Ville Paasonen

THE UTILIZATION OF CROWDSOURCING IN VIDEO GAME DEVELOPMENT IN THE FINNISH VIDEO GAME INDUSTRY

UNIVERSITY OF JYVÄSKYLÄ
DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS
2020

ABSTRACT

Paasonen, Ville
The Utilization of Crowdsourcing in Video Game Development Projects in the Finnish Video Game Industry
Jyväskylä: University of Jyväskylä, 2020, 142 p.
Information Systems, Master's Thesis
Supervisor: Tuunanen, Tuure

Crowdsourcing is a tool which enables businesses and organizations to tap into the power and knowledge of the crowd by outsourcing tasks normally taken on by in-house resources. By utilizing the crowd, it is possible to initiate software development projects with lesser needs for in-house resources and to utilize creative, quick, and effective task solving capabilities. The creation of value is one of the most important aspects for any business. Value co-creation remains an increasingly emergent and important trend in various markets. Despite the positive results and major possibilities to create value for organizations, businesses and their customers, crowdsourcing seems to have been underutilized in the context of the Finnish gaming industry, due to the lack of available information online. The concept of value remains complex, intangible, and often subjective, but extremely important for any business to understand, and the value creating properties of crowdsourcing remain relatively sparsely studied. This study aims to find out how crowdsourcing activities can create additional value in game development projects of Finnish game studios and organizations. The aim of this study is to spread information of the phenomenon of crowdsourcing and to help businesses realize, how and when crowdsourcing could be utilized in a game development project, by creating a conceptual framework depicting the crowdsourcing process, critical success factors, value creation and perception of value for game studios, organizations, related third party operators and customers.

Keywords: crowdsourcing, video game industry, value creation, software development, game development, service, value co-creation

FIGURES

TABLES

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Research background

Enterprises, businesses, and organizations are constantly looking for new ways to create additional value for themselves and their customers to gain and maintain their competitive advantage in their target markets. Their goal is also to maintain and enhance their existing market position. Customers constantly look for value to gain from purchasable services and goods from providing companies. New innovations are crucial for companies to survive, and businesses are looking for new innovations in the public, but often companies are stuck with a first-mover advantage. Companies have realized that by sharing their internal knowledge with potential and current customers, they can benefit financially, boost their knowledge base and accelerate the development of new products and services. (Agafonovas & Alonderiené, 2013.)

Consumers are becoming increasingly more powerful and involved in the market. Integrating consumers into the value creation process is becoming increasingly important in creating additional value for the company, their customers, and consumers. The business environment is becoming increasingly dynamic and complex, and simultaneously, product lifecycles are becoming increasingly shorter. New software-based business models are rising. The acquirement of new knowledge is vital, which is why especially ICT-related companies are searching for new ways to receive knowledge and information by outsourcing from the outside of their company context to develop solutions for better software development. To manage large, distributed teams in software development projects, one option is crowdsourcing (referred to as *CS* further in this paper, except in the case of CS:GO, which refers to a video game called *Counter-Strike: Global Offensive*), allowing to tap into the resources of the masses, referred to as the crowd, to solve specific tasks without a direct need for in-house resources. (Leicht, Durward, Blohm & Leimeister, 2015.) The utilization of external knowledge this way has been made possible by recent major developments in advanced ICTs, like the Internet and mobile phones (Muhdi, Daiber, Friesike &

Boutellier, 2011). CS is acknowledged as an innovative form of value creation, which must be taken seriously and is realized in various forms (Hammon & Hippner, 2012).

Value creation is at the heart of business. The customer chooses a product or service to purchase based on the amount of value it might create for solving a problem or a need they face in their lives. Value creation has been studied widely for a very long time with many major breakthroughs and alterations, especially in the 2000's during the rise of the capabilities provided by the Internet. The digitalization of societies is used as a driving force, and the global economy is heading towards a service economy, enabled by information systems (Rai & Sambamurthy, 2006).

Many traditional goods and simple purchase interactions have been turned into services. In the process of value co-creation, people and the service providers work co-operatively and interactively to create mutual benefits and value to create better products and services for all. Value co-creation relies heavily on the service-dominant logic, which promotes the idea of value being created in the use of the customer instead of existing in a purchased good by itself. (Vargo & Lusch, 2004.) Involving customers in the co-creation of value has been considered to be expensive because of the amount of time that is needed for it. As the market evolves, business models often need to be altered. The products and services need to meet the fully defined requirements and needs of their customers, and if they are not met, the product often ends up becoming a failure. A product needs to create new value for the customer. (Lagrosen, 2005.)

Both CS and value creation have been studied widely in the recent decades, and they remain a relevant topic and an emerging phenomenon in product and service development. Despite the research, it remains somewhat unclear, how and when utilizing CS could benefit businesses in various cases, in short and long term. As value creation and CS are quite complicated and abstract concepts, it is often difficult to determine, what type of value is created, for whom it is created for, how it is created and when it is created in different cases. It seems that also, it is not perfectly clear in which cases CS could and should be applied for beneficial results.

CS has emerged especially in the past decade, enabled by digitalization of services. Instead of solving a problem or a challenge in-house, it is often possible to share and outsource the tasks to the public, either by selecting a specified target group or letting anyone willing to participate in solving the cases and sharing ideas to create a better outcome. It helps also with letting the customers become more acceptive of the crowdsourced product or service. (Gatautis, 2014.) CS as a method provides multiple benefits, such as cost reduction, external expertise and collective intelligence, creativity, increased understanding of the market, increasingly better products and services, more satisfied customers, increased speed and quality of development, flexibility and lesser need for in-house resources (Rechenberger et al., 2015). CS has been utilized in a wide array of different areas of business. Therefore, it is vital to study the applicability of

crowdsourcing and value creation to create increasingly great products and services for businesses and consumers.

In this research paper, the goal is to examine the creation of new value via CS activities in various business cases, and moreover, utilizing CS in the development of video games. The aim is also to create a framework explaining how value is created, how CS works in the cases of Finnish game studios and what kind of value is created to each party via the means of CS.

1.2 Research motivation

Djelassi & Decoopman (2013) argue that even with the rising popularity of CS, the phenomenon remains little understood, but it is growing in importance constantly. The lack of understanding is probably caused by the complexity of the concepts of value creation and CS, leaving many questions unanswered. Especially, CS-based business models are low on academic research. The relevant studies show many new issues, such as strategic issues, and little has been studied about them.

Since value creation plays a major role in economics, it is extremely important to understand the process behind value creation. As digitalization of society has enabled new emerging methods and views for value creation, such as CS, they need to be carefully examined and researched. As there are various success stories regarding CS, naturally, all projects do not end up being successful. CS, especially in Finland, a trailblazing country in the ICT field and home to many globally known game studios, providing major global contributions in IS and the video game industry, seems underutilized and few research papers were to be found, which is why the topic is particularly interesting to study. Various game studios seem to utilize their current and potential customers at least somehow, and to the outside, it seems that the Finnish game industry is suitable for CS. CS includes massive potential to tap into with possibilities to have major positive effects on the whole Finnish ICT industry. The Finnish gaming industry itself is a very interesting subject to study, as it is a major contributor on many levels to the society and state of Finland, receiving much media attention and general appreciation.

The original idea for this study arose while participating on a course on service innovation at University of Jyväskylä in 2018 while pitching a student group's research idea. While pondering for an idea for a master's thesis, the lecturing professor currently supervising this thesis mentioned that this idea would be proper and interesting for a theme for a Master's thesis.

1.3 Research problem

The aim of the study is to find out, is CS underutilized in the Finnish game industry, and if it is underutilized, why is it underutilized? The goal is to create a generalizable, conceptual framework depicting the CS process with critical success factors and value creation in the context of Finnish game development projects, based on a thorough literature review on value creation and utilizing CS in the area of video game development and other software development projects, and interviews of relevant individuals in the Finnish video game industry. The dataset to be used for this study was collected from Finnish game studios, organizations and independent video game developers during the fall of 2020.

The main research question is as followed:

1. What kind of value is created by utilizing crowdsourcing in the context of Finnish game studios and organizations?

The secondary research questions are:

1. Is crowdsourcing underutilized in the Finnish game industry, and if yes, why is crowdsourcing underutilized in the Finnish game industry?
2. What are the critical success factors of crowdsourcing in the context of video game development projects?

1.4 Research methods

The research was executed as a qualitative interview study, focusing on Finnish game studios and organizations which had or had not utilized CS in their software development projects. Information was collected by conducting interviews to gather data, which was compared to already existing theories, case studies and relevant research.

In qualitative research, interviews are the most used method to gather data. Interviews provide flexibility, control, and possibilities for interpretation. The persons to be interviewed are often managed to be involved in the research, which often allows the persons to be contacted even afterwards, if additional data is needed. The interviewee can usually provide high quality information relevant to the researcher. On the other hand, interviews take time to conduct and design, and if the interviewee is not comfortable or the context is not suited for the occasion, the interviewee could provide biased and/or limited information. The interviewee might provide only answers that are socially desirable. Cultural and geographical factors also might affect the answers of the interviewee. These factors need to be catered to profoundly and considered during

the interview, and when analysing the validity and reliability of the study. (Hirsjärvi et al., 2009.)

A theme interview is a mixture of a form-based interview and an open interview. The theme and topic of the interview are known, but the exact positioning and order of questions are malleable. Theme interviews are not solely a method for qualitative interviews, but it can be used also for quantitative research initiatives. The collected data can be used for counting frequencies and made into a form required for statistical analysis. The answers also leave space for further analysis and interpretation. (Hirsjärvi et al., 2009.)

As the topic of this study is complex and not well known, an interview study was selected to suit this study in the best way. Since the number of cases available and relevant to this study is very limited, detailed data is required, which is why interviews were selected as the main data collection method. The literature review is based on previous information and research data about value creation, video game development and CS to answer the positioned research questions regarding this study. The selected reference articles are publications of mostly major information systems specific journals and studies, as well as prominent books on the research area with various citations. These cited articles are found via the usage of the Finna database of University of Jyväskylä, Google Scholar and the Association for Information Systems database (AIS eLibrary), along with other trusted databases and publications. The surveys and interviews included mostly open questions, and the number of statements and answers were collected into a table and analysed to create a basis for the framework.

1.5 Research data collection

The research data consists of interviews conducted during the fall of the year 2020. Finnish video game professionals, especially developers, designers, managers and team leaders were targeted as the primary target group for this study. There exist only a handful of transparent examples of Finnish game studios utilizing CS, so this research paper focused on those firms and their employees, as well as game studios without major known utilization of CS in their development projects. Some interviewees gave tips and helped in other ways as well to find more relevant individuals to interview. The interviews were conducted via video meetings because of the global coronavirus pandemic ongoing during the creation of this research paper. The collected answers, along with general information about the case companies, were compiled into a table, which was used to build the conceptual framework.

1.6 Research structure

The structure of this research consists of an introduction to the study, followed by the literature review including topics of crowdsourcing, video game development and value creation. The next part is the interview process and analysis, findings with the conceptual framework and conclusions, followed by the list of references and appendixes. The introduction provides information about the main topics of the study, general implications, and the goals of this research paper. The first part of the literature review includes detailed and specific information about CS, like the definitions, challenges, pros and cons and example cases of utilizing CS in software development projects, especially in the context of video game development. The second part of the literature review is about development of video games, a brief history, Finnish game development and information about various game studios. The third part of the literature review includes information about the definition of value, value creation, success factors, and challenges. The results are presented per interview case, and in the end of the chapter, there is a collection of the overall compiled findings and the compiled conceptual framework. In the conclusion part of the paper, the research questions are analysed and answered, followed by the author's reflection of the conducted research and future implications for further research.

2 CROWDSOURCING

2.1 Defining crowdsourcing

Crowdsourcing refers to the action of outsourcing tasks and challenges of an organization or business to solve by the public, specifically value creation activities and functions (Leicht et al., 2015). Another description is "using the collective wisdom of a large group of people to help solve problems" (Pedersen et al., 2013). The processes and business models of companies are opened for ideas and development by the crowd. CS has proved itself to be often successful in software development projects. As the possibilities of the Internet are increasing constantly, companies are utilizing CS increasingly to improve their potential for innovation and competitiveness, promoting collaborative approaches with different external networks, such as experts, scientists, customers, suppliers, other stakeholders and even competitors (Namousi & Svenningsson Kohl, 2016).

The term "crowdsourcing" was popularized by Howe (2006) to describe user activities for co-creation of content (Gatautis, 2014). CS as a term is a neologism, combining the words "crowd" and "outsourcing" (Leicht et al., 2015). The term in this context is defined as "the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call. This can take the form of peer-production (when the job is performed collaboratively) but is also often undertaken by sole individuals (expert or novices). The crucial prerequisite is the use of the open call and large network of potential labourers". (Wilson, 2018, Leicht et al., 2015, Howe, 2006.) Another, although similar definition, is "the act of outsourcing tasks originally performed inside an organization, or assigned externally in form of a business relationship, to an undefinably large, heterogenous mass of potential actors" (Hammon & Hippner, 2012).

Despite the coining of the term only recently in 2006, CS has been utilized throughout history, as people tend to work collaboratively. Advances in information and communication technology (ICT) and associated applications have enabled the phenomenon to rise and become increasingly popular for companies and other organizations to try to reach out to a wiser and more accessible crowd. CS allows businesses to obtain external expertise, access collective intelligence and creativities from the virtual crowd, and to reduce operational costs. (Pedersen et al. 2013.)

CS is flexible and can be applied in many types of projects. The work amount of the crowds may vary from a few seconds to even months or years. Crowds can even work in the value cycle upstream inside the firm as decision makers, or downstream as the product consumers. When applying CS to different projects, sophisticated project management is vital to keep the process productive and valuable. (Wilson, 2018.)

There are two primary types of CS, called tournament and collaboration. Collaboration-based CS aims to create a solution to finish a task co-operatively, whereas in the tournament type, independent solutions are created by various individuals competing for a monetary prize or other type of compensation. The best solutions can be evaluated and chosen by quickness, quality etc. These types can also be combined, for example, to evaluate individual submissions collaboratively. (Blohm et al., 2013.)

Sivula (2016) argues that CS can be divided into three different activities, focused on knowledge, funding and/or resources. The related generic crowdsourcing model (GCM) is presented in Figure 1. CS can be applied internally or externally of an organization. Organizations should consider which implementation methods should be applied for different activities. Funding focused implementation methods are used for funding an organization's activities. Knowledge focused implementation methods aim to create new knowledge about a topic or an area of interest of an organization. Resource focused implementation methods can be used to facilitate the crowd to be utilized as a resource of an organization. (Sivula, 2016.)

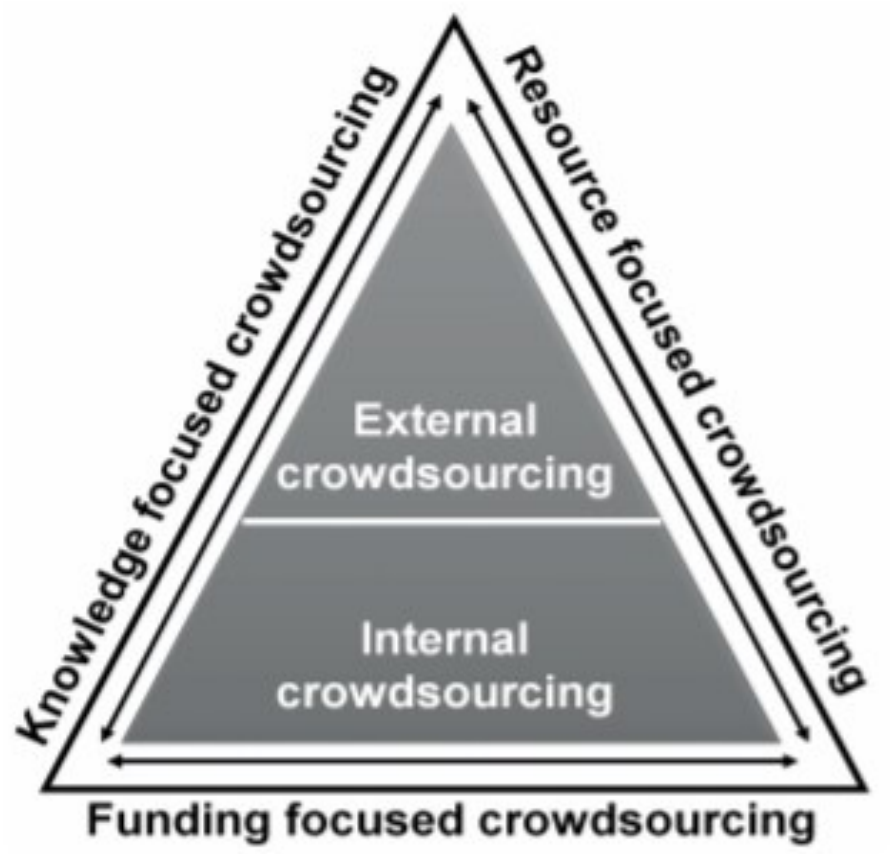

Figure 1. The generic crowdsourcing model. (Sivula, 2016.)

CS is not without any issues, since it includes many challenges. CS alters the existing business model, so implementations of CS programs must be based on the organizational structures. Changes to existing practices are required. CS can be used as a technique for user-driven innovation and value co-creation. It should not be seen as merely a tool, but a process for ideation and applying individuals' open innovative and collaborative efforts. (Djelassi & Decoopman, 2013.)

It is important to understand a difference between outsourcing and CS. Outsourcing describes the outplacement of specific corporate tasks to a designated third-party contractor or an institution. When utilizing CS, the tasks are allocated to an undefined mass of anonymous individuals who are somehow rewarded for their efforts. The internal tasks to be crowdsourced are selected by the institution and broadcasted online through a CS platform. Users registered onto the platform can select tasks to work on individually or collaboratively with other registered users and submit the solutions onto the CS platform to the provider of the task. After this, the submissions are assessed, and after a successful completion of a task, remunerated by the initiating organization. Therefore, in a CS model, there exist at least two types of actors: the organization (task provider) and the individual (task performer). Often, there exist a third actor, referred to as the CS intermediary, who mediates the process between the individuals and organizations by providing a platform for communication between these actors. This is not the case always though, because sometimes the initiator establishes and hosts the platform, removing the need for intermediaries. (Leicht et al., 2015.)

2.2 Benefits of crowdsourcing

Various potential benefits have been found through the utilization of crowdsourcing in software development projects. One of them is cost reduction, which is explained by lower in-house development costs and requirement for recruiting developers. CS allows a faster time-to-market, explained by accessing crowdsourced workforce, able to work parallelly "around the clock" because of the difference of time zones in which the participants are located in. CS potentially allows higher product or service quality, enabled by broader participation of talented individuals competing to provide the best solutions. Another benefit of CS is engaging creativity and open innovation. As heterogenous talent and expertise is available, it is possible to explore more creative solutions, as the potentially fixed mindset of a company is not as influential in the context of CS. (Stol & Fitzgerald, 2014.)

Through the means of CS, it is possible for companies to tap into the capabilities and skills of the crowd, unavailable within the company. The company can get a massive volume of solvers to work on organizational tasks. The crowd is heterogenous, meaning that the individuals provide varied skills and knowledge into the CS project, providing diverse and innovative solutions. The crowd also knows, what it wants from the CS project, due to perceived issues with currently existing products and services. This allows the initiator(s) to gain

valuable information about customer preferences and experiences and obtain suggestions for further improvement of products and services. There exist possibilities that crowds might even create commercially valuable, ahead-of-trend products and services in the market. Companies can also obtain solutions for their problems with lower costs, instead of solving them in-house, potentially increasing company profits and saving other resources, such as time. Companies can focus more on their core areas and specializations, and externalize their risk of failure, as the company have the right to not pay for the solutions, if they are not proper for the case of the company. (Ye & Kankanhalli, 2013.)

Lebraty & Lobre-Lebraty (2013) identified three elements a CS operation can create value through: cost reduction, innovation and authenticity. They state that CS is always less costly than outsourcing, but as CS has limitations, it can't completely replace outsourcing operations. Value can be created also through development of innovation that procures a competitive advantage against competitors. Authenticity consists of an organizations's improved understanding of its environment, market and clients, allowing a business to create value by offering better-adapted products and services.

2.3 Phases of the crowdsourcing process

According to Muhdi et al. (2011), in cases of intermediary mediated CS projects regarding idea generation in the early innovation process, five particularly important distinct phases were identified: the deliberation phase, the preparation phase, the execution phase, the assessment phase and the post-processing phase. The deliberation phase refers to the initial period of a crowdsourcing process when a company is considering the utilization of CS to solve a problem or take on a challenge. During this phase, information is collected to decide whether CS is compatible with the existing internal processes. The phase ends when there is a decision about whether CS will be utilized or not. (Muhdi, Daiber, Friesike & Boutellier, 2011.)

The second phase, preparation, describes the work to be done before the initiation of online idea generation. Expectations are considered and determined by the company. The CS question (problem) is examined and potentially clarified, in order to try to avoid unwanted results, outcomes and misunderstandings. The timing and scheduling is decided, and a criterion is set for the rating of generated ideas, regarding what the company values and wants as output from the participants. It is important to inform and remind all the persons involved in the CS project in this phase about their responsibilities, and to introduce them to the required tools for the project. The spreading of information about the CS initiative is also useful to attract as many valuable participants as possible. (Muhdi et al., 2011.)

Phase three, execution, includes the generation and submitting of ideas and solutions to the set CS problem. There is continuous interaction and communication between the crowd and the initiator(s), until the

question/problem is taken offline, and the phase ends. The generated content is very important to be read and considered effectively by the initiator. The initiators also should orientate themselves on modifying, refining, and commenting on the received content, as solutions can sometimes be combined or edited for an even better solution. (Muhdi et al., 2011.)

The assessment phase takes place immediately after the execution phase. The received content is clustered, rated, and the best ideas are selected, and their submitters are rewarded. Many tools can be used to sort out the best option for the initiator, and the decision of the best option can be done by the crowd, the initiators or both collaboratively. The best option is not always the only one rewarded, so there can exist multiple "best" options. (Muhdi et al., 2011.)

The fifth and final phase is the post-processing. Usually, after selecting the best options in the previous phase, the initiators communicate their intent to integrate the overall results in a project or in their business in some form. The implementation of the selected options needs to be planned carefully, and the possibility of side effects must be considered. Side effects refer to possible positive effects regarding other areas of application of the provided crowdsourced solution; there often might exist multiple uses for the crowdsourced options and solutions within the organization. All five phases can be seen in Figure 2. (Muhdi et al., 2011.)

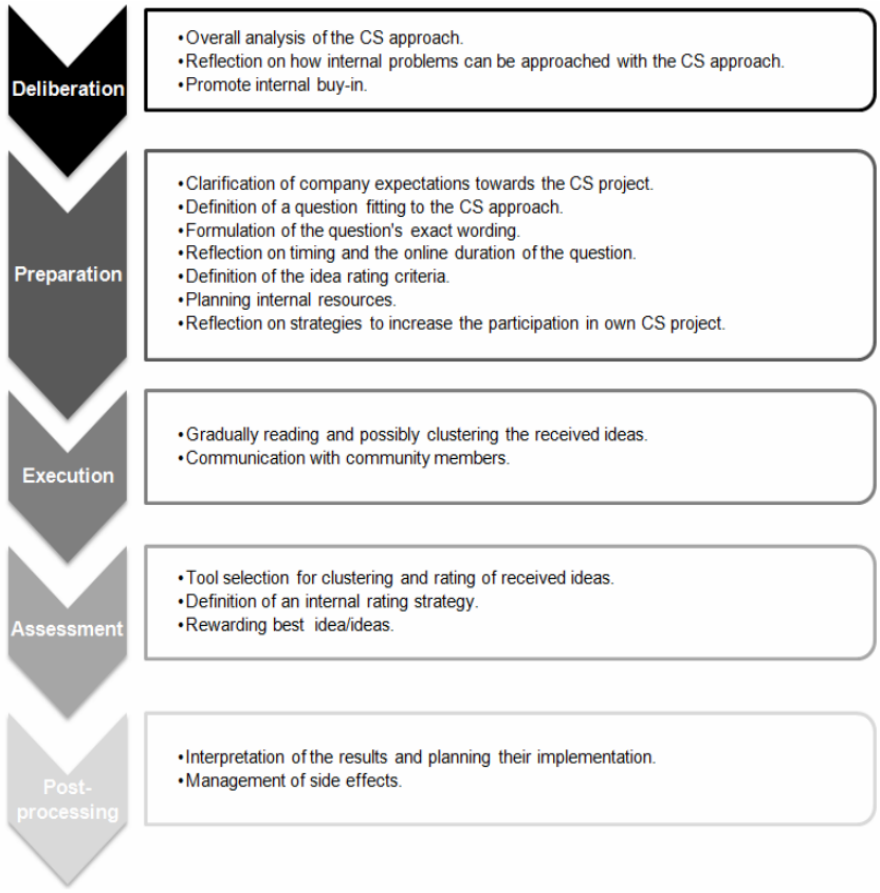

Figure 2. Five phases and important tasks in the CS process. (Muhdi et al., 2011)

Pedersen et al. (2013) suggest a conceptual model for crowdsourcing. In the model, they present the factors of problem, process, governance, people, technology, and outcome. The model begins with problem, which states the initial condition and a desired ending condition. The problem is at the core of CS, and its characteristics affect the other elements of the model. The problem can be simple or complex, and it can involve many or just few of the other model elements depending on the type of the problem itself. The problem types are co-creation, crowd creation, crowd voting, crowd wisdom and crowd funding. Problems can be "open" or "closed" depending on the context. (Pedersen et al., 2013.)

The process refers to a set of actions undertaken by all actors in a CS project to achieve an outcome. In the context of CS, it refers to the design of a step-by-step plan of action for solving a CS problem. Involvement of both, the problem owner, and the crowd, is required. The third factor, governance, means the actions and policies employed to effectively manage the crowd, and direct them toward the desired solution. This factor might be a major challenge in the case of CS, as the management of the crowd is vital in trying to reach the pursued goal. The more complex the project, the more governance is usually required. (Pedersen et al., 2013.)

The "people" factor can be divided into several subgroups: problem owner, individual and the crowd. The problem owner is usually a company or an organization, acting as the initiator and the controller of the project. Individuals are the people the problem owner interacts with. The crowd in this context is considered a separate entity. The attracting of individuals to participate is extremely important for the CS project to be successful. In order to attract suitable individuals to participate, it is necessary for the problem owner to understand the motivational factors of the individuals. The term "crowd" refers to the dynamically formed group of individuals who participate in solving the problem. The crowd works quite similarly as the individuals when examined singularly, but collectively the crowd also introduces additional issues and concerns. The collaborative actions depend on the type and the scale of the problem. When solving CS problems, it is very important to enable and upkeep trust between participants. (Pedersen et al., 2013.)

In the context of this conceptual model, technology refers to technical capabilities that enable the crowd to form, and which facilitate and optimize the continued interaction and ultimately, the solution to the problem. The application of technology is selected according to the problem, as simpler problems require simpler solutions and vice versa. The final factor, the outcome, refers to the outputs of the CS process. The outcome can be viewed in two ways: the factual outcome and the perceptual outcome. The factual outcome refers to the solution provided to the problem owner by the crowd and the degree to which to the outcome was considered optimal compared to what the problem owner really wanted. The perceptual outcome refers to how the problem owner and the participants feel about the CS process and its results. The conceptual model is presented below in Figure 3. (Pedersen et al., 2013.)

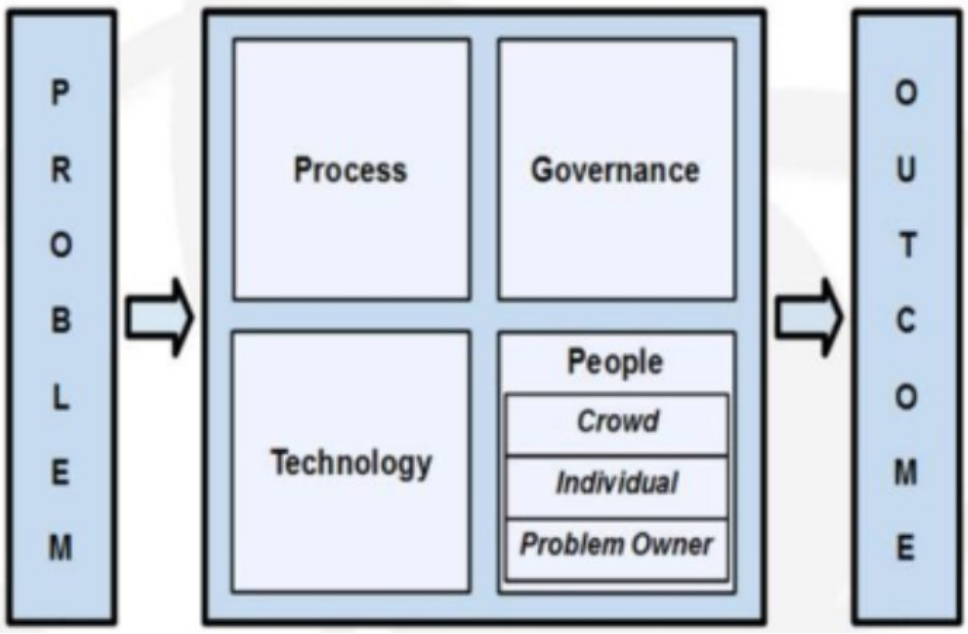

Figure 3 The conceptual model for crowdsourcing. (Pedersen et al., 2013.)

2.4 Crowdsourcing techniques

The first step of the CS process is the call generation. When the instructions are clear for the crowd, there is a higher chance of getting high quality responses from it. There are eight key elements to present and inform of an open call: description, timeline, submission requirement, judging and prizes, criteria and disqualifications, crowd qualification requirement, rules, and regulations and "about the sponsor". One of the major challenges of CS is the attraction of the crowd, and there are three particularly important factors to regard when recruiting participants: the reward, enjoyment, and reputation. The reward is the dominant motivation in the CS processes. The rewards can be tangible or intangible by nature, and common tangible rewards include money, discounts or free use of a service or a product. The crowd tends to select the tasks they are interested in, and which they enjoy. If a task is interesting enough, there isn't always a need for a prize, as the prize might be a feeling of accomplishment, joy etc. Some participants engage in CS because of possible gains of personal reputation, by completing tasks and, for example, getting their name on a leaderboard on the CS platform. (Niu et al; 2019.)

When it comes to the attraction of the crowd, it is not enough that the volume of participants is large, because the quality of the participants is vital, depending on the tasks to be completed. The tasks can be classified as open for all, reputation-based an domain-specific. Sometimes, especially for complex and domain-specific tasks, finding a suitable crowd might be difficult. The crowd's capabilities to participate in difficult tasks can be tested by examining user profiles, behaviour and experience of the users, and asking verification questions.

Worker agreements are often used to avoid unwanted CS submissions from the crowd. Some CS platforms enable a hierarchical participant structure, which helps finding proper individuals for the tasks, as individuals are classified by their capabilities. When the solutions are submitted, evaluation is necessary in order to find the most suitable solutions for the CS problems. The evaluation can be executed by the crowd, a group of experts, or sometimes, both. (Niu et al; 2019.)

Quality control is one of the most studied aspect in the area of crowdsourcing. For many popular CS platform, a large portion of submissions is considered low quality. The quality of the CS process is related obtaining high-qaulity output from the crowd. Design-time and runtime approaches can be utilized to manage quality control. The design-time approaches include the open call generation and the qualification of the crowds, whereas runtime approaches include workflow management, expert review, output agreement, ground truth and majority voting. Multiple runtime and design-time approaches can be used simultaneously in order to reach better overall quality. (Niu et al; 2019.)

2.5 Forms of crowdsourcing

There are various forms of crowdsourcing that can be commissioned for different types of projects and initiatives. Ye & Kankanhalli (2013) argue that the approach and type of crowdsourcing to be utilized in any CS project should depend on the types of tasks to be crowdsourced. The tasks can be categorized according to their simplicity/complexity and their outcome variety (low/high).

2.5.1 Crowdjobbing

The first form of CS is called crowdjobbing, which is one of the oldest forms of crowdsourcing. Via crowdjobbing it is possible to create a place where jobs may be offered or sought after. The ones offering work dissect their work into distinct tasks. These tasks are a part of a complicated but not as much complex of a project. This crowdsourcing method affects the whole of the labour market. Crowdjobbing may still include unique and specific tasks. Crowdjobbing offers a fast access to find employees with permanent availability, a high volume of available labour, a type of guarantee of a completed task (because the employee is only paid when the task has been completed) and a variety of potentially interested individuals. This type of crowdsourcing is usually very failsafe and effective. (Lebraty & Lobre-Lebraty, 2013.)

2.5.2 Crowdwisdom

The second form of CS is called crowdwisdom. In this form, usually a problem, a challenge or a question is provided, which needs to be answered by the crowd. The crowd may provide justifications, answers, opinions, thoughts etc. The

crowd can also discuss the topics and solutions, and with the stakeholders, a good solution can be possible to achieve. A democratic state is a great example of crowdwisdom, based in the belief that if a large enough population holds a certain opinion, they are probably right. Another example of crowdwisdom is reviews and scores on online stores. (Lebraty & Lobre-Lebraty, 2013.) For example, if a mobile game in the Google Play Store has nearly a perfect review score with a volume of hundreds of thousands of reviews, the game is most likely rather good.

2.5.3 Crowdfunding

Crowdfunding is a very common variant of CS, and most likely one of the first variations that come to one's mind when CS as a term is mentioned. Crowdfunding is a resource, which allows a project initiator to obtain financing via the users of the Internet. The initiator can set a goal of funding needed for a part of the project or the whole project. Usually the donators receive compensation for their donations, such as the product or service which is being funded. Crowdfunding is usually supported by specialized platforms. In crowdfunding, there usually are three different participants:

- The initiator of the project (business or individual)
- The crowd (Internet users wishing to participate)
- The platform (providing the contact possibilities and an interface between the initiator and the crowd)

Crowdfunding projects often concern developing a new innovative product or service, but not always. Parties such as existing businesses may seek crowdfunding to develop their current products and services, to diversify and/or to expand or to fund new business ventures. They also might have an idea of a potentially developable product or service, and they want to test the market for the market viability of their ideas. On many platforms, there are tens of thousands of people to evaluate one's business idea. To generate revenue for themselves, the platforms usually earn between 5% to 8% of the total amount funded for each successful project. If the project fails, the funders get their funds back, but the platform takes roughly 2% of the refunded amount. (Lebraty & Lobre-Lebraty, 2013.)

There are various factors that affect the viability and popularity of crowdfunding on a general level. Usually, there exists a proximity factor between the crowd and the initiator(s). The customers sense a connection and excitement towards the project because they invest their own money into the project. They are contributing to make something become a reality. The profile of the initiator might also influence the success of the crowdfunding project; projects proposed by well-known individuals are often successful. Gambling is also a factor. People will lose only little money if the project fails but potentially get a product or service quite cheap if the project is successful, since crowdfunding projects often provide rewards for funders in the sense of receiving the promised compensation

for a price lower than the retail price will be in the future. The initiator often provides multiple perks and extra options for people willing to invest more into the project. The more one invests, the more supposed value is proposed to the investors in the form of things such as extra accessories, getting another product for half the price, etc. (Lebraty & Lobre-Lebraty, 2013.)

2.5.4 Crowdsourcing and forecasting

Crowdsourcing and forecasting refers to the use of the crowd to plan, predict and/or decide the best option from a limited variety of known options. This is a great option for businesses, who have a portfolio of R&D projects, to find out the most promising and valuable one for the crowd. This can be considered a type of a survey. Usually, activities such as these are entrusted to specialized institutes, but here, the crowd acts as one. From a group of products with a starting price, the crowd chooses certain products, and sells or purchases them, and the equilibrium prices at given moments reflect the preferences of the crowd. The differences of CS and forecasting compared to a classic survey are that when conducting a classic survey, the goal is to get a representative sample of answers, which is still as small as possible for minimal cost. In this type of CS, the goal is to get as many answers as possible without the need to know who they are. (Lebraty & Lobre-Lebraty, 2013.)

2.5.5 Crowdsourcing and innovation

The form of crowdsourcing and innovation is about generating ideas. The crowdsourcing platform can be viewed as a connecting organization, and a seller of ideas. A business with a large volume of clients can utilize the clients to receive suggestions for new, commercialisable ideas. The crowd can also be utilized to test ideas from outside of the crowd, such as a third-party company. After testing the ideas, it can be seen whether them are noteworthy or not. These processes can be considered a part of an organization's innovation process.
In this form, there is a major potential for a company to obtain innovative solutions from specialized individuals, whose area of expertise might be very different from the people within the organization. Because of this potential, the challenges given out to the crowd often regard technical or conceptual issues. The solutions aren't necessary innovative in the sense of being something radically new to the market, but they are new and innovative for the initiative organization. Crowdsourcing brings individuals, ideas and organizations together, no matter how far from each other, to create potentially new innovations, which might improve the well-being of all parties and help enhanced innovations emerge. (Lebraty & Lobre-Lebraty, 2013.)

When it comes to game studios, new innovations are most likely always welcome additions, but after all, game studios usually are already very specialized in their area of work. A game studio is not only specialized on game

design and development, but the employees are specialized in a certain factor of game development, such as testing, quality assurance, art design etc. The crowd can still be utilized in a way that extends the capabilities of the individuals within the game studio.

2.5.6 Crowdsourcing and authenticity (C&A)

For an organization to fully understand its environment, they need to have relative proximity with their clients. Via this form of CS, the initiator can gain understanding of who the important participants in the company's environment are, as opposed to a previous form of outsourcing to companies to arrange opinion surveys. A company can gain vital information about the feelings, tastes and overall opinions of the crowd, when it comes to different organizations, brands and products. (Lebraty & Lobre-Lebraty, 2013.)

The work of the crowd is often related to brand authenticity, hence "crowdsourcing and authenticity". The brand is a very important and highly protected factor for many companies, proving authenticity of the products and services. The brand aims to create images, experiences, memories etc. Through these aspects, a person can create and/or affirm one's personal identity. This makes the customer (optimally) feel a connection and investment into the brand, resulting in customer loyalty, customer participation in the construction and image-building of the brand, resulting in more sales. The offers can also be made more optimized for a business's clients. Therefore, securing bonds of proximity with clients is an essential goal for almost any company. The initiator is looking for original and unique creations gathered from within the crowd. Through these creations, the initiator wishes that the crowd would participate in building their brand's image and identity. The aim is often to create a community, in which brand consumers come together to co-create. The company aims to create experiences and contexts, through events, locations, websites etc. Context matters in brand management and image, and the context can be affected by CS. (Lebraty & Lobre-Lebraty, 2013.)

In the gaming industry, many game studios and their franchises utilize branding in a major way to make their customers feel more affiliated with the games, studios and fantasy universes. Good examples are Rovio and Blizzard, who utilize their brand and franchises for not only to sell games, but enabling a mutually co-creating community, consisting of fans.

2.5.7 Crowdauditing

Crowdauditing is a form of data analysis meant for finding problems or opportunities. It is closely related to the Open Data movement. An example would be a company releasing their business data to be viewed by the intended crowd. The crowd could find and determine anomalies in the functions of the company, making possible the optimizing of functions of the business to enhance their overall business. For the crowdauditors, examining this data is very relevant in the sense

of coming up with new business ideas and ventures, especially when reviewing data gathered from a large public company or organization. If flaws are found, they can usually be mended somehow, either by the initiator company or an individual from the crowd. (Lebraty & Lobre-Lebraty, 2013.)

Crowdauditing can be utilized in contexts of private and public organizations, but most likely it is mostly used in the cases of public organizations. In the cases of private organizations, utilizing crowdauditing might increase the transparency of their business ventures, which most likely will be a great deed to enable further co-creation with their customers and add in to the feeling of trust the individual senses towards the company. Crowdauditing might be tempting for individuals to participate in, since curiosity, desire for knowledge and doubt are common human traits. These traits are especially present, when the goal is to find weaknesses and flaws in an organization. Many companies even hire individuals like cyber security specialists and penetration testers to find flaws in their systems. The amount of non-professional internet hackers is also massive, and the behaviour of the individuals interested in these topics can be used for a good cause. Many large companies own a considerable amount of data, some of which is never utilized, and various business opportunities might arise from analysing that data, either for the company that is being examined or for people or other organizations outside of the organization at hand. Crowdauditing is becoming increasingly rare, because the low amount of businesses and organizations that are willing to open their precious, well protected data. Most companies don't want their weaknesses to be exposed publicly, because finding major flaws might have a major effect on their brand, investors etc. (Lebraty & Lobre-Lebraty, 2013.)

2.5.8 Crowdcontrol

Many organizations, like the police, utilize CS in both ways; they inform the crowd through means like social media, and they get information from the crowd respectively. In the heterogenous crowd, there are potential victims and possible informers. Many countries, institutions and even companies often also provide channels, where individuals can safely report wrongdoings that happen without the authorities knowing about it. A form of crowdcontrol, crowdsecurity may be defined as the outsourcing to a crowd of surveillance and security activities. This happens when, for example, individuals watch web streams of security cameras and inform the authorities of seen crimes or misdemeanours. Some businesses utilize crowdsecurity as their main business. The most active individuals to participate in the form of CS are most likely curious, law-abiding and civil-minded. As security-related issues are on the rise and will be most likely in the future as well, crowdcontrol will become increasingly popular. (Lebraty & Lobre-Lebraty, 2013.)

2.5.9 Crowdcuration

Curation refers to the organization of various content in order subsequently to reveal relevant information. As content is often diverse and complex, this might prove to be a difficult task. This can happen within an organization, and in this case, it is necessary to designate this task to a team or an individual, who needs to select an area of interest, select the sources to be examined, verify the reliability of the content, cite the authors, create a network with experts, write editorials, present and share the content and analyse reader profiles. CS is used for these sorts of tasks. Crowdcuration refers to outsourcing the activity of generating, grouping and sorting data related to specific subjects. Therefore, it consists of tasks of arranging. As the amount of available data is becoming increasingly larger, these tasks are often very important to complete. (Lebraty & Lobre-Lebraty, 2013.)

Crowdcuration is flexible since there are so many different topics to cover; for example, a news media can utilize crowdcuration to gain a deep understanding of a large phenomenon or event via the Internet, analysing trending keywords on social media and following people and organizations, reviewing user data to guide their content and asking the viewers to share their information. A group of experts on the subject will review the content and cite it if necessary. The reporters, editors and journalists can create new articles and other content on the subject for the crowd to read, and find data on the readers, their preferences, reactions to different topics etc. (Lebraty & Lobre-Lebraty, 2013.)

Reddit is a very popular discussion and media platform, where people can discuss, rate, share and find all kinds of content from the Internet. The topics of interest are shared into various subtopics and groups. Without crowdcuration, the website would be most likely quite a mess, and it would be extremely difficult to find the content one actually wants to find. By utilizing crowdcuration, the website stays in control of its users and content to share interesting content to everyone on the website.

Humans are often much better in organizational skills than machines, which has made CAPTCHAs very common in many websites, because they help minimize the number of bots accessing their site. CAPTCHAs are simple tasks made for the purpose of authenticating that the user of the website is an actual person, instead of a bot. The tasks usually include things such as typing a text presented in a generated image or clicking on pictures, which have a dog or a cat on them. Crowdcuration is quite popular because of the traits and motivations of many individuals to arrange, organize and classify various things in their lives (Lebraty & Lobre-Lebraty, 2013).

2.5.10 Crowdcare

Crowdcare refers to using CS to aid people and/or organizations that are facing difficulties such as poverty or going bankrupt. The technological capabilities and devices of the crowd are the tools that are being used for the good deeds. This

aid could be in the form of material or monetary assistance, or practical help in the daily life. The activities are usually the same as what government services and associations provide constantly to certain groups of individuals, like people with illnesses, disabilities etc. (Lebraty & Lobre-Lebraty, 2013.)

2.6 Legal and ethical issues related to crowdsourcing

As CS enabled by the Internet is somewhat new as a phenomenon and constantly evolving, it is very important for initiators and crowdsourcing platforms to keep up with factors related to legal and ethical issues, especially considering the factor of cheap labour.

As CS is executed, the intellectual input of the crowd is usually much more worth than the initiator pays in terms of rewards to the providers of best results. The crowd is utilized to find profits for the initiator. The company receives skilled labour for lesser cost than in-house employees. CS might be considered controversial in this sense, seen as a form of labour exploitation by some. On the other hand, CS can be also seen as an enabler of opportunities for the crowd, as CS often provides possibilities of entrepreneurship and a creative outlet for individuals. Individuals can learn new skills, express themselves, earn rewards, gain experience etc. (Brabham, 2008.)

As usual, when commercial, profitable business is being executed, there are regulations set by various institutions to protect the sellers, distributors, and buyers. In the United States, home to various CS platforms, The Securities and Exchange Commission has the following regulations:

- Give permission to companies to increase the amount of one million dollars per year through the offers of crowdsourcing.
- Give permission to investors who have net worth of annual income less than 100,000 dollars to invest maximum amount of 2,000 dollars per year or five percent of their net wort or annual income.
- Investors who have net worth or annual income greater than or equal to 100,000 dollars could invest ten percent of their net worth or annual income.
- Securities purchased by crowdfunding transaction cannot be resold for a period of twelve months.
- Companies like Non-U.S. companies and Exchange Act reporting companies are ineligible to use the crowdfunding exemptions.

Most if not all countries most likely have less or more strict regulations, but in a nutshell, like any sort of business, there are regulations when it comes to crowdsourcing. (Alqahtani, El-shoubaki, Noorwali, Allouh, & Hemalatha, 2017.)

The legal issues of CS usually are in relation to the abuse of personal information and the protection of intellectual property. Abuse of personal information on the Internet is somewhat common because of the amount of available

data, social media etc. This kind of information can be used for illegal activities. One should always consider, how much personal information to share online. Crowdfunded products and services face many risks, such as infringement, which is very common, because of the usual hype around certain CS projects, especially when it comes to new technologies and innovations. Overall, in crowdsourced projects, there are cases where it is sometimes unclear, who owns the product or service, if the number of contributors in the project is large and heterogenous. Luckily, there exist intellectual property laws to protect the products of the companies. (Alqahtani et al., 2017.)

Ethical issues include privacy, accuracy of information, property and accessibility. When CS activities happen, privacy must be handled properly by each party at every phase. Especially CS platforms get access to a massive amount of personal information of the members of the crowd. This data needs to be handled with care, both for legal and ethical reasons. It needs to be assured to the crowd from the very start that their data will be handled correctly, because few will want to join a project which might affect their privacy in a non-beneficial way. Accuracy of information refers to the validity, reliability, and correctness of information. Inaccurate information may cause problems for the crowdsourcing initiator, the platform, and the crowd, so this is also a major factor to consider. Incorrect information may cause massive impacts on each party, reducing the possibility of success for the project. (Alqahtani et al., 2017.)

Property issues might occur due to both legal and ethical issues. The crowd consists of individuals, who are still working as a part of the project, and many want their deserved portion of the success of the project. It isn't dependent on the fact whether the end product or service is actually a service or a purchasable good. Intellectual property can be protected by the means of copyrights, patents, and trade secrets. Accessibility, the final issue, refers to the fact that humans need to be able to function in the project environment and be able to contribute, despite of possible personal limitations. These factors must be considered when designing and testing the work efforts of the crowd for ethical reasons. (Alqahtani et al., 2017.)

Crowdfunding is somewhat highly regulated in Finland, which most likely has a major effect on crowdfunding possibilities of Finnish game studios. To initiate a crowdfunding project in Finland, there are two ways to do it. Parties, such as non-profit associations and other organizations, with a permit from the National Police Board of Finland to collect funding, can initiate crowdfunding on platforms like the Finnish Mesenaatti.me, which was launched in 2013. Mesenatti.me will not engage a crowdfunding project until it receives a statement from the National Police Board of Finland that Mesenaatti.me is considered a media, not an executor regulated by the fundraising laws of Finland. If the initiator doesn't have a fundraising permit, it needs to provide the funders some sort of compensation. This can be a good, a service, an experience, a membership, or a share. It may also be a portion of the product's profits. The compensation needs to be comparable to the amount of the amount of donations given and a delivery schedule needs to be set. Every party to receive crowdfunding is required to state

the funding in their accounting and taxation. Non-profit organizations are usually tax-exempt if their business is considered tax-free. TO crowdfunding can be targeted to a large audience, a niche segment of people or only a close group of stakeholders. The project review and funding is still available and open to anyone willing to participate. (Mesenaatti.me, 2020.)

Questions of ownership of property could also be a major problem for crowdsourced products and services. In an example case from the USA in 2018, two gaming companies, Valve and Blizzard, filed a copyright infringement lawsuit against two game development companies, uCool and Lilith Games. The reason for this was that according to Valve and Blizzard, uCool and Lilith Games were allegedly infringing the copyrights of the game series Defense of the Ancients (DotA), which is originally a modification of Blizzard's game, Warcraft 3. In 2004, DotA was declared to be open source. Soon Valve begun development of DotA 2, an official follow-up to the first game, which was still just a mod of a Blizzard game. The rights to the game had been at least partially gained because of Valve hiring two of the major contributors of the original DotA. Lilith Games and uCool had created mobile games, in which very similar characters to DotA games were discovered. An especially interesting factor in the case was that the infringement regarded mostly these characters, but they were made by the players of the game (crowdsourced content), not by the game publishers. The question was whether game publishers can sue for copyright infringement of crowdsourced content. Another factor was that DotA and DotA Allstars, the games in the focus, were viewed as "collective works": in other words, combinations of various content, like an encyclopaedia. (Kelly, Plassaras & Tung, 2018.)

2.7 Crowdsourcing in software development projects and open source software

Software development is described as "the processing knowledge in a very focused way as well as a progressive crystallization of knowledge into a language that can be read and executed by a computer." Since the increasing rise of the digitalization of societies, almost every value chain of companies includes software in some form, despite the industry they are operating in. (Leicht et al., 2015.)

Many major IT firms have utilized crowdsourcing in improving their innovation management, such as Fujitsu Siemens, IBM and SAP. When developing new software, crowdsourcing has proved to be often an efficient, fast and cheap way for developing. In some examples, such as a programming contest, the provided solutions were much faster than the industry standard. The results were also reached very cost-efficiently, as the total cost equalled only 6000 dollars. As testing new software before launch is vital to avoid bugs and errors, development with crowdsourcing is becoming increasingly important. According to the World Quality Report, over half of the asked organizations partaking were

utilizing crowdsourcing in their testing processes or planned to do so in the year 2014. (Leicht et al., 2015.)

One of the early examples of web user participation and CS is Wikipedia, a massive, free to use, online encyclopaedia, which was developed by people performing tasks which often prove to be challenging for computers to do. The in-house staff of Wikipedia is small, but tens of thousands of people voluntarily create new content and update existing content for the website. Wikipedia has certain rules for the participants, but they are limited to allow free and open contribution. (Olson & Rosacker, 2013.)

Crowdsourcing itself isn't usually open source. Open source production involves allowing access to the essential elements of a product (like the source code of a software) to anyone to collaboratively improve an existing product, with the continued transparency and free distribution of the product through various stages of open development. These "requirements" act as the backbone of open source development. Whereas in CS, there is often a participation reward, there usually isn't one present in the context of open source, besides potential, intangible rewards like self-improvement, personal reputation or other motivation to participate. Also, in the context of CS, the project initiator is the product owner in the end, and the results of CS carry monetary value, which is usually not a value sought after in open source development. (Brabham, 2008.)

Another interesting example case is the case of GoldCorp. The gold-producing company made its geographical databases available to the public in attempt to find more gold to mine and produce. The solvers of the task would be awarded a monetary prize for their efforts. The results were impressive, cutting the costs and increasing the amount of gold production of GoldCorp, and the value of the company was raised from 100 million dollars to 9 billion dollars. (Blohm et al., 2013.)

According to Howe (2008), four fundamental developments have led to the phenomenon of CS within the environment of the Internet: A renaissance in amateurism, the emergence of OSS as a movement, greater availability of tools to produce content and the rise of vibrant online communities. The vibrant online communities in this context refer to a phenomenon, known as Web 2.0. The term refers to the use of the Internet for collaborative efforts with a common purpose. (Olson & Rosacker, 2013.)

The rise of Web 2.0 brought forth a massive interest in user-generated content, which was one of the main contributors to the phenomenon of CS. Other factors which are related to the modern concept of the Internet, which helped with the growth of CS, are increased speed, global reach, anonymity, increased interactivity and capabilities for collaboration, asynchronous capabilities and the ability to carry media from other modes of communication. (Pedersen et al; 2013.)

Since the rise of Web 2.0 only took place not long ago, open source software (OSS) development is a rather new phenomenon, risen from the idea that software should be free and open, instead of being sold or licensed as

precompiled binary code. OSS refers to software, which is usually free to download and has access to the software's source code. This means that the software users can voluntarily fix bugs in the code and make modifications to it. The developers of OSS are usually a community of voluntary participants. One of the best examples of OSS is the Linux kernel and various distributions and versions of Linux-based operating systems. Mozilla Firefox and the Apache server software are also very important and popular OSS, used globally. Almost anyone with access to the Internet, necessary tools and devices can partake in OSS development. The participants aren't usually compensated with concrete rewards, but there are many ways that OSS development can be commercially successful as well. Many companies and organizations are adopting and utilizing open source as a new form of organization form. (Xu, Jones & Shao, 2009.)

The reason to participate in OSS development is often a factor such as reputation building, fun or learning a new skill. The efforts and involvement of individual volunteers is vital to the development of OSS because there often isn't an appointed administrator to formally manage the development. Considering this, one of the key elements to successful OSS development is proper involvement of the crowd. A project, job or product needs to contain importance and relevance to involve volunteers. An OSS initiative is usually started by a functional prototype of the software to be developed, provided by an individual or a group. The prototype might be adopted as it is, or it also could be co-operatively developed further. The roles are as such:

- The project leaders, who are in charge and control the software versions.
- Core developers, who develop and maintain the software
- Peripheral developers, who reports bugs, suggest new features and sometimes program as well

In addition to these main roles, there are various passive end users, who utilize the software without any further contribution, playing an important part in assessing the popularity of the software. The development usually happens rapidly, run mostly by the core developers. The project leaders review the code patches made by the core developers. The source code gets tested by the peripheral members their contributions are reviewed by the leaders and core members. (Xu et al, 2009.)

Xu et al. (2009) found out that involvement is one of the key factors in OSS development. Involvement directly affects performance of voluntary developers in a positive way. In the context of OSS development, involvement is different from mere participation. Involvement is about how and what individuals believe and feel about objects. The voluntary developers' involvement is defined as a belief that the open source project he or she is participating in, is important and personally relevant. The involvement of volunteers is a critical to the contribution of knowledge to the project. Community factors and individual motivations explain 70% of the total variance in a developer's involvement. The most important motivational factors of volunteers are the personal needs for the software, the developer's expectations of gaining skills and reputation, and one's

enjoyment of open source coding. The community environment drives the project members and the quality of the open source project forward. The project leader's enthusiasm also positively affects the involvement of project members, along with interpersonal relationships of the participants and sharing of a common ideology. (Xu et al, 2009.)

SaaS, or Software-as-a-Service refers to a domain-specific cloud software ecosystem that encompasses many customizable applications to meet the demands of customer communities. When building a SaaS ecosystem, the largest challenge is supporting and enabling fast software innovation and simultaneously supporting end-user level customization of the software. TopCoder is a crowdsourcing platform, which is often utilized by many companies and other organizations to run programming contests for the crowd in order complete their various software development tasks. For the best solutions, the coders are provided with rewards and the company gets the necessary tasks completed without the need of in-house workforce. The CS platform TopCoder has over 600000 registered users from over 200 countries, and almost 50000 developers who partake in SaaS development. The development tasks include requirement analysis, algorithm design, coding, and testing SaaS software. When utilizing crowdsourcing in open source SaaS development, the move from traditional software factory or distributed development teams, to a decentralized, peer production-based ecosystems, needs to be made. (Xu, Wu, Wang & Wu, 2015.)

A SaaS ecosystem is a networked community of organizations, sharing a common interest for a specific domain for online services. An example of a market-driven SaaS ecosystem is Salesforce, which introduced SaaS-oriented application stores to incorporate third-party SaaS applications to extend the functionalities of their platforms. SaaS related development tasks include specification, design, coding and testing, and all of these tasks can be crowdsourced to the SaaS ecosystem communities. As the development environment is unified, it is easy and fast for crowdtesters to verify the correctness of community-contributed SaaS applications. (Xu et al., 2015.)

2.8 Crowdsourcing platforms

When utilizing crowdsourcing, a platform is needed to engage the crowd and connect the crowd to the CS project initiator. There exist businesses who create their own platforms for their tasks, and there also exist businesses and organizations for merely providing a platform for other users and businesses to interact and operate tasks. Prominent examples of crowdsourcing implementations include Wikipedia, Kickstarter, iStockPhoto and eBay (Howe, 2006), Steam and Threadless (Namousi & Svenningsson Kohl, 2016), innocentive.com, ninesigma.com (Muhdi et al., 2011), Zooppa (Kohler, 2015), Ideastorm.com (Hammon & Hippner, 2012) and Mozilla Firefox (Brabham, 2008).

Many businesses have implemented CS into their own business models. The value creation process is changing from linear to networked, from

centralized to decentralized, from closed to open, and from top-down to bottom-up. Businesses are increasingly opening their processes and actions to the public, even transforming industries. The goal of any CS platform is to engage a motivated crowd with a willingness and capability to engage in the creation of value. Successful business models that utilize CS are usually difficult to replicate. (Kohler, 2015.)

Crowdsourcing-based business model are becoming increasingly popular. There are three elements which create a CS-based business model. Certain in-house processes and resources need to be shared for the public to see and analyse to create a possibility to utilize CS. This is called an open business model, which allows a product to be potentially transformed into an interactive, decentralized platform. The company gets access to greater set of resources and can share ideas and resources. Technology must be leveraged to exploit social networks. The companies, acting as platform leaders, need to transfer value-creating activities to the crowd, to enable the co-creation of value. (Kohler, 2015.)

Blohm, Zogaj, Bretschneider & Leimeister (2018) classify CS platforms into four distinct types: microtasking, information pooling, broadcast search and open collaboration. Microtasking describes CS platforms that produce pre-determined, qualitatively identical, and homogenous crowd contribution that result from simple and usually repetitive tasks, such as categorization of data and writing and translating text. Examples of microtasking platforms include Amazon's Mechanical Turk and Galaxy Zoo. Information pooling CS platforms focus on distributed information in the form of votes, assessments, opinions, forecasts etc. The information is aggregated by averaging and visualization of information. Information pooling is especially helpful in the contexts of evaluation and selection of alternatives, eliciting and validating customer needs, market research etc. An example of information pooling is Google Maps, as the users can receive real-time information of traffic. The goal of broadcast search platforms is to collect contributions to solve tasks, insights, and solutions from outside of the organization. The crowd submissions are often heterogenous, so this type of CS platform is particularly useful for solving challenging tasks, like technical, analytical, and scientific problems. One of the examples of a broadcast search CS platform is Applause, which distributes software for certain crowd members, who will test the software and send a detailed report to the developer(s). In the fourth type of CS platform, open collaboration, individuals join the platform to form a crowd to collaboratively solve a complex CS problem. The crowd members are often heterogenous, which is necessary, since many kinds of knowledge and skills are required from the participants. Open collaboration is usually utilized for open source software development and open ideation. Wikipedia is probably the most known open collaboration example. The four types of CS platforms can be found in Figure 4. (Blohm et al., 2018.)

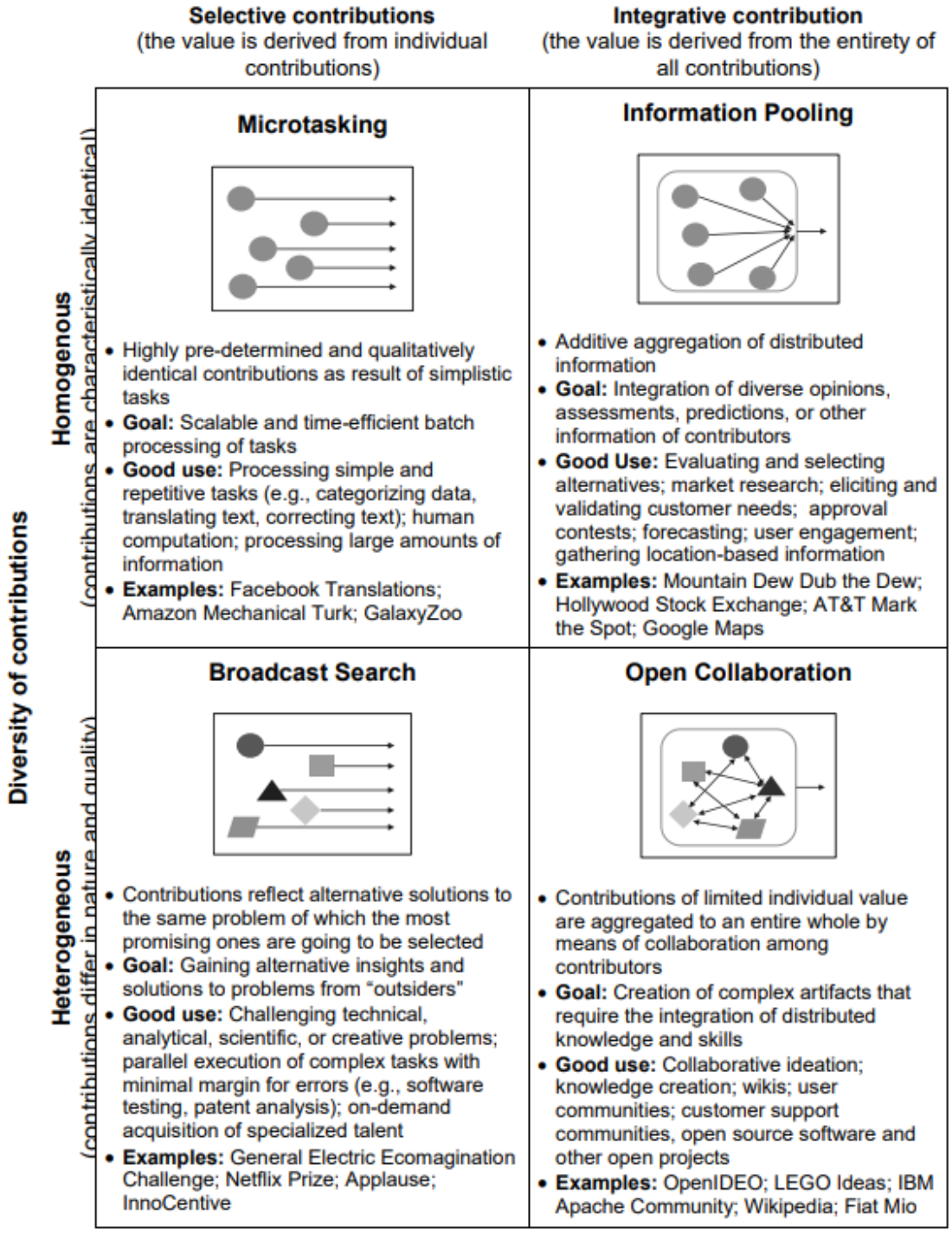

Figure 4. Four Types of Crowdsourcing Platforms. (Blohm, Zogaj, Bretschneider & Leimeister, 2018.)

There are plenty of ways of crowdsourcing different kinds of tasks. The forms, categories and types of CS can be utilized to classify CS platforms. CS tasks are often micro tasks or macro tasks. Micro tasks are more parallelizable, and they can be divided further into smaller tasks. Micro tasks are usually hard to complete by computers but easy to complete by humans. Macro tasks, on the other

hand, are difficult to divide into smaller tasks. In addition to micro tasks and macro tasks, there are challenges, volunteer campaigns and contests, which can't be classified into the categories of micro tasks or macro tasks. (Niu, Qin, Vines, Wong & Lu, 2019.) Niu et al. (2019) propose a general crowdsourcing framework to represent the CS process, regardless of the form of CS, presented in Figure 5.

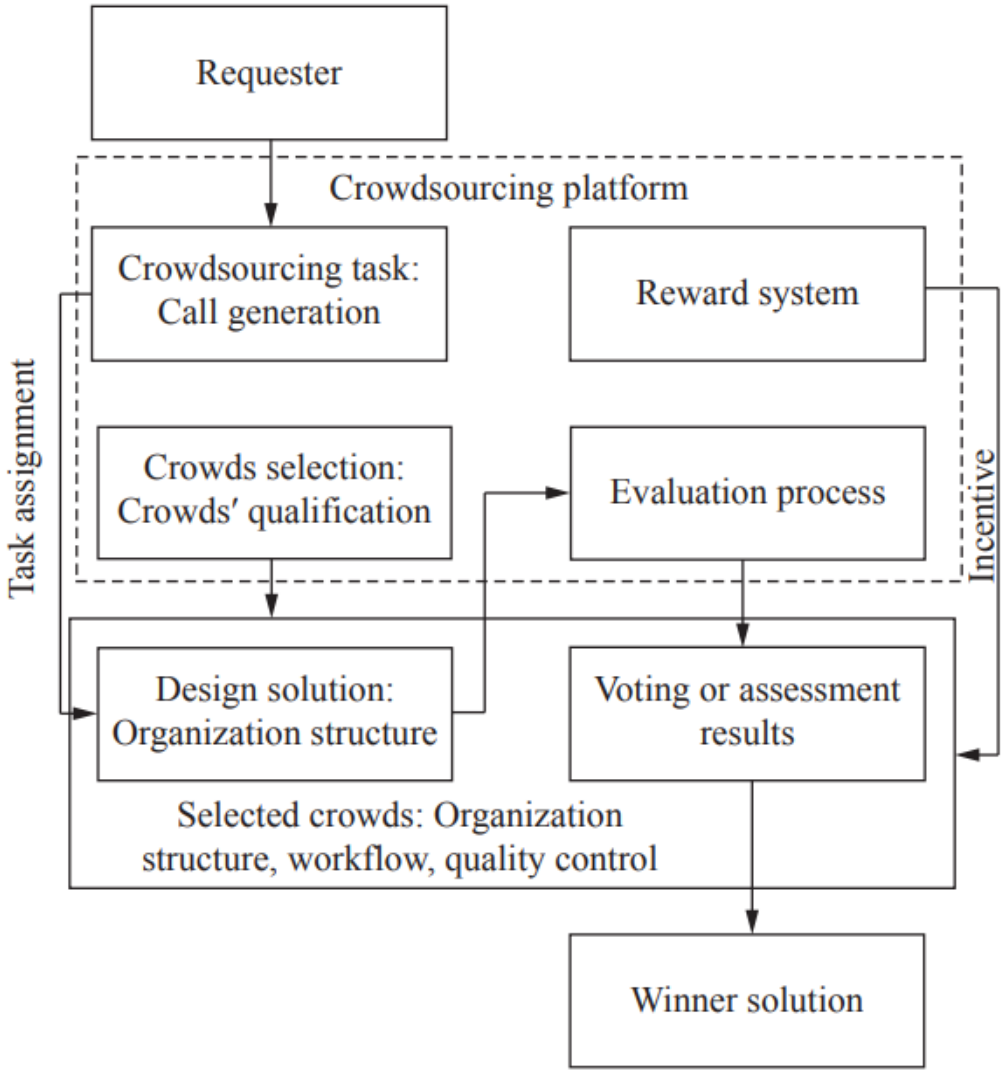

Figure 5. Crowdsourcing framework. (Niu, Qin, Vines, Wong & Lu, 2019).

When it comes to simpler tasks, the task is usually completed by an individual crowd. When the tasks are more complex, the crowds might be required to build a conventional team. When the tasks are finished, they are released onto the crowdsourcing platform for evaluation. In this example, the best solution is selected by the crowds, whereas in some other cases, the solutions are assessed by a group of experts. The choosing of the best evaluation depends on the project, task, etc. (Niu et al., 2019.)

2.9 Challenges of crowdsourcing and critical success factors

As there are various benefits for the initiator and the crowd to partake in CS, there are various challenges and risks to consider. These risks include factors such as establishing motivation and trust, managing and filtering responses and controlling the crowd. According to a recent study by Pedersen et al. (2013), difficulties rise when the complexity and size of a CS initiative rise. Rechenberger et al. (2015) identify various success factors for CS initiatives, such as willingness to share ideas, brand-strength, market maturity, specifity of the task, quality of management, verifiability, duration, transparency, expenses, security, access to knowledge, variety, trust, number of participants, diversity of the crowd and know-how.

Xu et al. (2009) promote the effect of motivation and involvement regarding open-source community-based software development. The contributions of the core developers are vital to ensure the success of a software development project. The individual motivations and community factors explain a major part in the developer's involvement. The need for the software had a significant effect on the volunteer involvement in the project, more so than enhancement of personal reputation or enjoyment. The project members are influenced by the community environment. The quality of the project's community is important regarding the involvement of project members. The outcome of the project is dependent of the attraction and retainment of volunteers with strong motivation. Strong motivation is enabled by not only personal motivation of the volunteers, but also by controlling the volunteers by sufficient involvement, building interpersonal relationships, exploiting a community ideology and effective leadership. (Xu et al., 2009.)

Agafonovas & Alonderiené (2013) present five different success factors (seen in Figure 6) for CS, referring to the study by Sharma (2010). According to the success factor model, the single most critical success factor is the motivation of the crowd. Motivation can be built upon five factors:

- Vision and strategy of the company, initiative, product, or service.
- Human capital referring to the skills and abilities of the involved people
- Infrastructure of the platform
- Linkages and trust referring to the liability, ethics, and respect of the initiator
- External environment or other factors, low influence

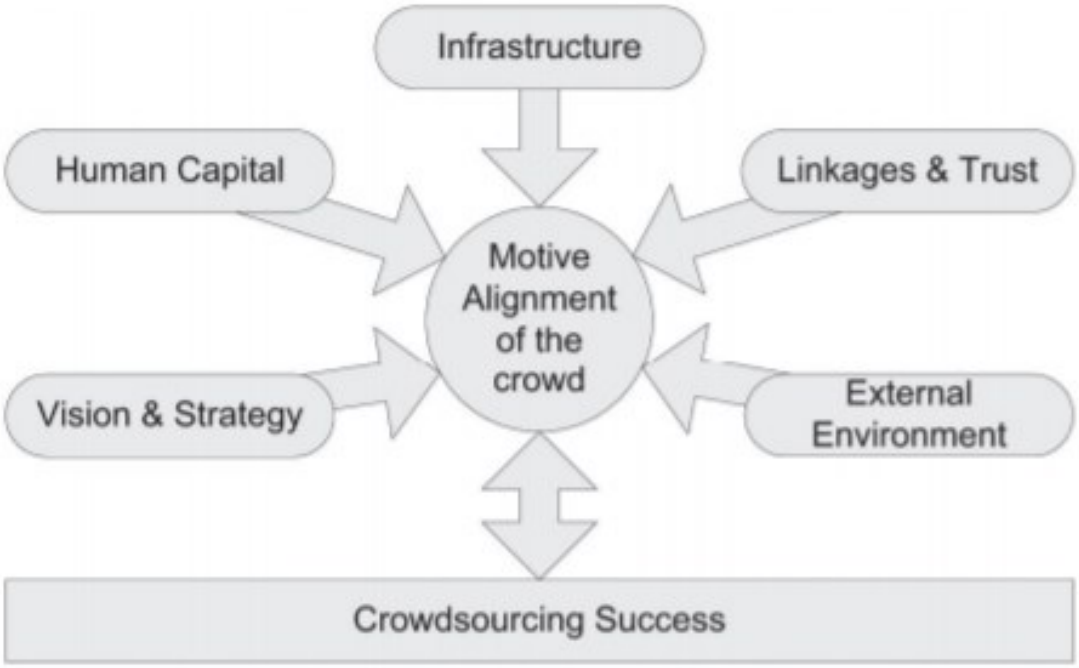

Figure 6. Critical factors for crowdsourcing success (Agafonovas & Alonderiené, 2013).

2.10 Crowdsourcing of video games

One of the logical concrete uses of crowdsourcing is video games. As video games are usually created in the sense of generating revenue and profit for the development company, it is useful and often necessary to engage the target audience in order to create a game suited for the task to save in development costs and make a game as suited as possible for the purpose.

2.10.1 Artificial intelligence

Artificial intelligence has been in video games throughout the history of video games. Artificial intelligence (AI) in this context describes how non-playable entities function within video games. It is mandatory to exist for various types of games when it comes to enemies and allies in video games. Primitive types of AI can be found in even quite old games for controlling the non-playable characters (NPCs). AI in video games is still often very simple and unsophisticated, and it feels often scripted and predictable, instead of a natural behaviour of a human. AI technology in video games has been stagnant over the last decade. This is a problem since the players need to interact with AI-based NPCs quite often. The AI's behaviour is caused by the need to imagine the characters first and then program their behaviour into the game's source code. (Baraniuk, 2014.)

A company called GiantOtter focuses on developing realistic AI for in-game non-playable characters, enemies, and allies, using data from

crowdsourced human interactions, collected from their series of online mini fantasy games. This would lessen the need for scripted interactions and create a vast database for AI bots to utilize to create a more realistic, natural experience for players. The focus is especially on group dynamics. The players interact with each other online, and their conversations are recorded by a speech recognition software. The researchers of the company can label the pieces of conversation with keywords to be utilized by the AI in similar situations in the game. The aim is to create an AI which can enable NPCs to have conversations with each other and behave in a natural and unique way. (Baraniuk, 2014.)

2.10.2 Unreal Tournament

The Unreal Tournament series is a PC game series. In 2014, they announced their plan to heavily utilize CS in the development of their new Unreal Tournament game to be released on PC, Mac, and Linux. The Unreal Tournament community would drive the design of the free game, and the source code would be publicly posted throughout the development process. The developer, Epic Games, would deploy a small team of Unreal Tournament veterans to spearhead the development, but things such as design decisions and art direction would happen collaboratively between Epic, Unreal Tournament fans and the developers of the game engine. The project would be free-for-all in the sense that anyone interested is welcome to participate. In terms of monetization, there will be a digital market for developers, modders, artists and gamers to give away, buy and sell mods and content. Out of that revenue, Epic will take a cut for themselves. The open development structure also helps promote their other products, such as their game engine, Unreal Engine 4, which one can subscribe to, for a monthly fee, in order to access its source code. The Unreal Engine 4 is also being licensed to developers for a 5% royalty fee on gross revenue generated by games utilizing Unreal Engine 4. (Orland, 2014.)

2.10.3 Digital distribution channels

Digital distribution of games has been a ground-breaking technology in the global video game market. Digital distribution refers to the sale and distribution of video games directly from the publisher to the consumer on a digital marketplace. The publisher provides a server with a front-end software for browsing through games available to be purchased or downloaded free of charge. The same software can be used for updating the games the player owns. These distribution channels usually have an internal token system for purchasing games. In this way, real-life currency can be used to purchase a product, or it can also be turned into tokens to use later for purchases. The business advantages of utilizing digital distribution channels include an easier reach of international and remote markets, lowered costs of sales, lack of a need for an inventory, more game sales through smaller second-hand game sales and the elimination of video game piracy. An important factor is also the game developers and publishers gaining

direct access to their customers, allowing them to tap into the power of the crowd. Sharing ideas, sending and receiving feedback, and optimizing the products and services is much easier and faster this way. Customers often voluntarily form online communities and fanbases around games, game universes and franchises, regardless of their geographic locations. Digital distribution is able to make market entries easier for new developers, making new innovations more possible than ever before. (Hight & Novak, 2008.) Great examples of digital game distribution channels are Steam by Valve Software, Android's Play Store and EA's Origin.

Electronic Arts (EA) has also encouraged people to crowdfund their independent games, providing limited free of charge distribution of their games on their digital game distribution portal, Origin. To be eligible for free distribution, a game needs to be crowdfunded, ready to publish and downloadable for the PC platform. If these terms are met, EA will provide 90 days of free distribution, providing reach for over 12 million users of Origin. (Electronic Arts, 2012.)

2.10.4 Steam by Valve Software

One of the greatest examples of video game-related CS is Steam, a digital video game distribution platform, created by Valve Software in 2003 (Valve Corporation, 2020). Steam provides almost 30,000 game titles from massive AAA-titles to small indie games. Steam has a community of over 100 million people who play games, modifications and other content downloaded from Steam. Steam also provides various tools and services for developers and publishers for launching new games and content. Steam has a built-in chat system for communication, game centres and forums for discussion, content centres and workshops with updates and tools to create new content, an "early access" platform for upcoming games and livestreaming tools. Steam is available in 28 languages, and the Steam marketplace supports over 100 types of payment. Steam also provides support for external controllers to use in games and encourages developers to provide support for their new games, too. (Valve Corporation, 2020.)

Steam has evolved into a platform for thousands of creators and publishers to deliver content and establish direct relationships with their customers, enabling millions of players to share entertainment and ideas. At the time of research (24.4.2020), there were over 22 million players online and over six million players in-game on Steam. Valve is one of the largest video game companies in the world, providing various vastly popular games, such as Counter-Strike: Global Offensive, Team Fortress 2 and Dota 2, for millions of players around the world. Valve has also co-developed the Vive VR headset with HTC. In addition to software, Valve has also released hardware like the Steam Controller, the Steam Machine lineup and the Steam Link to improve the PC gaming experience. In software development, customers are heavily involved in the development and manufacturing processes of Steam hardware products, engaging in playtests and testing prototypes. (Valve Corporation, 2020.)

Two of the clearest examples of Steam's crowdsourcing side are Steam Greenlight and Steam Workshop. Steam Greenlight is a platform for independent and/or smaller developers to release their own games and test the market at the same time. Team Fortress 2, a very successful first-person shooter video game title, is one of the prime examples of utilizing Steam Workshop, as free content has been added into the game by not only the official game developers, but outsourced developers, as well. In the case of Steam Greenlight, the creators even receive a monetary reward for their contributions.

The Steam Workshop, created in 2011 (Valve Corporation, 2015), is a centre for user-created content, in which people can publish, arrange and download that content into their games. There are various ways to utilize Steam Workshop, depending on the game. For example, people can directly create new items and/or give ideas to create certain in-game items into the game itself. Another way is to publish mods and items into the Workshop for people to view and download. Steam Workshop has certain limitations on items, meaning that anything isn't publishable or otherwise allowed. The Steam Workshop used to be limited to strictly Valve games, but non-Valve games were added later. (Valve Corporation, 2020.)

There are also significant possibilities for people to make money via content creation on Steam. Acting as an example of value co-creation, people voluntarily make content to be utilized in popular Steam games, generating value and revenue for the game developer, and for their efforts, they are rewarded monetarily by Valve. According to a Valve publication from 2015, content creators had earned over 57 million dollars for the creation of in-game items and other content in Valve games Team Fortress 2, Dota 2 and Counter-Strike: Global Offensive. The money has been given out to over 1500 contributors and content creators across 75 countries. Valve also provides the creators with revenue tools to review their earnings via a web portal, in which they can see where the revenue is coming from. Content creators can keep producing high quality content for various games and the players can enjoy their creations to customize and enhance their gameplay experience, in addition to directly supporting the game developers and content creators. (Valve Corporation, 2015.) In the year 2014, over 100 games on Steam were utilizing the Steam Workshop, with over 700 million unique downloads. Over 1,1 million maps, in-game items and mods had been posted into the Steam Workshop. Over 12 million gamers had played a modified game or a custom map downloaded from the Steam Workshop. They also had downloaded 57 items each (on average) from the Steam Workshop. The downloaded content includes custom maps, weapons, game rules, full conversions, and other modifications. (Valve Corporation, 2014.) In August 2020, searching the Steam Workshop provided 171 pages of games with a total 1365 results (games) utilizing the Steam Workshop.

2.10.5 Blizzard Entertainment

Blizzard Entertainment is one of the most renowned game studios in the world, known mostly for their Warcraft and Starcraft fantasy game universes, spanning various games. Blizzard is known for their massive community and utilization of co-creation in the development of their games and universes. The game universes expand over various video games, tabletop games, movies, collectibles etc.
World of Warcraft is one of Blizzard's most popular video games, created in 2004 after five years of development. World of Warcraft is a massively multiplayer online role-playing game (MMORPG), that held 62% of the global MMORPG market with over 11 million players worldwide in 2008. Blizzard utilizes a model of innovation, based on opportunities created by sharing knowledge online. During the development process of WoW, over half a million players took part in the pre-release of the game and were able to share and give out their opinions and experiences on the game. Players often do not merely enjoy and play Blizzard's games, but participate in the virtual community, by having conversations on the forums, creating fan art, videos, and customization tools for the game. During the launch of the game, Blizzard released an API toolkit for players to customize and develop new add-ons and applications for the game. This is called utilizing peer production. These add-ons enhance the gameplay, for example, by providing more relevant information during fights. These add-ons are especially valuable for the players because the add-ons cater to their individual needs. Blizzard arranges open and closed beta testing phases before launches of their games nearly always. Blizzard utilizes their community heavily in game development to ensure and maximize the success potential of their games. The beta testing helps the company especially with debugging and balancing related challenges. Game developers can focus more on gameplay experience and development, and save resources, like time and cost spent on interface design, as their fanbase executes interface design on their own, co-creating mutual value. If a customer is not happy on the interface, one can create their own enhancements to their own liking. (Davidovici-Nora, 2009.)

2.10.6 Foldit

An interesting and especially relevant for the year 2020 case of video game CS is Foldit, referring to the global coronavirus pandemic. Foldit is a puzzle game that has been developed by the University of Washington's Center for Game Science and Department of Biochemistry. By playing the game, players are able fold protein structures and to help design and identify proteins that may be able to bind to and neutralize the SARS-SoV-2 spike protein. In a fortunate case, players will be able to make creations that will help top scientists to create an antiviral therapy for COVID-19. In most of the cases of diseases, proteins are a major part of the cure since they are central to the structure of the diseases. This is a great example of the potential of gamification and CS. The most promising solutions will be chosen, manufactured and tested at the Institute for Protein Design in Seattle,

Washington. Foldit doesn't only help fight COVID-19, but also other serious diseases such as HIV/AIDS, cancer and Alzheimer's disease (Fold.it, 2020). Foldit is available to download on Mac OS, Linux, or PC. (Nieva, 2020; Yasinski, 2020.)

2.10.7 Pokémon GO

Pokémon GO is one of the newest games in Nintendo's long-running Pokémon universe. It utilizes augmented reality (AR) and location data on mobile devices, allowing players to go look for Pokémon creatures in their local environment. Pokémon GO was released for the iOS and Android in 2016, and it broke records for launch week downloads for Apple's App Store with over 550 million downloads in its first 80 days of existence. Pokémon GO is a great example of value co-creation. When the players integrate their resources, like time, money and skills while playing Pokémon GO, there are possibilities to co-create various types of value, such as recreational, physical and psychological well-being for the players of the game. (Lintula, Tuunanen, Salo & Kari, 2017.)

2.10.8 Super Mario Maker

Super Mario Maker is one of the newest additions to Nintendo's popular Super Mario universe. It was released for Nintendo's Wii U home console in 2015. A sequel, Super Mario Maker 2 was also released in 2019 for the newest of Nintendo's home consoles, the Nintendo Switch. Both games include the same type of formula; the basis for creation, the sandbox-type platform, the level editor software, tools and assets, are developed by Nintendo, but the content to be played by players is developed mostly by the players. One can create levels with custom scenery, themes, styles, assets, win conditions, structures, audio etc. Even the main campaign of the game is created of crowdsourced content, made by the players. This also means that without crowdsourced content, the game could not be successful. In addition to the novelty factor of playing the game, it is possible to develop game design skills by creating Super Mario levels. (Capati, 2015.)

2.10.9 BioWare

BioWare, the developer of the Mass Effect game series, utilized CS in developing and optimizing their game for their existing fans and potential future customers by issuing a survey. The goal of the survey was to get input from the fans of the game on what the next Mass Effect game should highlight. The survey was released by the producer of the game, Michael Gamble, asking the fans about how familiar they are with the game series and what aspects of the new game they are most looking forward to. Another question was about which RPG (role-playing game) activities are most important for the players. It is likely that the answers of the questionnaire were used for the development of the game. (Phillips, 2014.)

2.10.10 Ubisoft

Another game studio to utilize CS in their game development is Ubisoft. Ubisoft teamed up with a crowdsourced content network, hitRECord, to generate new ideas for the second instalment of their Beyond Good and Evil game series. Any person willing and interested could submit their art and audio onto the hitRECord website. A demo would be created of the collection of the submitted material, and sent to Ubisoft, which would incorporate these ideas and material into the finished game. The crowd members would be rewarded by Ubisoft if their material were used in the finalized product. (Shieber, 2018.)

2.10.11 Minecraft

Minecraft is a Java-based PC and console game that is made of an infinite number of blocks. In the game, the player can do pretty much anything, such as farming, building, mining, engineering, fighting monsters, etc. A player can collect, craft and combine materials to create new objects. As the game is immensely popular, there is a massive community around the game. As the sandbox-type game has unlimited creative potential, there are ways to use the game for the good, outside of just the novelty and fun factor of playing it. One of the examples includes Minecraft and other ICT as an enabler to encourage youth participation in urban design and governance. According to the report, three of the most important changes currently facing the world are urbanization, digitization, and the youth bulge. Citizen participation is important for city governments to consider the needs, interests, and knowledge of different stakeholders. Participation of the community in urban planning can improve outcomes by bringing together people with different information, knowledge, skills, and ideas, promote mutual learning, create a sense of ownership and commitment, and increase support for implementation. (UN-Habitat, 2016.)

In the year 2014, Minecraft was utilized to run a public space crowdsourcing exercise in Mexico City. In the competition, the partaking youth was asked to redesign a city square in the centre of Mexico City. Three themes were to be considered especially: “safety and security”, “sociability and playfulness” and “games for kids”. The youth was accompanied in the project with student volunteers and Minecraft players. The participants were given three hours for the redesign. Over 7000 young people took part in the competition with over 1400 submitted ideas and over 400 completed projects. (UN-Habitat, 2016.)

2.10.12 Communal testing and monitoring of video games

One of the examples of utilizing CS in game development is crowdsourced testing, monitoring and bug fixing of video games in multiple phases of video games’ lifecycles. As humans are different from machines, some errors, misdemeanour, and other similar factors can most likely be solved in an easier way by the means of using the crowd instead of machines.

One of the most renowned examples is Valve's deep learning system, VACnet. As the number of cheaters has risen exponentially over the years, VACnet has played a vital role in catching them (Kotwani, 2020). VACnet is used to catch cheaters in various video games sold on Valve's Steam platform. VACnet works as a stand-alone system but it is also helped by various players of the games VACnet is enabled on. One of Valve's most popular video game titles, Counter-Strike: Global Offensive, has a "game mode" called Overwatch. Overwatch is made for the community to enable the regulation of itself by allowing qualified and experienced community members to review reported players and hand out temporary bans. In this mode, players view demos consisting of multiple game rounds played by potentially suspicious players. There are four distinct major forms of disruption (cheating), referring to third-party game-aiding software, (automatic aiming), griefing (bad behaviour towards teammates, quitting the game prematurely, giving information about the location of teammates etc.), wallhacking (the player is able to see other players through the textures of the game maps) and scripts (the player is able to move their character more quickly than intended, by creating a script, allowing jumping in a certain manner). The viewers select a proper verdict based on the play footage, "Insufficient Evidence" or "Evident Beyond a Reasonable Doubt". If many viewers agree on the verdict, the consequences will be implemented. The community members viewing the footage have a hidden reputation system, meaning that some opinions and views weigh more than those of others. This reputation starts automatically from a low score, building up when the viewers get more cases and experience on Overwatch. This reduces the possibility of misusing the system. The viewers receive experience points in-game as a prize for participating in Overwatch. (Counter-Strike: Global Offensive Blog, 2020.)

VACnet not only notices blatant cheaters by certain algorithms and learns specific patterns related to cheating software and certain dependencies, but also rates players into classes known as Trust Factors. Trust Factors do not stop cheaters, but classifies suspicious players into "bad sectors", meaning that they most likely end up playing against other (potential) cheaters, therefore overall aiding legit players. The decisions of players from the Overwatch system act as a pool of information for VACnet. VACnet is designed to prevent the usage of the most evident cheats in the game, like the aimbot (referring to automatic aiming), but some cheats are left without much focus on them, because they are harder to detect with certainty. (Kotwani, 2020.)

Another Valve example is DotA 2, which has an automatic system for making abusive players unable to communicate with other players in-game. This has resulted in a major decrease of toxic communication, but it is not perfect, because abusive communication still occurs occasionally. Also, there is a presence of misuse of the system in the game, making innocent players suffer from being unable to communicate for no reason, which affects the game and its community in a negative way. (Blackburn & Kwak, 2014.)

One of the world's most popular games, League of Legends (LoL) by Riot Games, has a similar feature to the previous examples, called The Tribunal,

introduced in 2011. It uses the crowd, in this context, the players, to judge guilt and/or innocence of players accused of being "toxic" in their way of behaviour within the game. The "jury" consists of humans, instead of machines. This way feels just and fair, but it takes a lot of resources, like costs, time and human efforts. There is also a possibility that the jury might be biased, corrupt etc. The players being "toxic" can be reported for various reasons, which are assisting the enemy team, intentional feeding (meaning the player being passive and letting the enemy team defeat them on purpose), offensive language, verbal abuse, negative attitude, inappropriate character names, spamming, unskilled player, refusing to communicate with the team, and leaving the game or being away from the keyboard. After the players doing these misdemeanours, the Tribunal is called upon to judge the reported players by crowdsourcing the players of the jury. The judgement is determined by votes, and the majority of the votes "wins". The players are attracted to participate in the Tribunal by ranking and scoring the participating players as an element of gamification. (Blackburn & Kwak, 2014.)

Software testing is becoming increasingly complex due to the development and generalisation of modern technologies and other phenomena, such as smartphones, tablets, wearables, the Internet of Things (IoT) and new IT-enabled business models. Traditional, manual testing is becoming less applicable. Companies have realized it is possible to engage and profit from crowdsourced testing of software. Crowdtesting refers to "a dynamic testing scenario in which a crowd is concerned mostly with output from given specific inputs because they don't know or see the source code". There are three forms of crowdtesting that can be initiated: engaging a company's employees, engage an external crowd of Internet users and engaging a company's customers. Crowdtesting usually involves verification testing (eliminating software defects) and validation testing (user-executed testing to determine whether a system meets the user's needs). There are other types of crowdtesting as well, such as usability testing. Especially if there is a scarcity of resources or time pressure regarding software testing, using an external crowd can overcome the capacity limits of testing departments. If crowdtesting is executed by in-house employees, there are possibilities to increase acceptance of the new software. When crowdtesting with a company's customers, a new customer interaction channel is formed, and the customers can be involved in user-centred design. Crowdtesting can provide various benefits, such as better quality of the software. (Leicht, Blohm & Leimeister, 2017.)

2.10.13 Modding

The term "modding", taken from "modifying", refers to changing a game, usually through programming, using software tools that aren't a part of the game. Modding can be fixing bugs, modifying in-game content, or adding new in-game content. Modding is predominantly done by players and fans of games, instead of game studios. Modifying can be done independently or communally. Many popular standalone titles, like the Counter-Strike games, have their roots in modding. Other examples of modding-friendly games include titles like Unreal

Tournament, the Civilization series, the Grand Theft Auto series and the Half-Life series. Game studios often help these players by providing tools and discussion platforms for modders of their games. There are still various studios, for example, Blizzard Entertainment, who are extremely protective of their intellectual property, and dislike the idea of fans modding their games. Modding communities usually have a culture of sharing, whereas many game studios want total control and ownership of their IP. (Poor, 2013.)

It was found that most modders participate in modding mostly because of their ability to make the game better for themselves and the community around the game, not particularly for the game studio who originally made the game being modded. Most modders feel a sense of community with fellow modders, at least in the case of modding only one game or series of games. Modding gives the modders often also a sense of fun (novelty, enjoyment), control over the game, personal learning of skills, and pride, which shows that their participation motivations are often both internally and externally focused. (Poor, 2013.)

2.11 Motivational factors of crowdsourcing

To maximize the number of contributors and the quality of the contributions of the crowd, the motivations of the crowd and the CS organization are important to understand to maximize the potential for success of the CS project. Usually, motivational factors are divided into two categories: intrinsic and extrinsic motivation. Intrinsic motivation refers to the motivation which is generated when a person is rewarded to participate in the activity itself, like the act of playing a video game. A concrete reward is not always necessary, as the activity itself is often the reward. In opposite to intrinsic, extrinsic motivation rises from not the process, but the reward in the end of a process, a direct pleasure. This includes activities such as studying, or training in a sport to win a major prize. Intrinsic motivations might even be undermined by extrinsic motivations, such as in the case of someone enjoying the process of studying but looking forward to graduation and getting into the work life. Also, a third category of motivational factors has been identified, called social motivations. Social motivations are positioned between intrinsic and extrinsic motivations: social motives affecting motives and motivations of people. (Namousi & Svenningsson Kohl, 2016.)

2.11.1 Intrinsic motivations

As motivations are abstract and complex, they can be categorized into many types. Intrinsic motivation can be divided into three separate subcategories, including hedonism, learning, and ideology-related motivations. Hedonism refers to pleasure, curiosity, enjoyment, or intellectual stimulation. These are internal feelings that have a way of driving an individual forward. Learning refers to

people's motivations to learn new things and partake in activities, where their abilities can be improved. CS is a great example of this, since merely the prize for participating in CS is not likely to be the main motivational tool. Creation of new knowledge in interaction between each other is also possible via CS activities. Also, ideology is a major part of partaking in crowdsourcing, especially when it comes to the communities related to open source development. Ideology is considered a major driver for many partakers, since often it is not even necessary to provide a promise of some sort of a participation prize for participants, because the ideology is enough to make certain people partake in various projects. Participation in such activities might improve people's senses of self-esteem and efficacy. (Namousi & Svenningsson Kohl, 2016.)

2.11.2 Extrinsic motivations

Extrinsic motivation can be roughly divided into two categories, including individual and economic motivations. Individual motivations arise to gain personal benefits for personal contributions to the community in the case. Personal benefits to gain include things such as reputation via good efforts and competition and career opportunities via participation and interactions between participants and employees of the initiator(s). The reputation of the initiator affects people's participation motivations. People search to gain reputation among the company and market their personal capabilities. For many, this is more important than peer reputation. Freelancing opportunities may also arise via participating in CS activities, turning people's hobbies into jobs. The last motivator identified is user need and having a possibility to influence the product or service that is being developed. Users are often involved in design and development of commercially successful products and services. The main reason for users to be involved in crowdsourcing is customization of the product or service for their own purposes. (Namousi & Svenningsson Kohl, 2016.)

In addition to individual motivational factors, there also exist economic extrinsic motivations. Often, rewards and prizes are given to the winners and/or partakers in crowdsourcing projects. This is most likely often the most common motivator. The rewards might include money, prizes, gifts, free services, discounts etc. Financial rewards have been proven to have a major influence of people's motivations to partake in crowdsourcing, but some studies have found mixed results. (Namousi & Svenningsson Kohl, 2016.)

A third category has been identified by Antikainen & Väätäjä (2010), called social motivation. Usually in online communities, people tend to share common interests and beliefs, implying that to have a sustainable community, it is important to consider social motivations to improve collaborative actions. One of the social motivations is called altruism, meaning that rewards are not always necessary to make people collaborate. The care for community is also a suggested factor, suggesting that people take from and give out to the community as an obligational action. Some people also expect payback for their services and contributions, referred to as reciprocity. Also, when there is a community with

shared interests, seeking friendships and other relationships might be a motivational factor, even a stronger factor than recreation and social support. One of the more controversial factors is an addiction to a community as a motivator of participation, extending the 'care for community' factor. All 25 identified motivational factors are presented in Table 1 below. (Namousi & Svenningsson Kohl, 2016.)

In conclusion, there are as many reasons for partaking in crowdsourcing as one may imagine. Everyone partaking might have different reasoning behind their participatory wishes but there usually are one or more reasons occurring more often, dependent on context.

Intrinsic	Hedonism	Enjoyment
		Intellectual stimulation
		Entrepreneurship opportunity
		Creative energy outlet
		Exercising amateur skills
	Learning	Knowledge creation
		Knowledge exchange
		Creative skills improvement
	Ideology	Self-esteem
		Sense of efficacy
Extrinsic	Individual	Reputation
		Competition
		Firm recognition
		Career opportunities
		Freelance opportunities
		Self-marketing
		User need
	Economic	Tangible rewards
		Implicit promise of rewards
Social		Altruism

		Care for community
		Reciprocity
		Friendship
		Peer recognition
		Addiction

Table 1. A list of the 25 identified motivational factors behind contribution to crowdsourcing projects. (Namousi & Svenningsson Kohl, 2016.)

2.11.3 Gamification of crowdsourcing

Recently, there have been major developments in the area of incentive design in information systems. One of them is called gamification, which refers to a design that attempts to increase users' intrinsic motivations to engage in certain activities and to increase or change the behaviour of users. Gamification applications often borrow design patterns from video games, trying to raise feelings usually related to playing video games, such as autonomy, mastery, achievement etc. In the context of CS, gamification can be seen as an effort to transform the participators' motivations from rational gain-seeking into self-purposeful, intrinsically motivated activities. Concrete examples of gamification elements include things such as leaderboards, points, badges, avatars, and stories. These elements also add competitive elements into the CS processes. The utilization of gamification in CS has been empirically found to be successful. The inclusion of gamification elements has provided various positive effects in crowdsourcing work, such as increasing of long-term engagement and output quality along other positive effects. (Morschheuser, Hamari & Koivisto, 2016.)

3 VIDEO GAME DEVELOPMENT

3.1 Video game design process

According to Adams (2014), video game design is the process of imagining a game, defining the way it works, describing the elements that make up the game (conceptual, functional, artistic, and others), transmitting information about the game to the team who will build it and refining and tuning the game during development and testing. CS is a valuable tool to utilize in game development since it can be utilized in every phase of the game development and design processes. As for most games, it is intended that the game would become a success commercially. A player-centric approach is a great technique to reach this. Of course, there are various other factors that affect the commercial success of a game, such as marketing, development experience and expertise and distribution of the game.

Player-centric game design is a design philosophy in which the game designer envisions a representative player of the game the designer wants to create. The game is supposed to primarily entertain that player, what acts as the primary objective of the game. Therefore, the game needs to be created for that intended player, and no one else. This is universally applicable, whatever type of game is to be developed. (Adams, 2014.) In this sense, when the game is at least partially developed utilizing CS, it might cause both pros and cons for development.

3.1.1 Stages of design

The game design process consists of various stages. The designing starts at the concept stage. When designing modern, vast games, it is usually impossible to create a complete design before programming the game. Instead, developing and designing games is generally an iterative process with modifications, testing and tuning throughout the development. Adams (2014) states that there is no simple, universal, step-by-step way to designing and developing games. All games are unique and there are various ways a game can come to fruition. Many of the stages of game development can be revisited when necessary, but some stages like the choice of concept, audience and genre should not be altered after the beginning phases.

The major parts of the process are the concept stage, the elaboration stage and the tuning stage. The concept stage is the first stage, and its results do not change. All game designs begin with a concept which is built upon. At this stage, it is defined, how and why the player of the game would be entertained by the game. A target market is chosen, and the game is to be developed for the players of that market. A genre for the game is also chosen to fit the target market. To create supposed immersion into the game, a role for the player must be

determined. This is also the stage that isn't revisited or modified afterwards. The critical and fundamental decisions are made considering the game and altering them could mean a disaster for the success of the whole project. The concept of the game doesn't need to be completely unique, but it's a good practice to playtest several similar games in the same genre. The gameplay and experience are based on these decisions. (Adams, 2014.) When considering CS in game development, usually the concept is predetermined by the initiator and the next stage is where CS can be utilized for a better effect. This is not to say that video game concepts couldn't be crowdsourced in any context, but this would be most likely very difficult because of the heterogeneity of the crowd.

The elaboration stage includes most of the design details and refining the decisions through playtesting and prototyping. In this stage, usually a development team is deployed to create a functional prototype of the game. A prototype is a simplified but testable version of the game. They are made to test the functionality and features of the game before implementing them into the actual game. A prototype is made for testing the game and to find out, whether it is enjoyable or not by the crowd. For different kinds of games, there are three main types of prototypes: software, paper and physical prototypes. There also could be technical demonstrations if there are factors like cutting edge technologies to be embedded into the game. (Adams, 2014.)

In this stage, the concept and the idea are tested in practice on a concrete level. Hopefully, at this stage, funding is found for the full production of the game. When the foundations for the production have been laid, design tasks can be shared among the team and work can be done simultaneously on various areas of responsibility. Important areas to development are factors such as defining the game world and gameplay mode, the protagonists and antagonists, designing the core mechanics, creating levels or maps, writing the game's storyline, building, testing, iterating and creating additional modes. Radical changes are not supposed to be made anymore, and the focus is to reach a complete product. Depending on the game and the studio, there are techniques and methods to be applied for development processes, like Scrum. (Adams, 2014.)

The tuning stage is the stage in which small adjustments can be made for polishing, but no new features are added. It is difficult to determine at which point the elaboration stage ends and the tuning stage begins. The move to the tuning stage is often determined by the schedule of the project. (Adams, 2014.)

3.2 Game studio roles and composition

Game studios, as other businesses, are often very heterogenous and unique in their own sense. The size of a game studio might vary anywhere between one person and tens of thousands of people within the organization. To understand how the game studio works and which persons to interview for this study, it is vital to understand to understand the roles and the composition of studios and their development teams. The roles of development teams are not always

standardized because of the heterogeneity, limitations and possibilities of the game studios. Team members are usually handed out tasks according to their interest and abilities, and especially according to the needs of the project in case. Some roles still have become commonplace in most game development projects. (Adams, 2014.) Sometimes game studios also might be supported by outer contributions from persons like specialized contractors (Hight & Novak, 2008). These outer contributions also include CS as a possible factor.

The lead designer is the person who leads the overall design process, makes sure that the required work is being done and is responsible for making sure that the game is coherent and complete with necessary polish and features. The lead designer is also the one who is usually in charge of being the spokesperson for the game and responsible for public relations of the project with the marketing team. There is usually only one lead designer in a development team. A general game designer is usually a game designer with a focus on designing the gameplay. A game designer designs things such as levels, characters, game progression etc. A mechanics designer is the one who designs and documents how the game works as a system. He focuses on factors like the physics engine, combat system, how characters are controlled etc. He also could work as a researcher for background data, like in gathering metrics and data for the context of sports games. (Adams, 2014.)

Another standard role is the level designer or world builder. The other designers create necessary components, such as the user interface, core mechanics and gameplay, for the game and the level designer takes them and uses them to create the individual levels that the player will go through. In 3D games, the level designer also builds 3D models and does programming work. A development team often has many level designers, who report to the lead designer or a leading level designer. Another important piece of the development team is the user interface designer, who designs various layouts of screens in the game, like the game menus, weapon and health interfaces, maps, radars, input devices etc. As all of the roles in game design are important, the interface is very important for the game to be enjoyable, since a bad interface can make an otherwise fine game become suboptimal. (Adams, 2014.)

The writer's responsibility in a game development team is to create the instructional and/or fictional content for the game, such as the cutscenes, the lore, the world and the game universe, back story etc. A writer rarely does technical work on the game because that is the work of game designers, but the writer naturally interacts often with the game designers for consistency's sake. There are four other roles that affect the creative side of the game's design. The art director (or the lead artist) oversees and manages production of in-game visual assets, having a major contribution into the visual look of the game. The audio director conducts audio for the game, such as sound effects, ambience, and music. The lead programmer manages the programming team and often does programming by himself as well. He accounts for the technical design of the game and overall quality of the software. He also works on hardware constraints and requirements with the coding team. The last role is the producer or project manager,

who is responsible for the commercial side of the game, such as public relations, marketing etc. with the goal of trying to get attention from the public to sell the game. The producer might also oversee the continuous development process, making sure that the necessary work is being done smoothly and on schedule. (Adams, 2014.)

3.3 From design to production

Game design is not the same thing as game development or game production. Behind the full project lie many phases, stages and documentation.

3.3.1 Important documents

Creating a game as a process from the beginning to the end needs to be documented properly at all phases. The game design document (GDD) describes all creative aspects of the game and works as the guide for development of the game. It includes a plan and a direction for the whole development team, including designers, artists, software engineers, producers etc. The design of the game is vital for the game to be successful on all pursued areas. More specifically, the GDD includes information and decisions about the story and its outline, the plot points, environments, the script, non-interactive sequences, storyboards and non-linear storytelling, characters and their properties, inventory, features, gameplay mechanics, interfaces etc. (Hight & Novak, 2008.)

The technical design document (TDD) is an important piece of design, development and production. The technical design document is the plan for creating the game code., usually written by the technical director or the lead programmer of the team. It includes all software that needs to be either licensed of written, data to be stored and updated and the tools required for the team to complete the project successfully. The TDD is of secondary priority compared to the GDD, but both are very important pieces of the development and design project. The TDD can't be finalized until the GDD is complete and approved by the team. The TDD includes information and decision about the architecture, coding standards, tools, game engine, risks and contingencies, security aspects, revision control, artificial intelligence (AI), physics, input and output of data, hardware considerations, multiplayer and internet aspects, graphics, sound, localization, research and development (R&D), the technical design review (TDR) and prototyping. (Hight & Novak, 2008.)

The last stage of pre-production of the game is to create a production plan. The production plan acts as a sort of an owner's manual for the project management of the game, acting as a development strategy. It focuses on things such as whether the game can be made successfully in time and according to the previously mentioned game design document (GDD). It has a thorough analysis of the budget, scheduling and the wanted return on investment (ROI). The things

included in a production plan are a staffing plan, project schedule, budget and financial analysis. The production plan is made by the producer. Other important documents are the art style guide and the sound design document. All of these documents are "living" meaning that they should be constantly kept up to date as the project moves forward to be relevant and to reflect the changes. (Hight & Novak, 2008.)

3.3.2 Developer categories

Video game developers can be roughly categorized into separate categories. The first-party developers are usually combinations of hardware manufacturers, publishers and development studios, like Sony-owned Naughty Dog which makes video games for the Playstation console platforms, or Nintendo, who manufactures their own hardware, games for the hardware and licenses their own game franchises. A second-party developers are combinations of developer and publishers. They are not owned by a hardware manufacturer but they might create games exclusively for a single hardware manufacturer. Insomniac Games is a good example of a second-party developer, since they are under contract to make games exclusively for Sony's Playstation platforms, but they are not owned by Sony. Both first- and second party developers usually have close relationships with their publishers. Second-party developers can be often trusted to be given possession of proprietary technology and classified information, since they do not work with competitors. The producer and the developer share the same goals. Third-party developers create games for various platforms and manufacturers. Most independent game studios are third-party developers, as are most of the game studios targeted in this research paper. Some third-party developers, such as Ubisoft, also publish their own games, but some only develop their games and use external publishers to publish their games. Third-party developers need to create trusting relationships with their publishers, since the publisher and the developer might not completely share the same goals, especially if the developer is about to publish their game for multiple platforms, sometimes even using various publishers. (Hight & Novak, 2008.)

3.3.3 Phases of game development

The table below goes through all the common phases of the development of the game from concept to completion. The first column refers to the phase of development. The "Primary / Approver" column refers to the persons responsible for overseeing and approving the tasks. The "Secondary / Contributor" column refers to the persons contributing to the mentioned tasks. In a nutshell, the producer is the one overseeing all the phases of development, as the team management is shared among the directors and leads. Therefore, most managers require great skills to manage people and a good overall view of all the phases of the whole project. (Hight & Novak, 2008.) As one can see, there is an extreme number of tasks and phases in developing and producing a game, and as previously

mentioned, utilizing CS throughout the development project can most likely be very tempting but difficult.

Concept	**Primary / Approver**	**Secondary / Contributor**
High concept, premise, game description, USPs	Design Director	Designers, Writers, Producer
Edit/format proposal, estimated budget and schedule	Producer	Associate Producers
Concept art, storyboards, presentation	Art Director	Artists
Review of concept, interactive mockup	Technical Director	Programmers
Pitch to publisher/management	Design Director, Producer	Art Director
Pre-production	**Primary / Approver**	**Secondary / Contributor**
Game Design	Creative Director	Designers
Technical Design	Technical Director	Programmers
Art Style Guide	Art Director	Artists, Animators
Sound Design	Audio Director	Sound Designers
Production Plan	Producer	Associate Producers
Production	**Primary / Approver**	**Secondary / Contributor**
Naming conventions, asset database	Programming Lead, Art Lead, Design Lead, Sound Lead	Programmers, Artists, Designers, Sound Designers
Engine code, Game code, Tools, Intaller (PC), Security / Encryption, Multiplayer Code	Technical Director, Lead Programmers	Programmers
Concept sketches, 3D models, Textures, Lighting, Scene descriptions, Storyboards	Art Director	Artists
Code/asset revision control and build procedures, Software task schedule	Lead Programmer	Associate Producer, Programmers
Concept sketches, Scene descriptions, Storyboards	Art Director	Concept Artists, Illustrators
3D models	Lead Model Artist	Model Artists
Textures, Bump maps, Normal maps	Lead Texture Artist	Texture Artists

Shaders	Art Director	Lead Artist, Lead Programmer
Lighting	Art Director	Lead Artist
Character and in-game object animation	Lead Animator	Animators
GUI / Menus	Art Director, Design Director	Interface Designer, GUI Artists, GUI Programmer
Character / Enemy / NPC designs, balance	Design Director	Character / Unit Designers
Missions / Levels	Single Player Design Lead, Design Director, Art Director	Level Designers, Artists, Programmers
Multiplayer maps and Multiplayer balance	Multiplayer Design Lead, Design Director	Designers
Voice-over Script	Design Director, Audio Director	Writer, Designers
Music Soundtrack, sound effects	Audio director	Sound Designers, Musicians, Composers
Cinematics	Cinematics Director, Art Director	Model Artists, Animators, Artists, Sound Designers, Video Editors
Schedules, Tracking, Status Reporting, Interdisciplinary Communication, Milestone Preparation, Contracts, Team Management, "Firefighting"	Producer	Associate Producers, Lead Programmer, Lead Designer, Lead Artist, Lead Animator, Audio Director
Post-production (Beta to release)	**Primary / Approver**	**Secondary / Contributor**
Bug fixing	Producer, Lead Programmer	Programmers, Designers, Artists, Sound Designers
Quality Assurance Testing	Q/A Director	Q/A Testers
Gameplay Testing	Producer, Design Director	Gameplay Testers, Associate Producers
Localization	Producer, Audio Director, Lead Programmer	Associate Producers, Sound Designers, Programmers, Artists

Table 2. Activities associated with bringing a game from concept to completion. (Hight & Novak, 2008.)

3.4 Player data and game metrics

It is very common nowadays that game developers receive all kinds of information about the players of the game. This has become a controversial topic, due to information and privacy leaks etc. Metrics remain very important, especially to the developers and designers of games, to optimize their games in terms of quality, playability etc. Metrics also sometimes provide valuable information about factors that make the designers and developers realize better, how to create a long-lasting customer relationship and connection to their games.

Today, collecting player data is considered an integral part of game development, especially when it comes to design and playtesting. Player data can be recorded either actively or passively. Usually, factors like how many times players use a certain weapon, and percentages of time a player spends doing certain activities, are targeted. The collected data is usually collected automatically, as the players play the game, and analysed by game designers and quality assurance professionals. Collection of data remains important also post-launch because the data helps to prevent cheating, monitoring the economy and designing new content. (Normoyle, Drake, Likhachev & Safonova, 2012.)

One of the most basic forms of game metrics is raw telemetry data, which is usually stored in a database format, making it possible to transform the data into a measurable form. Measurable data includes factors such as average completion time of game levels or generated revenue per day. Therefore, it is possible to gain potential advantages by examining and utilizing the data. Metrics are usually like these: Measures based on calculations involving several variables and/or features. Metrics are also usually calculated as a function of something. This data can be used, for example, to support decision making in the context of companies. Metrics are always bound to time, so they may be drastically different when time is changing. As future metrics cannot be measured, it is still possible to create estimations and predictions based on current and previous metrics data, like expected sales, churn rate, number of players etc. (Drachen, 2012.)

3.5 The Finnish video game industry

Finland has a rather long history of game development. Finnish game development had humble, amateurish beginnings before reaching one of the stronger game development markets, especially compared to the size of the population of Finland.

3.5.1 Brief history

Video game development in Finland started in the 70's and the 80's after home computers became common household items and rose in popularity. The first games were developed by single developers, and gaming companies started operations in the late 80's. Companies like Housemarque and Remedy Entertainment were born, created out of development teams, and they exist to this day. In the 90's, most games were still made for home computers, not taking too much of an advantage of the rising home console market. (Neogames Finland ry, 2019.)

In the early 2000's, Finnish PC game titles like Max Payne and Habbo Hotel became very successful. Nokia was at its peak as it released the N-Gage, which was again a shift in the mobile gaming market, but the N-Gage wasn't a success and disappeared quite quickly. Still, the N-Gage was an important aspect in driving the Finnish game development industry further into the mobile gaming market. Overall, the early 2000's was a tough time for the Finnish game industry. From 2004 to 2009, the turnover of the game industry more than doubled from 40 million euros to 87 million euros. The 2010's was a massive step forward after digital distribution of games became the norm, enabled by platforms like Steam, Origin, Apple's App Store and Google's Play Store. This reduced distributive costs, enabling much higher sales margins than previously. One of the most important "early adopters" of these opportunities was Rovio with their Angry Birds franchise, which quickly adopted the free-to-play monetization model, making the game free to play with limitations, but microtransactions could be used to enhance the gameplay. (Neogames Finland ry, 2019.)

During these times, when the amount of Finnish game studios was at its peak (260 studios), another Finnish gaming studio, Supercell, started to develop games using this same model, being one of the first game studios to do this. Their mobile games, Hay Day and Clash of Clans, gained major popularity and remain popular, active and profitable to this day. Supercell made the Finnish gaming industry more interesting for international investors, and there was a major surge upwards between 2012 and 2015, which was the year when the Finnish gaming industry reached a turnover of two billion euros. During this era, while Finnish game studios were mostly focused on mobile markets, renowned Finnish game titles Cities: Skylines, Alan Wake and Quantum Break were released on other platforms as well. (Neogames Finland ry, 2019.)

The year 2017 was also an important year with the listings of various Finnish gaming companies. In the end of 2018, there were 3200 people working in Finland in the gaming industry. In 2018, the number of new Finnish video games was around 100, less than the previous years, which is caused by utilizing the game as a service -model. As launching a brand-new game title is demanding, studios concentrate more on developing their existing games. The most popular gaming platform for Finnish video games is still Android, followed closely by iOS. iOS used to be the most popular platform still in 2016. PC as a platform is steadily rising in popularity to launch games on, and games are being made for

consoles too, but consoles remain way less popular than PC and mobile, along with Facebook, Windows Mobile, VR and AR. (Neogames Finland ry, 2019.)

3.5.2 Challenges of Finnish game studios

Finnish game companies face various challenges in their business. Some of the challenges are universal and some are very specific to Finnish game studios. Publishing is one of these, and because of that most Finnish game studios publish their games by themselves. Investors are also often doubting to invest because they would need to be provided a track record of the team and the people behind the project, a concise demo of the game, or metrics. Developers often develop their games fast and launch their games at an early stage. Player usage data can be utilized to reveal and analyse errors, user experiences and issues. The last decisions about publishing are often made supported by the metrics. The game industry faces a lot of regulatory issues, and things such as consumer protection, the GDPR, the ethics and other properties of "lootboxes" and e-privacy are to be considered throughout the development of the game. The cost of user acquisition is on the rise in the whole of the gaming industry with no simple answers to solve the issue. Steam is still the market leader in distribution of digital games, but other platforms are on the rise in popularity. One of the most important weaknesses in the Finnish gaming industry is the lack of employees, which has made many game studios to hire people from abroad. Coaching and supporting up and coming talents could be one of the answers to this challenge. (Neogames Finland ry, 2019.)

3.5.3 Strengths of Finnish game studios

As there are specific challenges for Finnish game studios, there are various strengths as well. The first strength is the increased business focus in young start-ups. Many new companies in the gaming industry offer work for hire -services, enabling them to stablish sustainable businesses via the means of subcontracting. This is also a great way to educate junior employees. Perhaps related to this phenomenon, Finland has a great indie game scene, which is seen as one of the cornerstones of the Finnish gaming industry. Popular indie games rise from Finnish game studios annually, one of the latest ones being Noita by Nolla Games, which has received universal praise by the players of the game. (Steam Store, 2019). As of 2020, still most Finnish games utilize mostly the PC and mobile platforms, but new platforms, like the Nintendo Switch, have seen Finnish video games developed for them as well. (Neogames Finland ry, 2019.)

Another strength of Finnish game industry is the Finnish video game community. Regional clusters of game studios, along with incubators, found in colleges, universities and business centres are highly appreciated by game companies. Communities of developers provide support for their members and other companies and organizations. The game industry organizations co-operate for the good of the developer community. Finnish game developers also seem to

have a great ambition to pursue new opportunities, technologies, creative content, strong narratives, and innovative game mechanics. As the design of successful games is often driven by metrics and data, space for new kinds of games has emerged in the market. A great example of Finnish innovations, Finnish game developers have often been early adopters and successful in taking advantage of new, emerging markets, platforms, technologies, and business practices. New opportunities are found in such areas as blockchain, cross platform games, cloud gaming, subscription models, HTML5, new consoles and XR technologies. (Neogames Finland ry, 2019.)

3.5.4 The future of the Finnish game industry

Because of the current and rising processing power and other capabilities of smartphones, many video game titles and genres previously exclusive to PC and home consoles have become accessible for mobile devices as well. PC and console game developers are developing games for mobile platforms and on the contrary, mobile game focused companies are heading into the PC and home console markets. The digital game distribution business is expanding constantly, and Steam is gaining a lot of worthy competitors. Cloud gaming is on the rise, but for mobile gaming, the larger distribution of 5G is most likely mandatory of this technology to thrive. The continuing growth of esports is also something to consider looking forward to the future of the Finnish game industry. This is not only applied to PC and console games, but there is also a growing market of mobile esports as well. Various game studios like Rovio and Supercell rely on the free-to-play monetization model. These companies must face and manage the regulatory challenges and new guidelines regarding data and consumer protection soon, especially since the audience of these types of games often consists of minors. (Neogames Finland ry, 2019.)

A related topic to this is the line between gambling and entertainment, which is also constantly examined and analysed by authorities, because social casino games, esports gambling and so-called in-game lootboxes bought with real currency are becoming increasingly larger businesses and issues in the gaming industry. There are also regional factors also to consider, such as China with a massive population of potential players. The local and regional regulations must be considered, especially if China is the market that is sought after by the game developers. (Neogames Finland ry, 2019.)

The game industry in Finland provides various positive aspects when it comes to social and economic factors. Finnish game studios engage hundreds of millions of players around the world every day. Finnish game studios also consider this factor in their actions, by focusing on safety and responsibility in gaming. Other areas of focus include factors such as responsibility of licensed products, employee well-being and diversity, operation responsibility and environmental factors. (Neogames Finland ry, 2019.)

The success or failure of games lies in the long-term value the games create for the players, especially in premium game markets.

Successful games usually stand out with strong brands, which is very important because of the sheer number of available games in digital distribution platforms and copycats. The free-to-play game market grows constantly via updating and fine-tuning current games, adding new content and features into them, and creating new standalone games. The aim is to create long lasting customer relationships by making the games become a digital hobby worth investing into. Strong and long-lasting customer relationships are of vital importance for increasing player engagement and monetization. (Neogames Finland ry, 2019.)

Multiplayer games have been important for a long time and increasingly in the future, enabled by the capabilities of the Internet. Player usage data and feedback remains very important for game studios, as analytics driven game design seems to be the way to go to create successful and engaging games. This data and feedback is highly utilized by Finnish game studios when making important decisions regarding their games. They also constantly develop their processes to make player-centric decisions. Finnish game studios also investigate opportunities regarding the utilization of machine learning and artificial intelligence, since AI of the future will be highly integrated and embedded into the games themselves, the development tools, and the development of game content. The video game industry is also increasingly creating new opportunities to engage the players and the community to work with the development of current and upcoming games. Professional e-sports athletes and streamers have been allowed to partake in game development already and in the future, more jobs will be most likely available for other members of the community as well. (Neogames Finland ry, 2019.)

4 VALUE CREATION

4.1 The concept of value

Value creation is the core purpose and central process of economic exchange. Understanding the terms of value and value creation are vital in order to understand the dynamics of so-called service systems. Service systems engage in exchange with other service systems to create value for both themselves and other parties. There are two general meanings for value, value-in-exchange, and value-in-use, referring to different ways of viewing value and value creation. Value-in-exchange, the traditional view, creates the basis for goods-dominant logic (G-D logic). According to this logic, value is something that is created by a company and distributed to the company's customers in the market through exchange of goods and money. The value is created through many activities done by the company. The company's production process embeds value into their providable goods, and the value of that good is represented by the price of the good. The real purpose of economic exchange is to make and distribute things to be sold in the market. (Vargo, Maglio & Akaka, 2008.)

The other view, service-dominant logic (S-D logic) refers to value-in-use, and emphasizes the co-creation of value through various interactions between the company and its customers through the integration and application of resources and competences, such as skills and knowledge. In S-D logic, the value is created, when the customer uses the purchased products and goods. The relationship between the customer and the company creates mutual value. (Vargo, Maglio & Akaka, 2008.) Through co-creation experiences, companies and their suppliers can learn more about consumers, and get new ideas regarding design, engineering and manufacturing. The uncertainty of capital commitments can be reduced, and sources of environmental risks can be found, and even eliminated. The companies' employees can gain deeper understanding on consumer aspirations, behaviours, desires, motivations, and agreeable trade-offs regarding features and functions. Employees are also able to relate their efforts to individual consumers. (Prahalad & Ramaswamy, 2004.)

Adam Smith, one of the first and most important individuals to discuss value in the context of economics, noticed that many things that have great value in people's daily use don't necessarily have much value when exchanged in the economic sense. Valuable things aren't always useful and vice versa, and particularly useful things aren't necessarily expensive to obtain. He therefore noted two separate meanings for value, value-in-exchange and value-in-use. According to Smith, labour is the real basis for value, but measuring labour is challenging. (Vargo, Maglio & Akaka, 2008.)

Especially in service literature, value-in-use is considered the central value concept. Value-in-use refers to potential future value to be created for the customer when the purchased resources are being used, whereas value-in-

exchange refers to value being materialized during the moment of purchase. Value is usually considered an elusive concept, which is why value can be defined in many ways, depending on the context. The definitions include "benefits against sacrifices", "means-ends-models" and "the hedonic appreciation of the consumed object" or "making an actor better off". (Grönroos, 2017.)

4.2 Goods-dominant logic and service-dominant logic

Along the years, the core of marketing has evolved from an object- and production-oriented perspective to a perspective based more on resources. The value is not delivered, but instead co-created among businesses and their customers. This means that the value is not considered to be embedded into produced objects and exchange anymore, but realized by the customer through an experience, as he/she is activating and using the offerings and resources provided by the firm. Customers of the firm are considered to be value creators during the value creation processes and also in value-supporting interactions. Firms are seen as facilitators and co-creators of value, and the customers' value experiences are somewhat dependent on resources provided by companies. There have even been suggestions that the customer creates value and the provider of the resources, the firm, is only supporting the customers' value creation. S-D logic highlights a value perspective based on resources with a focus on value creation via processes. (Heinonen, Strandvik & Voima, 2013.)

The notion of value-in-exchange is considered doubtful, and more of a sales concept than a value concept. Value-in-exchange acts as a concept of potential future value for the customer when the customer uses the purchased resources. (Grönroos, 2017.) In value-in-exchange, tangible output is ideal, because it can be produced away from the customer, standardized, and stored, until the value is sold and afterwards consumed by the customer. Service is more difficult to handle in this sense because service is usually intangible. This kind of value can't be standardized, stored, or produced without customers, because the value is ultimately determined by the customer. (Vargo, Lusch & Akaka, 2010.)

Value-in-use, compared to value-in-exchange, refers to the value emerging during the use of resources, meaning that this kind of value does not exist before the usage of those resources by the user, who can be a customer or a service-providing firm. Therefore, the user is the one determining the value and the actual creator of the value. The value is created in the as the customer uses his or her skills to integrate the obtained resources with his or her existing resources. (Grönroos, 2017.) For an example, the obtained good or service is valuable in the sense of solving a problem in the life of the user or his or her household. According to the service-dominant logic, all exchange is based on service, and goods are used to deliver service (Vargo, Maglio & Akaka, 2008). The key resources for gaining and maintaining competitive advantage in the market are knowledge and skills (Vargo et al., 2008).

Value-in-use often includes a type of an emotional component, especially in B2C contexts, in which value is often merely a feeling or an emotion. These factors can only sometimes be measured in monetary terms, and they are difficult to assess with one single measurement. This is not the case in business-to-business contexts though, as there is usually a direct or an indirect impact on the customer's commercial outcome due to the use of offerings. Possible outcomes include increasing the capability to generate revenue and/or cost reduction. As in B2C context, emotions are also involved, but the commercial effects are measurable. Other measures include customer satisfaction, service quality, brand perception, the length of customer relationships, customer base turnover, the customers' willingness to pay, employee satisfaction and employee turnover. According to service logic, firms can be more than mere value proposition makers. Instead, they can affect the value fulfilment and future purchasing behaviour of their customers. To enable further the value creation of customers, firms and their employees should attempt to make the customers interested to let the firm help their customers to use the resources and processes as well as possible. This helps the firm with the transformation from a mere value facilitator to a value co-creator. (Grönroos, 2017.)

There is a key difference when it comes to the view on resources when comparing S-D logic and G-D logic. Resources are seen as either operant resources or operand resources. Operant resources are resources that act upon other resources, whereas operand resources are resources which are acted upon by other resources to produce an effect. G-D logic focuses on operand resources, which are the primary resources. On the contrary, S-D logic focuses more on operant resources, which are usually invisible and intangible by nature, such as core competences or organizational processes, whereas operand resources are usually static and finite, such as produced goods. (Vargo & Lusch, 2004.) Within service-dominant logic, operant resources are the underlying source of value and the drivers of value co-creation. In addition to the company and its resources, customers, suppliers and other stakeholders also contribute to the creation of value. (Vargo, Lusch & Akaka, 2010.)

When it comes to value-in-exchange and G-D logic, value is quite easy to measure. In this context, value is seen as something tangible, that is easy to measure (Heinonen, Strandvik & Voima, 2013). The value is realized through the purchase and sales, and the volume of sales acts as the measure. Still, this only includes potential value and not the real value for the customers, that is created during the usage of the purchased objects. This is one of the reasons value in the context of S-D logic is often difficult to measure. (Grönroos, 2017.)

4.3 Service and value

Service is defined by "the application of competences (such as knowledge and skills) by one party for the benefit of another" (Vargo, Maglio & Akaka, 2008; Vargo & Lusch, 2004). In S-D logic, the focus of exchange is shifted from

transactions to relationships (Vargo, Lusch & Akaka, 2010). This definition implies that value is created collaboratively, in interactive configurations of mutual exchange. These configurations of value creation are called service systems. A service system includes various resources, such as people, technology, and information, which are connected to other systems by value propositions. The goal of exchange between these service systems is to utilize the applied knowledge of other service systems and their resources. Value is determined through the use or integration and the application of operant and operand resources. For service systems, value is defined by an improvement in system well-being. This value can be measured in terms of a service system's adaptiveness or ability to fit in its environment. Figure 7 represents the value co-creation among service systems. (Vargo, Maglio & Akaka, 2008.)

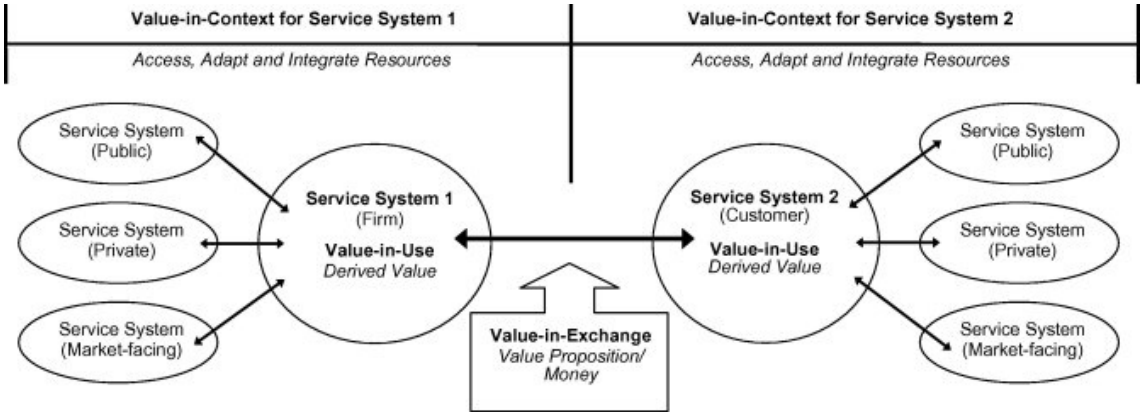

Figure 7. Value co-creation among service systems. (Vargo, Maglio & Akaka, 2008.)

According to the service perspective, the main purpose of resources, like goods and services, is the distribution of service to customers and other related beneficiaries. Companies, acting as providers, create offerings, whose aim is to help customers achieve their goals in life or business in a way that is value-creating for them. The value to emerge for the end customer is generated via a complex process, including various stages with multiple actors, such as companies, end users, the supply chain, and other actors. This is referred to as a value contribution, and value co-creation in the context of service-dominant logic. (Grönroos, 2017.)

The model below, the Grönroos-Voima value model (Figure 8), describes three value spheres, depicting the actors in the value creation process. It is to be noted that these roles can change through various interactions, and the value process can start with any sphere. The customer's value experience may be physical, cognitive, affective, emotional etc. and the value experience might have a value implication for the customer. It is vital to know the processes of the customer before the purchase, during the purchase and after the purchase. The entirety of the customer process is related to the value process. One of the important aspects of the model is the customer-to-customer interactions. The customer's

value creation might be drastically affected by word-of-mouth and other social value co-creation with the peers of the customer. Those interactions may affect the customer's value fulfilment, his/her perception of the firm, his/her future purchase behaviour, resales, cross sales, and sales to new customers. It is difficult for the firms to affect these customer-to-customer interactions since they are not that manageable by the firms, but the firms can invest in great service and try to avoid failures and mistakes to maximize the potential for value co-creation in these contexts. (Grönroos, 2017.)

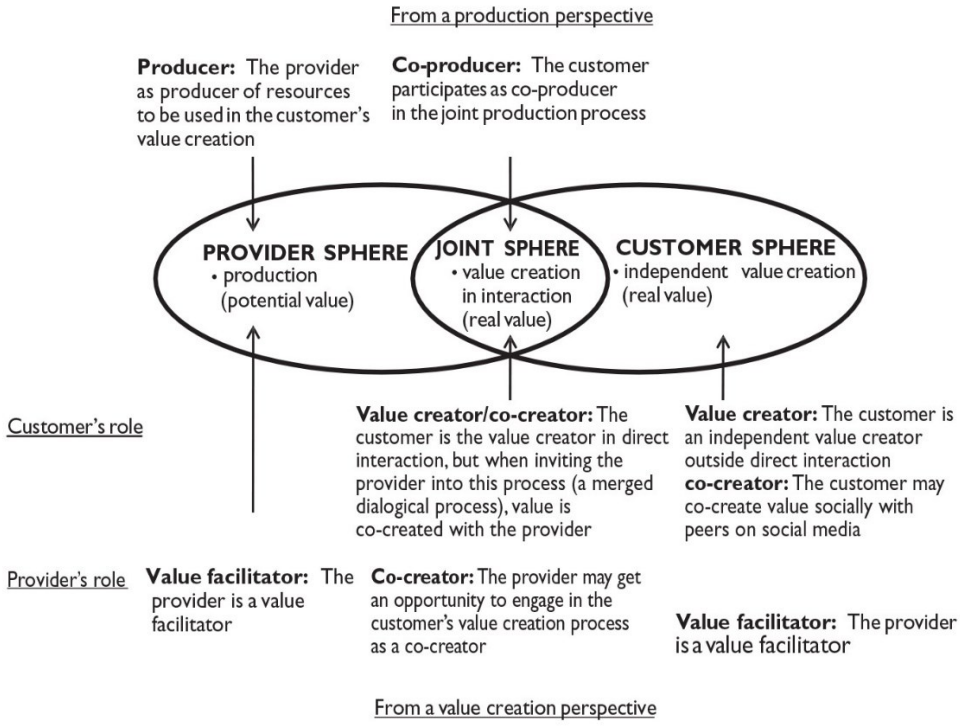

Figure 8. The Grönroos-Voima Value Model. (Grönroos, 2017.)

Building on the concept of service-dominant logic, Payne, Storbacka & Frow (2007) present a conceptual framework for value co-creation (Figure 9), consisting of three distinct key components: customer value-creating processes, supplier value-creating processes and encounter processes. The customer value-creating processes refer to the processes, resources, and practices in a B2C relationship, which customers user to manage their activities. In a B2B relationship, the processes are ones which the customer organization uses to manage its business and its relationship with suppliers. The supplier value-creating processes refer to the processes, resources, and practices which the supplier uses to manage its business and its relationships with customers and other stakeholders. The encounter processes stand for the processes and practices of interaction and exchange that take place with customer and supplier relationships, and which need to be managed to develop successful opportunities for co-creation. (Payne, Storbacka & Frow, 2007.)

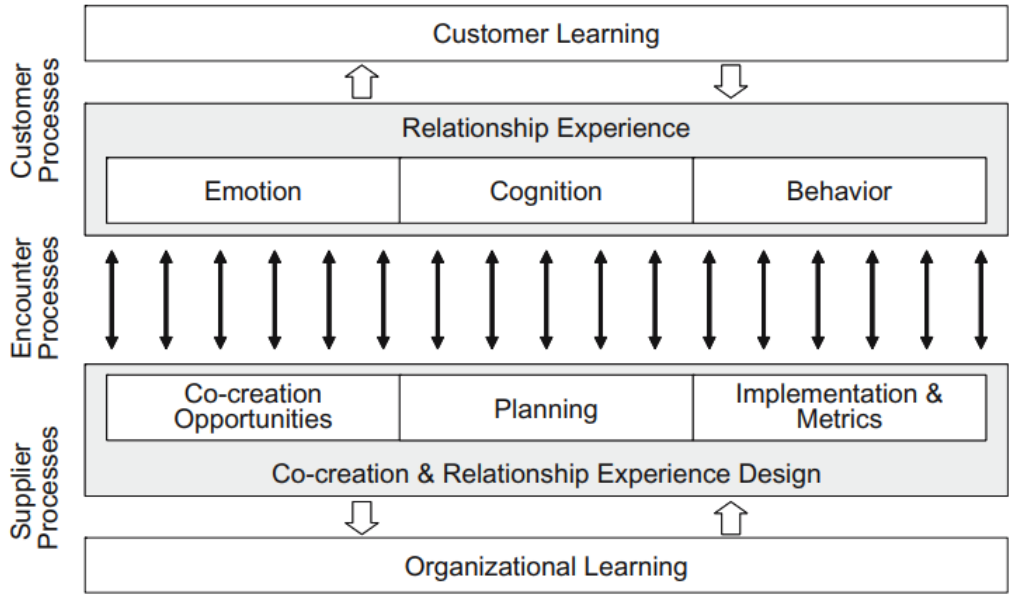

Figure 9. A conceptual framework for value co-creation. (Payne, Storbacka & Frow, 2007.)

4.4 Value co-creation

Prahalad & Ramaswamy (2004) focus on co-creating unique value with customers. Creating unique value begins by recognizing that the customer's role is not isolated but connected. Customers are well informed instead of being unaware, and active co-creators with the aim to affect businesses and markets, instead of being merely passive consumers. Customers also have often unlimited access to knowledge and information to make informed decisions in the market. This phenomenon challenges companies to understand this trend and not limit the flow of information to consumers. Personal networks and customer communities are having continuously more power on markets and companies, and consumers have increasingly more capabilities and possibilities to do product development. The basis of value is the consumer co-creation experience, and the uniqueness of various customers affects that experience and the co-creation process. Therefor, investing into co-creation experience quality is necessary, not just the in-house quality of processes and products. The quality of the co-creation experiences depends on the infrastructure that enables the interaction between companies and consumers. This infrastructure should not only be of high quality, but capable of creating different, meaningful experiences for different customers to create unique value. (Prahalad & Ramaswamy, 2004.)

When initiating value co-creation, there are various questions and challenges to consider. In order to tackle some of the challenges and uncertainties around value co-creation, Prahalad & Ramaswamy (2004) created the DART model. DART stands for dialogue, access, risk assessment and transparency. Dialogue refers to interactivity, engagement, and willingness to act. Listening to

customer is not enough; shared learning, equality between the customer and the company and continuous communication is important to create a loyal community. Access refers to giving necessary access to information to the customers. For example, a company can provide in-house data about their processes to their customers, helping the customers and other companies and further engage co-creation. Risk assessment refers to the notion of companies assessing risks in their business environment and informing their customers about them, to minimize the probability of harm to the consumer. Consumers will increasingly participate in value co-creation in the future, and they need not only information about possible risks, but also ways to assess their personal and societal risk as well when it comes to purchasing and usage of products and services. Businesses should try to make their companies as transparent as possible to consumers, as information becomes increasingly more accessible to consumers. All these factors play an important role in engaging customers as collaborators. Consumers are more able to make informed choices, debate and co-develop private and public policy choices, develop and maintain thematic communities, and co-develop trust. (Prahalad & Ramaswamy, 2004.)

In the modern context of online value co-creation, online engagement can be views interactions of four distinct elements: people, organization, technology and service design. Customers often have the intention to reciprocate in satisfactory online customer service encounters, caused by their sense of being valued and appreciated by a company. Value is co-created when the customers feel that their feedback is valuable and important, especially if the customer feels that the company in the case has done something that was influenced by the customer's feedback. The company's employees can affect value co-creation by being polite, helpful, responsive, and emphatic towards the customers. It is necessary to create organizational guidelines and policies on how to manage and serve the company's customers, and how to engage the customers in the feedback and service delivery processes. These guidelines and policies signal the customers that the company cares about them and values their input. Technology is an important aspect to facilitate customer engagement, especially because technology ultimately enables the interactions between the company and online customers. Choosing and operating proper technology enables further customer engagement and value co-creation. Customers also appreciate companies' efforts to adopt high quality online service technologies. Proper service technology design improves the quality of customer interactions, adding to value co-creation capabilities. (Zhang, Lu, Torres & Chen, 2018.)

In this context, value can be similarly co-created and co-destructed. Customers often publicise their issues regarding service encounters, and tend to warn others and write negative reviews, if they have been poorly treated by a company. Reasons for negative customer interactions include a lack of empathy or rudeness of the employees towards the customers. These behaviours affect the customers' view on service quality and service recovery. Communication failures are also a possibility, regarding hearing, speech etc. Sometimes employees can display bad manners and behaviour, such as lying, confronting, cheating, or

misleading the customers. This might lead to loss of customer retention and damage towards the company brand. The success of the company is based on its competency, which is related to the ability of the company to deliver fast, effective, and high-quality customer service. Bad technology choices and implementations might also negatively affect the service process and interrupt value co-creation, as customers assume the company's responsibility in creating a strong technological infrastructure and capabilities, that not only suit the customers but also works reliably. (Zhang et al., 2018.)

4.4 The ten foundational premises of service-dominant logic

To further determine the service-dominant logic, Vargo and Lusch (2004) in their paper introduced eight FPs, or foundational premises to enable and understand service-dominant logic. The first foundational premise is that "the application of specialized skills and knowledge is the fundamental unit of exchange". According to this FP, people have two operant resources, which are physical and mental skills. These are not divided equally among populations. Therefore, specialization in skills is necessary and beneficial for individuals and society. Specialization results in scale effects, and specialization and skills are exchanged for mutual benefits. There are two ways to view these exchanges; the first view focuses on the output of the specialized activities and the other focuses on the performance of the specialized activities. This means that the exchange might be either the end outcome of the processes, or purely the specialized activity required for reaching the outcome. (Vargo & Lusch, 2004.)

The second FP determines that "indirect exchange masks the fundamental unit of exchange". In modern business, where markets have become complex and multi-sided, and organizations and companies are large and hierarchical, exchanges have often become indirect in nature and the view of the customer has been altered. The customer is not merely a direct trading partner. Microspecializations have become common, meaning that a previously mastered skill or art has been divided into smaller parts, and people master those parts of a larger scheme, which is used to provide goods and services. This means that many exchanges have become indirect, since various people are utilized to create the whole good or service. This "chaining" of operations used to mean that the workers lost touch of their customers, ending up in loss of quality. This challenge was solved by developing new management techniques. Even in indirect exchanges, the exchanges regard people exchanging specialized skills for specialized skills, and services for services. This happens via the means of marketing systems, money, goods, and organizations. (Vargo & Lusch, 2004.)

According to the third FP, "goods are distribution mechanisms for service provision". Goods are not in the focus of exchanges, because the focus is more on the application of specialized knowledge, mental skills, and physical skills. There are three ways to transfer knowledge and skills: direct, through training and education, and embedding them into something. Tangible goods

can be seen as encapsulated knowledge and/or skills, becoming the distribution channel for the application of skills and therefore, the enabler for service performance. The skill-embedded object replaces direct service, like a digital game download eliminating the need to physically visit the local game store to purchase the game, insert it into the disc reader and manually install the game. The direct service provision is not the only reason to obtain certain appliances. There exist higher-order needs, like the feeling of satisfaction, self-fulfilment, and esteem, which can be reached via certain appliances. (Vargo & Lusch, 2004.) A good example is purchasing an iPhone, which works as a phone, a compact computer, a messaging device, an entertainment system, a camera, a music player etc. but in addition to that, it is seen as a luxury item, providing social status and feeling satisfaction, happiness, security etc.

The fourth FP indicates that knowledge to be the fundamental source of competitive advantage. Knowledge is an operant resource, meaning that it is not acted upon, but acts upon other resources to produce effects and create competitive advantage. It enables economic growth and is the key source of wealth. Skills and competences are also used to gain competitive advantage. A company's productivity is strongly related to utilization of knowledge or technology. Technology is defined as know-how, consisting of three components: product technology, process technology and management technology. The service-provision-level chaining of knowledge and information is beneficial to organizations and their customers. The flow of knowledge can be independent of the flow of physical goods. Service is the provision of the information to the customer. With knowledge, the organization can create value propositions for gaining competitive advantage. (Vargo & Lusch, 2004.)

Foundational premise five deals with service economies, describing all economies to be service economies. People are continuously specializing in narrower and more specific specialties. Operand and operant resources have changed, and outsourcing is becoming increasingly popular. Throughout economic eras, the common denominator has been the increased refinement and exchange of knowledge and skills. Activities done by humans today have been done before in some form, but they have been separated into microspecializations and smaller tasks, being exchanged in markets. Services have become more vital and apparent through time, shifts in economic activities, manufacturing, and specialization. Only recently, it has been considered that a shift towards a service economy has occurred. (Vargo & Lusch, 2004.)

According to the sixth FP, the customer is always a co-producer. The traditional G-D logic views the producer and the consumer as separate entities. The service-centered view has a major focus on continuous processes, and the customer is always considered to be involved in the production of value. Production does not end with the manufacturing process since it is seen merely as an intermediary process. Certain goods, with skills and specializations embedded into them, provide services indirectly, but customers are usually heterogenous and their skills, behaviours, needs and wants are different. By using, repairing, maintaining, and adapting an appliance to his/her needs, the customer is also

taking part in the delivery and value creation processes and the service chain. Therefore, customization and evolving of service and product offerings is important. (Vargo & Lusch, 2004.)

The seventh foundational premise discusses value and value propositions, specifying that organizations can only provide value propositions to consumers. The factor of embedded value in tangible goods has been debated for a long time since the value creation process is dependent on the nature of value itself. According to S-D logic, the consumer must decide the value of a product or service, use it and therefore, participate in the co-production of value. Unsold goods do not have value, and customers are needed for production. Value propositions are made to distinguish products and services from competitors, but value in the sense of utility is not present in a mere good itself. (Vargo & Lusch, 2004.)

The eighth FP states that a service-centered view is customer oriented and relational. Goods aren't what people really need. What is needed, is to perform mental and physical activities in life, and some goods help people perform activities for an extended benefit. The profits of the company arise from customer satisfaction, not just the units of good sold by the company. To create long-lasting customer relationships, a single transaction might not be important, it is what is done before and after the transactions. Relationships are more beneficial and important than single transactions. To maximize service provision, a mutual learning process between the customer and the organization is vital. All relationships and interactions are different, but some factors are applied to each one, such as warranties and norms. Customers are heterogenic and want different kinds of interactions and relationships with the company they are dealing with. Warranties are often required by the law and many companies provide return policies and satisfaction guarantees or such for their services and products to extend the relationships between the customers and the business in any case if necessary. These promises and warranties also represent the brand and the value propositions of the company. (Vargo & Lusch, 2004.)

There were later additions and minor modifications to the original eight FPs in 2006 and 2008. The ninth FP states that all social and economic actors are resource integrators (Vargo & Lusch, 2008). The focus on this FP is entrepreneurship. Entrepreneurs can combine the inputs from microspecializations of individuals to create service that people want and will pay for, which is why entrepreneur and the spirit of entrepreneurship are important for society (Lusch & Vargo, 2006). Entrepreneurs can multiply resources by combining them in an organization and exchanging applied organizational competences with customers (Lusch & Vargo, 2006). The resource-integration role of entrepreneurs and companies was later realized to be applicable to also individuals and households (Vargo & Lusch, 2008). The tenth and final FP was added in 2008, stating that value is always uniquely and phenomenologically determined by the beneficiary, because the experiential nature of value was not explicitly stated back in 2004, when the first eight foundational premises were introduced (Vargo & Lusch, 2008).

4.5 Value co-destruction

Whereas value can be produced co-operatively, it can also be destroyed co-operatively. This might happen to all parties, some of the parties or just one party in question. Value co-destruction is a major topic when it comes to development of video games that utilize CS, since there are various cases of crowdsourced games which failed at some level to be successful despite promising beginnings. Plé & Cáceres (2010) define value co-destruction as "an interaction process between service systems that results in a decline in at least one of the systems' wellbeing (which given the nature of the service system can be individual or organizational)". During the value co-destruction process, service systems interact either directly (person-to-person) or indirectly (via appliances, such as goods) through the integration and application of resources (Plé & Cáceres, 2010).

The notion of value co-destruction has been introduced only recently to the service-dominant logic literature, although being an important matter. Value co-destruction is an interplay of service systems, resulting in a decline of well-being of one or more involved parties. Value co-destruction can result in various unwanted outcomes, like increased costs, customer loss, dissatisfaction, and negative word of mouth. Value co-destruction may happen before, during, and after the service process, and even simultaneously to value co-creation. Value co-destruction can be either intentional or accidental (Zhang et al., 2018). It is often related to the factors of orientation, resources, and perceptions. (Lintula, Tuunanen & Salo, 2017.)

As video games, such as Pokémon GO, intend to create mutual benefits and value for all related parties, sometimes the usage of the application ends up in value co-destruction through negative service interactions. Value co-destruction has presented itself through negative occurrences, such as increased mobile costs, trespassing, abduction, violence, and injuries. The negative value is presented by the players gaining feelings of unsafety, sadness, hurt and disappointment. According to the researchers, value co-destruction can ensue as an outcome of critical service components, such as expectations, incongruence of applied practices, insufficient perceived value, and contradictions. (Lintula, Tuunanen, Salo & Kari, 2017.)

According to a study by Järvi, Kähkönen & Torvinen (2018), eight specific reasons were found to cause value co-destruction: absence of information, an insufficient level of trust, mistakes, an inability to serve, an inability to change, the absence of clear expectations, customer misbehaviour and blaming. Each of these reasons may result in a failed interaction between parties, causing one or both parties to experience a decline in their well-being. The first one, absence of information, can be influenced by both the customer and the provider. Information is at the core of interactions, and the interaction might potentially fail if either party is unable to provide, produce or process information. This can happen with or without direct intent of the parties. (Järvi et al., 2018.)

The second reason, insufficient level of trust, describes the necessity of trust between all parties. If mutual trust is not present, collaborative activities may suffer. An example case of missing trust is when the customer is not willing or able to provide correct information. There are also cases where a party is not able to trust the other party for no specific reason. Behind these occurrences might lie previous negative experiences. A party could also act selfishly, which causes interruptions and further trust issues in relationships. (Järvi et al., 2018.)

When it comes to humans, mistakes are bound to happen. These mistakes might occur because of wrong assumptions. This is common in the IT industry, where the discussing parties might not share the same language, terminology and/or have the same type and level of information. In these cases, the parties might have very different views and expectations of the process and outcome of the collaboration and relationship. Actions of each party might also cause co-destruction if the results of the actions are not completely understood. Sometimes incorrect products and services might be purchased and provided if the parties do not understand each other. This might happen intentionally or unintentionally. (Järvi et al., 2018.)

The fourth reason is the inability to serve. Customers might become upset, if they are given expensive or overpriced offerings, feeling that they receive less than what they're paying for. Sometimes the value of the customer is disregarded, as the provider focuses on its own value too much over the customer's value, presenting in inadequate customer relationship management. A company must keep its promises to the customers, and the customers need to feel that they are getting what they want. (Järvi et al., 2018.)

Reason number five, the inability to change, can regard the customers, the company, or both. If a failure to change occurs, the other party faces a decline in well-being. The company might not be able to provide the newest and best services and products, or if they do, their customers might not be able to change in the sense of wanting to buy the newest available products and services, reducing the company's potential to make the customers happy. (Järvi et al., 2018.)

The absence of clear expectations refers to the customers not knowing or expressing their needs. If this occurs, it is difficult for the service provider to offer products and services to match the expectations and needs of the customers. In this case, value co-destruction occurs for both parties, as the provider is unable to provide proper products and services, and the customers can't receive proper products and services. If this occurrence is present, it is increasingly difficult to design future products and services as well. This phenomenon can occur also due to the customers' previous experiences with other companies and their offerings. (Järvi et al., 2018.)

Customer misbehaviour might cause stress and other issues for the provider, causing a decline in the provider's well-being. The customer might intentionally use a service or product in an unwanted manner, and most likely blame the provider, causing value co-destruction for the company. In projects which include the customers as co-creators, the customers might make changes

without informing the project owner, causing delays, potentially making the customers unhappy, causing value co-destruction. (Järvi et al., 2018.)

The eighth, final reason is blaming. Bad behaviour on the company's side and public complaints might drastically affect a company's brand and reputation, influencing potential new customers possibly not wanting to associate with a company. As this happens, the company declines in well-being, and value co-destruction occurs. For example, if a retailer provides a faulty item for the customer, the customer is likely to still blame the retailer for the faulty item, instead of the manufacturer. Sometimes, customers also blame a company for no reason, or the customer's own mistakes. (Järvi et al., 2018.)

Kokko, Vartiainen & Tuunanen (2018) studied player-to-player interactions in online games to find out, how value co-creation and co-destruction occur in this context. It was found that three distinct themes can create value co-creation and/or co-destruction: communication between players, relations between players and performing on a team. Behaviours in each theme might affect behaviours in other themes as well. Communication between players, when positive, created feelings of encouragement, empowerment and wanting to play more, enabling value co-creation. If the communication was negative, the players could handle it seemingly well, but as this predisposes players to potential value co-destruction, it could affect the overall success and popularity of the game. Positive relations between players refers to making friends within the game, being able to play with other players and being able to interact with like-minded individuals in online games. Positive player relations boost the perceived value of the game, enhance the gameplay experience, and increase the time spent on playing. The social community in the game was crucial for many individuals to continue playing the game. It was also viewed as being a comforting and reassuring aspect. For some players, the in-game friends became friends even outside of the game. As the player groups formed, they became an important aspect of social value creation, enhancing the players' willingness to keep playing the game. For some games, the social component is especially vital, because it is impossible to play those games without socializing with other players. On the other hand, sometimes social in-game groups might cause pressure for some individuals, if they have social requirements for the individuals in the group, such as the necessity to spend time and other resources on the game. In some particularly competitive games, the competitive aspects sometimes caused negative social behaviour. The players take the game more seriously, sometimes ending up in a motivational conflict and peer pressure, which might cause value co-destruction, if the players feel forced to opt out of playing certain game modes. Gaming groups present an interesting example of simultaneous potential value co-creation and co-destruction. (Kokko et al., 2018.)

5 INTERVIEWS

The goal was set with the thesis supervisor, to find 10 to 15 people within proper game studios and related organizations to interview for this study. The interviews took place during September of 2020 via video calls and face to face interactions. The interviews were half structured, including the questions seen in appendix 1 but not necessarily limited to them. The interview requests were sent to various Finnish game studios and game industry experts. Some questions and answer naturally came up during some of the interviews as well, when discussing the topics and the cases of the representatives interviewed in this study.

5.1 Transcription of the interviews

The transcription refers to the process of reviewing recorded material and turning the video and audio into text. The required accuracy of the transcription process is determined due to the research problem and the methodical approach to the study. If the research question is related to the interaction, positioning or the relationships of the parties taking part in the interview process, the transcription should be as detailed as possible. Instead, if the interest is on the topic and information about it, it is not that necessary to review the material as intricately. In this case, it is important to also review the speech of the interviewer, so the researcher is able to examine, how the design and shaping of the interviewer's questions (may) affect the given answers. The benefit of recorded material is that it can be reviewed at later times if necessary and the transcription can be specified. A transcription is still never likely to gather all the information that is gained during the interview. Affecting factors include the interviewer's observational abilities and the interviewer's choices on whether things are considered relevant or not relevant. To improve the validity of the transcription, and therefore, the analysis and the study, it is vital to keep the analysis as transparent as possible. (Ruusuvuori, Nikander & Hyvärinen, 2010.)

Regarding the theoretical background, in this research paper, it was chosen that for a good practice, the interviews would be transcribed carefully, but not in extreme detail, because the relationships of the people being interviewed and the person interviewing would not be vital to the results, focusing merely on the topic of the study. The goal was to make sure the interviewee would be as relaxed and open as possible to give honest and truthful answers. This was ensured by the anonymity of the persons and the businesses and organizations to take part in the interviews. The interviewees were informed about this factor in the inquiry emails and in the beginning of each interview. The best way to conduct the interviews was chosen to be a video call. The transcription process started immediately after conducting the interviews, transcribing one interview at a time.

5.2 Ethical practices regarding the interviews

When potentially highly confidential data is collected in any way, there needs to be serious ethical consideration about the collection, utilization, analysis, containment, further use and disposal of the data to protect the people being interviewed and their information with the best possible ways. In extreme cases, if data is mishandled, there could be serious consequences for all parties participating in the research.

A proper research plan is vital before the collection of the empirical data. This research plan needs to state, what information will be collected, how the data will be utilized, how it will be presented in the study and if it will be used after the initial research is complete. It needs to also include information on how the collected data will be disposed of. Even though the interviewer has the power to guide the contents of an interview, interaction, and its fluency, has a major effect on the success of the filtering of information in the way the person being interviewed wishes. Information about individual people must not be spoken about or written about with identity information, without the consent of the person being interviewed. (Ruusuvuori, Nikander & Hyvärinen, 2010.)

All interviews were recorded, and after the transcription of the material had been done, the video and audio material were destroyed. For this kind of study, the discussed topics and the views of persons are in the focus, so it was not deemed necessary to include detailed information about the organizations, game studios and their representatives, more than that they were suited for the interview. However, it needs to be considered, that as the Finnish game industry is relatively small, it might be possible, despite the anonymity of the data, that people and their represented game studios could be recognized due to the uniqueness of the information they provide. This has been seriously considered when designing the interviews and in their analysis. As little information about the persons and their organizations as possible is provided, leaving only the data that is relevant to this study. This factor still might affect some of the answers given out to this study in the interviews.

6 INTERVIEW ANALYSIS

11 game studios, organizations and their representatives were interviewed for this study. Due to the ethical and accurate design of the interviews, it seemed that the people were able to be honest in their answers, without a distinct reason to hold back information or say anything potentially controversial. The experiences and views of the interviewees were very versatile and provided a large amount of interesting data and information on the topics. Regarding the persons that were interviewed for this study, the amount of new information gained for each interview varied quite drastically. This might be caused by differences in experiences, passion for the games, knowledge and information, personal traits, the position within the company or organization they represented etc.

6.1 Game studio 1

The company in the case was a Finnish game studio, developing games for various platforms. They did have quite many experiences with CS in their game development practices, so this interview provided a great basis for the empirical phase of this study. Their most known game title utilizes crowdsourcing in the form of players being able to create content and modifications into the game.

The interviewee was quite positive about the capabilities and possibilities of the utilization of CS in video game development. The representative stated that for their cause, CS has been a great additional tool, but it was also stated that crowdsourcing is not optimal, or even useful, for any game studio and game development project. The potential of crowdsourcing is dependent on the type of the development project, since there isn't always value to be created in certain types of video games through the utilization of CS. When it comes to their newest game title, the introduction of CS happened "accidentally", since their previous game wasn't really designed with crowdsourcing as a major feature, but many passionate fans of that game wanted to customize and enhance their gameplay experiences and started to produce mods and content into the game. This was found to be a major value creator, so it was clear that the next game title would include possibilities for CS as well. The development phase was mostly done in-house and partially utilizing outsourced development services with an active crowd following the development. The crowdsourced content creation and modification capabilities were introduced more after the actual release of the game.

According to the person, CS is very useful and important in creating a community to pursue additional value for the customers of the studio, third parties and the studio itself. CS is vital for the studio's game development at this point, so CS is strongly integrated into their practices and processes. CS also has various risks and challenges to consider, such as the management and guidance

of the crowd, as they are not directly working for the game studio. CS requires a lot of additional work and resources in the design and development phases, so there might a need for additional employees, or else current employees must spend time out of their main area of focus to interact with the crowd. Plenty of consideration, planning and orientation into the process is also required. Despite the present risks and challenges, the game studio has found the necessary extra effort to be worthy of doing, as there is much value creation potential. Other presented challenges included the filtering of ideas and balancing between what the crowd wishes and what can and should be done to the game in terms of development resources. In their view, crowdsourcing works for them, and that is the main reason they utilize it, and most likely they will be doing so also in the future in their future video game projects.

For the company in this case, CS creates many significant benefits for each party in question. The game studio and especially their main game title have a large and active community built around them. The players are able to harness their own hobbies and interests to good use to create content into the game they are passionate about, which is one of the greatest forms of value created for the crowd in this context. The players acting as content creators can design new content to enhance the gameplay experience for themselves and other players. The studio can lengthen the lifecycle of their games, because of the new crowdsourced content and modifications updating the gameplay experiences of the players and adding new playable content into the game. The studio also gains ideas, feedback, and suggestions from the crowd to make it better for the players currently and in the future. The crowd spreads word of the game to increase the size of the crowd and provides "free" marketing for the game studio, therefore also potentially increasing the sales figures of the studio's video games.

For the crowd, CS creates multiple benefits as well. The players have a direct channel to enable communication between the crowd and the players of the game. The players' views and opinions are listened to by the game studio, potentially creating feelings of pride, excitement and importance for the crowd members, as they are capable of affecting the game's development and therefore, making the game better for the players to enjoy. Some particularly active crowd members have also gained personal reputation as quality content creators within the game's community. The players can show their skills and express themselves through the means of content creation, and for crowd members, their creations can be used even as proof of their skills when it comes to employment. Everyone does not have to create their own content, but they can enjoy rich content made by other players. Some active members are also rewarded monetarily for their major creations. When it comes to the critical key factors for successful crowdsourcing, they are dependent on the types and ways that crowdsourcing is initiated, but for general guidelines, the representative listed proper planning, setting clear goals and sticking to them and understanding the need for resources.

The game studio also had experience with outsourcing some parts of the game development projects, such as audio design. When asked, whether these tasks could be completed by crowdsourcing, they saw it as being difficult

or impossible, at least at this stage of their game studio, since they do not wish to share much content of their games before the launches of their games. The source code of their games is also kept strictly within the boundaries of game studio. Another challenge is paying the individuals creating the content, since the individuals should have a company of their own to receive the payments of the game studio. It seemed that the representative knew the set limitations of what can and should be crowdsourced well. It was stated by the interviewee that crowdsourcing more content could be possible in the future.

The representative believed that one of the main reasons for not utilizing CS when it comes to Finnish game studios is the fact that CS takes up a lot of resources and additional planning. It is also generally quite difficult, so many game studios might prefer sticking to their in-house resources. As there are few larger Finnish game studios, the resources might be a considerable issue especially for smaller studios. The aim to crowdsource content post-release requires a lot of planning in advance in the development phase. If the enabling of CS is not considered during the early game development and design processes, it would be extremely difficult to add the possibility to crowdsource content afterwards in the post-release phase of the game's lifecycle. CS might also create technical issues, as the game engine and the rest of game architecture must be chosen and designed with possibilities for crowdsourced content and mods in mind, if they are to be used. One of the reasons for the underutilization of CS in the Finnish game industry might be old-fashioned views on the topic, even occurring as actively not wanting to initiate CS. Some individuals might see CS as too much of a risk, so it might negatively affect marketing and the overall sales of the game. Some individuals might not trust the crowd and fear, that the crowd might use the possibilities permitted to them for wrongdoings, such as the misuse of in-game assets. Overall, there also might be a lack of experience and/or knowledge on the topic of crowdsourced game development.

The interviewee saw the Finnish game industry as quite unique. The Finnish game industry is very collaborative, encouraging, and communal. The industry is also very open to the public. Other game studios are not seen as direct competitors, but rather as possible collaborators or "friends". There is a sense of making things together to participate in the global game market against foreign game studios. The best ways to encourage Finnish game studios to utilize CS more in their game development projects would be education on the topic and sharing information and experiences. Game studios could analyse their own business and games and examine, what could be done with CS in their context, and whether they would benefit from utilizing CS.

One of the most interesting factors came up in the end of the interview. They were asked whether they know about other Finnish game studios with experiences on utilizing CS in their game development projects, and the representative couldn't come up with any examples besides their company, which reinforces the hypothesis that Finnish game studios underutilize CS their game development. Especially for games that enable the self-expression of players and include potentially unlimited content and playability, CS could bring a

lot of benefits. It needs to be examined, how private the game development projects are in terms of the viability of the utilization of CS in those types of projects.

6.2 Game studio 2

This company was as well a Finnish game studio. Their development focus is mainly on mobile gaming. The company also had experiences of utilizing crowdsourcing in their games in the form of crowdsourced, user-generated content creation into their game. The game provides assets, tools, and a built-in level editor for creating new levels to play and share to other players. The representative was a leading figure in the company, focusing mostly on game design and leading the business side of their company.

The representative had overall positive views and thoughts on the utilization of CS in video game development, but saw a large amount of risks and challenges when utilizing CS. The representative also stated that CS requires additional work. As one of their most prominent game projects includes mostly user-generated content, CS is very necessary for the game to succeed. The representative stated that in mobile game development, it is vital to know your target market, what is done in the game, and how to execute monetization of the game. Monetization might be difficult in game projects that heavily utilize CS, especially in games that utilize the free to play -monetization model. This factor was raised as a major challenge of utilizing CS this way in game development. One of the reasons why Finnish game studios do not usually utilize CS more in their game development is because most Finnish games utilize the free-to-play monetization model. The challenge is not as drastic in more traditional monetization models, such as in paid games, meaning games that are purchased once.

The representative stated a dilemma about player progression within a game, as it might be very different from player to player, especially when it comes to a game which utilizes user-generated content. The player progression in this case refers to the things different players do: quests, tasks, character development etc. Completing those factors leads to progression in the game, rewarding the players. There are various ways to view and design different progression paths for individuals who simply play and enjoy the game and for individuals who play and create content into the game. The challenge lies in these progression paths: could they be united? Should they be united? Should there be different paths for different kinds of players, such as one progression path for all and another, different one for the content creators as well? How are these players rewarded and how to make them generate revenue for the game studio? These questions, combined regarding the element of monetization and the economy of the game, present a major challenge for this type of game. In their games, the most active members of their "crowd" were the players who designed and created content into the game. The representative is eagerly looking into the future, waiting for someone to successfully monetize in-game content creation, because it remains a very difficult aspect in game development, and something that hasn't

been seen often in mobile games. The person stated that their game development processes are almost completely done with in-house resources. They do not currently outsource any parts of their design and development processes. Although, they use third party programs and other tools for attribution and analytics.

The studio's decision to utilize CS arose from personal passion for games that utilize user-generated content. The phenomenon was interesting to them, and they saw some success stories from the PC and console markets of these kinds of games. They came up with a vision to bring it to the mobile platforms and started designing and developing the game with a small team, bringing in more people during the development of the game. In the early phases of the game studio, their game development processes used to follow a traditional waterfall-type model, but as the team grew and the game was nearing its soft launch, the model was altered to fit the needs of the game studio. The development also wasn't as metrics-driven as it is currently. The focus was on the quality of the product. Further on, development became more metrics-driven and faster in terms of development cycles, focusing more on retention, engagement of players and session times, which is very common for game studios focusing on mobile platforms. Prototyping, early and consistent testing and minimum viable products play a vital role in their development. The aim is to produce a playable version in short cycles in a short time, do a simple trailer for the game, acquire players and then to follow the data and metrics and make decisions mostly on the gathered data and analytics.

The technical quality assurance and testing is mostly done by designated employees in-house, but the game studio is also running a beta server for their newest game, where people outside of the studio can experiment with new updates and features, test the game and send feedback on the new content before the game's release. The company also runs thorough analytics on the beta server, as well. Player data and analytics are usually the most trusted source of data and information, but there is a balance between sheer trust in data and analytics, and feedback received from players themselves. The company's Discord server is especially active and crowded, being utilized heavily by the game studio to gain many types of information from players.

The person stated that it is likely that the game studio will utilize CS in their game development as well in upcoming game projects, at least in some of the various forms of it. Despite this, crowdsourcing will most likely not be a "spearhead" in the company's upcoming game projects, meaning that the game will not be made with full focus on crowdsourcing in the form of user-generated content. According to the interviewee, as almost all free-to-play mobile games currently seem to utilize CS in some form, it is very useful to include in many types of games, especially if the game utilizes the free-to-play monetization model. The person referred especially to the communal aspects like player feedback and testing, data-driven development, and player-generated content.

According to the interviewee, CS can create much value for both the game developers and their crowd. One of the most prolific occurrences of value creation is the longer lifecycle for the game, because the stronger the community

around the game, the more connected people feel towards the game. Lengthening the game's lifecycle naturally is a great way to deliver more money and other value for the game studio. This phenomenon is important when considering the servitization of video games, which might be useful considering the community around the game and value co-creation between the game studio and their customers. Often, the success of games is largely dependent on their longevity. If a game becomes a viral phenomenon, it might be very popular for a while, but it also might die out very quickly without an active and connected community. Especially in games that utilize the free-to-play monetization model, commitment of customers is especially important, because paying customers generate much more revenue as they use the game service, whereas in more traditional monetization models, players usually purchase the product once, paying for it, and potentially never invest any money towards the game anymore. This behaviour describes the servitization of video games: the customer gains value to oneself when using the product and has the will to keep investing to it, if the game service is deemed worthy of it by the customer. This is another example of value-in-use (Vargo & Lusch, 2004). The customer in this context can be referred to as an existing or a returning customer. When a game studio creates new paid content into the game, there are already plenty of potential, existing customers in the game already, so it is not necessary to invest as much into the marketing of the game in order to find new customers. This can generate great savings regarding time, money and other resources to the game studio and possible related parties, such as the publisher of the game, outsourced subcontractors etc. According to the interviewee, regarding the previous factors and topics, it is understandable, why free-to-play games like Clash of Clans by another Finnish game studio, Supercell, remain in the top 10 of top grossing games in the mobile application markets, despite already being there for multiple years continuously.

"No matter if the game is the same and the features are the same, but one can't steal away the community of that game."

The interviewee emphasized the significance of the communities of game studios and their games, especially considering the number of clones and copycats in the mobile application markets. The growth of the community might take a lot of hard work and many years of time, but it is very important for competitive advantage.

The interviewee, when asked about critical key factors of successful crowdsourcing, stated that building an active community is crucial from the very beginning of the game development project. This helps to grow the game in various ways, provides potential virality and "unofficial marketing" for the game, especially if smaller groups consisting of very active individuals, superusers and "superfans", arise from the crowd. It is beneficial to engage the "superfans" from the beginning to allow them to affect the game to raise its popularity and common awareness of the game.

Another important factor is the early testing of the game. These actions help determine the popularity and success potential of the game. The

interviewee brought up another Finnish game project, "My Summer Car" as an example of gaining a cult status and reaching a niche but gaining a large fanbase consisting of very active fans around the game. According to the interviewee, "it is not worth forcing it afterwards, when the game is already too finished", stating that one of the "magical" aspects of creating a crowd around a game is the fact that the crowd has seen various phases of the game being developed, and potentially affected the development in various ways. This is why it is not as viable to try to attract a crowd, when the game is already launched, as the crowd might think that the game is made just on behalf of the crowd with little interaction with the crowd.

The person saw that CS is in fact utilized quite often in the Finnish gaming industry, especially in mobile markets and the free-to-play markets, and its popularity is continuously on the rise. A good example of this is soft launching game titles very early, enabling the crowd to participate in the form of testing the games and sending their feedback on them. Other examples include creating social media presences and utilizing communication platforms like Reddit and Discord early in game development. Games that utilize CS in the sense of users being able to generate content into games aren't made more than currently because of the various challenges these types of games face. Critical challenges of these types of games include the challenges of consistency and marketing. Also, game designers and developers usually have a good understanding of game formulas. As the market grows, "guidelines" for creating successful mobile games are becoming a reality. The same goes for game genres and game subgenres. There isn't a straightforward formula to create a game based on user-generated content, as the most prevalent examples of those kinds of games, Minecraft and Roblox, have been "coincidences".

The person didn't particularly see the Finnish gaming industry as being very different, compared to other countries. In the person's view, Finland used to have a major technical advantage when it comes to game development, but currently, the differences are minor, at least in the mobile market. The person also didn't see Finnish game studios utilizing CS in game development less than in other countries.

6.3 Game studio 3

The person interviewed in this case was a representative of a gaming organization and a leading figure in a Finnish video game studio. The person had a long experience as a game developer. The interviewee didn't have a long experience on CS but great understanding and knowledge on the topic, in addition to game development and the Finnish video game industry.

The interviewee saw CS in game development to be often useful, and had overall positive views on the capabilities and possibilities of CS. In the same context, the person also mentioned, that the possibilities and usefulness of CS also depends on the genre of the developed game, and the platform(s) the game

is going to be released onto. The person viewed PC to be the best platform for CS in the context of modding. The person told that the reason for this is that getting mods and modding capabilities onto consoles takes more time, and on mobile platforms, modding capabilities are more limited. Including the possibilities to enable CS should be done in the beginning of the game project, because implementing the necessary tools to enable CS in later phases could be very difficult. The crowd needs to be given enough freedom, but also limitations. When the crowd is large and loyal enough, they can be trusted more in terms of executing CS activities.

The person stated that CS might boost the performance of the development and production processes even considerably, depending on what is wanted from the crowd. There are also various ways to create new content, that possibly could not be generated by the in-house employees. CS enables experimental aspects and elements to game development as well. CS might provide recognizability for the product, raised as one of the main benefits of CS for the side of the game studio. As virality of games is often an important aspect, recognizability is one of the main traits to increase the virality of the game. The inclusion of CS in video game development projects may not only increase recognizability, but also generate new possibilities to make advantageous marketing deals with influencers, other companies etc. and increase the company's PR value. Another form of value is a sort of safety for the initiator company since there is an existing fanbase of passionate and active crowd members who have accepted the company and their games. It is necessary to try to attain new customers, but the existing customers bring in revenue and resources. Especially in competitive games, it is not enough that the competitive elements exist, but the crowd must accept those elements alongside the other elements of the game itself.

The value generated for the crowd by CS activities manifests in various forms. A couple of main factors are the sense of trust and pride, and a connection to the company. These feelings for mutual benefit arise from the belief that the company is listening what the crowd is saying, and the members of the crowd have a possibility to affect the game they are passionate about. The members feel pride, as they can affect the game, especially if their content ends up existing in the game or if their views affect a tangible object in the game. The crowd members also feel that they are worthy of listening to and the company also trusts the members of the crowd. Many crowd members might partake in the development of the game because of the need or will to learn a new skill, such as programming or 3D modelling, and partaking by designing objects or other assets might provide to be a useful addition to their resume or portfolio. The person also stated that many times, a passionate community member with significant contributions to the game has been recruited by the initiator to work for them.

The greatest risks and challenges in CS lie in controlling the crowd and the CS activities. The person also described the possibilities to hurt the brand via CS. Another risk could be that misinterpretations in the communication between the crowd and the initiator might cause issues. These phenomena can be

considered value co-destruction. After all, the person believed that a passionate and active fanbase, and the persons in charge of community management, would at least regulate the crowd and its outputs to reduce the possibilities of value co-destruction. There are possibilities that some members of the crowd might be upset about the fact that their creations may not end up included in the game, but there needs to be rules to regulate the outputs of the crowd. The initiator cannot please everyone. The rules need to cater for the great good for the whole community.

The person also stated that CS is a good tool for the validation of new ideas, using an example of adding a new character into the game. The crowd can be utilized to validate the character by asking the crowd, what they think of the characters and whether they think that the character should be added to the game or not. The same type of activity has been also applied in Hollywood movies for a long time.

The interviewee also brought up Blizzard Entertainment, as it relies heavily on its community. The person viewed that Blizzard wouldn't be as successful as it currently is, without their community. Often, their game universes are also mixed or built upon to attract both new and old customers. Blizzard has possibly designed their first games without the aim of CS in mind, but as the community became more prevalent, interactive, and connected, they realized to utilize it more in their development processes. It has been very useful for Blizzard and many other companies to crowdsource some of the parts of development and design because it reduces the needs for in-house resources and speeds up the processes. The interviewee raised player data as one of the most important, if not the most important, drivers of development, especially on the mobile games market, but the importance of data is on the rise on the console and PC markets as well.

The form of CS that had been utilized by the interviewed person and their organization was to hold a competition for game designers to create and send content into an upcoming game. The organization's goal was not only to find content, but also to find new employees for the project. The results were great since their lead designer was found via the competition. After the game project, CS has also been utilized by the organization for networking, gathering information and new members, communication and organizing events. This type of CS was mentioned by the person to be utilized in various events, like hackathons and game jams, to find new employees for companies looking for them. The person told about CS in general and the case of the organization, and the topic of user-generated content in video games was discussed thoroughly as well. The person not only had experiences on various forms of CS, but also very considerable insights into other organizations and the Finnish video game industry. According to the interviewee, the video game project that was discussed earlier, would have been very different compared to what was actually done without utilizing CS, because CS didn't only bring content into the game, but a lead designer as well, so CS was a vital part of the project from the very beginning.

When asked the questions regarding the usage of CS in the Finnish gaming industry, the person referred to the roots of the Finnish game industry, mentioning the early demo and mod scenes. They used to be small scenes, but afterwards they grew into various game studios. Therefore, the roots of Finnish game design and development are, in a sense, in CS. Still, partially because of the beginnings of Finnish game development, often the mentality is to create humble but unique games with a small development and design team. Budgets are often small. The Finnish game industry relies heavily on the mobile markets, partially because of the legacy of Nokia. Many game studios also utilize the services provided by freelancers and buy outsourced services. As investments into game development education in Finland have not been as major and early as in many neighbouring countries, the Finnish gaming industry is quite unique. For example, in Sweden, there have been many possibilities to study game development and design for long. This has enabled the Swedish game industry to include various, globally renowned AAA-title game studios with few mobile game studios, whereas in Finland, there are only few AAA-title game studios but many small mobile game studios. One interesting factor is also that Sweden has many game publishers, but Finland has few if any, although there are many globally prominent game studios in Finland. Also, game studio-oriented investment business is very small in Finland.

The person had a strong view that spreading information about CS would be very important to encourage Finnish game studios to utilize CS more in their development and design processes. CS should be taught more in game development related studying topics to students. Many people and organizations with necessary skills to enable and utilize CS might not even know about the possibilities and capabilities of CS. The game studios currently utilizing CS are not sharing too much information about their utilization and benefits of CS. CS requires many resources, so many game studios and individuals might also lack the necessary skills for successful CS. Many studios also might suffer from too much pride in their ideas, not wanting to share them with others because it is something they cherish. They don't feel the need to receive visions and ideas from the outside of their team or organization. There is also the possibility that someone could steal their idea, limiting the possibilities for CS. Overall, the sharing of information would be crucial to enable more CS in the context of Finnish game studios. There could be workshops, speeches, blogs, events etc. focusing on informing people and organization on the topic of CS.

6.4 Game studio 4

The person being interviewed in this case had a lot of information and experience on CS. The person's overall views on CS were positive, with the person seeing CS as a valuable and important tool to utilize in their game projects, even to the point that the projects could have been abandoned without the involvement of

the crowd. The interviewee stated that CS has at least partially enabled the success of the interviewee as a game industry professional.

The organization introduced CS into their game project "accidentally", as their first project had much interest from the crowd in terms of participation in the development process. This was considered successful by the game developers, so it was a natural move to pursue CS in their new project as well. The projects started as solo development projects, but soon turned into full-fledged in-house development projects. The crowd is interacted with mostly on common social platforms, such as Discord, the Steam forums, and Reddit. The crowd has contributed into the game mostly in the forms of validation and creation of ideas, quality assurance, testing and even some programming and asset creation. This has meant that from the very beginning, it has been necessary to inform every contributor, that their contribution might be used in the final product without payment to the creator. Crowdsourcing also acts as a motivational tool for the developers, since the active crowd is cheering on and pushing the development of the games forward.

The representative stated that the largest benefits of CS for the crowd have been the ability to be a part of game development, and the creation of an active community around the game. The players can share their interest with other crowd members and the game developers, and work towards creating a better game. The developers listen to the crowd carefully, so the players feel importance, commitment, and passion towards the game. The most significant benefits for the game studio have been valuable feedback, quality assurance, testing, visibility for the game and the lesser need for marketing. The community consists of individuals who are ready to purchase the product and recommend it to their personal networks. The person saw that CS is not applicable or useful for any type of game development project. The game studio in this case also had some experiences in outsourcing, as they had outsourced music design for their newest game title to a freelancer artist. This is explained by being able to do most aspects of development in-house. Even these outsourced aspects of development could be possibly crowdsourced in the future.

The representative stated that as there are various benefits to be gained from CS, there are multiple challenges and possible issues as well. When it comes to legal issues, they are important to communicate to the crowd. There is a possibility, that a player who has committed material into the game's developed, wants a share of the profits of the game sales, because of creating a part of the game. It must be stated to the crowd that their participation is voluntary, and they will not be paid for their participation, regardless of whether their material ends up being included in the game or not. The game is a commercial open source project, but the game is still purchasable for money, so these factors might cause issues as well. The game studio is using an external publisher for the games, and this scenario has also provided various challenges due to the transparency of the game project. The overall openness of this game development project was considered quite risky and potentially problematic in the beginning of the project, but the developers have managed to accomplish success, nevertheless. The

person saw active, high-quality communication as a critical key factor for successful CS. The crowd wants and needs to know, what the developers are doing, and why they are doing it. CS seems to provide great results and value for both the crowd and for the game studio, and the commercialization of this kind of a project has been proved possible, which is why the game studio will most likely be utilizing CS in their future game development projects as well.

According to the interviewee, the Finnish game industry is especially communal. Most Finnish individuals and game studios within the industry interact with and help each other often. It seems that most individuals within the industry know each other at least on some level. Other studios aren't seen as competitors, but more as potential collaborators. The interviewee stated that CS is underutilized in the Finnish game industry. According to the interviewee, CS only works for certain kinds of games, such as games with potentially endless content to play. Some individuals might fear the possibility of going public with their game idea, since the idea might be stolen, but the representative in this case was sceptical about this occurring, since the person didn't see mere ideas as being that valuable. The person stated that the best way to encourage other game studios and organizations to utilize CS is to examine examples of existing Finnish games which utilize CS and to witness their success. Game studios should actively consider the possibilities of CS in the context of their own game development projects.

6.5 Game studio 5

The interviewee provided interesting information especially on the Finnish game industry, since the person interviewed had moved to live in Finland from another country and launched a game studio. The rather small but growing game studio was also otherwise quite international. The studio had quite a lot of experience on CS already, although the game studio at this point was a start-up company, currently designing and developing their first game title to be launched soon.

One of the first forms of CS the person mentioned was the utilization of alpha testing of versions of their video game. As alpha tests are usually quite limited and closed, the game studio is taking a more public approach to alpha testing by letting much more individuals to participate in the early testing of their upcoming game. The meaning of this is to gain information and feedback from the players. There are many positive outcomes for the game studio from this process. The game studio can test their theories, concepts and ideas co-operatively with the crowd, such as the decisions regarding game balancing (such as in-game characters), game content and mechanics. The crowd also commits reports of bugs and other in-game errors for the game studio. The game studio is also able to prioritize factors such as new content and features to be added to the game. The prioritization is highly based on the questions, actions, and feedback of the crowd. The testing doesn't provide as thorough and professional information as the in-house game testers but is still a highly valuable asset. CS also helps the

game studio market their game. The crowd is constantly growing and creating therefore even more value for the company. According to the interviewee, CS is a great supporting tool for game development and saves some money and time for the game studio, but the crowd still cannot replace in-house resources.

On the other hand, the interviewee stated that CS should be initiated in a way that the crowd must not be trusted and followed "blindly". The crowd must be catered to and listened to but the decisions about the development of the game are still ones of the game studio. The crowd can be used more as a support of decisions and ideas of the designers and developers at the game studio because there need to be limitations.

One of the most important factors to keep in mind when utilizing CS in game development is to set clear goals and to follow them. The person used testing, as in their case, as an example; the game studio needs to have the goals in mind when the crowd is testing the game. The crowd needs to be informed on what needs to be tested, and what the game studio wants the crowd to test in each testing session. Therefore, planning the testing sessions is very important to do as well. The interviewee stated that there are many benefits to gain from crowdsourcing, including making the product more relevant to the game studio's target market but simultaneously growing the community around the game.

"You create the base, your loyal player base that will not only support you for your current game, but will probably go further and support your another development, if you do it well."

The interviewee stated that story-based games are probably not the best types of games to utilize CS in but said that the utilization of CS in their current game development fits the game studio well. According to the interviewee, CS provides a win-win situation for both the game studio and their crowd. It was stated that the main reason behind the utilization of CS in their game development was their vision of CS as a great tool for growing the community. The person viewed that the involvement of the community was a vital component in their game development process from the early phases of the game. It is important to make the crowd feel that they are involved in the development of the game throughout the game's whole lifecycle. The person also told that as the game project has moved further and further, the involvement of the crowd could have been done even earlier than the game studio did in this current project.

The interviewee brought up some potential risks and challenges when utilizing CS in game development. As the crowd is a heterogenous group of people, some crowd members might get upset if their suggestions aren't added into the game or if they feel that the suggestions of other members are preferred. This is why proper communication is vital – how the game studio responds to the feedback, communicates interactively with the crowd, presents the game studio's decisions, promises different things to the crowd and keeps its promises to the crowd. Transparency and openness are some of the key factors to have good communications with the crowd. The representative stated that they take in all suggestions but ultimately, it is the game studio's choice to make, which

suggestions are to be followed. The suggestions must be corresponsive to the vision of the game studio.

As for challenges, the interviewee stated the factor of attracting crowd members to participate in the project. There are questions regarding both quantity and quality of the testers. The participants are required to fill a short feedback form. The game studio also receives feedback on their Discord server, but the feedback forms are very important as well, as the game studio is able to utilize statistics and generate graphs and charts out of the information on the forms. It was stated that very important decisions have been made regarding the development of the game, based on the given feedback. The game studio in this case is solving the challenge by co-operating with the studio's partners, who already have gained a certain following. The partners also help the game studio with the organizing and the promotion of the testing. The game studio is also utilizing their website, a third-party platform, and various social media to attract members to the crowd. The interviewee stated that the attraction of more people would take much more resources without the help from the game studio's partners. The active crowd members that do the testing properly and fill in feedback forms are also rewarded by the studio with tangible things such as game-related merchandise and discount codes. The rewards are not the only value proposition to the crowd, though. The value created for the crowd consists of various things, such as feelings of involvement and being able to participate in the development of the game from the very early stages. The game also gets more tailored towards the crowd, enhancing the gameplay experience. The crowd most likely also feels that they feel important and useful for the game studio. The growing community also allows the crowd members to put their skills to use and to find other people with similar interests. There is also a potential for the feeling of pride, as some especially active crowd members are mentioned in the upcoming game in some form, such as an in-game character name.

The interaction with the crowd takes up a great amount of human resources and time, and the current roles within the studio are quite specific and dedicated at this point. Despite this, many employees must spare time out of their schedule to spend on the crowd. For example, if there are very specific questions about the technical side of development, some game studio employees might not be as informed on the topic as other employees, so inner communication of the game studio is vital as well.

The representative of the game studio stated that as CS fits the game studio, CS initiatives will be utilized by the game studio as well in the future. At this point, the game studio had outsourced some design elements to other studios, such as some art and sound design, because they currently didn't have the artists and designers needed for those areas in-house. They also had an agreement with a certain party, allowing the game studio to receive workforce in the form of trainees and interns. Otherwise, all the work towards the game is done in-house. Some of the required artists and designers were found through the game studio's existing networks. The person stated that their game studio started to receive much more contacts from various talents after their game studio was added to

the Neogames register of Finnish game studios, seeing the register as a great asset for increasing awareness of Finnish game studios and also increasing the possibilities for employment.

The interviewee praised the Finnish game industry. The person viewed the Finnish game industry to be "very open", "friendly" and "special". It is very easy to grow one's network. There is a low threshold to ask things and contact relevant people. The industry allows the game studio in this case to improve their skills and strategy. This has been important for the game studio, because their team is small, and the game isn't very experienced yet. According to the interviewee, the reason why CS isn't utilized more in Finnish game development is possibly related to the Finnish nature of people and culture, as many people most likely do not feel like being open and loud about their projects. It could be hard to present your projects, especially in early development, to the public. There is also the possibility of someone stealing the game studio's idea, especially "if the idea is big but the development team is small".

To encourage Finnish game studios to utilize CSs more in their game development projects, people of game studios should connect with other studios and individuals more often to share ideas, tools and experiences. There also could be workshops and other events on the topic of the utilization of CS in game development. The knowledge about CS tools should be shared as well, as many parties have great tools, such as platforms for attracting people to participate in game and other software development.

6.6 Game studio 6

The person being interviewed was a very experienced, leading role employee in a Finnish game studio. The person also had experience of working in other game studios as well. The studio usually works with small teams that focus on different projects.

Talking about the game studio the person represented, there was some utilization of CS present in their game development processes. It had been very important from the very beginning of the game studio to include the players as a community in their game development, and to be open to the public about the studio's actions. As they had a considerable amount of resources in-house, there was not really a major need for CS, but the representative stated that the forms of CS they utilize provide great value and information for the company. The main way the studio utilizes CS is to use a group of people from outside of the company for beta testing the game, especially when they are releasing updates for their games. The studio receives metrics and analytics based on player data to help with the optimization of the game and to find out if there are anomalies or errors in the game. In this case, the crowd is mostly selected by the game studio, because the people need to be considered reliable, active and trustworthy, to minimize the possibility of unwanted information leaks and unwanted testing behaviour. According to the person, this helps out a lot and creates much value.

The development of the studio's games might take a long time and the developers and designers might become "bubbled" in their vision of the product, meaning that they might view the game in a very different way compared to the people actually purchasing and playing the game. The community of the game studio is mostly interacted with via the game studio's own Discord server and various social medias. The meaning of beta testing is not only to find bugs or other issues in the game, but also to find out the reactions of the most active players.

The game studio in this case also utilizes player services from outsourced companies. These companies have a network of gamers, who are given rewards for playing a game. The gaming sessions are recorded, and the session videos are sent to the game studio. These videos are carefully analysed to find out information about player behaviour. The goal of analysing these videos is usually related to a smaller, technical task, such as solving issues in the user interface to optimize the gameplay in terms of preferences and usability. The game studio also receives basic gameplay data in the form of various reports collected from each player of the game, not only limited to the test crowds. This data is very important to give information about crashes, bugs, or other possible issues, especially after updating the game or introducing new content into the game.

The game studio also had other experiences with outsourcing some parts of their development processes, such as in quality assurance. The key aspects of development are kept strictly inside of the game studio. The game studio has in-house employees and outsourced individuals focusing on quality assurance. The testing crowd partially helps with quality assurance, but it cannot replace the professional quality assurance work made by in-house and subcontractor employees. The benefit of CS in this context is the additional volume of players and testers for the game, since even with professionals working on the topic, it might be hard to find all possible issues, especially as the game is continuously updated and developed further.

At this time, the game studio has not really considered crowdsourcing parts of development that are currently being outsourced. The game studio has been using some open source resources in their game development. According to the interviewee, it would be hard to imagine the utilization of CS to replace the work being outsourced currently when it comes to their current projects. The person saw a possibility to do this, in the case that there would be a game project, in which the players would be able to create user-generated content in the game. According to the interviewee, it is key to know the crowd participating in the context of beta testing and to carefully plan the test sessions, because the test group always needs to be informed about how the testing should be done. It is also vital that the group knows what they should do, or otherwise the gained feedback and other information will not be as informative and correct as it could be.

The person stated that there are various challenges and possible issues in the utilization of CS. When it comes to person outside of the organisation playing a beta version of the game, there is a significant possibility of information leaks about the game. The players are trusted, but this scenario is presumed by

the game studio, as it is quite likely to happen, so confidential material is usually not given out to the crowd to play. The leaks could cause issues when it comes to the game studio's public relations. One of the game studio's previous game titles was leaked in its soft launch stage, causing various problems for the game studio. As CS creates a lot of visibility for the games of the studio, there are possibilities for "negative visibility" as well.

The largest value creators for the game studio, in the context of CS, are the most loyal and active players of the games. For example, they create intricate and detailed reports of their gameplay experiences, which the interviewee viewed as particularly helpful. The game studio can get a deeper understanding about their game from the players' perspective. The game studio can find out about factors such as resource bottlenecks, the metagame balance and other issues. As for critical key factors for successful CS, the interviewee recited continuous and high-quality communication, knowledge about the crowd and proper community management.

The interviewee saw some clear reasons, why Finnish game studios don't use CS more than they currently do. CS has a couple of "built-in issues". The first one is how to attract enough people to participate in CS and how to get relevant people to participate. The second one is the management of the crowd. If a game is focused on user-generated content, there might be technical issues as well. Various resources should be used and spent on the management and curation of the content as well. These kinds of games are risky, but possibly rewarding.

According to the interviewee, the Finnish game industry is quite exceptional in its own way. The industry is small, and there is a positive mood and culture. Information about studio practices, challenges etc. are shared quite freely. This is somewhat related to the history and heritage of the Finnish gaming industry. A common view within the industry is that it is more beneficial to collaborate instead of seeing other studios as competitors. According to the interviewee, the best way to encourage Finnish game studios to utilize CS more in their game development projects would be sharing experiences and information of successful game project cases that included crowdsourcing and talking about CS at Finnish game industry related events.

6.7 Game studio 7

The person in the interview was a leading figure in a Finnish game studio and one of the leading characters of a game development community. The person had experience of utilizing CS in game development and great understanding of the phenomenon, especially in the context of the Finnish game industry.

The person started by stating that CS is a useful and important tool to use in game development. The basis for this is that after all, games are made for people to enjoy, not for the game studio. A better product can be achieved by listening to the opinions and views of the customers. However, these opinions

and views need to be filtered, so every comment and feedback regarding the game development must not be taken self-evidently. The crowd has been involved in various parts of the game's development, including an interactive crowdfunding projects on Kickstarter and IndieGoGo. There were various, differently sized investment perks for the contributors in the crowdfunding projects, and the minimum amounts of funding were reached. Despite reaching the minimum goals, the representative viewed the projects as being unsuccessful, as the minimum goals were far from the amount of funds sought after by the game studio.

There have been also many other ways CS has been initiated by the game studio, such as questionnaires, voting for features, development prioritization and assets and continuous conversation between the game studio and the crowd. The communication platforms include social media and Discord. The person stated that CS can provide many beneficial aspects to game development, such as visibility for the game, testing and valuable feedback. These aspects have been important for the game studio in this case, since the studio is rather small, and resources are limited. CS helps with thinking "outside the box", in the sense that the game developers don't only work on designing and developing a game for themselves.

"You start to become blind to your own actions."

The game studio has a persistent vision of the developed game, but it is a necessary reminder to find out the opinions of the crowd to optimize the game for the players. CS also works as a motivational tool for the developers, since the most active and informed crowd members send positive feedback, encourage, and support the developers to keep developing the game. The utilization of CS does not provide benefits only for the game studio, but for the crowd as well. For the crowd, the main benefit is to be a part of game development. The representative told that many people, who had dreams of working in the game industry, but never managed to work in it, are able to participate in this sense in game development and become a part of the project. As Kickstarted perks, the participants can get their name presented in the game, for example. The person had a great vision on the crowd members because the person had also been participating in some CS projects regarding game development before starting their own video game studio.

The game studio in this case has also experiences on outsourcing. Their main game title was published by the game studio itself for PC, but for other platforms, the game studio is using an external publisher. The Kickstarter campaign was initiated collaboratively with another non-Finnish company since there are many challenges regarding crowdfunding in Finland. Some other parts of the game, such as audio design and music were outsourced as well. The game studio was reached out to by various individuals who wanted to do volunteer work on the game, but as the studio wanted to keep the game project as professional as possible, those opportunities were declined, because there was enough competence for those tasks to be found in-house and through existing

subcontractors. The risks of volunteer work were deemed too large in the sense of crowdsourcing critical parts of game development, because volunteers aren't in direct employment and have no obligations towards the game studio. The representative stated that the best way to utilize the crowd in game development, at least in this case and in cases similar to this game development project, is to initiate testing, get feedback, ideas and suggestions and utilize the crowd in this communal sense, not necessarily by handing out concrete critical tasks to the crowd, such as programming, art design etc.

The idea and decision to utilize CS in the development of this game project was clear from the start. The studio saw it as an obvious decision in terms of creating a game designed for the players of the game, and therefore it was important to involve the potential buyers and players in the development process as well. It is generally important to have a fanbase or some kind of community around the game studio or its game(s). A community doesn't only help with development of the games, but reduces the need to find buyers and players for upcoming projects as well.

Since the game studio only had few launched game titles to this day, there isn't a cohesive game development process that is utilized for each and every game, especially because the studio isn't specialized in developing a single genre of games. The representative described their style of development to be "game jam -like". Every studio employee is usually working on specified aspects of the game, based on their knowledge and skills, but the roles are not limited to that aspect only. A couple of people lead the project and focus on leadership, public relations, marketing, representing the company at events etc. but also work on various tasks on the game as well, such as graphical design and programming.

According to the interviewee, there are pros and cons to CS. There are some risks and challenges to consider. The crowd is a two-sided factor, that can bring good and positive things, but also negative things with it regarding the development process. An example of this is negative comments and attitudes from the crowd, caused by the fact that the game studio doesn't want to develop the game by only following the advices and opinions of the crowd. The feelings of upset among the crowd might be caused by personal factors, as most people of the crowd are most likely video game enthusiasts, but potentially do not know the amount of work and resources necessary to develop a complete video game for the beginning of development to the post-release phase. Still, the representative stated that the game studio is most likely going to utilize CS in their future game development projects as well, because it has been found useful by the game studio. As critical key factors for successful crowdsourced game development, the person raised communicational and interactional skills, as the feedback and comments of the crowd must be filtered and weighed, but the crowd also needs to feel that they are respected and listened to.

In this case, the interviewee also high praise for the Finnish game industry, telling that the Finnish game industry is especially open, and people share their ideas, opinions and experiences quite freely for the benefit of

everyone within the industry. The person told of an example of meeting a game developer from abroad, who told that in his country in the gaming industry, the culture is very different to that of Finland, as he was approaching other developers and game studios at various events, and they were extremely secretive, not willing or not being able to talk about various things regarding their game studio and game development. The interviewee stated that openness is very important for a small country like Finland, allowing the whole industry to work collaborative for the good of the whole Finnish game industry. This is one of the reasons why a small industry keeps producing high quality games. The Finnish game industry is highly respected by the Finnish people. Finnish game studios also seem to be responsible in their business, as major game studios like Rovio and Supercell could easily arrange paying less taxes to some other country, but they keep paying their taxes to the state of Finland. The Finnish game industry also receives a lot of coverage in Finnish media.

The person stated that the reason why CS isn't utilized more by Finnish game studios might be partially caused by the Finnish nature (being shy and underestimating one's own achievements, projects, and success). Perhaps Finns do not like or understand the way things like marketing are done abroad. Finns are often quite direct, which is a good trait, but there might be some cultural and communicational challenges. There also might be a thought that the resources put into CS might take time from the actual development of the game. The reasons are understandable, but some sort of community interaction must be done to market and sell one's game. One needs to have the courage to show and present your project, otherwise no one will know about it. Telling about ideas and concepts is vital to find potential players for games. The person didn't see the possible theft of game ideas as a very industry relevant topic and was quite confident that one should spread and share the game ideas. Idea theft is possible but shouldn't be a major factor to consider in game development. To encourage Finnish game studios to utilize CS more, information about it should be spread more, especially crowdfunding, which is considered very difficult to execute in Finland. Communication is an aspect which game studios should invest in. It is beneficial and important to utilize the existing networks and to grow one's networks to enhance the possibilities for CS.

6.8 Game studio 8

In this case, there were two separate representatives of an upcoming game project made by a Finnish game team. Both persons acted as leading forces of the upcoming project. The project had started approximately ten years ago as a sort of a strong narrative, made by the representatives, based on real life experiences and occurrences. The narrative had previously taken the form of a documentary, a book, and an animation film, leading into the final form, which would be a video game, as in their view, it would prove to be the best form of media for this project. The game is considered a passion project for the game developers and

designers. Both persons had experience in the ICT area, the other one focusing on programming, animation, and narrative design and the other on focusing on management, planning and directing. The interviewees didn't have previous experiences on crowdsourced video game development, as the upcoming game is their first video game project. The upcoming game will include crowdsourced material consisting of tales, happenings and true stories regarding the people and history of a certain location in Finland. The developers are also considering initiating a crowdfunding campaign on Kickstarter.

The inclusion of CS into this game project happened coincidentally, as one of the representatives mentioned the project in social media, and various people were very interested to participate in the project. Many of those people volunteered to participate in the testing of the game. According to the interviewees, so far CS has been a great addition to this game development project, creating additional value in the project. CS is a major part of the development, as most of the main developers have been recruited through the means of CS. CS also helps the dedicated development team with testing and content creation on many levels, as the crowd creates their own assets directly into the game and helps the development team also with the creation of assets. CS works as an inspirational and motivational tool for the developers, as the rapidly growing game community is very active and provides content, ideas, and feedback, that helps with the game development constantly. The game developers are also able to validate their ideas with the opinions of the crowd. The community is mostly based on a Discord channel, which is dedicated to the game. The game studio representatives also stated that CS enables cheap marketing, as the game's reputation grows and the game gets recognizability through the community members, spreading information continuously to their networks, finding more potential buyers for the game. According to the interviewees, the story and the locality of the game are the main factors that attract the crowd. The game team is going to soft launch their game on Steam, hoping to get even more crowd members to join the project. As the game will be released with the goal of generating a profit for the developers, if crowd members create content into the game, they will have to desist their copyrights into their created in-game content to avoid further issues when it comes to royalties etc. The game will not be open source.

CS creates various benefits, but there are also risks and challenges in the utilization of CS. The crowd can't be trusted in the same way as a developer or a designer focusing on the project, because a crowd member doesn't have a responsibility towards the game project, and may quit work on the project any time. As the topic of the game in the case might be considered controversial, there are possibilities for misunderstandings, bad reputation, and value co-destruction. As the community grows, the goal is to please the crowd members as much as possible, but all suggestions and ideas still can't be accepted into the development of the game, so it is impossible to please everyone, so there might be feelings of upset and being let down among the crowd.

CS provides benefits for the crowd as well. The main benefits for the crowd are feelings of inclusion through being a part of a game development

project, and the feelings of pride and motivation. The game project might feel very personal and relatable for various people in the crowd, especially if they have lived in the area the game takes place in. For the crowd members, it is a great way to prove and show one's skills and capabilities in script writing, storytelling, game design, and development.

In this project, any parts and areas of design and development aren't being outsourced to other game studios or other companies. This is one of the reasons, why CS is utilized heavily, and the utilization of CS reduces the need for outsourcing. This scenario depends on the project in case though, so the game studio might outsource some parts of their future projects. For critical key factors for successful implementation of CS, the interviewees emphasized the necessity of continuous, high-quality communication, overall management of the crowd and distinct rules and guidelines for both the crowd and the developers.

When it comes to the Finnish game industry, the interviewees had quite neutral views. According to them, the Finnish game industry is highly experienced and technologically very capable, especially on mobile games, but it is not particularly marketing-oriented, reducing the possibilities and willingness to engage in CS. Some individuals might fear the possibility of idea theft, which might also create prejudices and affect the willingness to share their projects publicly. As an example, they shared a case where the people working on a game development project were way too keen on their game idea and vision, so they would be too confident in the sense of not wanting or "needing" any opinions from people outside of the project. The interviewees stated that the best way to encourage Finnish game studios to utilize CS more in their game development projects would be by actively sharing examples of successful CS-based game projects, experiences, and information about the topic.

6.9 Game studio 9

The representative acted as one of the leading figures of the game studio in this case. The person was focusing mainly on managing the community around their main game title. The company which the person represented used CS heavily, as the crowd is producing various content and ideas into their game. The crowd has been also executing beta testing in collaboration with the game studio from the soft launch of the game. The communication between the crowd and the game studio is mostly done on social media platforms.

The interviewee had positive views about the utilization of CS in game development, even going as far as to state that CS is even necessary for some game projects to be successful. CS allows the studio to get fresh views, ideas, and opinions on the development of their game, valuable feedback on the game and information that might otherwise be out of reach of the employees of the game studio. CS was considered a very important aspect of their game development. The representative told that the communication with the players is very

important, but also communication with other game studios and developers is highly beneficial as well.

CS helps the studio to enhance player retention and customize the game for both the studio and the players of the game. There are also possibilities to lengthen the lifecycle of their games through longer customer relationships. The single most important benefit for the game studio is still getting new, fresh ideas from the crowd. According to the interviewee, the crowd also helps the game developers, designers, and artists of the game studio to learn new things, such as organizational skills. The crowd is rather large at this point of the game's development, and there are various vocal and active crowd members who help develop the game further. The game studio is also able to utilize a form of genuine influencer marketing in their game development and collaborate with other industries and companies to create value for multiple parties. The future of the game studio looks promising in terms of collaborative efforts, partially due to CS. As the game in this case is heavily based on art and visuals, the employees at the game studio might start to be low on ideas at times. The crowd can present their feedback, creations, and ideas, which can provide refreshing views and inspiration to the in-house artists and designers. As the crowd often shares their generated content, there is a smaller need for marketing for the game.

Like various previous interviewees, the person told that one of the main challenges of CS is the filtering of information. The game studio receives a large amount of information from the crowd on how they wish the game to be developed. Considering the target market of the game, the game studio needs to balance its own vision about the development of the game and the wishes of the crowd.

"You have to hear many voices, and you choose what is potentially good for you."

The interviewee also mentioned that this balancing isn't the only challenge when it comes to crowdsourced information, as one aspect about the received information is the modifying and evolvement of the information. For example, an opinion or advice from the crowd may be good as it is but evolving and/or modifying that opinion or advice and comparing it to the vision of the game studio might provide even better results. Often, the game studio is curious and experimental, and tries out many of these crowdsourced ideas and suggestions in order to find new value, and after examining how they are working, they keep that direction or abandon it, if it's not working out. The studio's goal is to learn something out of every experiment. It must be estimated whether the suggestion, idea etc. is worth trying out, so these ideas and suggestions aren't taken self-evidently.

CS also requires various resources and causes additional work for the game studio employees, especially when it comes to the management of the crowd. There are also limitations to consider in the utilization of CS. The game studio has got offers from private individuals to create art or other content into the game, but they haven't accepted those offers at least yet, because the focus is mainly on company-related collaborative efforts. The person also mentioned that the communication with crowd members could be tricky. If one or few

contributions are accepted into the game, suddenly more and more crowd members might want to participate too, and that might provide to be chaotic. The sheer amount of content and determining, which content should and could be introduced into the game could be difficult. Then, there could be cases of crowd members becoming angry or otherwise upset, if his or her idea wouldn't be introduced to the game, but someone else's would. The person still thought that feelings of angriness are not necessarily bad, because strong feelings also implicate a feeling of passion towards the game.

As most game studios nowadays do, the game studio relies heavily on collected player data. There is another balancing factor present in this context, as the player data is more trustworthy and accurate than the feedback of the crowd. Often, the feedback is similar, compared to the generated user data, but there are times when the data is very different compared to the feedback. At these times, it is important by the game studio employees to thoroughly review both the data and the feedback to make the right choices towards making the game better for the players.

The idea to utilize CS was clear from the beginning of the game project, based on the game studio's core values. It is considered important for the game studio to build a community and interact with it by teaching them how to play the game and to create and share ideas and content with the crowd. From the game studio's perspective, it is an important factor for the game's success to make the players feel like they are a part of the development and are listened to. The game studio will most likely utilize CS also in their future projects because it has been deemed a great tool for the enhancing of the game.

The person stated that the usefulness of CS is dependent on the type, monetization model and design of game in the case, as it doesn't probably provide value for all kinds of game studios and games. Finnish games are often quite similar in the sense of high production quality, especially when it comes to the visual and logical aspects of the games. Finnish games also seem to often tell a story. The person stated that Finnish culture might affect the Finnish game industry in some sense at least. To encourage Finnish studios to utilize CS more in their game development projects, the person stated that game studios should realize the potential value of CS. There could be events regarding crowdsourced game development, like hackathons, where people could improve their networks and listen to or give speeches about CS and related topics to create.

6.10 Game studio 10

The interviewed person was a very experienced game developer, team leader and designer, having worked for various Finnish game studios. The person was specializing in quality assurance and had very interesting experiences and views on utilizing CS in game development projects in the Finnish game industry, especially in areas of QA, localization and testing. His general views on CS were quite neutral. The person stated that CS can be a great tool, even necessary at

times in many ways, but it has many issues as well, so it is seen as a partially imperfect tool in the context of video game development.

The greatest benefits of CS, according to the interviewee, are scaling, opinions, feedback, and data. The consistent fostering of the crowd is valuable, since it enhances the results of CS, because the larger the crowd is, the more information is gained from the crowd. Likewise, the better the management of the crowd is, the better the quality of data to be received. The larger the crowd is, the more moderation and management it requires. The game studio needs to know its crowd. A great benefit of utilizing CS in the form of data-driven development is also the fact that the crowd members are usually experienced players of games or products like the game in the case. This is a major factor when it comes to the quality of the feedback, and the suggestions and ideas the crowd members are usually quite creative, regarding things such as new game features. The crowd members tell their view of the value of new features and other additions to the game, increasing mutual value for all parties. There are also possibilities that via testing and playing the game, the crowd might find bugs or other issues the in-house QA and testing teams wouldn't be able to find.

The person also pointed out that the developers, designers, and other expert might never realize all the problems within their game. The interviewee stated that creating and maintaining an active community is a major value creator for both the game studio and their user base. The development and evolution of tools and analytics has improved the interaction with the communities and enhanced the capabilities of CS in a major way. As an example, the person recited the earlier times of video game communities and fanbases, as moderation and analysis of crowdsourced data and content would be much more demanding, chaotic, and difficult. Also, because of the scarcity of proper, advanced player data, most received data was anecdotal, and therefore, not always correct and trustworthy. This raised a lot of questions regarding the allocation and optimization of resources, since it was questionable, which data and which opinions should be emphasized in this context. Usually, growing a community around a game is very valuable for all parties, but for simple puzzle games, for example, it is debatable whether creating a community would be valuable, because the value creation potential might be quite small. The game needs to be communal and/or in nature to properly engage the players and to enable CS.

For the crowd, the main benefits to partake in CS are the conceived sense of participation and connection to the game and the game studio, and the feelings of passion towards the game. It is very valuable to make the players feel that they have influenced the game they are playing. These factors are also beneficial for the game studio in the sense of finding players for the game and therefore, enhancing player retention and generating revenue and profits.

"And in the end, you make a better game."

The results of CS experienced by the person had been very mixed, depending on the focus, type and area of CS. Especially in the form of localization, CS had been deemed successful with positive results, but in the technical areas, the results had

been very mixed, or even negative. The most mentioned problematic area was beta-testing, where the crowd was handed out instructions on how to test and play the game to actually help the developers, but the testers seemed to not follow the instructions, so the results of the testing process were of low quality. The testing tools were gamified and enhanced in other ways as well, generating better results in the end. According to the person, the game industry is doing well with CS in ways of soft launching, beta-testing, and community-driven development.

As the person mentioned, there are various issues often in the utilization of CS in game development. CCS requires many resources, such as time and money. The person brought up an important factor, which is the balancing of information gained from CS and the information gained from analytics: the analytics and user data might provide sometimes different information compared to the information gained from the crowd by feedback and other communication. Then, there is the information, views, and opinions of the game studio itself. It is vital to balance these visions, goals, opinions, data etc. to make the best choices for the best outcomes for the game. Crowdsourced data might not be in line with the game studio's product leadership strategy, and the strategy might need some alterations and reconsideration. The crowd needs to be listened to carefully, or serious issues might occur regarding the development and overall success of the game. If the game studio is about to utilize CS, they have to commit themselves to the nurturing, analysis and management of the crowd.

"That's how hits die."

This is not a challenge only related to CS, but more on product leadership. On the other hand, this challenge provides a valuable tool for the game studio to examine and evaluate their strategy. The evaluation of value provided to the company by the crowd is sometimes very hard to measure, but usually there are at least perceptions of value, because most likely CS wouldn't be initiated unless there was creation of new value.

One of the most interesting views of the interviewee was that especially in the markets of free-to-play games and mobile games, basically every game company is utilizing at least some occurrence of CS, since so-called soft launching can be seen as a form of CS to gain data and information from the players to decide, what to do next to the game in case. The formula for free-to-play mobile games is often quite similar: the game studio makes a prototype of the game, the game is validated with the company ecosystem and the in-house team, validated with friends and family and then soft launched for a couple of markets. After this, the market analytics will tell the game studio, how the game will do in terms of viability. If the soft launch is deemed successful, a global launch will follow. As an example, the interviewee raised the Finnish game studio Supercell, which acts as a prime example of CS by soft launching many of their game titles. Soft launching has most likely "killed off" many promising game titles, but this isn't necessarily a bad thing, since it has proved that the game is lacking, and most likely not viable in terms of generating a profit.

According to the interviewee, the whole free-to-play game market is a large experiment on CS. Many companies still deny or are oblivious to the fact that what they are doing is CS. As CS is a complex and flexible term, it is often a question of semantics. This might have a major effect on the lack of data of Finnish game studios utilizing CS. Also, some companies openly tell that they are crowdsourcing features and other parts of their game development, but in fact they are not utilizing CS, only publicly stating that they are, to improve their game studio's public image and marketing.

The way CS is initiated by the game studio depends heavily on the strategy of their game development and their business. In the interviewee's view, it is almost mandatory to apply a kind of CS activities when developing games that utilize the free-to-play monetization model. The better the game studio is in interacting with the crowd, the better the results. A critical key factor when initiating CS in game development is planning. Especially when it comes to crowdsourced testing, there needs to be a clear plan on how the crowd is being utilized, which parts of the game are being tested, what the time frame is for this, who are testing the game etc. As the results might vary a lot, great planning enables the possibilities of the success of the testing sessions. The testing can't be done in a same way for the crowd and the in-house QA professionals, because the testing individuals are most likely very different. Another critical key factor is setting goals for CS. There needs to be a purpose to utilize CS, and the purpose is related to the set goals. Planning and execution of CS must be done with the set goals in mind, as CS requires a lot of resources. Crowdsourcing can be done without a direct purpose or clear goals, but most likely, the results will not be beneficial for the game studio. The game studio also needs to have entry criteria and exit criteria for CS.

When asked about the Finnish game industry, it was clear from the beginning of the interview that the interviewed person had high regards. The person mentioned that the Finnish gaming industry itself is one of the major unique selling points (USPs) of Finnish games. The person stated that the Finnish gaming industry is unique by being extremely open, alive, and collaborative. An example of that is that the largest Finnish game developer is possibly one of the most open ones about what is going well and what isn't. They tell openly about their objectives and struggles, leading by example. Similar foreign studios do not usually speak up about those things. In the Finnish gaming industry, there is a lot of sharing, discussion, validation, or invalidation of ideas of other game studios, gaming related events etc. These factors affect the growth of the Finnish game industry.

According to the interviewee, there is a lot of general scepticism towards CS, because there have been great results but also "horrible" results, and the negative results are often focused more on than the great results. The person also stated that "Finnish people don't like crowds", as an answer to possibly explain why Finnish game studios don't use CS more in their game development. CS requires soft skills, and many Finnish individuals within the game industry are more skilled in other areas than soft skills. As many people in the industry

are creative, perhaps some of these creative individuals in general are not fond of crowds, at least within the working environment. A crowd might feel even disruptive from the perspective of those people. The challenge is not as much in business culture, but more in individuals, which is why larger Finnish game studios tend to use CS quite often. To encourage Finnish game studios to use CS more in their game development projects, there need to be more valid solutions when it comes to the issues and challenges regarding CS. The person was confident, that when the utilization of CS as a phenomenon gets researched and utilized more in game development, the Finnish game industry will follow and start to utilize it more than they currently do.

"If the solution is there, people will follow."

6.11 Game studio 11

The game studio which the interviewee represented was a quickly growing Finnish start-up game studio. The game studio had experiences with CS, mostly in the form of creating an interactive community, crowdfunding and crowdsourced testing of their games. Especially the crowdsourced testing has been found to be very successful and beneficial for the game studio, providing valuable feedback and great testing results. As the local gaming community is active, it is possible to initiate testing done by either game studio professionals or other heterogenous crowds. The crowdfunding, enabled by IndieGoGo, was more of an experiment for the company since it was done in a very early phase of the company and there were not any launched products available yet. The company didn't really know what to expect of the campaign, and there were many questions to answer inside the company during and after the campaign, such as what was to be expected, in which parts of business could the campaign help, what should and could have been done differently, was the project successful etc. The minimum funding goal was reached, but ultimately, the crowdfunding project wasn't deemed successful by the game studio.

The person told that the benefits of CS arise from and are enabled by a socially capable and tight crowd. A form of CS enabled locally, is inviting local and interested people, such as IT students, as the crowd, to test their games at the game studio's location. Usually, the crowd is given a small reward for their participation. The CS initiated by the game studio has been deemed successful and helpful, which is why they keep doing it continuously. The company's office is in a location with various other game studios as well, and the game studios in the location also execute community-based CS in their own way, by meeting the employees of other studios and sharing their experiences and brainstorming together, enabling value co-creation. The location also allows the game studio employees to meet potential investors, publishers, experienced designers, and developers, enabling possibilities for enhancing company and personal networks. Coincidentally, most if not all the employees of the game studio have been found

and recruited via the personal networks of then current game studio employees. The greatest benefits of CS for the game studio overall are meeting new people, building and improving personal and business networks, improving organizational and communication skills, gaining feedback on the development of the games and easy, cheap and fast organization of valuable testing sessions.

The person saw CS as a sort of deed of good will, because the crowd doesn't have a direct commitment and responsibility towards the game project. The actions are mostly based on trust. When it comes to the crowd, there is a lot of freedom, but few responsibilities. This allows the crowd members to join the projects with a low threshold. As an example, the game studio can just hope that enough people and qualified people come into the game testing sessions, when invited. These sessions have worked as intended, so there is no need to doubt the crowd in this sense, but there are possibilities that no one would turn up. The interviewee saw limitations when it comes to CS, since the game studio is developing some projects for external clients as well. In these cases, the crowd often cannot be utilized for testing these kinds of projects, if they are confidential. The crowd would be under a confidentiality obligation, but there are often still too many risks to do this, but there are exceptions, varying from project to project. There is a possibility that some of the crowd members might not understand, what the confidentiality obligation means in practice. Communication is in a vital role if confidential projects are being crowdtested.

The game studio is not the only party that gains benefits out of crowdsourcing, since the crowd gains benefits as well. Along with small tangible participation rewards, like the serving of food and beverages, the crowd may get feelings of pride, motivation, privilege and excitement, as they are perhaps testing a game that very few people have experienced before. If a crowd member is particularly interested in a gaming company or the gaming industry, the events are a great way to discuss different matters with the game studio representatives and show one's skills to them. The events are also a good way to develop one's social and game testing skills and improve one's personal network.

The game studio also had some experiences with outsourcing parts of their game development, as one of their previous project in the early stages of the game studio had been mostly developed by another game studio with some additions from the representative's game studio. The game studio will also be doing outsourcing in as well in the future if there aren't enough available in-house resources. The main game title has been made almost completely without the need of outsourcing, but some parts like audio production have been outsourced. Regular participation from an audio producer is not required, which is why they have decided to outsource this part of their development. The representative stated that at least at this point, the outsourced activities could not be outsourced. There would be no guarantee of quality, and CS on a larger scale would be difficult to arrange. As the studio is still quite small, there most likely wouldn't be enough crowd members to complete the tasks. The representative also referred to ethical issues, since the game studio will want to be fair and pay individuals who commit work towards their game projects, which is why CS

wouldn't most likely be an optimal solution for the case of this game studio, as the studio focuses on premeditated employment. The representative stated, that as a general guideline, the work towards the game should be either well rewarded, or in the case of crowdsourced work, very relaxed and care-free for the crowd members if the rewards are small.

The person stated that CS will be utilized by the game studio as well in their future endeavours, especially when it comes to testing and community aspects. CS creates mutual value for the crowd and the game studio and overall, the game studio is interested in initiating all interactions that co-create mutual value. The representative stated that the possibilities to use crowdsourcing for different aspect in their studio's game development are growing and developing continuously. Any situation, where people outside of the game studio can be given opportunities through CS to participate, are interesting to the game studio, as it has possibilities for value co-creation and the further building of the game studio's community. It is not likely that the game studio would utilize CS in terms of the crowd creating valuable and difficult to make assets, like code or visuals, as the focus isn't on saving resources but more on creating "buzz" in the community. CS in this case is about giving opportunities for the crowd to participate, engaging the crowd, and allowing the crowd members to develop themselves. As critical key factors, the representative recited common rules and terms and high-quality communication between the crowd and the initiator. It is also recommended to have an existing network of people and companies to enable CS. The studio should also have a certain fame, so it is easier to find crowd members. The crowd members need to know what value they are getting for participating in CS.

The person had various thought on why CS isn't utilized more in the Finnish game industry. One of the most likely reasons is the fact that various Finnish game studios work for external clients, and their contracts might affect the possibilities for CS. There are also risks to CS, so many game studios might do their risk assessment and deem the risks too major for initiating CS. The representative told as a disclaimer that as there have not been many conversations regarding the utilization of CS in the Finnish game industry, the interviewee's thoughts are purely speculative.

"It's hard to tell on the behalf of others."

There are many creative and communal possibilities in the utilization of CS, but when it comes to larger game studios, there are trusted, paid professional resources in-house and in the game studio's networks to do the necessary development, so perhaps CS isn't really considered or needed in those contexts. As many studios have a regular and general game development process, there is most likely a habit to do things their way. There are also possibilities that some individuals in the gaming industry might have prejudices towards the utilization of CS. Finnish game studios might use CS quite often, but as the game studio in this case, they do not really highlight the utilization of CS.

When it comes to the Finnish gaming industry, Finland overall has a culture of strong societal trust, allowing game studios to enhance their capabilities for CS. People usually have trust towards the game studios. The Finnish business culture overall is quite open. These factors might be different in other countries, and communication might not be as open as in Finland in some other countries. As there are various game industry related conventions, hackathons, and other events in Finland annually, a great way to raise awareness and encourage Finnish game studios to utilize CS more in their game development projects would be highlighting CS in these events, by discussing, sharing information, views and experiences on the topic.

7 FINDINGS

Surprisingly, most of the interviewed persons and organizations they represented had utilized CS in the development of their games, at least in some form. This isn't to suggest that all interviewed game studios had particular thoughts of utilizing CS in all aspects of their game development. This was not expected in the beginning of this study, since the data on Finnish game studios and games to utilize CS was scarce. This might have been caused by the fact that although all kinds of game studios and independent developers were reached out to give interviews for the study, CS was mentioned in the mails and messages sent out. This could have motivated especially people and organizations with CS experiences and knowledge to answer to the interview requests. It seems clear that Finnish game studios and organizations often do not especially provide information about their utilization of CS in their game development. Overall, it seems that information about Finnish game studios utilizing CS and overall information about CS should be spread more, like many of the interviewees clearly stated. One of the most important contributions of this study is spreading that information.

7.1.1 General information

In this study, 11 companies and their representatives were interviewed in the empirical phase of this thesis, and the analysis and conclusions are based solely on these interviews. The goal was set to include ten to fifteen separate interviews in this study, so the set goal was reached, providing a sufficient sample size for a master's thesis. There were a couple studios in addition to the ones that were interviewed, that showed interest in participating in this study, but they could not be interviewed due to the schedule of this study. As the Finnish game industry includes over 220 game studios and over 3200 employees (as of the year 2019), the sample size is not sufficient to provide information applicable to each and every game studio and individual within the Finnish game industry, but it is deemed possible to generate trustworthy and potentially generalizable information based on the interviews conducted in this study. There was a lot of variation between the game studios, regarding their ages, amounts of experience, backgrounds, target markets, business models, game platforms, personal backgrounds of the interviewees etc. but there still were plenty of similarities in the answers of the persons representing the game studios and organizations. It seems that Finnish game studios seem to have usually quite similar views on the utilization of CS in the context of video game development.

7.1.2 Overall views on crowdsourcing

The general views on CS of the interviewees were mostly positive with few persons with neutral views on the topic. All interviewees with a positive view of CS

stated that CS is a particularly important aspect of their game development. Many stated that it is a great tool, but it is not suitable for any kind of game development project. Many persons stated that CS is most applicable for games that provide a potentially endless amount of gameplay and games, in which a community can be built around. There was a consensus among the interviewees, that crowdsourcing most definitely has much potential for value creation in terms of game development, but also limitations, risks and challenges to consider. Many resources must be allocated to communication and the management of the crowd.

7.1.3 Reasons to utilize or not to utilize crowdsourcing

There didn't seem to be a single reason to explain, why and how the decision to utilize crowdsourcing in the development of games was made. There were multiple interviewees, who stated that it was clear from the beginning of the game project, due to the game studio's values or experiences from previous successful projects. Various interviewees stated that the utilization of CS had partially been intentional and partially happened by chance. This was particularly interesting, since most people with experiences of utilizing CS also stated that games often should be built with the utilization of CS in mind from the beginning, especially when the form of CS regards the creation of in-game content. This is because adding tools for in-game content creation afterwards, after the launch of the game might be very difficult, because the ability to create in-game content needs to be considered during various design phases of game development, especially on the technical side.

Many interviewees stated that the usability of CS is dependent on the type of development project and engaging is CS doesn't automatically always bring additional value to a game development project. For simple games without a narrative, like various casual games, the application of CS, in the sense of creating and managing a community, is most likely not necessary or even useful. Engaging in CS requires a lot of resources, such as time and money, so game studios must also examine their infrastructure and capabilities and consider, whether CS is useful for them. As presented in the interview analyses, CS can be used in any phase of the lifecycles of video games. These aspects show the multiple possibilities and forms of CS, as well as its flexibility as a development tool.

7.1.4 Value creation (company side)

It turns out that most of the value that is created for companies in the cases of crowdsourced game development is intangible, and often difficult to measure, as stated by many interviewees. The most important value consisted of intangible, intellectual input, such as feedback, community and network growth, suggestions, creation and validation of ideas and visibility for the game. Some of this value is most likely measurable by the companies in terms of money or other resources, but only few representatives emphasized "money" as a major form of value gained from CS activities for their companies, even in cases of

crowdfunding initiatives. Some interviewees did state that some resources, like money and time, have been saved through CS, though. All the previously mentioned aspects also most likely affect the business aspects of the companies. For example, the community growth, scaling and visibility for the games bring in more potential customers, which brings in revenue and profits for the companies.

In the case of mutual value co-creation, a game studio can be considered a client of the crowd, as the crowd provides services for the company. As stated by Vargo & Lusch (2004, 2006), through S-D logic and value-in-use, the game studios can apply the customers' resources of skills and knowledge and use them to co-create value without the exchange of money or goods, which causes the intangible, intellectual output of the crowd to be valuable.

In many cases, there had been various benefits related to concrete crowdsourced work, like quality assurance, asset creation and testing of games. Testing helps especially before launching the game itself, a new update or adding new features, assets, or other content into the games. Despite this, it was often stated that in the context of testing and quality assurance, the crowd can't completely replace specialized QA and testing professionals, whether they are outsourced from another company or hired in-house. The communities created around the games and the game studios were found to be very valuable to build for the game studios. The growth of the communities enables various benefits for the game studio, such as better player retention, more customers, optimization of the game for the game studio and the players, and longer game lifecycles. The interviewees noticed various possibilities for value co-destruction through communication and interaction with the crowd, but no major occurrences of value co-destruction were reported.

7.1.5 Value creation (crowd side)

The value created to the crowd manifests often in various feelings. These senses and feelings are created in the participation processes throughout the game's lifecycle. These feelings include being able to affect the game, pride, excitement, passion, mutual benefit, inclusion, commitment among other feelings, which are enabled by the utilization of CS. This is strongly related to the notion of value-in-use in the context of value co-creation and service-dominant logic presented by Vargo & Lusch (2004), who identify value to be experienced by the customer. Grönroos (2017) stated that in the context of value-in-use, there is usually (only) an emotional component to customer-perceived value in B2C contexts, as in the cases of these game studios, so this statement is highly supported by the results of the interviews.

The crowds are also sometimes given more tangible rewards, such as money, discount codes, or merchandise as a prize for their participation. The interview results show the general redundancy of tangible rewards for the crowd members in the context of crowdsourced game development, as only three interviewees mentioned that they provide crowd members with tangible participation prizes. For most crowd members, intangible rewards were in a much larger role.

Other customer value themes were usability and personal gains. Usability was mentioned rather often, referring to harnessing of the crowd members' hobbies and interests to enhance the gameplay experience and usability of the game for themselves and also for other crowd members. CS platforms allow the crowd members to engage in activities that allow personal gains and development, such as learning and presenting personal skills, growing one's personal network, gaining reputation and potential employment opportunities.

7.1.6 Crowd motivations

In the context of this study, it is difficult and purely speculative to assume the participation motivations of crowd members, as the interviewees were representatives of game studios and organizations that utilize CS in their game development. Still, the interviewees had some insights of possible motivations, as some of the interviewees knew their crowd surprisingly well. There were occurrences of both intrinsic and extrinsic motivations among crowd members. Hedonism, learning and ideology (intrinsic motivations) (Namousi & Svenningsson Kohl, 2016) are very likely motivations for various crowd members participating in crowdsourced game development, as presented in the interview analyses. Extrinsic motivations are divided into individual and economic motivations ((Namousi & Svenningsson Kohl, 2016). For the examined cases in this thesis, economic motivations are most likely rare, as few of the game studios provided tangible rewards of participation, but individual motivations, such as reputation building among potential employers and peers and reaching a better gameplay experience are very probable.

7.1.7 Crowdsourced game development processes

When comparing the game development processes of all the interviewees, it was very difficult to find similarities among them, since each project seemed to be different and unique. This was not only the case when comparing studios to each other, but even when comparing different games made by the same developers. In some projects, CS was initiated already during development in the pre-launch phase, for example, by crowdtesting, crowdfunding and idea creation. Most game studios initiated crowdsourcing mostly in the phases of launch and post-launch, as in the form of asset creation, ideation, and quality assurance. The analysis of the interviews showed that CS can be utilized in various forms and ways, in all of the phases of game development.

7.1.8 Crowdsourcing and outsourcing

Most game studios interviewed in this study had outsourced at least some parts of their game development. Outsourced activities included things such as audio production, 3D modelling and attaining other assets to put into the game and

publishing the games. A common denominator for these instances of outsourcing was that they were temporary, as most of the interviewees wished to keep most areas of development within the boundaries of the game studio. Most interviewees stated that outsourcing has been necessary for their game studios, due to the lack of in-house resources or other practical reasons, such as not needing a constant, full-time employee for a certain task such as audio production. For some of the companies interviewed for this study, according to their representatives, it could be possible that some currently outsourced activities could be crowdsourced in the future without drastically compromising the quality of work but achieving results with much lesser costs for the initiator companies.

7.1.9 Specified utilization of crowdsourcing

In most cases, the forms of CS utilized in game development projects concerned the community around the games and the studios. The cases included crowd-generated ideas and validation of ideas, feedback crowd-generated in-game elements, assets and levels, crowd-voting for upcoming features and properties in the game, programming, quality assurance and testing, and crowdsourcing data, metrics and information from the crowd to be utilized for optimization of the games and further development. There were some occurrences of crowdfunding as well. In all cases of crowdfunding, the game studios reached their minimum funding goals, but none of the game studios with experiences on crowdfunding viewed their crowdfunding projects to be successful in their own view. This is because the minimum amount of funding reached for the game projects didn't really have a noticeable long-term effect on the actual development resources. According to the identified forms of CS (Lebraty & Lobre-Lebraty, 2013), crowdwisdom, cs & innovation, crowdjobbing and crowdfunding were mostly utilized by the game studios. CS & authenticity, crowdcontrol, crowdcuration, crowdcare, and cs & forecasting weren't utilized even once.

7.1.10 Risks and challenges regarding crowdsourcing

Most of the mentioned risks and challenges regarded communication, crowd management and the allocation of resources. The list of risks and challenges was extremely long, especially since various factors were mentioned multiple times. The risks and challenges present in engaging in CS activities in game development probably partially explain the supposed underutilization of CS in the Finnish game industry. Communication was raised as the most common challenge, followed by filtering of the crowd's output and balancing between the vision of the game studio and the crowd. Also, the amount of necessary additional work and resources was mentioned often. The importance of communication in the context of value co-creation is highlighted by Prahalad & Ramaswamy (2004) and Kokko et al., (2018), and Muhdi et al., (2011) highlight the importance of communication in the context of crowdsourcing processes.

7.1.11 Critical key factors for successful crowdsourcing in game development

Almost every interviewee stated that high-quality, continuous interaction and communication between the crowd and the initiator is one of the critical key factors. Other often mentioned critical key factors included planning, setting clear goals, and sticking to them. Many interviewees also emphasized the creation of common rules and guideline and the management of the crowd, among others. Agafonovas & Alonderiené (2013) identified motivation of the crowd as the single most critical success factor for CS. This was considered while analysing the interviews and crafting the findings of this study. Opposed to the findings of Agafonovas & Alonderiené, "attracting participants" was only mentioned three times out of eleven interviews. The feeling of motivation was also mentioned as a factor of customer side value only three times. Three interviewees saw CS and the crowd as a motivational tool for in-house inspiration and motivation. It seems that Finnish game studios face different challenges than Agafonovas & Alonderiené do, which might be explained by different factors, such as culture, location, the industry or other explanations.

7.1.12 The prevalence of the utilization of crowdsourcing in the Finnish game industry

Contrary to an early hypothesis, it turns out that quite many Finnish game studios and other organizations within the Finnish video game industry utilize CS in their game development, but few are especially highlighting and/or sharing information about it. This could be explained by various reasons as identified by the interviewees. This is especially interesting, because according to most of the interviewees, the Finnish game industry is open, communal and collaborative and information is shared freely.

The utilization of CS seems to be especially common in the free-to-play– and mobile game markets, which are ones of the primary markets of Finnish game studios. There are potentially various companies that utilize CS, but don't realize that they are initiating CS. Because of the malleable nature of the term of CS, there could be misunderstandings on the topic, and at times, it could be a question of semantics, what people consider to be CS.

7.1.13 Why crowdsourcing isn't utilized more in Finnish game development

Various reasons were presented by the interviewees to explain, why CS is not currently utilized more in Finnish game development. In the analysis of the interviews, the reasons were classified into business-related reasons and individual-related reasons, as many of the reasons are explained by the traits and differences of individuals, whereas some reasons are more related to the prevalent business culture, the Finnish game industry, or the game studio. Some of the

reasons were difficult to categorize into only one class, so they were classified as "both", referring to the complexity and generalizability of the reasons.

Overall, individual-related reasons were dominant in the interview analysis chart. This strongly suggests that the reasons behind the phenomenon of the underutilization of CS in the context of the Finnish game industry lie in individuals within the industry, not game studios and/or organizations. One of the most prevalent individual reasons was the nature of Finnish designers and developers. The scarcity of "soft skills" and "people skills" was mentioned sometimes, along with introversion and possible prejudices towards CS. A nation does not have a unified, shared mentality on different things, but it was pointed out often that Finns in the gaming industry tend to be often a bit shy and not keen to share their ideas too freely. Also, too many interactions with different parties might cause anxiety and disturbances in development. These views might be considered controversial, and they naturally are not applicable to each and every individual within the Finnish game industry. There were many occurrences of business-related reasons as well, such as the overall difficulty, uncertainties and risks around the phenomenon of CS.

Nearly everyone who was interviewed saw the Finnish video game industry as unique and had very positive views about the Finnish game industry. Adjectives such as "supportive", "unique", "transparent", "co-operative", "collaborative" and "encouraging" were mentioned many times to describe the Finnish gaming industry. One interviewee even mentioned that the Finnish game industry is the unique selling point of Finnish games. Many told that other video game studios aren't seen as enemies or competitors: instead, they are seen as "buddies", who can be trusted to share even protected information with. Many interviewees saw the Finnish game industry as being technically capable. The other studios are seen as being in the same "sector", working together against the game studios of the rest of the world.

The Finnish game industry is quite small, especially on the global game market, but important for the state of Finland. The Finnish game industry produces usually high-quality games, and as there aren't many in numbers, there are various Finnish game titles that are very successful even globally, such as the Angry Birds series by Rovio, Supercell Clash games and the Hill Climb Racing series by Fingersoft. Professionals within the industry know each other very often. The Finnish game industry seems to be focused on and specialized mainly in the mobile game markets. On a general level, the Finnish game industry seems like to be highly appreciated by Finnish individuals, and highly suitable for CS and value co-creation.

7.1.14 How Finnish game studios could be encouraged to utilize crowdsourcing more in game development projects

According to most interviewees, the answer is in the sharing of information, such as experiences and success stories about CS applied to game development projects. As it turns out, various Finnish game studios are currently utilizing CS, but

there is very limited data and documentation on the cases of CS in the Finnish game industry, which might also partially explain the supposed underutilization of CS in the Finnish game industry. According to the interviewees, many Finnish game studios are utilizing CS without realizing it or talking about it. Many interviewees saw that giving out speeches on the topic in conventions and other similar events, arranging CS-related events and overall company co-operation within the industry would help considerably to encourage more game studios to utilize CS in their game development. It was suggested that game studios should examine their capabilities and whether they could benefit from utilizing CS. Some interviewees also mentioned the lack of the presence of common guidelines or other instructions on successful crowdsourced game development projects.

7.1.15 Optimal crowdsourcing in game development

The developed framework below (Figure 10) is based on the literature review and the interview results, and represents, how Finnish game studios create value by utilizing crowdsourcing in their game development projects and processes. It highlights the different phases of the game's development lifecycle and critical success factors for optimal and value co-creating crowdsourcing initiatives.

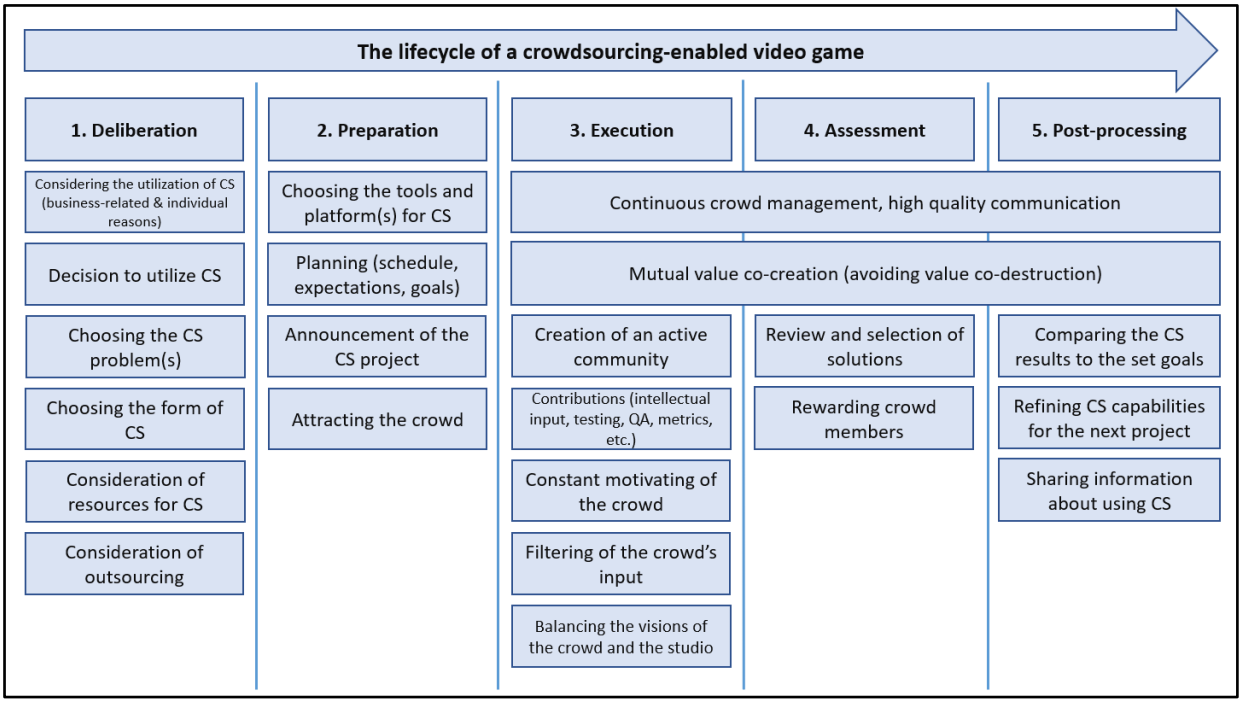

Figure 10. The OCSDG Framework.

8 DISCUSSION

The goal of this study was to create a simple yet easily understandable model or framework, that would explain, how CS is initiated in video game development projects, and how value is co-created between the initiator(s), the crowd, and sometimes, with other related parties, like publishers and subcontractors. The framework would be based on not only the literature review, but also compared to the interview results, to find similarities and differences to make a framework that is true to the context, providing authentic, real-life value. The motivation for this was the fact that CS is so flexible and easily applicable (Wilson, 2018), making it easy to utilize for most projects, but most likely difficult to recreate in various changing and complex contexts (Kohler, 2015). The aim of the framework was to make it as universally applicable and generalizable as possible, but the main objective is to reflect the set research problem and questions. Value co-creation is a very important aspect for companies and other organizations, because it allows companies and their employees to gain a deeper understanding on consumers, receive new information and ideas from the crowd, and to reduce the extent of risks and uncertainties (Prahalad & Ramaswamy, 2004). These are major benefits to optimize game development and maximize the potential for more game sales and more loyal and happy customers. According to S-D logic, value is ultimately decided and determined by the customer (Vargo et al., 2010), which is also a reason why CS was deemed an interesting and important aspect to study in the context of modern video game development, in which customers are often engaged in the development of video games.

The topic and scope of this study were particularly interesting, because there was such little information available on the combination of topics, especially in the context of the Finnish video game industry, which according to the interviewees, is quite unique and peculiar, usually meant in a positive way. In the beginning of this study, there was a presumption, that CS is very underutilized in the context of the Finnish video game industry, and this proved to be at least partially true. Another presumption was that value is mutually co-created when CS is successfully utilized in an online environment (Zhang et al., 2018), which also proved to be true, at least to the extent of the interviewees and the companies and organizations they represented, who often recited the creation of value to be one of the greatest benefits gained out of CS. Another presumption was that the Finnish video game industry would not be particularly unsuitable for the utilization of CS, and one of the goals of this study was to find why CS is underutilized in Finland. It is concluded that the presumed underutilization of CS is the Finnish game industry is mostly related to reasons regarding individuals, such as employees of game studios, and not particularly related to business aspects, or the industry as an entity. It is still a bit unclear, whether there is underutilization of CS in the Finnish game industry or not because of the lack of documented cases and the mixed views of the interviewees, and more business cases should be studied to find answers to the question.

The video game industry is one of the largest media industries globally, which makes it naturally an important study subject, especially at the time of the study, since it seems that during the global coronavirus pandemic, the video game industry is flourishing. The Finnish game industry is rather small, but despite its size, it has produced many globally relevant hit games, especially in the mobile game market (Neogames ry, 2019). The Finnish game industry is mostly focused on mobile games, and it is peculiar that many massively popular games have been developed in such a small country and industry, but at the same time, it is interesting that only few massively popular games have arisen, as the potential for Finnish games seems massive, independent of the genres and platforms of the games. It is unclear, why there are no game publishers in Finland, because it is assumed that publishing Finnish games could be profitable. This should be looked into in future research.

The research question was as such: What kind of value is created by utilizing crowdsourcing in the context of Finnish game studios and organizations? The answer is that various kinds of mostly intangible value is created through crowdsourcing for all related parties, like the initiator organization and their customers, acting as the crowd. The crowd consists mainly of the customers of the game studios, but they are a heterogenous group with different kinds of motivations, needs and wants. For the initiator organizations, value consists mainly of intellectual input of their customers, such as feedback, suggestions, and ideas, which all can be used to create a better game in terms of customer satisfaction and game sales. This intangible value can potentially be converted into tangible value in the form of revenue and profits. For the customers of the organization, value consists mostly of various positive feelings and skills gained during the crowdsourcing processes, and sometimes, tangible rewards for participation in the crowdsourcing project.

The secondary research questions were as such: 1. Is crowdsourcing underutilized in the Finnish game industry, and if yes, why is crowdsourcing underutilized in the Finnish game industry? 2. What are the critical success factors of crowdsourcing in the context of video game development projects? To answer the first question, it seems that there is a presence of underutilization of crowdsourcing in the Finnish game industry, and a lack of available information about the topic. In the beginning phase of this research, it was thought that the underutilization of crowdsourcing in the Finnish game industry is drastic, but during research, it has been revealed that various Finnish game studios utilize crowdsourcing. Probably a major portion of Finnish game studios do utilize some type of crowdsourcing in their game development projects, but often, they do not particularly share information about it. This information should be shared to shed light on the phenomenon of utilizing CS in video game development. Some Finnish game studios also utilize crowdsourcing without even knowing about it. To answer the second secondary research question, the answer is summarized in the developed framework (Figure 10.). In the context of Finnish game studios, the critical success factors are high-quality, constant communication between the crowd and the CS initiator, proper planning of CS, and setting clear goals for CS.

Crowdsourcing, in the context of software development, is still a quite new topic to study, and the capabilities for CS are developing continuously. CS, along with other modern, emerging trends in the fields of business and information systems, remains an important topic to study in order to enable the creation and innovation of business models, business strategies, product and service development and value co-creation, because value co-creation is important for gaining competitive advantage (Vargo & Lusch, 2004). Like the interviewees stated, knowledge about the utilization of CS in game development must be shared more among Finnish game developers and studios. After all, knowledge is the fundamental source of competitive advantage (Vargo & Lusch, 2004), and by sharing knowledge within the Finnish game industry, the whole industry can be pushed forward.

8.1 Theoretical contributions

This thesis adds an important piece of information into the field of IS, especially onto the areas of crowdsourcing and game development. As all the interviewees had experience on crowdsourcing, the results can be considered trustworthy, although it would have been interesting to hear from interviewees with no experiences on crowdsourcing. The Finnish game industry has been studied quite thoroughly locally in Finland by operators like Neogames (2019) but the utilization of CS and the possibilities for it haven't been studied yet. Studies about the topics in in the Finnish language are almost non-existent. CS has been in a major focus of research since the term was coined in 2006. Value co-creation has also been studied extensively, especially since the introduction of the foundational premises of S-D logic in 2004 by Vargo & Lusch. When it comes to crowdsourced video game development overall, the research is quite scarce, which is surprising, because video game development is a very logical application area of CS.

Many frameworks and models regarding crowdsourcing and value co-creation have been presented and proposed by multiple researchers in recent years. Some of these are presented as figures in this study. Most CS-focused studies referred to in this study focus merely on one aspect of CS. For example, Leicht et al. (2017) focus on crowdtesting, and Muhdi et al. (2011) focus mostly on idea generation in the early innovation process. In this study, the focus is CS as a constant phenomenon and a resource, regardless of the form, type, and application of CS. This was chosen as the focus, partially because locally relevant information about the utilization of CS in the Finnish game industry was not to be found yet.

The newly developed OCSDG model is also a bit different to the various previously designed models referred to in this study. For example, Pedersen et al. (2013) focus on the components and resources in the CS process. The crowdsourcing framework by Niu et al. (2019) aim to explain the CS process consisting of various tasks. The OCSDG model emphasizes the scale and importance of the value co-creation process, starting in the execution phase and only ending, until a game's lifecycle ends, presenting also critical success factors. CS can be

initiated in any phase of a video game's design and development phases, but usually the process begins after the design phase, as most interviewees stated that the concept and other foundations of games are built in-house. CS is still initiated as soon as possible, and many interviewees stated that if they had done something differently, they should have initiated CS actions even earlier than the did in their current project(s). Ideation was one of the mentioned processes, whose start and end are difficult to determine in the context of this research, but it can be debated that they start when the initiators recruit the crowd members, and might continue well after the game's lifecycle is complete, in the form of ideation of other games in the same game universe, or around the other creations of the studio.

Communication is raised as the most important critical success factor for CS initiatives in the OCGDS model. Synonyms and similar things have been often raised in previous research on value co-creation and crowdsourcing. Communication is not a self-explanatory term, so it can be used loosely sometimes. For example, Muhdi et al. (2011) mention communication with community members only in one of the five phases of the CS process, "execution". Pedersen et al. (2013) mention "management of the crowd" and refer to interaction with the crowd and the attraction of the crowd, but the necessity of communication is not emphasized. Agafonovas & Alonderiené (2013) also fail to mention "communication" directly, but "human capital" and "vision and strategy" are mentioned. These factors most likely do include communication as one of the elements.

Researchers like Pedersen et al. (2013) and Stol & Fitgerald (2014) found various benefits from utilizing CS, like cost reduction and faster development. These benefits are supposedly applicable to any CS project, but it seems like when it comes to crowdsourced video game development, the "profile" in terms of gained benefits and value differ from the "norm". This is a major finding since individuals and businesses can't just easily dismiss the utilization of CS because of financial losses. For the interviewees and their customers, the flow of money to the crowd was very minimal. The crowd was rarely rewarded with tangible things such as money, discounts, free usage of products and services etc. Even the initiators rarely mentioned money to be a major reason for utilizing CS, in terms of gaining more money from customers or saving money through lesser development costs. Value is co-created continuously in the CS process for all sides, but the flow of goods is usually not present. What is changed, is ideas, opinions, experiences, skills and other intellectual, intangible resources.

Most of the studies about value co-creation and CS focus on singular CS tasks and problems, whereas this study focuses more on CS as a continuous process, consisting of various small and reoccurring tasks, which emerge during a video game's development processes and lifecycle. Wilson (2018) supports this statement, by stating that the work amount of the crowds can vary from mere seconds to years. This seems to be the case for various video games, as some crowd members might participate in various forms and phases of CS in a video game development project, working on programming, testing, designing, ideation etc. His/her work might not be continuous and still focused on smaller tasks,

but as it takes place over a long and complex timeline, this work can be viewed more as a process, doing more work than solving or completing singular tasks. There are also participants, who do very little in terms of effort, but their acts are still very important and valuable. For example, in the cases of crowdfunding, even one game supporter's efforts in the form of supportive comments, ideas, or money, may be of extreme value, despite only spending few resources on the game's development.

It is strongly indicated and believed that CS is here to stay as a technique to be utilized increasingly in software development in the future, so it is assumed that this research can act as a leverage for future research, not only necessarily on crowdsourcing, but other types of co-creative and collaborative software development as well. The reason for the scarcity of information about the utilization of CS in the context of the Finnish game industry remains somewhat unclear, but it is most likely explainable by the fact that information about the utilization of CS is not especially shared by Finnish game studios. CS is only one of the variety of techniques related to video game development, which is a very complex process. CS isn't necessarily considered a vital part of video game development by many, so it might not be highlighted for this reason as well.

8.2 Practical contributions

As described in the literature review and according to the interviewees, the Finnish industry is important to the state and society of Finland. There isn't a reason, why a game industry wouldn't benefit from the utilization of emerging phenomena and techniques, such as CS, because the game industry is changing all the time, and it is vital to stay relevant in increasingly transforming markets and industries. This study might prove to be very important for the entirety of the Finnish game industry, as it shows that the lack of CS-related activities and knowledge is more related to individuals within game studios and within the industry, instead of being more of a business- or industry related issue. This study hopefully presents the possible issues and possibilities of CS, sparks discussion and encourages those with positive CS experiences to share their information to other individuals and game studios as well. Game studios should ponder on the utilization of CS in the context of their studio, as it might bring value that wouldn't be reached otherwise, and ultimately, help the studio create an even better game for the players.

It seems that the game industry of Finland is even especially capable of enabling crowdsourcing, as it is already collaborative, transparent, technically capable, and open, and things are shared often among industry professionals. These are great traits to engage in CS activities. Game industry professionals know each other rather often, so there is a great basis for sharing information. The reasons not to utilize CS are more individual-related than business- or industry related, meaning that if a game studio has the goal of utilizing CS in their game development, it should be considered even before a new game project in

regards of hiring practices. There most likely should be a more specific mapping of individuals to be recruited as employees when it comes to game studios with their sights on crowdsourcing. Game industry professionals seem to divide and form their personal opinions and views separately on both, the individuals in the industry, and the industry as an entity. CS-minded individuals seem to push the utilization of CS forward, along with other visionaries specializing on other topics. Hiring the "wrong" individuals might affect crowdsourced game development projects negatively and hinder the development of the industry. A "breakthrough" in the sense of Finnish game studios embracing CS more could possibly help with the current lack of and growing need for technical side professionals, such as programmers, and with the unfortunate, growing problem of youth unemployment.

9 CONCLUSIONS

In recent years, the phenomenon of crowdsourcing has drastically altered the business world. Instead of sticking to merely in-house resources, various businesses have understood the capabilities and power of the crowds. Many businesses have altered their business models to allow the engagement of crowdsourcing by opening some of their processes and knowledge to the masses to benefit each other by co-creating value. Usually, successful utilization of CS creates various types of value for the initiator(s) and their customers, such as financial savings, intellectual input from the crowd, flexibility and modifiability, faster development, lesser financial risk of development, better customer satisfaction, and ultimately, better products and services. Value co-creation has been studied quite thoroughly in recent decades. The concept of value has changed drastically, even in modern times. Customers are not merely consumers of value, but active participants in the creation of value. Value is often an elusive and intangible concept, but it remains a vital concept in any business and industry.

As crowdsourcing as an online phenomenon is still rather new and inexperienced, there exist risks and challenges, which need to be examined to maximize the value creation potential of crowdsourcing. As crowdsourcing can be applied to various causes, many video game studios have been utilizing crowdsourcing in the context of game development, often successfully. It seems that Finland, a major contributor to the video game industry, hasn't yet fully realized the possibilities of crowdsourcing, or at least there is a major lack of information about the topic.

This master's thesis provides a practical and theoretical contribution to IS research, especially to the research of crowdsourcing, by creating a thorough literature review about the topics relevant to this study: crowdsourcing, video game development and value creation. Based on the literature review, interview questions were carefully designed, and eleven Finnish game industry professionals were interviewed to gain a deeper understanding on the topics of this study and to answer the research problem and questions. Based on the literature review and the interviews, a conceptual framework was developed to present the phasing of crowdsourcing in video game development, value creation and critical success factors.

The findings of this study can help businesses and organizations realize their possibilities to utilize and benefit from crowdsourcing and to ultimately create better products and services for their customers. This creates many benefits for all parties, since a better game does not only provide better customer satisfaction, but also potentially increased revenue and profits for game studios and organizations, and possible related third parties. The developed framework can be used for successful initiation in crowdsourcing in the context of video game development and potentially, future theory building.

9.1 Limitations, validity, and reliability of the study

The results and findings of this study are focused on the cases provided in the research paper and the conducted interviews. The aim of the study was to create universalizable information to be used as a possible part of future theory building, and to provide answers for video game studios and organizations considering the utilization of CS in their game development projects. The results can be considerably useful also for determining critical success factors of CS and encouraging game studios to utilize CS activities in their own game development activities. Still, because of the rather limited amount of research data, focused on predominantly Finnish gaming-related companies and organizations, the conclusions and results can be strengthened or weakened due to future research. It seems, according to the interviewees and the literature review, that game development as a phenomenon, and as a process, is not the same in all cultures, countries, regions and ethnicities, so the results might be proven to be only applicable locally. The interviews also presented that most CS-enabled game development projects are quite unique by nature. This might also cause the results to only reflect the cases of only Finnish game studios, or only the cases of the game studios in this study. Crowdsourcing in video game development is a rather new phenomenon. New techniques, platforms and companies arise and fall. Therefore, the results may or may not be relevant in the future.

As the researcher goes through the collected interview data, he makes decisions about which data he will present for the reader and how it will be presented (Ruusuvuori, Nikander & Hyvärinen, 2010). The validity of the study refers to the capability of the measurement tool or the research method to measure the factor that is meant to be measured. Therefore, for example, when conducting an interview, it is very important to shape the questions in a way that is as self-explanatory as possible. In this way, misunderstanding of the questions and answers can be minimized for optimal clarity. When conducting qualitative research, detailed information of the research as a whole and of all its phases might also increase the reliability of the study. Triangulation refers to the use of various kinds of research methods, and it can be also utilized to increase the validity of the study. (Hirsjärvi et al; 2009)

The interview questions were presented quite early in the research process, much before the interviews were conducted. They were revisited and modified once with the supervisor of the thesis. The aim was to make the questions as self-explanatory as possible to avoid possible misunderstandings. Most of the interviews were conducted in the Finnish language, but some were conducted in English, so there were Finnish and English versions of the question patterns. A document was made in the possible case, that the interviewee would not know the meanings of field-specific terms, such as crowdsourcing, but it was never needed, because all of the interviewed persons had previous knowledge about the topics of this study. The validity of this study is enhanced by the fact there was always a possibility to explain the questions and terms during the

interviews and to ask the questions again, if they were misheard or misunderstood. Therefore, open questions were chosen in the first place to be optimal for this type of study. To maximize the quality and quantity of information gained from the interviews, all interviews were recorded, and notes were taken during the interviews. The recordings were re-watched and transcribed carefully to find all relevant information. The pieces of information were inserted into an Excel spreadsheet to combine information and find out trends, phenomena etc.

The reliability of the study refers to the repeatability of the results of the study, and repeatability means the capability of the study to output coincidental results (Hirsjärvi et al., 2009). The methods and practices regarding this study were thoroughly chosen with the thesis supervisor, who is very accomplished in the field of IS research. Game studios seem to be rather unique and heterogenous, when it comes to their processes, staff, image, games they make and their view on video game markets and industries. They often have complex service systems and networks of various parties. As there are over 250 game studios in Finland alone, it cannot be confirmed from the findings, that the results of the interviews would be generalizable for all the game studios in Finland. The results might be partially affected by the fact that video calls were used to conduct the interviews. Some technical issues affected the interviews, which would have been avoided if it were possible to conduct the interviews in person. This was impossible in the case of this study, caused by the global coronavirus pandemic.

The developed framework aims the be as generalizable as possible to create practical value, especially for Finnish game studios, which were the primary research target. Many potentially relevant factors were intentionally left out of the framework. Much consideration went into the creation of the framework, and it was determined that adding the mentioned factors might affect the applicability of the framework. The interviews were anonymous, and carefully designed and conducted to gain relevant and authentic results.

9.2 Future research

This research paper has provided new information about the utilization of CS in the Finnish video game industry. The findings are clear, but as the views of the interviewees on the popularity of CS in the Finnish game industry were mixed and heterogenous, there are no public facts about the popularity of crowdsourcing in the Finnish game industry, and there should be more documented cases and data available to the public to seek more benefits for the video game industry of Finland, especially if Finnish game studios and organizations begin sharing information about their utilization of crowdsourcing more than they do currently. The Finnish game industry is rather small on a global scale, and various factors remain unstudied in this context, so there are many possibilities and needs for future research on the topic.

As this study focused more on the initiators of CS, research on CS participants should be executed to gain deeper understanding on the topic and context. The research could be compared to this master's thesis to either strengthen or weaken the findings. There were various ways CS was initiated among all the interviewees and the companies and organizations they represented. The developed framework aims to be as generalizable as possible, but it can't necessarily be applied in any type of CS-enabled video game development project, so it would be useful to apply the developed framework in more use cases. In the future, it is recommended to study the utilization of different forms of crowdsourcing more precisely, and other specified forms of CS, which weren't utilized by the game studios interviewed in this study.

REFERENCES

Alqahtani, B., El-shoubaki, R., Noorwali, F., Allouh, D., & Hemalatha, M. (2017). Legal and Ethical Issues of Crowdsourcing. *International Journal of Computer Applications, 167*(10), pp. 1-3.

Agafonovas, A. & Alonderienė, R. (2013). Value Creation in Innovations Crowdsourcing. Example of Creative Agencies. *Organizations and markets in emerging economies, 4*(1).

Antikainen, M., & Väätäjä, H. (2010). Rewarding in open innovation communities—How to motivate members. *International Journal of Entrepreneurship and Innovation Management, 11*(4), p. 440–456.

Baraniuk, C. (2014, September 24). Buttonmasher: Gaming bots learn from how we play. New Scientist. Retrieved from https://www.newscientist.com/article/mg22329884-300-buttonmasher-gaming-bots-learn-from-how-we-play/

Blackburn, J. & Kwak, H. (2014). STFU NOOB! Predicting Crowdsourced Decisions on Toxic Behavior in Online Games.

Blohm, I., Leimeister, J. & Krcmar, H. (2013). Crowdsourcing: How to Benefit from (Too) Many Great Ideas. *MIS Quarterly Executive: Vol. 12 : Iss. 4 , Article 3.*

Blohm, I., Zogaj, S., Bretschneider, U. & Leimeister, J. (2018). How to Manage Crowdsourcing Platforms Effectively? *California Management Review, Vol 60, Issue 2*, p. 122- 149, doi: 10.1177/0008125617738255

Brabham, D. (2008). Crowdsourcing as a Model for Problem Solving: An Introduction and Cases. *Convergence (London, England), 14*(1), pp. 75-90. doi:10.1177/1354856507084420

Brabham, D. (2013). *Crowdsourcing*. Cambridge, Massachusetts; London, England: The MIT Press.

Capati, M. (2015, June 24). Crowdsourcing Games: From Entertainment to Space Probes. Crowdsourcing Week. Retrieved from crowdsourcingweek.com/blog/crowdsourcing-games/

Counter-Strike: Global Offensive Blog. (2020, May 6). Overwatch FAQ. Retrieved from https://blog.counter-strike.net/index.php/overwatch/

Davidovici, M. (2009). The Dynamics of Co-Creation in the Video Game Industry: The Case of World of Warcraft. *Communications & Strategies. 1,* pp. 43-66.

Djelassi, S. & Decoopman, I. (2013). Customers' participation in product development through crowdsourcing: Issues and implications. *Industrial Marketing Management, 42*(5), pp. 683-692.

Drachen, A. (2018, September 24). What Are Game Metrics? GameAnalytics. Retrieved from https://gameanalytics.com/blog/what-are-game-metrics.html

Electronic Arts. (2012, May 18). Origin Waives Distribution Fees For Crowd-Sourced Games. Electronic Arts Inc. Retrieved from https://www.ea.com/news/origin-waives-distribution-fees-for-crowd-sourced-games?isLocalized=true

Fedorenko, I. & Berthon, P. (2017). Beyond the expected benefits: Unpacking value co-creation in crowdsourcing business models. *AMS Review, 7*(3), pp. 183-194. doi:10.1007/s13162-017-0106-7

Fold.it. (2020). The Science Behind Foldit | Foldit. Retrieved from https://fold.it/portal/info/about

Gatautis, R. (2014). Crowdsourcing Application in Marketing Activities. *Procedia - Social and Behavioral Sciences, 110*(C), pp. 1243-1250.

Grönroos, C. (2008). Service logic revisited: who creates value? And who cocreates? *European business review, 20*(4), pp. 298-314.

Grönroos, C. (2017). On Value and Value Creation in Service: A Management Perspective. *Journal of creating value, 3*(2), pp. 125-141. doi:10.1177/2394964317727196

Grönroos, C., & Voima, P. (2013). Critical service logic: making sense of value creation and co-creation. *Journal of the academy of marketing science, 41*(2), 133-150.

Hammon, L. & Hippner, H. (2012). Crowdsourcing. *Business & Information Systems Engineering, 4*(3), pp. 163-166. doi:10.1007/s12599-012-0215-7

Heinonen, K., Strandvik, T. & Voima, P. (2013). Customer dominant value formation in service. *European Business Review, 25*(2), pp. 104-123. doi:10.1108/09555341311302639

Hight, J. & Novak, J. (2008). *Game development essentials: Game project management*. Clifton Park, NY: Thomson Delmar Learning.

Hirsjärvi, S. & Sinivuori, E. (2000). *Tutki ja kirjoita (6. uud. laitos.)*. Helsinki: Tammi.

Howe, J. (2006). The rise of crowdsourcing. *Wired magazine, 14*(6), 1-4.

Howe, J. (2008) *Crowdsourcing: why the power of the crowd is driving the future of business.* Random House, New York.

Järvi, H., Kähkönen, A. & Torvinen, H. (2018). When value co-creation fails: Reasons that lead to value co-destruction. *Scandinavian Journal of Management, 34*(1), pp. 63-77. doi:10.1016/j.scaman.2018.01.002

Kelly, L., Plassaras, N., & Tung, C. (2018, January 8). Crowdsourced Content In Video Games: How Ownership Issues Almost "Ganked" A Copyright Case. Mondaq.Com. Retrieved from https://www.mondaq.com/unitedstates/copyright/661628/crowdsourced-content-in-video-games-how-ownership-issues-almost-ganked-a-copyright-case

Kohler, T. (2015). Crowdsourcing-Based Business Models: . How to Create and Capture Value. *California Management Review, 57*(4), pp. 63-84.

Kokko, J., Vartiainen, T., & Tuunanen, T. (2018). Value Co-Creation and Co-Destruction in Online Video Games: An Exploratory Study and Implications for Future Research. *Proceedings of the 51st Hawaii International Conference on System Sciences (HICSS 2018).* pp. 1158-1167. University of Hawai'i at Manoa. Retrieved from http://hdl.handle.net/10125/50031.

Kotwani, B. (2020, August 18). What is VACnet, a deep learning product of CS:GO's Overwatch? TalkEsport. Retrieved from https://www.talkesport.com/news/what-is-vacnet-a-deep-learning-product-of-csgos-overwatch/

Lagrosen, S. (2005). Customer involvement in new product development. *European Journal of Innovation Management, 8*(4), pp. 424-436.

Lebraty, J. & Lobre-Lebraty, K. (2013). *Crowdsourcing: One step beyond.* Hoboken, NJ: Wiley.

Leicht, N., Durward, D., Blohm, I., and Leimeister, J. (2015). Crowdsourcing in Software Development: A State-of-the-Art Analysis. *BLED 2015 Proceedings.* 16.

Leicht, N., Blohm, I., & Leimeister, J. M. (2017). Leveraging the power of the crowd for software testing. *IEEE Software, 34*(2), pp. 62-69.

Liang, H., Wang, M. M., Wang, J. J., & Xue, Y. (2018). How intrinsic motivation and extrinsic incentives affect task effort in crowdsourcing contests: A mediated moderation model. *Computers in Human Behavior, 81*, pp. 168-176.

Lintula, J., Tuunanen, T., & Salo, M. (2017a). Conceptualizing the Value Co-Destruction Process for Service Systems : Literature Review and Synthesis. *Proceedings of the 50th Hawaii International Conference on System Sciences (HICSS 2017)*, pp. 1632- 1641. IEEE Computer Society. Retrieved from http://hdl.handle.net/10125/41350.

Lintula, J., Tuunanen, T., Salo, M., & Kari, T. (2017b). Understanding Augmented Reality Game Players : Value Co-destruction Process in Pokémon Go. *ECIS 2017 : Proceedings of the 25th European Conference on Information Systems, Guimarães, Portugal, June 5-10, 2017*, pp. 3092-3101. European Conference on Information Systems. Retrieved from http://aisel.aisnet.org/ecis2017_rip/56.

Lusch, R. & Vargo, S. (2006). The service-dominant logic of marketing: Dialog, debate, and directions.

Mao, K., Capra, L., Harman, M., & Jia, Y. (2015). A survey of the use of crowdsourcing in software engineering. *Rn, 15*(01).

Mesenaatti.me. (2020). Tervetuloa Joukkorahoitus. Retrieved from https://mesenaatti.me/tervetuloa-yhteisorahoitus/

Morschheuser, B., Hamari, J. & Koivisto, J. (2016). Gamification in Crowdsourcing: A Review. 10.1109/HICSS.2016.543.

Muhdi, L., Daiber, M., Friesike, S. & Boutellier, R. (2011). The crowdsourcing process: An intermediary mediated idea generation approach in the early phase of innovation. *International Journal of Entrepreneurship and Innovation Management, 14*(4), p. 315. doi:10.1504/IJEIM.2011.043052

Namousi, A. & Svenningsson Kohl, D. (2016). Crowdsourcing in Video Games: The Motivational Factors of the Crowd. *The Computer Games Journal, 5*(3), pp. 149-163. doi:10.1007/s40869-016-0021-4

Nassar, L. & Karray, F. (2019). Overview of the crowdsourcing process. *Knowledge and Information Systems, 60*(1), pp. 1-24. doi:10.1007/s10115-018-1235-5

Neogames Finland ry. (2019). The Game Industry of Finland – Report 2018. Retrieved from http://www.neogames.fi/wp-content/uploads/2019/04/FGIR-2018-Report.pdf

Neogames Finland ry. (2020). Tietoa toimialasta. Retrieved from https://neogames.fi/fi/tietoa-toimialasta/

Nieva, J. (2020). Foldit Is Crowdsourcing Solutions For Coronavirus. Player.One. Retrieved from https://www.player.one/foldit-crowdsourcing-solutions-coronavirus-133443

Niu, X., Qin, S., Vines, J., Wong, R. & Lu, H. (2019). Key Crowdsourcing Technologies for Product Design and Development. Report. *International Journal of Automation and Computing, 16*(1), p. 1. doi:10.1007/s11633-018-1138-7

Normoyle, A. & Drake, J. & Likhachev, M. & Safonova, A. (2012). Game-Based Data Capture for Player Metrics. *Proceedings of the 8th AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment,* AIIDE 2012. 44-50.

Olson, D. & Rosacker, K. (2013). Crowdsourcing and open source software participation. *Service Business.* 7. 10.1007/s11628-012-0176-4.

Orland, K. (2014). Epic Announces Crowdsourced Dev Model For Next Unreal Tournament. Ars Technica. Retrieved from https://arstechnica.com/gaming/2014/05/epic-announces-crowdsourced-dev-model-for-next-unreal-tournament/

Panda, S. (2018, September 26). The Benefits of Crowdsourcing Testers for Online Games. Topcoder. Retrieved from https://www.topcoder.com/crowdsourcing-testers-for-online-games/

Pascarella, L., Palomba, F., Di Penta, M. & Bacchelli, A. (2018). How Is Video Game Development Different from Software Development in Open Source? *Proceedings of the 15th International Conference on Mining Software Repositories,* MSR. ACM, New York, NY.

Pedersen, J., Kocsis, D., Tripathi, A., Tarrell, A., Weerakoon, R., Tahmasbi, N., Xiong, J., Deng, W., Oh, O. & de Vreede, G. (2013). Conceptual Foundations of Crowdsourcing: A Review of IS Research. *Proceedings of the Annual Hawaii International Conference on System Sciences.* 10.1109/HICSS.2013.143.

Phillips, T. (2014, July 15). Bioware Surveys Fans For Mass Effect 4 Input. Eurogamer.net. Retrieved from https://www.eurogamer.net/articles/2014-07-15-bioware-surveys-fans-for-mass-effect-4-input.

Plé, L. & Cáceres, R. (2010). Not always co-creation: introducing interactional co-destruction of value in Service-Dominant Logic. Keywords. *Journal of Services Marketing. 24*. Pp. 430-437. 10.1108/08876041011072546.

Poor, N. (2014). Computer game modders' motivations and sense of community: A mixed-methods approach. *New media & society, 16*(8), pp. 1249-1267. doi:10.1177/1461444813504266

Prahalad, C. & Ramaswamy, V. (2004). Co-creating unique value with customers. *Strategy & Leadership, 32*(3), pp. 4-9. doi:10.1108/10878570410699249

Rai, A. & Sambamurthy, V. (2006). Editorial notes—the growth of interest in services management: opportunities for information systems scholars, pp. 327-331.

Rechenberger, T., Jung, V., Schmidt, N. & Rosenkranz, C. (2015). Utilizing the Crowd – A Literature Review on Factors influencing Crowdsourcing Initiative Success. *PACIS 2015 Proceedings*, pp. 250.

Ruusuvuori, J., Nikander, P. & Hyvärinen, M. (2010). *Haastattelun analyysi*. Tampere: Vastapaino.

Sharma, A. (2010). Crowdsourcing Critical Success Factor Model. London School of Economics.

Shieber, J. (2018, June 12). Ubisoft Partners With Hitrecord To Crowdsource Ideas For Beyond Good And Evil 2. Techcrunch.com. Retrieved from https://techcrunch.com/2018/06/11/ubisoft-partners-with-hitrecord-to-crowdsource-ideas-for-beyond-good-and-evil-2/

Sivula, A. (2016). Generic crowdsourcing model for holistic innovation management. Vaasa: University of Vaasa.

Steam Store. (2019). Noita on Steam. Retrieved from https://store.steampowered.com/app/881100/Noita/

Stol, K. & Fitzgerald, B. (2014). Two's company, three's a crowd: A case study of crowdsourcing software development.

Storbacka, K., Brodie, R., Böhmann, T., Maglio, P. & Nenonen, S. (2016). Actor engagement as a microfoundation for value co-creation. *Journal of business research, 69*(8), pp. 3008-3017. doi:10.1016/j.jbusres.2016.02.034

UN-Habitat. (2016, January). Using Minecraft 4 Youth Participation in Urban Design & Governance. United Nations. Retrieved from www.un.org/youthenvoy/2016/01/using-minecraft-4-youth-participation-urban-design-governance/

Valve Corporation. (2020a). About Us - Valve Corporation. Valve Software. Retrieved from https://www.valvesoftware.com/fi/about

Valve Corporation. (2014, May 16). 100 Games Now Using Steam Workshop. Steam Community. Retrieved from https://steamcommunity.com/games/SteamWorkshop/announcements/detail/149882681592861148?l=finnish

Valve Corporation. (2020b). Steam Workshop. How it works. Steam Community. Retrieved from https://steamcommunity.com/workshop/workshopsubmitinfo

Valve Corporation. (2015, January 28). Content Creators Earn Over $50M Through Steam Workshop, Can Now Earn Money in More Games. Steam Community. Retrieved from https://steamcommunity.com/games/SteamWorkshop/announcements/detail/154581565731694927

Valve Corporation. (2020c). Steam, The Ultimate Online Game Platform. Steam. Retrieved from https://store.steampowered.com/about/

Vargo, S. & Lusch, R. (2004). Evolving to a new dominant logic for marketing. *Journal Of Marketing, 68*(1), pp. 1-17.

Vargo, S. & Lusch, R. (2008). Service-dominant logic: Continuing the evolution. *Journal of the Academy of Marketing Science, 36*(1), pp. 1-10. doi:10.1007/s11747-007-0069-6

Vargo, S., Maglio, P. & Akaka, M. (2008). On value and value co-creation: A service systems and service logic perspective. *European Management Journal, 26*(3), pp. 145-152. doi:10.1016/j.emj.2008.04.003

Vargo, S. & Lusch, R. & Akaka, M. (2010). Advancing Service Science with Service-Dominant Logic. 10.1007/978-1-4419-1628-0_8.

Wilson, K. (2018). Crowdsourcing. *International Journal of Operations & Production Management, 38*(6), pp. 1467-1494.

Xu, B., Jones, D. & Shao, B. (2009). Volunteers' involvement in online community based software development. *Information & Management, 46*(3), pp. 151-158. doi:10.1016/j.im.2008.12.005

Xu, X., Wu, W., Wang, Y. & Wu, Y. (2015). Software crowdsourcing for developing Software-as-a-Service. *Frontiers of Computer Science, 9*(4), pp. 554-565. doi:10.1007/s11704-015-4900-9

Yasinski, E. (2020, March 9). Scientists Use Online Game To Research COVID-19 Treatment. The Scientist Magazine. Retrieved from https://www.the-scientist.com/news-opinion/scientists-use-online-game-to-research-covid-19-treatment-67230

Ye, H., & Kankanhalli, A. (2013). Leveraging Crowdsourcing for Organizational Value Co-Creation. *Communications of the Association for Information Systems, 33*. Retrieved from https://doi.org/10.17705/1CAIS.03313

Zhang, T., Lu, C., Torres, E. & Chen, P. (2018). Engaging customers in value co-creation or co-destruction online. *Journal of Services Marketing, 32*(1), pp. 57-69. doi:10.1108/JSM-01-2017-0027

APPENDIX 1. INTERVIEW QUESTIONS

1. What are your general views of game development via utilizing crowdsourcing?
2. What risks do you think exist when utilizing crowdsourcing in game development?
3. What other challenges do you think exist when utilizing crowdsourcing in game development?
4. What benefits do you think to exist when utilizing crowdsourcing?
5. Do you or the company/organization you represent have experiences with crowdsourced video game development? (Examples?)
6. What type/form of crowdsourcing have you utilized in your game development projects?
7. What made you consider utilizing crowdsourcing?
8. How is your typical game development process like?
9. Do you have experiences with outsourcing areas of your game development? Could these areas be crowdsourced?
10. How do you engage your customers in creation of new games?
11. How do you engage your customers in updating of your current games?
12. Have you considered utilizing crowdsourcing in your future game development processes?
13. Why have you utilized/not utilized crowdsourcing in in your game development?
14. What has been the greatest benefit you achieved via crowdsourcing?
15. What kind of value can be created via crowdsourcing? (customers/company?)
16. Why don't Finnish game studios utilize crowdsourcing more than they currently do?
17. Is Finnish game development or Finnish game studios different compared to other countries?
18. How could Finnish game studios be encouraged to utilize crowdsourcing more in game development projects?

APPENDIX 2. INTERVIEW ANSWERS AND CLASSIFICATION

Interviews v. 1.0			
Question	**Answer/ classification**	**Specified occurrences**	**Number of occurrences**
Overall general views on CS	Positive		9
	Neutral		2
	Negative		0
Experience on crowdsourcing	0-1 projects		5
	2-3 projects		6
Risks and challenges of CS	Communication with the crowd		8
	Filtering of the crowd's output		8
	Balancing between the vision of the game studio and the crowd		6
	Additional work		5
	Allocation of resources		5
	Balancing between crowd feedback and analytics		5
	Management of the crowd		5
	The crowd isn't in direct employment		4
	Knowing the target market		3
	Responsibility of the crowd		3
	Attracting participants		3
	Paying for crowdsourced content		3
	Potential need for more employees		2
	Mutual trust between parties		2
	Planning CS		2
	Publisher relations		2
	Legal issues		2
	Information leaks		2
	Confidentiality		2

	Ethical issues		2
	Becoming "blinded" by the studio's vision		2
	Open Source issues		1
	The crowd's understanding of game development		1
	Project consideration		1
	Monetization of UGC-intensive games		1
	Consistency		1
	Marketing		1
	Becoming "blinded" by the crowd's wishes		1
	Aligning the product leadership strategy with CS		1
Benefits of CS	Active community		11
	Value creation		10
	Scaling of data		7
	Validation of ideas		6
	Growth of networks		5
	Scaling & volume		3
	Increases motivation		3
	Thinking outside the box		2
	Money		2
	Inspiration		2
	Revealing issues that might not be noticed in-house		2
	Win-win situation for all parties		2
	Helps find employees		2
	More sales of games		1
	Performance boost		1
	Faster production		1
	Event production		1
	Encouragement for the studio		1
	Understanding of player reactions		1
	In-house learning from experiences		1
	New marketing opportunities		1
	Low threshold to join		1
Type/form of CS	Crowdwisdom	Ideas, feedback, idea validation etc.	11

	CS & Innovation	Generating ideas	8
	Crowdjobbing	Testing & QA	8
	Crowdjobbing	Content creation	5
	Crowdjobbing	Finding employees	3
	Crowdfunding		3
	Crowdauditing		1
	CS & Authenticity		0, debata-ble
	Crowdcontrol		0
	Crowdcuration		0
	Crowdcare		0
	CS & Forecasting		0
What made the com-pany utilize CS?	Accident		4
	Self-evident for company values		3
	Community is vital for the game		2
	Personal passion for UGC games		1
	Due to previous positive experiences		1
	CS was seen as a great tool for community growth		1
	Games are made for the players afterall		1
How are the customers engaged?	Social medias (Facebook, Instagram, Twitter etc.)		8
	Discord		7
	Reddit		3
	Steam		3
What do the customers do in terms of game de-velopment?	Intellectual input		11
	Produce metrics		10
	Testing/QA		8
	User-generated content		5
	Mods		2
	Programming		1
Future utilization of CS?	Yes		10
	Maybe		1
	No		0
Reasons to utilize CS?	Because it creates value		8

	Because it "suits" the studio		5
	It is important for the company		4
Is CS particularly important for the initiator?	Yes		10
	No		1
Utilization of outsourcing?	Yes		7
	No		4
What is being outsouced?	Audio design		4
	Composing		3
	Art design		2
	Attracting crowds		2
	Quality assurance		2
	Publishing		2
	Graphics design		2
	Part-time employees		1
	Game mechanics		1
	Player services		1
	Help with crowdfunding		1
	Script writing		1
Could OS be replaced by CS?	No		7
	Maybe (in the future)		4
	Yes		1
Customer side value	Feelings	Being able to affect the game	11
	Feelings	Passion	7
	Personal gains	Skill presentation	6
	Feelings	Pride	5
	Feelings	Connection	5
	Feelings	Interest	5
	Personal gains	Skill development	5
	Usability	Enhancement of gameplay	5
	Feelings	Being listened to	4
	Usability	Easy to communicate with game developers	4
	Feelings	Excitement	3
	Feelings	Commitment	3
	Feelings	Motivation	3
	Feelings	Being important	3

	Usability	Personal expression	3
	Usability	Having a personal asset in the game	3
	Feelings	Joy	2
	Feelings	Being useful	2
	Feelings	Comradery with the community	2
	Personal gains	Personal reputation	2
	Personal gains	Employment opportunities	2
	Personal gains	Finding peers	2
	Other	Harnessing interests	2
	Other	Harnessing hobbies	2
	Feelings	Privilege	1
	Feelings	Trust	1
	Feelings	Worth	1
	Feelings	Relatability	1
	Tangible rewards	Merchandise	1
	Tangible rewards	Discounts	1
	Tangible rewards	Money	1
	Tangible rewards	Other	1
Company side value?	Feedback		11
	Community growth		10
	Creation of ideas and suggestions		10
	Marketing	Visibility for the game	9
	Communal testing & QA		9
	Optimization of the game		9
	Validation of ideas		6
	Business	More potential customers	6
	Marketing	Free marketing	5
	Marketing	Network improvement	5
	In-game content		5
	Business	Customer retention	4
	Business	Saving resources	4
	Business	Longer game lifecycle	3
	Business	More sales	3
	Experimentation		2
	Development prioritization		2
	Learning skills		2
	Marketing	Improvement of PR value	1

	Business	Competitive ad-vantage	1
	Loyal and active userbase		1
	Deeper understanding of the players		1
	Business	"Sales safety"	1
Critical key factors for successful CS	High quality communication		10
	Planning		4
	Setting clear goals		3
	Sticking to the goals		3
	Common rules & guidelines		3
	Management of the crowd		3
	Building a strong community		2
	Interactional skills		2
	Openness		2
	Early testing		1
	Have an existing network to attract participants		1
	Knowing the crowd		1
	Understanding the need for resources		1
	Commitment to CS		1
	Entry & exit criteria		1
Why isn't CS used more in Finnish game development?	Both	Not beneficial for all types of games	6
	Both	Depends on the type of CS project	6
	Individual-related reasons	"The Finnish nature"	5
	Individual-related reasons	Introvertedness	4
	Individual-related reasons	Fear of upsetting the crowd	4
	Both	The possibility of idea theft	4
	Individual-related reasons	Old-fashioned views/ prejudices	4
	Both	Too many risks	4
	Individual-related reasons	Difficult for people to present their projects	3
	Business-related reasons	Outsourcing	3
	Business-related reasons	Requires additional resources	3

	Both	The "Finnish way of developing games"	2
	Both	Fear of value co-destruction	2
	Both	Trust issues	2
	Business-related reasons	Technical issues	2
	Business-related reasons	Possibility of negative marketing	2
	Individual-related reasons	Lack of experience	2
	Individual-related reasons	Lack of skills	2
	Individual-related reasons	"Too much pride" in own ideas	2
	Individual-related reasons	Lack of information	2
	Individual-related reasons	Finnish game studios not sharing CS-relevant information	2
	Individual-related reasons	Professionalism	2
	Individual-related reasons	Communication challenges	1
	Individual-related reasons	Finns often not marketing-oriented	1
	Individual-related reasons	Habit	1
	Business-related reasons	Small budgets	1
	Individual-related reasons	Fear of misuse of assets	1
	Both	No need for it	1
	Business-related reasons	Contract issues	1
	Business-related reasons	Disrupts main objectives	1
	Business-related reasons	Too few investments into the gaming industry	1
	Individual-related reasons	More an individual than a business issue	1
	Individual-related reasons	"Creative people usually don't like crowds"	1
	Business-related reasons	Requires additional work	1
	Both	More focus on negative than positive results	1
	Business-related reasons	Might reduce sales	1
	Business-related reasons	Works only for public projects	1

	Business-related reasons	Monetization	1
	Business-related reasons	No Finnish game publishers	1
	Both	Overall difficulty	1
	Both	Attraction of partici-pants	1
	Both	Crowd management is difficult	1
Finnish game studios and game industry com-pared to other countries?	Especially open		6
	Unique/special/exceptional		5
	Sharing of information		5
	Especially collaborative		4
	Especially communal		4
	People know each other in Finland		4
	Other studios not seen as direct competitors		3
	Sense of comradery		3
	Technically capable		3
	Positive culture		2
	Especially friendly		1
	Especially encouraging		1
	Strong trust		1
	Easy to improve skills and strategy		1
	Experienced		1
	High coverage in the media		1
	The game industry is important for the state		1
	Responsibility		1
	High quality of production		1
	Being a Finnish game is a unique selling point		1
How to encourage Finn-ish game studios to uti-lize CS more in game development?	Sharing information and experiences		8
	Events		5
	Speeches		4
	Self-examination of game studios		3

	Growing networks		3
	Examining existing cases		2
	Collaboration		2
	Education		2
	Understanding value creation potential		1
	Valid solutions		1
	The Finnish game industry will follow development		1