

Design and Innovation in Game Development

Observations in 7 Small Organizations

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

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

I. INTRODUCTION

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

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

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

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

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

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

II. RELATED RESEARCH

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

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

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

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

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

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

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

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

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

III. RESEARCH METHOD

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

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

A. Data Collection

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

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

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

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

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

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

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

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

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

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

B. Data Analysis

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

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

TABLE I. INTERVIEW ROUNDS AND THEMES

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

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

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

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

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

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

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

TABLE II. DESCRIPTION OF THE ORGANIZATIONS

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

¹Amount of people contributing to the released product, size by SME

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

IV. RESULTS

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

A. Categories

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

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

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

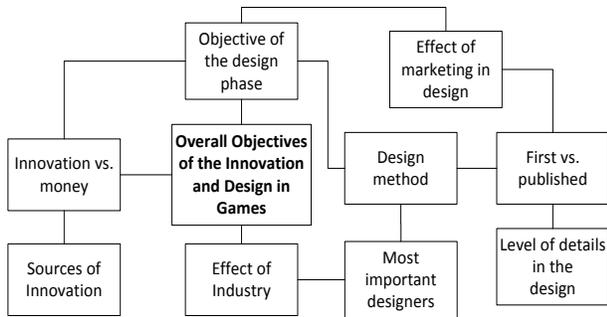


Figure 1: The main relationships between the study categories; the lines represent categories which share related features.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1) Game product design is driven by economic factors.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

V. DISCUSSION

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

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

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

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

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

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

VI. CONCLUSIONS

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

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

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

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

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