top down) or locally (employees by themselves)?
 - b. How would you describe the decision making process in your company (fast, slow etc.)?
 - c. Does your organization produce official (or formal) reports?
 - d. Does your organization use set or flexible work hours?
 - e. What kind of working environment does your organization have? What you think is the typical Finnish working environment?
 - f. Does your organization have definite short and long term business plans?
- 3. Is the work relationship between employees competitive or cooperative?**
 - a. Is the work individual or group effort?
 - b. Do you trust your colleagues?
- 4. Do the individual workers feel like they are important to the company?**
 - a. What personal skills are appreciated by the management?
 - b. How about colleagues?
- 5. Does your organization have some form of rewarding system?**

- a. Does this system offer rewards based on novel ideas or general improvement proposals?
- b. Which is rewarded more: a large amount or high quality of accomplished tasks?
- 6. Do you feel that your work is challenging or routine tasks?**
 - a. How large portion of your work involves paperwork?
 - b. Do you have too many tasks?
 - c. How large portion of the employee working time is allowed to be used in searching, inventing or testing out new working methods or concepts?
 - d. Do you have enough free work time to do other work-related tasks (such as follow work-related journals or news outlets)?
 - e. What is the main principle in hiring new people? Does it matter if the personality is fitting addition to the existing team or are the actual skills more important?

Innovation in practice and development of business practices

- 1. How are the ideas born? ***
 - a. Please describe your most successful game project.
 - b. Please describe any successful case: what inspired you to participate in this project?
- 2. What inspires you? ***
 - a. Have you gained ideas from Finnish folklore, cartoons or movies?
 - b. As a child or teenager, what was your favorite telltale or cartoon? Has that influenced your work, or could it in future affect your work?
 - c. If you have children or relatives of suitable age, have their plays or toys inspired your work?
 - d. Do you gain inspiration from national or international media? Please name an example.
- 3. How is Finnish mentality represented in your games?**
 - a. How is the Finnish nature, culture, character etc. represented in your games?
 - b. Is Finnish nature or environment represented in your games?
 - c. Do you use Finnish music in your games?
 - d. Do you use Finnish names for characters or places in your games?
 - e. For mobile game developers: do you have any special cooperation with Finnish device manufacturers (e.g. Nokia)?
- 4. Are your products technology or marketing-oriented?**
 - a. Do you base your designs on the most recent technical advances or based on current best sellers?
- 5. On which platforms do you develop games?**
 - a. On which platforms you would like to develop games for?
 - b. Which platforms do you prefer?
- 6. How do you see your organizations innovation ability?**

7. **Is there any constant interaction within your organization and how does that affect the game design and innovation process?**
 - a. Is it easy to exchange ideas during the working hours?

8. **How much can one employee affect the functionality, content or visual presentation of the game?**
 - a. Is it possible for the employees to suggest development ideas? How are these ideas handled, how are they refined and applied in practice?
 - b. What kind of meetings does your development teams have?

9. **How do you define the needs and requirements of your end users?**
 - a. Please describe your target audience
 - b. Please describe a typical end user

10. **How does your end users affect the product development process? ***
 - a. Do you gain ideas from your customers?
 - b. Do you collect and apply the customer feedback?
 - c. Can your customers affect the game concepts, characters, story etc?
 - d. Do you release information about works-in-progress and collect data based on the customer feedback?
 - e. Do you apply lead-users in the game testing work? At what point of the process? Before or after the demo phase?

11. **How do you develop your game after the initial launch?**
 - a. Updates, DLC content, gold editions, extension disks etc.?

12. **How do you measure your development processes?**
 - a. How long does one development process take?
 - b. What is the shortest phase in development? How about the longest?
 - c. At what development phase does your organization excel?
 - d. What development phase you consider to be the most troublesome?

13. **How do you apply external expertise?**
 - a. Consultation, development of local innovation system to enhance business?
 - b. How do you apply open innovations in problem solving and/or game development?

Financing and marketing

1. **What kind of marketing strategy does your organization have?**
 - a. In what outlets do you sell your games?
 - b. How does the outlet affect the price and marketing strategy?
 - c. What are the strengths of your marketing strategy? How about weaknesses?

2. **How large is your marketing budget when compared to your business revenue?**
 - a. Alternatively, how many people work on your marketing team?
 - b. How has your marketing strategy developed in the last couple of years?
 - c. How do you see your marketing strategy developing in the future?

3. **What marketing channels are you using?**
 - a. Do you use social media in marketing?
 - b. Do you use your customers to market your products? (For example to gain new levels you have to send an advertisement to your friends.)
 - c. Which marketing channels do you consider the most effective?
 - d. Are there any unused marketing channels you would like to use? What and why?
 - e. Are there any marketing channels you failed to use effectively? Why?

4. **Does your product launch marketing differ from the marketing used to generally increase sales?**

5. **Do you use demo or trial versions in your marketing?**
 - a. How do use them? Free trials, more levels on bought product etc.

6. **What financing sources do you use?**
 - a. Loans, EU-funding, publishers, investors, business angels?
 - b. Do you consider securing the financing to be difficult? Why?
 - c. Is the EU 7th framework programme familiar in your organization?

7. **How do you apply public funding or support programs, such as Tekes or regional development services such as Kouvola Innovation, Cursor Oy or similar?**

8. **Do you cooperate with universities, community colleges or schools of applied sciences?**
 - a. What other institutes you are doing cooperation with?
 - b. Do you cooperate with system providers?

Final questions *

1. **In your opinion, what are the differences between the game industry and other areas of industry?**
 - a. Are creativity requirements any different when compared to the other industries?
2. **In your opinion, what do you consider to be the key to the success of Finnish game industry?**
 - a. How do you see the future of the game industry?

Round 4 Interviews: Game designers

Topic 1: Key figures

Q1: In your terms, explain what you do in your organization and how your work is related to game development.

Q2: How large is the organization you are working in? How many people work in the company? How many people, including those from outsourced or outside organizations, contribute to the products you design?

Q3: What is the target platform of your products?

Topic 2: Development process, ISO/IEC 29110

Q1: How does your organization develop a new software product like full game or expansion disc/DLC, What are the phases of this process? Do they differ between different types of products? How long does it take to develop one major product in your organization? *Please describe your development process in a nutshell.*

Q2: ISO/IEC 29110 defines the following activities as a part of the project management (see last page):

- Project planning; requirements and plans are created to guide the work
- Project plan execution; product is developed as planned
- Project assessment and control; the execution is assessed and controlled to steer the work towards preferred results.
- Project closure; product is delivered, needs for changes assessed, asset and tool reuse is decided upon.

ISO/IEC 29110 defines the following phases for software development (see last page):

- Software Implementation Initiation
- Software Requirements Analysis
- Software Architectural and Detailed design

- Software Construction
- Software Integration and Tests
- Product delivery

How does your organization reflect to these phases? Does your development method follow some certain model? *In general, how formal is your development process?*

Q3: By using similar notation: Please draw and explain (*your opinion*) how your organization's process actually works. (*You can use different names for the steps, overlap them, etc.*)

- Does everyone in the organization share this view of the company's actual process?
- Does the actual process differ from the organizations official process? (*How? Why?*)

Q4: Name three strengths and three possible weaknesses in your development. Why are these things strengths or weaknesses?

Topic 3: Design process

Q1: How do you design games? How detailed designs your organization produces? *Please describe your design process in a nutshell.*

Q2: What sources do you use most for inspiration? Do you follow current trends (as in what sells right now)? How does the financial feasibility affect your game designs? How about other people in your organization? Do you use game design patterns of any kind?

Q3: In your opinion, how closely do the finalized products resemble to your designs? How do you communicate your designs to other stakeholders such as programmers? How closely do they follow your designs?

Q4: How do you decide on what product to make next? Who are involved in the creative process? Who decides on the themes, rules or concepts included to the game? Can some external source such as publisher or customers affect these decisions?

Q5: Are there any restrictions on your creative work, caused for example by available resources or tools? In your current organization and given unlimited resources, would you change something in your current development process? Why?

Q6: Are games art? Why/Why not?

Topic 4: Test process

Q1: How is your software tested? What activities are done to test your software?
Please describe the test process of a typical software product in your organization.

Q2: Do the testing results affect the game design, for example cause changes in game designs? How?

Q3: In your opinion, what is the main objective of testing work? *(Find the most important bugs vs. release a non-broken product) Would you consider your testing work to be more risk- or design-based?*

Topic 5: Quality

Q1: How do you decide on the required quality of your software? How do you communicate this quality requirement to other stakeholders? In your opinion, does this approach work?

Q2: Does the required (or intended) quality change during the project? Why?

Q3: Name up to three changes in your organization which would enable better quality.

Topic 6: Tools and technologies

Q1: Describe the main tools you use in design phase. For example, do you generate game design document? Do you make prototypes and if so, what kind (paper/software)? How do you consider these designs or prototypes affect the production most (quality-wise, efficiency-wise etc.)?

Q2: Do you feel that the tools you use support innovation or creativity? Is it easy to test ideas with the tools you use? Name two good features of the tools you're using. Is there any room for improvements?

Q3: Is cloud computing in any way applicable for game development in your organization? If yes, how are you utilizing it? What are the advantages and disadvantages? What aspects of your work are most affected by cloud computing?

Q4: Do the terms "gaming-as-a-service" and "gaming-on-demand" mean anything to you? In your opinion, what do you think about the free-to-play business models?

Topic 7: Company-specific questions on processes

<1-3 questions reserved for ... Diploma Thesis-related company-specific questions, based on earlier interviews.>

Topic 8: Other

Q1: Name up to three most important abilities required for game developer. Where can these abilities be learned or acquired?

Q2: In your opinion, is your work creative work which also has software development components or software development work with creative components? Why?

Q3: If you had to choose, which in your opinion is more important, to make a financially successful, or high quality game? Why?

Q4: Is there something you would like to add to this interview? Something you think is relevant but was not asked, or something that needs to be emphasized?

Round 5

--Background

- In your terms, explain what you do in your organization and how your work is related to game business.
- Information about the company
 - Year the company was founded
 - Annual revenue (year 2012?)
 - Amount of financially successful product against amount of published products in total.
 - Does your company operate internationally?
- What kind of games do you develop?
 - Large-scale games (i.e those requiring specialized game consoles) or smaller-scale games (i.e. those that can be played through the internet or with mobile systems) and what is your target market? PC market, Internet, consoles, or other?
- How do you decide on what product to make next?
 - Who are involved in the creative process? How do you design the game (for example, by prototyping, mockups etc)? Who decides on the themes, rules or concepts included to the game?
- How is your software tested?
 - What activities are done to test your software? Who decides when the product is tested enough? *Please describe the test process of a typical software product in your organization.*
- What software tools do you use in your development and testing?
 - In your opinion, are they good enough or is there something that could be better? Is there any tool or service, which you currently would like to have but are unable to acquire? How or why did you choose this tool?

--Customer - can be player or any other who pays

- Who is your customer? [What is the target market]
 - What languages are you using in your games?
 - Why
- What do you do to understand the need of the customer? [Has there been any market research?]
- How do you maintain customer relationship?
 - Do you have communities for players?
 - Do you steer them?
 - Which do you see more important: serving old customers or getting new ones?
 - How are players involved in game designing?

--Key partners/resources

- What/Who are your key partners?

- Do you do outsourcing? Both ways?
- What are the ways/platforms used in delivering games to customers?
- What are your key resources? (e.g. designers, computers...)

--Business model & value proposition

- What do you base your revenue stream on? [What is your business model]
 - Are you selling physical game products, downloadable games, only licenses, shareware, advertising, freemium, game-as-a-service, spin-off products... or what?
 - Which party is the main source for income
 - Now?
 - In 5 years?
 - How much are you getting external funding (TEKES, Business angels, Pappa betalar...) and how much is generated from your product?
 - Do you have a revenue model now (or even from day one) or does the external funding provide a way to establish a real revenue model in the (near) future?
 - Have your revenue models changed after you started business?
 - Why?
 - What is that what you give to the player? [What is the value proposition?]
 - How are the players involved in business decisions?
 - [A] If the player is paying, what is the value he is paying for? [Connects to the previous]
 - How do you see e.g. game experience as the value you are providing?
 - [B] If the player is not paying who is then more important user (player) or customer (payer)?
 - Why? How? Long-term and short-term issues.

--Cost structure, modelling & marketing and advertising

- How would you describe your cost structure? (e.g. salary, rent, computers)
- Have you drawn any business schemas to show e.g. how money is flowing? (SWOT is bad example, but it's still an example...)
 - Have you used any business model building tools? (e.g. business model canvas, UML)
 - In what case you could use some tools to model your business?
 - Have you confirmed or tested your business model?
- How important you see marketing and advertising?
 - Which channels you use?
 - What kind of marketing you do?
 - What kind of marketing you would like to do?
 - What is required to get to this level?
- How do you see 3rd party companies doing promotion - or even business - inside games? (e.g. Pirelli in F1 2012, Nike in Fifa '13 or Lidl in Facebook)
 - How would it affect your players?

- How do you see could it give additional value to them? Or realism to the game? Or improve immersion?
- How do you see your product in the market? Do they match (the product and the market)?
 - Should the product or markets be changed somehow?
 - How?
 - Have you ever thought that you should be doing something else?
- Are you interested in providing your service (game) in the browser environment (gaas)? Or are you doing it already?
 - Why / Why not?
- How do you see free-2-play?

--Organization & industry

- What are the most important key activities you do in your company?
 - e.g. programming, art, sounds, marketing, customer relationship...
- What sort of background your core employees have? (engineers, business persons, marketers...)
 - How many employees you have?
 - How would you categorize them? (e.g. 40% engineers, 20% marketers)
 - What kind of mindset (persons) you would need?
- How do you see games differing from traditional software developing?
 - What do you see the biggest differences between projects that build software and other products like buildings or ships?

--Reasons behind the whole thing

- What was the reason to start a company?
 - Are you in this business to make great games or money?
 - Why?
 - Which one is more important?
 - Has the reason changed?
 - What was the first idea, when company was started?
 - What was the first commercial release?
 - How has the idea changed?
 - Why
- Is there something you would like to add to this interview? Something you think is relevant but was not asked, or something that needs to be emphasized?

Round 6

Customer

- What do you do to let gamers to influence on game design/development?
 - How game players give ideas inside the game? And outside? (e.g. in Facebook)
 - How do you see player created content?
- How do you enable players to build identity inside your game?
 - What are the parts player can customize in his or hers identity?
 - How players gain achievements that unlock more features to build identity?
 - How players interact with each others inside the game? What about outside?
 - How do you handle leadership?
- How is the identity inside game seen outside?
 - How the achievements are seen from outside? (e.g. is there hall of fame in website of the game?)
- How do you follow what players are doing?
 - Within the game
 - Outside the game
- How controlled is the growth of number of players?
 - Too slow? Too fast?
 - What would happen if there were 100 times more players? 100 times less?
- How do you see localization?
 - Why(/why not) are you localizing your games?
 - Was your game designed to be localized straight from the beginning?
- Why do players trust you?

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