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Games and Innovation Research Seminar 2011 Working Papers

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Introduction

The games industry carries the image of innovation and creativity, but still we know relatively little about the innovation processes that take place within the domain. To date, games and innovation have been studied in several disparate fields, including cultural studies, information sciences, design research and industrial economics and management. Perhaps due to such a fragmented nature of academic work on the subject, the bulk of the influential work on games and innovation is found in practically oriented guidebooks authored by experienced games industry experts (e.g. Adams, 2009; Salen & Zimmerman, 2003; Fullerton 2008).

Within the multidisciplinary field of game studies, a variety of topics have been examined. For instance, how players participate and could participate to the design of a game (e.g. Sotamaa, 2009; Sihvonen, 2009), how the medium and specific genres have developed through the time (e.g. Juul, 2007; Zagal et al., 2008; Fernández-Vara, 2011), what kind of work cultures are evolved around the games industry within different countries (e.g. Kerr, 2011; Chung, 2010; Cadin et al. 2006), how game designers come up with new ideas (e.g. Hagen, 2009; Kultima, 2010) or how to solve a specific design problem to support innovation (e.g. Fullerton et al., 2006). However, these studies do not necessarily build on each other.

Somewhat isolated from the game studies, in the management field the games industry has remained a marginal and somewhat quirky research site. So far, top journals have published a few studies on the hardware side of the business (e.g. Clements & Ohashi, 2005; Schilling, 2003; Shankar & Bayus, 2003; Venkatraman & Lee, 2004) while game development has received far lesser attention (for notable exceptions, see Aoyama & Izushi, 2003; Cohendet & Simon, 2007; Tschang, 2007).

Games and Innovation Research Seminar 2011

In spring 2011 University of Tampere Game Research Lab in collaboration with Aalto University organized a working paper seminar with the aim of bringing together scholars of games and innovation from diverse fields and stimulating dialogue between them. Moreover, the goal of the seminar was to encourage the further development of rigorous academic research on the topic while keeping the work accessible to game professionals.

The event in question was the seventh in the annual series of game studies working paper seminars organized by Game Research Lab. The topics that were examined included the praxis of game development, the characteristics of innovation in game context, supply and demand for innovation in games, creativity and games, and the relationship of game innovation and management practices. The seminar concentrated on discussing work in progress and the papers presented in the seminar are published in this proceedings.

In order to spark the discussion from multiple viewpoints, we invited commentators for the working papers from different professions. The seminar was chaired by Professor *Frans Mäyrä* from University of Tampere. Invited paper commentators included associate professor *F. Ted Tschang* from Singapore Management University, and Dr. *Mirva Peltoniemi* from Aalto University School of Science. We also invited an industry representative consultant and former IGDA president *Jason Della Rocca* to instigate more practice-oriented discussion as suited to the topic of the seminar.

The working papers were distributed to both the official commentators and the participants prior to the seminar for peer-review and as a basis for the discussion at the seminar. The combination of the participants and commentators provided multitude views for the papers from different fields; management studies, design research, cultural studies, sociology, philosophy, political sciences and information sciences to name a few, as well as perspective from the side of the industry and business of making games. We also had

remarkably international representation. The countries that were represented by the speakers alone were Finland, Sweden, Denmark, the Netherlands, Spain, Singapore, Brazil and Australia.

Game Research Lab Spring Seminar has been traditionally an area of peer-to-peer discussions and thereby providing support in refining and improving research work in this area. Papers present different stages of work in progress, some papers being more ready for final publication and some being on the level of early work. They also present different traditions of domains: some more technical, some theoretical, some with qualitative data; interview studies, design experiments, ethnographies and so on. This should be kept in mind while reading these papers.

The collection of the seminar working papers presents an interesting variety of views from management of game production, philosophy behind game innovation and to the specific advancements in game innovations, such as avatar modification. The publication is also an image of the era: game cultures as well as tools and processes are going through constant changes and development.

The Context, The Process and The Player

We have divided the papers into three different groups: The Context, The Process and The Player. **The first section of the papers – The Context - analyzes the context of game innovation, namely innovation in industry history and the economic and societal realities within which game innovation takes place.**

In her paper, *Kati Alha* presents a study on game history books and their take on the most influential games in history. The lesson that we can learn from the short history of digital games is that innovation is not merely about the originality of the idea. It is necessary to find the right time and right place to develop the game, as well as seeing what has already been done and learning from other games that have existed before.

Juho Karvinen discusses the game industry from the perspective of evolutionary economics. Game companies face an environment that constantly changes. Therefore, the introduction of variation, i.e. new games and new technologies, is required to please the selection environment. This also creates opportunities for innovative start-up firms to introduce novel ideas and create a market for their products.

Guiditta De Prato and *Jean Paul Simon* discuss the history of the game industry and how it relates to other digital industries. In their view, the game industry is one of the most innovative labs of the growing digital economy. They concentrate in innovation in distribution: how digital distribution may be taking over the boxed product in the future.

David B. Nieborg describes the phenomenon of blockbuster games and how they are taking over the market and dominating sales. From the perspective of critical theory, this reduces the variety of products available in the market and limits the cultural alternatives developers and consumers may experiment with. The rising cost of game development and the publishers' preference on "sure hits" thus sets limits to innovation within the field.

Larissa Hjorth and *Michael Arnold* examine the playculture of Happy Farm, Chinese version of FarmVille. The interest here is on mobility, media literacy, and the casual game experience. The interviewees indicate that the game is used for inter-generational communication where different generations show varying ways of using the product for their specific purposes. Therefore, users choose particular methods to enjoy the product which may differ vastly from the purposes for which the game was designed. The conclusion is that users may be innovative in using new products and such innovativeness may also spur from low levels of media literacy rather than from the user being especially skilled.

The second section – The Process - focuses on the game development process from the perspective of design practices. Various tools for the purpose of aiding the work of game designers are presented and evaluated in these papers.

Annakaisa Kultima, Juha Köönikkä and *Juho Karvinen* present the findings of an experimental study on Finnish game professionals' innovation processes. They state that in the descriptions of game innovation processes one can see at least four different overlapping philosophies for game innovation: idea centric, human centric, evaluation centric and iteration centric approaches.

Jon Manker presents the findings of an interview study on Swedish game professionals and their take on prototyping. He states that there are at least three complementing views on how to understand prototyping: views are seen through variation theory, activity theory and rhetoric. He also states that these views are not something that one should necessarily combine: they are different levels of prototyping as parts of game design processes.

Richard C. Davis introduces a specific tool developed for the needs of game developers. Prototyping tool PlaySketch is mixing storyboards and animation to help the sketching needs of game designers. Tools like these and their development are an important part of the tool ecosystems that help the daily creative work of game professionals.

Kim Nevelsteen and *Sergio Gayoso* discuss the role of game design documents (GDD) within the game production processes. Based on the examination of discussions and game design post-mortems as well as their design experiment, they form new GDD medium to ease the process of making games.

In their paper *Timo Nummenmaa, Kati Alha* and *Annakaisa Kultima* present a design experiment, where a formal model approach was applied to a game design process. With the help of formal models it is possible to simulate potential changes to game designs. This has interesting implications for the future of game development tools.

Sebastian Möring evaluates the art of making games from the perspective of conceptual blending theory. He states that interesting concepts, such as Tuper Tario Tros. and Hell, can be better understood by the help of the conceptual blending theory. According to the theory, we construct creative thoughts by blending existing concepts; this view sheds a light also to the mechanisms of game creation and thus could be one of the approaches in developing game design theory and practices further.

The last section – The Player - focuses on the relationship between the players and the game developers. The main question in this section is how to include the users into the innovation process - whether it is before or during the gameplay or game development.

In her paper *Tanja Sihvonen* discusses the role of participatory design practices within the games industry. She discusses the success of social games and the prevalent I-Methodology approach of game developers, i.e. the tendency of game designers to design games that please their own tastes. In order for the I-Methodology to be successful, it is crucial that the designers' tastes are very similar to those of the potential players. Many of the current social games have proved out to be massive hits, and the player base is diversifying. However, the combination of rapid prototyping, iteration and participatory design have so far resulted in great commercial success.

Ana Paula Narciso Severo and *Thais Arrias Weiller* discuss the importance of player freedom in creating engaging video games. Their take on the participation of the user is about allowing players to have customization possibilities relating to their avatar. This is just one of the ways that players can be actively engaged into the production of interesting game experiences.

In his article *Patrick Prax* examines the role of user-created interface modifications in the company-led development of game design and interface design. He argues that the innovation in the interface design of the MMORPG World of Warcraft is to a substantial part

originating in the user-created interface modifications called add-ons. By monitoring the user-created add-ons, the developer firm may capture important information relating the needs and wishes of the consumer and thus better respond to them.

The papers collected here are work-in-progress. Therefore, we encourage the readers of this publication to follow the work of the authors and participate to the academic discussion by publishing their own related work. There is plenty of room for high-quality and innovative academic contributions on games and innovations. There is also considerable interest on practitioner constructions to the discussion on games and innovations. Get inspired, participate and enjoy!

Annakaisa Kultima & Mirva Peltoniemi

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The Concept of Game Innovation:

The History of Winners

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***Abstract*—In this article I present the findings of a textual analysis conducted on game history books and game guides. Seven books are used as data for the analysis, and a list of the most acknowledged innovative games is formed based on this. The books are further analyzed to see what makes these games innovations. The found areas concerning each game's innovativeness are *the game as such* (i.e., the quality of the game), *the game compared to other games* (i.e., the originality of the game), *context, reception, and influence*. I will use the results to discuss the concept of innovation in the game industry.**

Keyword-component: games; innovation; concept of innovation; history of video games

I. INTRODUCTION

Ever heard the phrase "this is the most innovative game ever"? The odds are pretty good, as innovation has always been something of a necessity in the game industry. Recently, the term "innovation" has become a buzzword throughout society, but especially in the game industry you cannot stay at the top without innovating [1].

Most of us have a view about which are these "most innovative games". The opinions differ depending on whom you ask, and there may even be some conflicts regarding what innovation means as a concept. The game industry as well has mixed definitions for innovation and people use the term to refer to different things [2].

Sometimes innovation is confused with other close terms, such as invention [3]. However, where invention is the idea for the product, innovation needs application, and it is the final product of that invention [4]. Furthermore, innovation is defined specifically as the first successful application of the product [5]. Thus invention becoming an innovation requires not only implementation, but also marketing and distribution. Therefore the first game with new innovative features would not necessarily be the innovation. Rather, the first game "hitting it off" with those features would be the one left with the innovation status.

The purpose of this article is to discuss what is required for a game to become acknowledged as an innovation and what innovation is in the realm of games. To achieve this, the article goes through the most acknowledged innovative games in video game history, and discusses why and how certain games are brought up more frequently while others are not. Innovation and its understanding in current society is discussed and challenged.

II. METHOD

There is still not much research focusing on game innovations, but innovative games are discussed in different terms especially in game history literature, which brings up many games as their time's most notable games.

Therefore, the method to examine past innovations is to conduct a textual analysis on game history literature. There are seven books that are used as source material:

- Steven L. Kent: The Ultimate History of Video Games [6]
- Rusel DeMaria and Johnny L. Wilson: High Score! [7]
- Van Burnham: Supercade [8]
- Mark J. P. Wolf (edit.): The Video Game Explosion [9]
- Bill Loguidice & Matt Barton: Vintage Games [10]
- James Newman & Iain Simons: 100 Videogames [11]
- Matt Fox: The Video Games Guide [12]

The first four books are game history books: *Supercade* concentrates only on the early years of video games, while others take in at least the first three decades of game industry.

DeMaria and Wilson's as well as Kent's books are widely quoted in academic literature, and are valid choices for this list. Mark J.P. Wolf in turn is a notable game researcher, and a game history book edited by him is a good addition to the literature. Van Burnham's history book concentrates on the beginning of the industry, but depicts the games of those years in detail.

Vintage Games introduces 25 games that the authors describe as having "the most potent influences on both the videogame industry and the culture that supports it" [10, p. ix]. At the same time, most of them are innovative as well. *100 Videogames* and *The Video Games Guide* are game guides with considerable lists of games with short descriptions of them.

It should be noted that most of the authors of these books are gamers themselves, and the books reflect more or less subjective views. I try to tackle this problem by bringing

together several books from different perspectives. The history books are a bit more objective than game guides while the guides bring out more personal views and opinions about games. Then again, the history books tend to bring up the same games with each other, and by bringing in game guides I attempt to break this pattern in some sense. Most of the books have been published in the United States, and thus the emphasis is on the US game industry.

The games were selected based on the style in which they are discussed in the books. Some of the games are directly called innovative, but most games had to be chosen on different grounds. Some are described to have taken something to a new level, defining something, or been the first to use some technology, for instance. The amount of text devoted to a single game or naming chapter titles after a specific game also influenced the selection.

The selected games, including the year of publication, the developer, and the developer's country were listed in a table. The games that were picked only from one book were dropped out for two reasons: To make the list a bit easier to handle, and because games that are mentioned more than once can be thought as more widely recognized. The final list consists of 168 games. These games and what is said about them are used to further examine the nature of innovation. In the following chapter the results of these examinations will be explored in more detail.

III. RESULTS

A. The Most Innovative Games

Of the games that were picked from the books, 168 games were selected at least twice. When looking at games that were selected from more books, the amount decreases quite rapidly. 69 of the games were selected from three or more books, and 30 from at least four books. The 15 games selected from five or more books are listed in Table 1. Only two games were picked from all seven books: *Pac-Man* (1980) and *Space Invaders* (1979).

The resulting games are not surprising as such, as they are well-known, successful games. It may be even stated that these games are not the greatest innovations, just a list of best-known games, or the "classics". The greatest innovations may have come from less widely known games and as such are left out from the list. As true as this may be, the purpose here has not been to find the *greatest* innovations, but rather the most *acknowledged* ones.

Even though many of the top games are seemingly very different from each other, they have much in common as well. They all have distinguished themselves from the games that existed before them. *Space Invaders* for instance appeared when most games were *Pong* (1972) variants, while *Pac-Man* was published at a time when most games were about space shooters. *Tetris* (1985) was invented when games were starting to evolve and get more and more complicated and story-driven – *Tetris*, on the contrary, pushed through by being really simple and lacking a real story. Instead, it impressed with a very addictive gameplay.

TABLE I. INNOVATIVE GAMES FROM LITERATURE

Game	Year	Developer	Country	Picked
Space Invaders	1978	Taito	Japan	7
Pac-Man	1980	Namco	Japan	7
Pong	1972	Atari	USA	6
Asteroids	1979	Atari	USA	6
Donkey Kong	1981	Nintendo	Japan	6
Dragon's Lair	1991	Advanced Microcomputer Systems	USA	6
Street Fighter II	1993	Capcom	Japan	6
DOOM	1993	id Software	USA	6
Myst	1993	Cysan Worlds	USA	6
Battlezone	1980	Atari	USA	5
Defender	1980	Williams Electronics	USA	5
Pole Position	1982	Namco	Japan	5
Robotron 2084	1982	Vid Kidz	USA	5
Super Mario Bros.	1985	Nintendo	Japan	5
Tetris	1985	Alexey Pazhitnov	Russia	5

Street Fighter II (1991) and *DOOM* (1993) both popularized game genres that are still extremely popular today. *Street Fighter II* took fighting games a giant leap forward, introducing the use of various game characters with unique combos and made the game a good example of the "easy to learn, difficult to master" mindset. *DOOM* popularized perhaps the most popular game genre of all time: first-person shooters.

The fact that there are no games from the last decade in the list is because the books mostly cover the earlier years. Another thing that catches attention is that among all of the games, there are almost no other countries in the developers than USA and Japan. This is a bit surprising, because while the US market is the biggest video game market, Europe is quite large as well. The United Kingdom alone is one of the largest game markets in the world [13], and still no game made it into the top list. The most acknowledged British game on the list, *Tomb Raider* (1996) by Core Design, was selected from four books.

As said, the selected books are mostly American, so it may influence the emphasis on American games. However, most likely an even bigger reason is that the video game industry was born in the US, gradually growing into a big industry. UK came into the picture later, with background in computing and "bedroom coders" and it was not until the 1990s when the UK game industry started to grow substantially [13].

Japan, on the other hand, came strongly into the picture in the late 1970s. The Japanese video game industry drew its creativity and technological talent from the toy industry, and was influenced by the well-developed manga and anime industries [13]. This has resulted in very different types of games than the games from anywhere else in the world.

B. What Makes a Game an Innovation?

There are numerous things that are mentioned when describing the innovative games in the books. Roughly they could be categorized in five main groups: *game compared to existing games*, *game as such*, *context*, *reception*, and *influence*. These categories are not clearly distinct and have a lot of overlapping and interaction between them. Basically, only two of these aspects are covered when compared to the usual definition of innovation from the academic literature: being something new (game compared to existing games) and being something successful (reception) [5].

1) Game compared to existing games: It is important to note that a game does not become an innovation just by being as different as possible from the games before it, not even when the changes are seemingly good ones. It is extremely important to balance the familiar with the new. When *Computer Space* (1971) was released, it was the first arcade video game and people were not yet used to playing such games. It was new in many ways, and it also had rather complicated controls and instructions, and that was a major reason why it was not successful. When *Asteroids* (1979) arrived a few years later, it had a similar control scheme as *Computer Space*. However, the audience had meanwhile played other arcade games and become more accustomed to them. More complicated controls were no longer an obstacle for success. [6]

A product is not an innovation, however, if it does not bring something new to the picture, and the actual core of the innovation is the novelty factor. Many of these games are described somehow as the first of their kind. However, when you dig deeper, they usually are not the very first to achieve something, but rather the first ones to achieve commercial success.

Many of the games examined here represent improvements to previous games. Area where the improvement happens can vary: it can be graphics, gameplay, technology, or essentially any part of the game. Especially in the beginning of the industry, when gaming was still a niche market, many innovative games rose to their stature by attracting new audiences. The same phenomenon has happened later on in larger scale with the success of casual and social media games, which have made playing games something that almost everyone does.

2) Game as such: The category of ”game as such” describes the game’s intrinsic properties, which are not necessarily new or even better than other contemporary games. For an innovative game, it is not only important to be a pioneer in some area, but the game needs to be good enough in other areas as well. It is also important that the whole game supports the innovative part. The quality of a game is of course an important factor, and may be the one thing that stands between a game becoming an innovation or not. The quality can be, for example, the quality of the graphics or of the gameplay.

Most innovative games were top quality at the time, but there are some exceptions as well. If the game was exceptionally good in some area, it could be successful even though it did not do that well in other areas. *Dragon’s Lair* (1983) was mentioned in most books, and it was a huge success. Its graphics and animations were completely above the standards of the games of the time. However, its gameplay is described as being quite poor, consisting merely of making choices of what the on-screen character would do next. If the player chose correctly, the game continued and a bit more of the story was revealed, otherwise the game ended. The story of the game was described as not very original either. [7]

Many of the games are described as having certain values, making them stand out or making the game experience better. It can be simplicity in some games, depth in others (sometimes even both in one game). Other value features mentioned are variability, modifiability, challenge, humour, cuteness, excitement, beauty, tension or even brutality, violence, and anxiety. Of course, it depends on the game which features are seen valuable and which are not.

3) Context: Even though the environment into which the game is launched is not something a game developer can affect that much, it is in many cases a crucial factor for a game to be considered innovative. Basically, environment influences the success of the game, and is an important factor for any game. Especially for innovations it is crucial, as – being somehow different than contemporary games – they involve more risks and may have a higher chance to fail. The contextual factors may be at least *cultural*, as an ongoing trend, *economic*, such as the state of the game industry, or *political*, for instance a negative view to game violence.

The timing of the competitors is a big factor as well, as can be seen when Mattel Intellivision came out in 1979. The console was superior in graphics, had the best sports games and was on its way to become the number one console. Then Atari released *Space Invaders* for the VCS, and the game company Activision was formed, releasing great third-party games for the VCS. These events guaranteed VCS’s place as the most successful console [9, pp. 57-58]. Even though Intellivision can still be considered as an innovative console, because of these events it is not as widely acknowledged as it could have been. A changing environment gives challenges for innovation, and on the other hand, constant innovation is needed to keep up in the changing business of games.

Another widely known example of timing is from the beginning of 1980s, when the industry was blooming and a lot of new entrants came to market. The good games were soon buried among the mass of low quality games, and in the end, the industry crashed in 1983 [9]. It took a while to get the industry back to its feet, and Nintendo played a big part in this. They took into account the environment and the console was marketed more as a toy than as a gaming console. It was named in Japan as Famicom and renamed outside Japan as Nintendo Entertainment System to further press this impression. It had also accessories such as *Robotic Operating Buddy* (1985), a moving robot controller that could be used to interact with the television screen in two games, and a glove shaped controller, *The Power Glove* (1989), to make the system more toy-like. [6]

Larger media trends of the time can have an effect as well: *Space Invaders* would not have been as successful if *Star Wars* (1983) had not been so popular at the time, creating a science

fiction mania [7]. Similarly, many sports games are tied to real-world sports events such as championships or seasons.

By doing market or trend research companies can affect the innovations they are producing. The publishers may have more resources to do market research and so influence developers' innovation processes [1]. In different areas different types of innovations get acknowledged more easily. In Japan, the genre of role-playing games has evolved, as its market is much bigger in there, while in Europe the strategy games tend to do better than elsewhere.

4) Reception: Even though not always seen so, the reception of the game is part of the innovation's definition. All the games picked are more or less successful in some way. The game does not have to be successful necessarily in sales, but can be otherwise distributed widely or critically acclaimed, for example. There are of course many things that affect the success of a game, as, for example, game being good quality and the context influence the success. On the other hand, by being successful the game has a greater influence on other games and the industry.

To be a success, a game must usually be widely distributed. Especially in the days of the arcade industry this was essential. However, distribution channels and methods are important in other games as well. *DOOM* was distributed as shareware on the Internet, and it would have never been so popular if it would have been sold only off the shelf. This has happened more recently as well, as the new distribution channels of Xbox Live, Steam, App Store (iOS), and many others are changing the way innovations occur today, making it possible to spread games more easily among players.

Even if people have not played a certain game, they may have heard about it. This is the case of many innovative games. Everyone recognizes the characters of Pac-Man or Mario even if they have not played any games. If a game rises to a certain status in the gaming community, it is more likely to be remembered as an innovation as well. Some terms describing a high status are an archetype, an icon, a classic, or a symbol.

5) Influence: One important element that innovative games have is influence. Influence can be recognized on various levels: how certain game mechanics function, how a story is told in a game, more generally on the development of a certain game genre or even the whole game industry itself. When the industry was still young and not yet as popular as today, individual games could have a critical role in the survival of the industry.

When a new, innovative game comes to the market, it is bound to attract followers. On one hand, people start to copy something that sells, and on the other hand, a successful game often produces sequels. Really strong innovative games may popularize a whole genre, evolve it substantially, or set other standards that future games will follow.

C. What Is Innovation?

Even while the most acknowledged innovations listed in this article have been forerunners from many aspects, it is interesting to note that not one of them has actually pioneered a game genre. Although some have popularized genres or evolved them significantly, they all have had forerunners. The game that is ultimately remembered as bringing something new to the industry is usually not the first of a kind. *Pac-Man* was not the first maze game and *Street Fighter II* was not the first fighting game. *Tetris* was very different than any game before it, but it was not the first puzzle game. Sometimes the acknowledged game is not even the first widely known game. For instance, *DOOM* is often stated as the founder of the first-person shooter genre, while many remember *Wolfenstein 3D* (1992) as the first one. In reality, the roots in the genre begin much earlier than that.

This gives some interesting notions to the concept of innovation. The pioneers of genres have many times become lost to history as mediocre games or outright failures. This reflects several things about innovation. First of all, when doing something very new, there is a big risk to fail. It is something never done before, and many things can go wrong. The pioneer may not have enough marketing power to make the product widely known or it may not be a good game, although it may be something very original. It may also be too original or the audience may not be ready for it, and the game may fail because of that.

This is not a completely new issue. In his list of 50 greatest game innovations, Ernest Adams tries to correct the tendency of forgetting the original innovator by mentioning both the well-known innovators as well as the original innovators [14]. Trying to find the original innovations can be hard, however, if not impossible.

Furthermore, if we attach the most radical innovation to new genre creation [15], then not one of the collected innovations is indisputably a radical innovation. This view would not seem reasonable. The genre aspect is insufficient also in the sense that many influencing innovations may innovate on technology or other aspects instead of the actual design of the game, and may not as such evolve the genre. Game genre is also problematic as a metric as there are no established genre classifications. A game rarely anymore belongs to one specific genre; instead, games tend to combine elements from several classifications. Therefore I would suggest separating the game innovation concept from new genre creation, and try to look at it as more generally breaking away from used conventions.

On the other hand, it has been suggested that the first instances of new types of games are the radical innovations while later games that have popularized the genres are the refinement innovations to those genres [16]. However, as stated in the beginning of this article, innovation is defined as the first successful implementation of something new [5], and therefore the view would be exactly the opposite. This would mean that the games popularizing the genres and bringing them to the big audience for the first time are the ones that are the radical innovations, while the first instances would not be innovations at all, being perhaps a part of the innovation process at most. In any case, it may be hard to track down the path from first introduction of a new idea all the way to the innovation.

IV. DISCUSSION

We often understand innovation as something it is not. The findings of this article further stress this issue: we see a set of innovative games that surely deserve their innovation status, but forget that they have not appeared from nowhere, but may and indeed in most cases have had failures and less-known games before them, from which they have taken inspiration from.

If we do not know what innovation is or have a shared understanding of it even while its importance is stressed everywhere in the society, how can we achieve it? From this viewpoint, it is no wonder that some game professionals have nihilistic attitudes towards innovation [2].

After finding these challenges in the concept, perhaps we should try to build a more suitable definition for game innovation. On the other hand, it is the nature of the history books to write the history of winners, leaving the first pioneers to receive less attention. The games mentioned in this article are the games that are acknowledged, and not necessarily the best or most important innovations. Therefore, this list gives only one viewpoint. It is, however, a very valuable viewpoint, as these are the games that we will remember and value as innovations.

The pioneers are crucial for the game industry by trying new concepts and making the way clear for the innovations. Writing and studying the history of games is challenging [17], but we need more effort around describing how games evolve. Seeing only the games that make major breakthroughs and are found as the biggest innovations gives a distorted view of how innovations evolve. The original games, the stepping stones that pave the way and may make these breakthrough games possible, are too easily forgotten.

V. CONCLUSIONS

This article presents a list of the most noted innovative games in the history of video games. As said, the list misses most of the contemporary games, and should be viewed as what it is: a historical examination. The list offers interesting considerations of the composition and practice of innovation. The purpose here has been to discuss some points of view that the concept of game innovation can be approached from, and to seek a deeper understanding of games as innovative products.

Generally, innovation can be seen as the first instance of creating something new. The games that are acknowledged in the industry are, however, frequently the ones with the greatest success. The definition of innovation discussed in academic literature somewhat supports the former view: innovation is the first successful instance of an invention. It sometimes might even feel unfair that the first instances do not get the credit for their visionary ideas or products.

When looking at how they have become the respected innovations they are known as today, five areas which are crucial for innovation were identified: *game compared to existing games*, *game as such*, *context*, *reception*, and *influence*. It is not only the originality of the idea or even the quality of the implementation that matters, but other factors influence as well. It is necessary to find the right time and right place to develop the game, as well as seeing what has already been done and learning from other games that have existed before it. It is not necessary for a game to be strong in all of the areas, as even some of the most acknowledged innovations listed here did not achieve superiority in all of them. However, to become the "biggest innovation ever", it does take a whole lot of things going right – including having a great big bunch of luck.

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An Evolutionary Approach to Games Industry

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Abstract—**The term evolution is often used when describing the change of economies or industries. There is also an approach inside economics called "evolutionary economics", which borrows conceptual tools from biology. This text is principally a theoretical and conceptual look at the games industry, and evolution as a metaphor is taken seriously and it is reviewed as a representation of economic phenomena. First, the basic mechanisms of biological evolution are revised, followed by a review of certain concepts of evolutionary economics. Finally, the games industry is examined as a special combination of cultural and technological industries.**

Keyword-component: games industry; evolutionary economics; innovation

I. INTRODUCTION

Studying players and games (as end products) can rightly be said to be the core areas of game studies [1]. This perspective, however, hides the fact that a significant share of games have their origins in circumstances and conditions set by profit-oriented businesses. The picture of game cultures is unnecessarily incomplete without a broad understanding of the industry and economic actors. The markets fuel cultural changes and some trends are strongly dependent on changes in the economic environment. The developers hoping to keep their jobs need to think about where consumers are ready to put their money [2, 3]. Consumers, on the other hand, are highly dependent on the markets to supply them with the games they play. Of course the dependencies between game cultures and markets are mutual, but in this paper I am mainly interested in the economic reality that the game companies have to face, and how it limits and enables certain paths they can take.

The games industry is interestingly situated at a crossroads of other cultural industries, in the style of the film industry, and engineer-driven fields such as the computer software and hardware industries, with important junctions also with the toy and sports industries [4]. Understanding the dynamics of the games industry requires detailed analysis of the similarities and differences from these related industries. It is clear that the games industry has its own particular characteristics, and it is equally clear that it carries with it features that are common to all related industries, if not across all industries.

This paper approaches the games industry from a general perspective, reviewing some theoretical conceptualizations used when studying the industry and its change. The ultimate purpose here is to understand the workings of general industrial mechanisms, particularly as they relate to the games industry, even though these are only preliminary steps towards that goal.

There are many approaches in economics, management studies and economic sociology that are interested in industries and their dynamics. In particular, the field of evolutionary economics addresses the transformation of industries as related to technological change and innovation. As its name suggests, evolutionary economics draws conceptual tools such as ”variation,” ”selection,” and ”adaptation” from evolutionary biology, implying that there are similar systemic properties in biological entities (populations) and economic entities (industries). To ensure that the biological concepts are not borrowed only for the sake of plausibility and rhetoric, it is necessary to look into the mechanisms of evolution, evaluate how well they are transferable to economic phenomena, and explicate the analogies in these two domains. This is the first step taken in this paper.

The second step is to introduce basic ideas and concepts of evolutionary economics. Innovation is undoubtedly the most important and oft-used concept, and it has found its way from academia to the policy makers and become a central means for maintaining national competitiveness. The political pursuit for innovations or ”innovation policy” has created a need to find the best way to produce innovations and has resulted in ambiguity in the word's meaning. When looked at from the evolutionary framework, innovation is not something that is done but something that happens. Whether a given activity can be called ”innovating” can only be evaluated afterwards, when the success of the activity is known .

Acknowledging this, something can be said and learned. Besides innovation and concepts borrowed from biology, evolutionary economics utilizes concepts like Schumpeterian creative destruction, national innovation system (with direct implications to national innovation policies), and path dependence, or the fact that past developments constrain future possibilities, that ”history matters.” While dealing with these economic phenomena I will try to carry the evolutionary vocabulary and concepts throughout the paper. Finally, utilizing the evolutionary framework described, I make some remarks on the games industry and its dynamics and evolution. Although there is no systematic empirical analysis, some secondary data from industry sources will support these statements. To benefit the research on the games industry in the long run, it would be necessary to gather the already existing research results and formulate a systematic and comprehensive research program.

II. The Mechanisms of Evolution

Evolution is a process whereby a species tends to adapt to its surrounding environment. Also, evolution means the change of a certain population and its gene pool, even though the changes are based on individuals' features. The three basic mechanisms of evolution are heritability, variation, and selection. Heritability means that individuals of the next generation inherit their genetic features from their parents. Variation in turn means that there are differences in genetic traits among individuals in the population. Finally, under conditions of limited resources, selection tends to limit variation in favor of traits that benefit survival, thus, ”the survival of the fittest.”

Variation and selection work as counter mechanisms to each other. Mutation and recombination cause increasing genetic variation, while natural selection decreases variation. Differences in inherited traits (genotype) cause differences in physiological and neurological features, which in turn limit and enable behaviors (phenotype). It is ultimately the behavior that determines whether an individual is suited to its environment and capable to reproduce. In the long run, natural selection also leads to genetic adaptation, or changes in the gene pool. Typically the successful traits are useful in protecting against threats, securing nutrition, or reproduction. While many traits benefit only the individual, some of them help the whole population to survive, especially traits connected to social interaction and cooperation.

In theory (in a fixed environment), the traits that benefit adaptation increase over time, generation by generation. In reality, of course, the environment can change, which can lead to ecological crisis and stress on the population. This in turn leads to a stronger selection process. When the changes in the environment are fast and radical, the existing gene pool might not be able to adapt, resulting in the population becoming extinct.

III. Using the Metaphor

To be useful as a metaphor for economic phenomena, evolution needs to be abstracted away from some of its biological details. The broad interpretation could be as follows. First, the features of an entity (population) are relatively stable (inherintance). Second, new features are generated more or less randomly (variation). Third, the features are systematically selected so that the ones best suited to surviving and adapting remain. These kinds of processes can be found all around and on many levels. When this framework is used to understand technological or economic change, the phenomena must be placed in the formula, so to speak. Evolutionary economics is interested in industries or large techno-economic systems instead of populations or species. The biological organism is replaced by the company. There are many potential equivalents for the gene, but perhaps the most reasonable is ”routine” [5].

Using this metaphor, the games industry (population), for example, includes a certain number of companies (individuals) and a plethora of routines (the gene pool). The relevant environment includes different national laws and international treaties, consumer demand, available labor force and raw materials, and competing industries (such as the film industry). With these elements in mind the concrete activities within the industry can be structured in evolutionary terms. Over time the routines adapt to the economic environment; on the other hand, the industry itself is active within its surroundings, utilizing different marketing and lobbying strategies for example.

The changes in the ”routine pool” of the industry are quite slow. One example of this is the long-lasting failure to address the non-hardcore gamers, when the potential mass markets were there long before the recent emergence of casual games, rhythm games, and social network games. The games industry has nevertheless been relatively flexible in terms of ”ecological crises,” the IT bubble and peer-to-peer networks for example, and has even broken through the traditional consumer segments. Industries have to face the crises by trying to prevent unwanted developments, as well as changing their own pools of routines or risking the collapse of the whole industry. The more institutionalized the industry, the harder the change.

The metaphor (”changes in an industry resemble changes in a population”) is supposed to aid in understanding the phenomenon currently under scrutiny (changes in the games industry), but it should be treated with scientific awareness. It is in any case essential that the other side of the metaphor (changes in a population, biological evolution) is understood well enough. Social sciences tend to have more normative elements than natural sciences. The danger is that the descriptive biological framework is used to justify normative beliefs set beforehand. Some keen proponents of sociobiology or evolutionary psychology could be charged with this. Communicating the metaphor, on the other hand, is impossible if the listener does not understand biological evolution and the related language. This is possible, for example, if evolution is misunderstood as progress or something morally desirable.

IV. Emergence and Diffusion of Innovations

The proponents of evolutionary economics claim that neoclassical economics is unable to consider technological change, even though it is admitted that it is a key factor in economic growth [6, 7]. Joseph Schumpeter (1883-1950), an influential scholar of evolutionary economics, criticized the neoclassical economics of his time and contributed to the theory of institutional and economic change. The systematic utilization of evolutionary vocabulary was started by Nelson and Winter in their book An Evolutionary Theory of Economic Change [8]. The concept of innovation, along with its causes and consequences, are all at the core of evolutionary economics. In theory, innovations can be divided into product and process innovations. The former are new products in the market, while the latter are new means of production. On the other hand one can distinguish radical from incremental innovations based on the rate by which they differ from earlier innovations. In practice the distinctions are vague. It is in any case useful to separate the concepts of innovation and invention. To be called an innovation, an invention has to be useful and most of the time successful in economic terms. [5]

Companies strategically seek innovations to create successful products. Intellectual property rights grant the developer of a new product or production process a competitive advantage. This advantage is only temporary,

however, and sooner or later the competitors will also have access to the new technologies. New routines (variation in evolutionary terms) are the result of intentional pursuit of innovations or other managerial actions and new workers with their know-how. Competition drives other companies to adopt the successful routines and abandon the obsolete ones (selection in evolutionary terms). This way the ”routine pool” of an industry gradually changes and it maintains its competitiveness. The Schumpeterian concept to describe this kind of techno-economic process is creative destruction [5]. If all others adopt new routines, the inflexible firm is in trouble.

These mechanisms are however somewhat different in cultural industries, where technological solutions are not the primary competitive factor, quality criteria vary a lot among consumers and, thus, the markets are fragmented. The ecological niches are more complex and harder to recognize. This limits the possibilities of the evolutionary framework of variation and selection, but does not undo it. There are established conventions and configurations even in the cultural industries. If a new game is a clear break from the existing conventions (radical innovation), its success is uncertain and there are many possible paths it could take and many possible styles of play that the developers would never have thought about. If it succeeds, the new conventions are gradually integrated to the game culture and gamers become familiar with its mechanics and styles of expression. Take, for example, id Software’s Doom. It was not the first of its kind in the market, but the FPS genre was not established when the game was released. Doom’s success was only partly due to the quality of the game; the more relevant factor was perhaps a new kind of marketing strategy: shareware [9]. Afterwards several similar games appeared and the conventions settled. The long and glorious history of FPS games has made it significantly harder to change the core features of the genre as gamers’ expectations are also relatively settled. It is clear that all creative games do not succeed in the same way.

V. Path Dependence and National Innovation Systems

In the social studies of technology and evolutionary economics the concept of path dependence illustrates that changing routines is slow and, once a path is settled, it is relatively hard to deviate from it [5, 10]. The parallel phenomenon in biological evolution would be inheritance. Earlier developments in the FPS genre limit current possibilities to some extent, but at the same time make it possible to further refine it. Changing routines is hard because the developers' competences and the gamers' expectations change slowly. Path dependence is a relative concept to specialization, which means focusing the available resources but at the same time it shuts out other possible courses of action or makes them too cumbersome. Pathological specialization leads to problems seen for example in countries that are dependent on only one exportable commodity. In the same way, a game developer who is too focused on one niche is vulnerable to sudden fluctuations in that market.

The fact that the actors trying to innovate are in many ways dependent on other actors and social structures is in turn illustrated by the concept of the innovation system. It is observed that different national economies are variably capable of producing innovations. Aside from private companies, public funding organizations (such as Tekes in Finland) and universities are essential parts in innovation systems. This is, of course, a politically relevant topic, as national innovation policies are largely based on these kinds of theorizing [5]. If the change in routines is slow within industries, it is certainly so among public actors. This also means that the idea of path dependence can be applied to whole innovation systems.

When looked at in more detail, the innovation system concept does not seem to be that well defined. It can include companies’ internal communications, quality management systems, circulation of labor force, interaction between producers and consumers, technological possibilities, education systems, rewarding systems besides the intentional research and development done in companies, and universities and research centers [5]. The concept is nevertheless useful in recognizing that the different kinds of actors and institutional configurations affect the ability to produce innovations. In evolutionary terms the innovation system could be called ”ecosystem” or ”selection environment,” which are equally complex concepts themselves.

VI. The Games Industry in the Crossroads of Culture and Technology

The economic significance of the games industry approaches that of the film industry. It also has a growing cultural significance, as an increasing proportion of people grow and live their lives surrounded by games. Due to its cultural nature there are some central differences between the games industry and the neighboring fields in technology industries. The value of cultural products can be described as aesthetic, semiotic, cultural, artistic, or entertaining [4]. The use of games is not primarily oriented towards some narrow instrumental gain like the use of utilitarian goods. The success in cultural markets is very unevenly distributed and a small number of hit products generate a large share of profits. The products are differentiated into genres. There are often tensions between business and artistic motives and, finally, the innovations in cultural industries are more often stylistic than technological. [4]

Among other cultural industries, the games industry is an exception precisely because of the importance of technological innovations. The development of computer processing power and computer network infrastructure, as well as various mobile devices, influence game development directly. Game companies are proud of new technological solutions and new technology not only makes it possible to draw more detailed graphics but also affects the designs and mechanics of games. However, the causal relations are complex and from another perspective: the demand side, that is, gamers who are interested in high performance hardware and willing to pay for it could be seen as the engine of progress in information technology. Most utilitarian software does not require the same kind of hardware performance as games require [9, 1].

To connect back to biological concepts one could say that the cultural industries tend to have more variation than other industries. There are a great number of different games in the

market and a great number of different routines in the companies that develop and publish them. Correspondingly there is variation in consumers' preferences and relevance structures. Mateos-Garcia, Sapsed, and Grantham describe game genre as a kind of institutionalized structure of relevance to which both gamers and developers relate their activities [10]. A company needs to evaluate what kinds of features the consumers generally find attractive, take into account its available resources, and decide which conventions to follow and where to deviate. The established conventions are here analogous to inherited traits, which direct the choices in a path-dependent manner. Moreover, establishing a genre is analogous to speciation and adapting to a certain ecological niche.

Tschang operationalizes the innovativeness of a game by the degree it deviates from the conventions of an established genre [11]. One could add that to be innovative by definition, the game also has to be successful. It is not enough to break conventions, and the wrong kind of deviation is certainly harmful to the company. It is not simple to break just the right conventions to be successful, of course. The importance of publicity and the hits-oriented nature of cultural markets make it even harder for a developer to be innovative: Early success and fame tend to bring more success. It seems that, in addition to strong variation, the selection mechanism is also strong in cultural industries. The fluctuating nature of those industries seems to reduce the use value of evolutionary concepts, as it is often hard to give more than ad hoc explanations about the success of a certain cultural product. That makes it hard to talk about systematic selection and adaptation to the environment. The games industry however, is again an exception because of its technological character.

VII. Conclusion

The strong relationship with technological change means that the environment of game companies is in constant change. With that in mind, it is not that surprising that the games industry seems to adapt to new situations much better than other cultural industries. The spread of computer networks and the digitalization of content has led to a situation where the costs of copying and distributing cultural products are nearly non-existent. Both the industries themselves as well as the legislators have been slow to react to the new situation. The traditional cultural industry is cornered and seeks to reinforce the old copyright system. Following Lessig [12] this could be said to be a fight against the windmills.

The games industry is, by contrast, relatively advanced in figuring out new practices and business models. There is a gradual movement from the retail of physical copies toward digital distribution, monthly subscriptions, and the so-called "freemium" model where the base game itself is free but includes separately purchasable content [2, 3]. The development of new models has begun in emerging markets where the traditional model has been impossible due to organized piracy (e.g., Eastern Europe, Brazil, China, Southeast Asia). These new models are based on the customers having network access, and the games industry has been quite optimistic about the growth potential in the emerging markets because the network infrastructures in those areas are relatively underdeveloped [13].

The overall change that is going on can be called the rise of the service paradigm [14], and it is likely to push the games industry into a phase of Schumpeterian creative destruction and adaptation to a new techno-economic environment. The companies stuck with obsolete routines lose significance. The financial crisis and the ensuing recession have only sped up this process, when the established actors face problems and make room for new ones. The traditional retail of games is not likely to come to an end anytime soon, but the ecological niches are likely to be renegotiated.

One particular value of the evolutionary approach is a serious attempt to understand change while being aware of the interdependencies of different actors. It treats the complexity of economic phenomena with respect. There are, however, notable differences between the mechanisms at work in populations versus those at work in industries. For that reason, evolution should still be treated more like a potential metaphor than a valid model summarizing empirical evidence. As pointed out in the introduction, the empirical research and comparisons between related industries is essential when trying to understand the functioning of the games industry.

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Updating Business Models: Innovation through Online Games

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Abstract—**: In less than 40 years, software games developed from scratch into an industry producing billions of profits and today, its revenues and investments give the video games industry a relevant position among other mainstream media industries. The growth of the video games software market is expected to be primarily driven by online and wireless game software, while hardware would proportionally decline in terms of revenues, changing hence the rules of the game. It is forecasted that especially the online space will substitute on the long run the currently available boxed product. The present paper is based on a comprehensive survey of the video games software industry with a focus on the EU competitiveness, and concentrates on one aspect of this research. The investigated research question is how and to what extent on line games transformed the structure of the video games industry with connectivity becoming permanent, products converting into (online) services, and the progressive integration of media services and technologies. By the same token looks at how online games themselves pave the way for experimenting and exploring innovative business models.**

This paper is based on the JRC-IPTS Report "Born digital/ Grown digital. Assessing the future competitiveness of the EU video games software industry".

Keyword-component: Online value creation, virtual world, virtual good, value chain, digital content convergence, new business models, services

I. INTRODUCTION

This paper is based on a comprehensive survey of the video games software industry with a focus on the EU competitiveness [1], and concentrates on one aspect of this research. The investigated research question is how and to what extent online games transformed the structure of the video games industry with connectivity becoming permanent, products converting into (online) services, and the progressive integration of media services and technologies. By the same token looks at how online games themselves pave the way for innovative business models.

In less than 40 years, software games developed from scratch into an industry producing billions of profits and today, its revenues and investments give the video games industry a relevant position among other mainstream media industries. According to the consultancy PriceWatergouseCoopers, in the period 2004 to 2013, the global video game market is expected to grow from less than 30 billion to over US$ 70 billion (PWC 2009).

The growth of the video games software market is expected to be primarily driven by online and wireless game software, while hardware would proportionally decline in terms of revenues, changing hence the rules of the game. It is forecasted that especially the online space will substitute on the long run the currently available boxed product.

In the present paper we first propose a brief review of literature, to then address the complex issue of measurement of activity in the online games segment. After a description of the on-line games industrial ecosystem, the characteristics of the production process and the value chain in the online video games industry are described, followed by the main techno-economic models for the production and distribution of online games. Then we provide an overview of market data to show the business activity and current dynamics of the industry, to conclude by highlighting innovative paths towards an economy of e-Services driven by the evolution of on-line games.

II. THE LITERATURE: A QUICK REVIEW

The research is based on our syntheses of the current state of the knowledge, on internal and external expertise, literature reviews and desk research, as well as several validation workshops with industry participants and experts. For the online part of our work, we reviewed the major attempts to define and categorize online games as this was a prerequisite to even quantifying the economic value of the sub-sector.

The OECD Working Party on the Information Economy (OECD, 2005) draws a line between the online and the offline video games industries. The OECD definition also takes the hardware platform into account: while it identifies different

[1] The report "*Born digital/ Grown digital. Assessing the future competitiveness of the EU video games software industry*" was released in November 2010. This report reflects the findings of our study on the video games industry, with a focus on two specific activities: on-line and mobile videogames.

The report "*Born digital/ Grown digital. Assessing the future competitiveness of the EU video games software industry*" was released in November 2010. This report reflects the findings of our study on the video games industry, with a focus on two specific activities: on-line and mobile videogames.

trends for offline games depending on their platform,[2] it forecasts strong growth for online games irrespective of hardware platform[3]. This makes it possible to consider the online segment without differentiating it by hardware platform, but simply by referring to the fact that the game is played over the Internet. Most of the literature agrees (Steiner, 2009) on this approach and considers online games irrespectively of the underlying platform, so long as it permits "*at least some sort of network connection*".

The aspect of interactivity is horizontal to all video games, as they all share the characteristic of being "*an interactive kind of mediated entertainment*" (Jansz and Martens, 2005), and without the user's interaction the game simply cannot proceed. However, the meaning attributed to interactivity is evolving, and with regard to (online most of all) video games it refers to the capability of the player to influence what happens in the game by means of actions performed via an interface (Grodal, 2003; Vorderer, 2000). This interactivity is pushed to the maximum in online gaming, where the player interacts not only with the game itself, but also, in many cases at the same time, with other players by means of the moves in the played game. Through this kind of interaction, the game enters the sphere of interpersonal communication. This "*social context of game*" is very important as a trigger to push players to play online multi-player games. This has pulled the demand for this kind of online games, leading to the definition of two bigger categories in games which are played over a network: games that the user plays alone over a network, and games which allow the user, by means of the underlying network, to interact and play with other players.

Using this approach, online games can be divided into two main sub-categories, with often very different characteristics in terms of game structure, user interaction, and most of all underlying business model. One or more specific markets correspond to each of the subcategories. This basic distinction drawn is the one between *single user games* and *multiplayer games*. The former are generally available as "*browser games*", which are played by means of a web browser and typically do not require additional software, specific to the game, to be installed.[4] Multiplayer games, however, are instead usually (still) played in the form of "*client-based games*", where the activity required of the client machine is still relevant, its performance and elaborating power still matter and possibly some kind of software programme or engine has to be installed on it. It is rather common to find nowadays these labels in the catalogues of successful game producers, and they represent the evolution of the previous categorisation, now rather obsolete.

Indeed, at a much earlier stage in the diffusion of online games, Junbaek et al. (2004, among others[5]) attempted to classify video games according to the characteristics of the interaction between the client machine (generally speaking, at that time, a personal computer) and the remote server. A rather old but accepted classification identified three types of games suitable to be played online. These were classified according to the structure of the system required by the games themselves in three groups: a distributed client model, a centralized server model, and a client/server model. The *distributed client model was* originally adopted by very successful pioneer online games, such as Doom.[6] In this model, the client PC ran the game's engine, and a server was necessary to provide the connections and environment to peer players' local machines. By leaving most of the operational effort on the client's layer, this model was especially appreciated in the past when the workload on the server's side used to represent a bottleneck (as did availability of a connection). Most of the process in this case is operated at the client layer. *The centralized server model*, on the opposite, delegated the engine management to the server, leaving on the client's side only the input and output operations, whose results were transmitted to the server, which was in charge of all the operational effort. Work overload on the server' side used to be a common problem in the past years. The c*lient/server model* was attempting to strike a balance between the client and server activities.

III. Measuring the Online Games Segment

It is not easy to quantify economic activity in the software market, where production is not accurately represented in official statistics. Measuring and monitoring the evolution of the online games segment is even less straightforward, due to the characteristics of the product itself and to the consequent lack of basic indicators suitable to frame in a single picture the complexity of the different sub-categories and articulated typologies which online gaming implies. Nevertheless, techniques are developing to track online gaming activities, mainly to support business decisions, and the resulting figures could contribute to building a quantitative view of the segment. Usage statistics and download numbers are often the only available ways to integrate data in order to monitor the dimension of the online and mobile markets. This is especially

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[2] While the offline PC video games segment is considered already mature, moderate growth is expected in the offline console segment. Strong growth is expected to continue in the offline wireless segment (OECD, 2005).

[3] In the cited work (2005), the OECD groups platforms in three big categories: PC, console, and wireless, and adopts a perspective similar to that of some major consultancy and market data firms. The difference between this approach and the one adopted in the present work has no relevant consequences. In the present work, a slightly more detailed classification of platforms has been adopted for the sake of clarity and because it allows us to address specifically the oligopolistic situation in the hardware production of handheld gaming equipment.

[4] In some cases, slightly different specifications of the definition are proposed, when for example games with multiplayer capability are named "Internet games" to distinguish from the simple single-user "online games", as done by Internet.com in its webopedia definition (available online at: http://www.webopedia.com/TERM/I/Internet_game.html; last checked on 12 March 2010).

[5] See for example Sweeney T. (1999).

[6] See: http://doom.wikia.com/wiki/Entryway

true where free applications are concerned as the easier accountancy of subscribers and paying customers is not possible. In any case, a lot of companies in the growing online field may not be accurately accounted for, thereby making it difficult to get a precise view of the size of this growing segment. However, some 'side' figures can help us to try framing the online gaming current dimensions and to give an idea of the potential development it could still have.

Taking into account the game console hardware penetration, and with regard to the US only, In-Stat (In-Stat, 2010b) estimates for video consoles used as in-home entertainment hubs show a penetration of almost 24 million online-enabled gaming devices in 2008, and forecasts more than 73 million households in the U.S. with an online-enabled gaming devices in 2013. The expected growth is still quite impressive, even taking into account that not all of online-enabled devices will be actually used for connecting to broadband Internet to play online games or to access online content.

The number of worldwide registered active users of console and handheld devices connected to the three main dedicated networks (PSN, Xbox Live and Nintendo online services named "Nintendo Wi-Fi Connection") has been estimated to have reached 40 millions already in the first quarter of 2009 (iSuppli, 2009). However, this being noted, it remains that tracking in a consistent way the number of users of online games, the success of games, the number and provenience of producers is a rather challenging task.

Still, by tracking the number of accesses to websites it is possible at least to have a proxy measure of the dimension of the phenomenon. Web information companies such as Alexa[7] propose traffic ranks of categories of web sites. Out of a total number of web sites belonging to Alexa's category of games, 38,258 are classified as related to games, and 1,538 to online games. Most of the web sites appearing among the top listed are portals, categorised directories of online games, sites listing online and downloadable games. In table 1, the top 3 sites are actually categorised directories, as well as sites positioned from 5th position on. The 4th position lists a massive multiplayer text-based role playing game. The *Alexa Traffic Rank* proposed in the table is based on (averaged) combined measure of page views and reach (reach measures the number of users, by giving the percentage of all Internet users who visit a given site).

[7] Alexa measures the popularity of web sites and calculates its traffic ranking by combining the number of average daily visitors to each web site with page views based on the traffic data of the past 3 months. The figures are updated on a daily basis, and the site showing the highest combination of visitors and page views is ranked as number 1. Therefore, the ranking for reach measures the number of users in terms of the percentage of all the global Internet users measured by Alexa, averaged over a specified period (one week or three months). More at www.alexa.com

TABLE I. TRAFFIC RANK OF ONLINE GAME WEB SITES: TOP 10

Rank	Online game web site name	Alexa Traffic ***Rank***
1	Play-Free-Online-Games.com	**47,358**
2	Apex Web Gaming	**55,574**
3	Multiplayer Online Games Directory	**86,907**
4	Omerta	**107,869**
5	Internet Gaming	**69,00**
6	Myth-Weavers	**149,234**
7	GamesByEmail.com	**176,567**
8	RolePlay onLine!	**179,114**
9	Top Mud Sites	**217,784**
10	Just Riddles and More	152,369

Source: Author's elaboration on data from Alexa.com, last accessed on 28 July 2010

Other online resources provide figures about the number of monthly active users (MAU) per categories of web sites. Appdata.com (www.appdata.com), for example, made figures available with regard to the users of applications inside a social network like Facebook. Though this is a rather specific measure, it is useful as it gives us an idea of the size of the phenomenon of online games based on social networks. AppData, as independent traffic tracking service, monitors traffic trends for more than 75,000 Facebook applications. A considerable number of online games are easily identified in the top 15 applications. The number of monthly active users for games such as Farmville (more than 75 million in May 2010) provides a justification for the interest in business related to micro-transactions, once the expected number of users and possible consumers reaches such high levels.

IV. THE ONLINE GAMES INDUSTRIAL ECOSYSTEM

The following model for digital mass consumption (Feijóo et al., 2009) proposes three main stages, the first of which includes the process of creation / production / publishing, the second considers the delivery / distribution / access and the third deals with the use / consumption / interaction. This model is applied to the online gaming ecosystem in table 2.

The core technical component of online games is represented by a piece of software. The innovation which online games have brought about was based on the co-evolution of the software core component, the content and the distribution model (and channel). Innovation in content quality and typology and in deployment was made possible by a corresponding transformation of the core software part, which basically allowed both a product innovation and a process innovation to take place.

The additional characteristics of online games complicate the picture even further. Online games share with the video game sector most of the peculiar characteristics of its production process, in particular the high ICT intensity and the highly technical nature of the creative activities leading to the production itself. It also shares its specific organization around hardware platforms. The coexistence of different platforms affects the whole first stage in the proposed model (Mateos-

Garcia et al., 2008): i.e. the production, the distribution and the publishing. Each platform provides specific requirements in terms of industrial and technical infrastructures. Nevertheless, when online games are considered, the consequent differences in the business models adopted tend to be smoothed by the predominant characteristics of the online access, fruition and interaction that come into play in the second stage. Therefore, while keeping in mind that platform differences also affect the business of online games; an overview of the industrial ecosystems seems even more useful, considering the classification proposed in the previous section.

TABLE II. DIGITAL CONSUMPTION MODEL AND ONLINE GAMES CATEGORIES

	Browser G. (BBGs)		Client-based G.		
Stages in digital consumption / types of games	***Stand Alone***	***Multi-player***	***Stand Alone***	***Stand Alone***	***Multi-player (MMOGs)***
Stage 3					
Consumption Narration/ Content	Simple	Low com-plexity	Simple	High complexity AAA	
Use: Virtual Worlds	Simple			Persistent	
Inter action & Commu nication	None	Simple	Simple	None	High & complex
Stage 2					
Delivery	Online		Download & online		
Distri-bution	Easy / browser based / social networks / viral		Relatively complex / platform portals / retailers		
Access	Easy / gen. free		Relatively easy / diff. models / retailers		
Stage 1					
Creation/ Development	Simple / Low investment required		Complex / High investment		Very complex / huge inv.
Production Process & Techn.	Simple / standard	Complex	Complex		Complex / persistent team
Publi shing, Market ing	Simple / online ad	Simple / online ad	Online & offline Ad		Online & offline ad

The label AAA, or Triple A, is used to refer to the top class characteristics of the most complex games (not simply A category, but AAA).

A. The ecosystem of browser based games (BBGs)

The browser-based game (BBG) scenario proposes the simplest solution to playing online: accessible to everybody, in most cases for free, offering simple, cheap and easy "casual"[8] entertainment to the widest variety of users of basically all ages. The narration is not articulated, so the effort in terms of time investment per game required of the player is not high. Generally the virtual world proposed, if any, is simplified, as are the graphics, so no last generation hardware is necessary. Users prefer to play standalone games, possibly to fill in a short break rather than to invest a lot of their free time, and the level of inter-user communication and interaction is absent or very low. These games can also be played by multiple players, and what differentiates these games from the complex MMOGs is the simplicity, recognizable in easier graphics, easier plot, and easier interaction. The multiplayer situation, nevertheless, guarantees the participation of users in the content development, both by means of interaction and of new content development. This could be an important hidden strength of this kind of game from a market perspective, as it is connected with several new business models allowing micro-transactions involving virtual items and game improvements of a number of types.

When considering the second stage in the digital consumption model, these kinds of games are distributed by allowing access online. In most cases, those of the free-to-play (F2P) games, the right to play the game is granted for free and the distributor gets revenue through advertising, but also through subscriptions for a period of time or, a trend becoming more and more important, payment for the purchasing of digital goods or additional content.

The distribution, in many cases, takes advantage of the viral diffusion capacity typical of social networks: in such environments, users can invite friends to join their network and connections. By accepting, the newcomers share resources and get to know and to try their friends' favourite games. This allows for an incredibly fast spread of a new title without any major off-line advertising efforts.

The development time for BBGs' projects is generally short, and the level of investment required by the production of a title is low, compared with the budget of MMOGs even if costs increase with improvements of quality. Publishing usually takes place on dedicated web sites acting as portals of online BBGs, where a huge number of games is offered and users know how to find their favourite types or to look for new experiences. The role of portals is in many cases very relevant, as they allow for new title visibility. Without them, it could be extremely difficult to compete successfully with the incredibly high number of available games. Actually, the low requirements in terms of initial investment, development resources and distribution efforts allow many companies, including small ones, to enter the business and develop new games. In spite of the free-to-play approach which is very common, this type of game has already demonstrated that it can guarantee important revenues and for this reason is a fairly contained risk. In fact, not only complex MMOGs but also many simple BBGs are forecasting impressive figures in terms of numbers of users, and approaches like that of micro-transactions are diffusing at a very high rate. Even if the per

[8] In this case the interpretation for the world "casual" must be that of the video game jargon, as in most cases the casualty pertains to the type of engagement and effort that these games require to the user, and not to the lack of loyalty of users towards their favourite games. On the contrary, in many cases easy and simple browser based games, casual in their genre, have an enormous amount of very loyal users.

unit revenue from the sale of a virtual good is minimal, the availability of millions of users easily makes the market sufficiently profitable.

B. The ecosystem of MMOGs

MMOGs are the most typical example of client-based, multiplayer, highly complex video games where users are confronted with a persistent world, real-life style graphics and evolved development of characters. Among users, communication is intense and relies on many tools, the system resources exploited and required are huge, and the investment in terms of users' time is also considerable. The virtual world that users access is impressive.

The distribution is relatively complex, as big dedicated portals are in charge of delivering software and access to users depending on the platform adopted. Titles are differentiated by platforms, and not necessarily all famous games are available for all the main platforms. In particular, the policy followed by console owners has been rather differentiated up till now.

Efforts are currently being made to provide independent developers with alternatives to the limited distribution channels available at the moment, and platforms are offering specific technologies to reduce the obstacles to game distribution, for example by allowing video games to be embedded anywhere online.[9]

The development requires huge efforts and impressive teams, the most advanced techniques are applied to improve the rendering of real effects, integration of real landscapes, textures and advanced graphics. Physics and rendering engines are exploited together with other middleware tools to improve the results and the impression of reality.

Moreover, the management of such projects must take into account a number of problems which occur due to the persistence of the related virtual worlds: the results of user interaction in massive multiplayer environments is very difficult to predict; sets of different levels of play have to be continuously developed. As a consequence, a team of developers must be kept active on the project after the product is officially released, unlike what happens in normal software development where probably only a bug fixing team is kept on to intervene in case of necessity. Moreover, the game never really "switches off" or goes offline: the management of devoted servers has to be taken into account, as the game plot keeps being developed by the interaction of developers and users, while server technologies become more and more important.

As one would expect, the cost of production of a title of this last type is many times bigger than that of a browser-based, standalone game. For example, Lightspeed Venture Partners estimated (Liew et al., 2008) a production cost of about US$ 30 million for a title such as Halo 3, one of the most famous and successful video game titles for Microsoft Xbox 360, with this version providing online multiplayer playing possibility.[10] The same source estimated that the cost of production of the Zynga browser-based online game, Texas Hold'em, was less than US$ 1 million. Of course, the disparity is based on the differences in the game graphics, plot, complexity, and in all the previously mentioned aspects. Nevertheless, it is also worth pointing out that, if Halo 3 in 2008 was expected to reach 10 million players, the Zynga's title was scoring around 8 million. Even though the browser-based title was raising a small amount of money per user, the target pool was big enough to guarantee a sound success in terms of revenues.

The first type of game is basically the transposition to the online environment of what core games used to be on offline PCs or console platforms. Those expensive games, built upon large budgets and possibly running to many subsequent editions, were called AAA games. The convention was to rank games as AAA, A or B depending more on their marketing potential than on other aspects. AAA games were those expected to raise the biggest interest on the market, guaranteeing the best sale performance, because of the budget invested in their development also because of the promotion and advertisement support campaign. Nowadays, the online segment is proposing a number of AAA games, most of which are MMOGs with widest audience. In this industry, the availability of an important budget is not necessarily a guarantee for success, because the aspect of creative content is preponderant and this makes of each game product a prototype.

It is worth mentioning, however, that many analysts foresee further growth in terms of market share and number of titles for the smaller, cheaper, simpler browser-based games. In particular, in 2010 Lightspeed Venture Partners foresees that the evolution to a "Game 2.0" situation will be brought about by browser-based online games rather than by AAA online games. Social games will lead this process, due to the viral marketing capabilities of the social networks that they can exploit, providing them with the possibility of increasing the number of users exponentially overtime. An AAA title, on the other hand, collects a very high number of users in the first phase after its release, and this number then progressively decreases as the offline advertising effort is reduced.

V. THE TECHNO-ECONOMICS MODELS

The main elements of the 'new economy business model' (Lazonick, 2006 cited in Teipen, 2008), primarily identified in the US ICT industry, consist of rapid product development for new markets, vertical specialization of companies in the value chain, the financing of companies by venture capital institutions and a highly flexible labour market. A similar framework was encountered when, after 2000, the convergence of the video game market towards a limited number of increasingly powerful console or handheld hardware manufacturers triggered concentration at the different levels of the value chain.

A first phase in the pre-online video game evolution saw very fast improvement in video game quality (in terms of

[9] See for example the experiment proposed by InstantAction, presented in April 2010.

[10] By means of accessing the Microsoft Xbox Live Arcade online portal.

graphics, realism, soundtrack, complexity and so on), made possible by the parallel increase in the power of consoles and PCs. To exploit the ultimate technologies and processing capabilities, big development projects concentrated on AAA-type games, whose complexity required huge teams, highly skilled project organisation, long or very long development time (up to years), and generally enormous budgets. In most cases, publishers financed development. When they were not agents for pre-developed products, they acted basically as financing entities, making it possible for developer teams and independent studios to afford the production of new games. Project costs were partially or even totally covered by publishers, leaving little room for self-financed or independently produced products, for which publishers were called only for bridging between production and distribution and retail.

A. Changes in the value chain

The progressive but impressively fast switch to online gaming introduced new distribution methods and started to rearrange the relative roles and interaction dynamics among the actors at the different levels in the supply chain.

Clearly, logistics has lost relevance in the online games segment due to the fact that digital goods are reproduced and distributed over the network at low cost. Online digital distribution has affected the value chain structure, resulting in a convergence of the roles of the distributor and of the retailer under the range of activities of the publisher. A whole part of the core business involving publishers, distributors and retailers has basically is being streamlined and some parts may eventually disappear as there is no longer any need to duplicate physical products because these can be distributed over the network. The publisher, in many cases, directly distributes games, without the need for a distributor to act as intermediary between the publisher and the retailer: i.e. "*disintermediation*" is taking place, cutting out the role of the distributor. [11] Publishers can also opt to distribute games through Internet Service Providers (ISPs). ISPs act as content aggregators and provide portals for game distribution which allow easier promotion and localisation of new games by users; at the same time they attract advertising which brings an added source to the mixed revenue models. The increasing importance of ISPs has triggered a process that is often labelled "*re-intermediation*": ISPs are taking on the role previously played by distributors. Possible legal limitations have to be taken into account, though, when considering this process.

These changes to the value chain of online video games, as compared with that of "traditional" video games, affect not only the interactions between the actors in the value creation process, but also the type and number of actors involved.

Different types of games are affected to different extents. The switch to online distribution has drastically cut the need for physical logistics. A whole part of the former business - manufacturing boxes, printing electronic support (disks, etc.), the organisation and the infrastructure of distribution, retail sales, inventory, and returns – is waning.

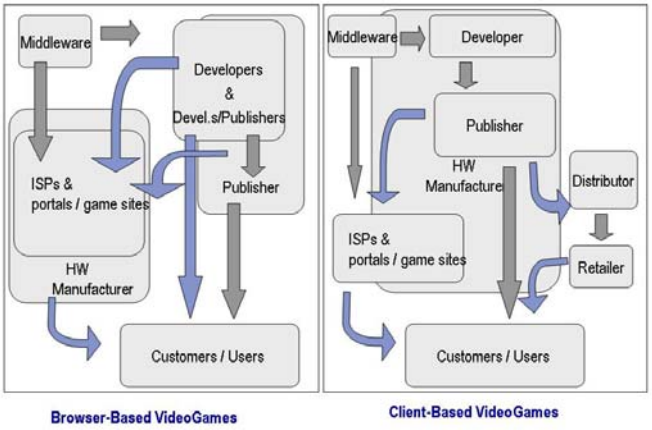
Though the characteristics of browser-based games have heavily reduced the need for distributors and retailers for logistic support, portals and dedicated sites with adequate visibility are required. In some cases, developers can afford to publish their browser-based games directly, shortcutting the next stages along the value chain.

This is not necessarily true for client-based online games, particularly the complex and expensive games, which in many cases still rely on the more traditional chain to reach consumers.

Figure 2 provides an overview of the changes to the value chain, for browser-based games (left panel) and client-based games (right panel). The arrows in the figure represent the flows along the value chain, and boxes represent the actors and steps. The dimension of boxes is different in order to provide a qualitative glimpse of the changes brought about by the switch to online to the video game value chain (bigger boxes show the increased importance of the actor along the value chain).

In the left panel, developers can take shortcuts to reach the users directly. However, the role played by publishers and new actors like portals and ISPs could also grow as they will make the identification of new games easier and facilitate access to specific categories. In the case of console-based online games, hardware manufactures especially could still play an intermediation role, in the case of BBGs and CBGs. In the right panel, moreover, some room is still available for distributors and retailers, while it is more difficult for developers to reach users directly.

Figure 1. Value chain in (re-) construction: comparison between value chain of browser-based online video games and of client-based online video games



Source: Author's own elaboration, inspired by data from the OECD Working Party on the Information Economy (OECD, 2005).

[11] Disintermediation is also taking place in the case of off-the-shelf games, where the increase in structure and negotiation power of big retail chains has allowed them to interact directly with publishers, leaving distributors with a marginal role.

B. The business models

In the above framework, sources of revenues and business models are bound to change, and to keep evolving at the same pace as the underlying products, or services. Moreover, with regard to online games, the wealth of different types of games and the variety particular features to attract customers make the landscape of business models rather articulated. This is not restricted to the online games industry, which provides a playground where various new forces are confronting each other and co-evolving. Referring to the whole content industry, Leadbeater (2008) writes "*between the pure, open and voluntary models at the one end of the spectrum and the classic closed corporation at the other, an enormous middle ground is opening up, where new hybrids will appear, mixing open and closed, public and private, community and corporation, collaboration and commerce*."

The alternative business models which users face when entering the world of online games are actually rather different from those they were used to. At least in the first phases of the online era, video games publishers tried to adopt the "old" video games industry business models. In the offline world, publishers used to hold the rights for the games, and licenses from software developers had allowed both publishers and console manufacturers to profit. The latter were even prepared to sell console hardware at loss per unit, while game titles were often pre-sold to publishers. A new title was generally expected to reach break-even point in the first few months after release, when some hundreds of thousands of copies had been sold.

Currently, the emerging revenue stream from selling virtual goods online is attracting a lot of attention in the online video games industry.[12] In-Stat (2011) forecasts that total virtual good revenues will reach more than $ 14 billion by 2014[13]. The virtual items model allows gamers to buy individual digital components such as virtual currency, items, characters, and any in-game good which are not a full game in themselves. The purchase of virtual items is generally associated with games providing persistent worlds and character building capabilities, therefore MMOGs are the category where this monetization method can be better exploited. This model does not suit those MMOGs which still ask users to pay monthly fees, but rather those which allow free access, i.e. Lite MMOGs.

The flexibility of this model is bound to be exploited by creative producers and publishers. Basically, every item could be sold as a virtual item. This allows extending the exploitation of virtual items to a specific genre or category of games, but leaves room for creativity to find different interpretations and applications of increased and consolidated users' acceptance of this type of cost. For example, now not only is virtual money is sold, but also "powers" or characters' features, together with extensions to the gaming experience of various types: soundtracks, scenarios, and textures - anything that can be transformed into a virtual item.

As regards demand, consumers are attracted by the F2P approach to the video game main product, because they see it as less of a financial risk. Users are more confident and more willing to pay small sums for digital items offered to enhance their gaming experience, once they already know the game itself and enjoy playing it.

As regards supply, publishers are motivated to adopt the virtual items model by the huge difference in sales life span between virtual items and the games themselves. Virtual items have a much longer life in terms of sales, a major advantage for the seller. A single virtual item product could be sold online for years, while the "productive" life of a standard game is of some (or, more often, only a few) months.

Western games publishers have been migrating in these years towards micro-transactions, putting the sale of virtual items at the centre of their monetization models. European and North American users now feel at ease with buying digital content, as reported by DFC Intelligence (2010), and the *virtual item model* has been fully adopted, thanks also to the popularity and viral diffusion of social network games.[14]

Social network games like Farmville from Zynga, Free Realms from Sony Online Entertainment and Combat Arms from Nexon have been able to attract millions of users while monetizing through virtual goods. Free-to-play online games have also been successfully issued by European companies, such as Gameforge and its Metin2, the largest massively multiplayer online game in Europe.

DFC has forecast that the market in 2010 for Lite MMOGs will be around US$ 800 million in North America and Europe, and that it could reach US$ 3 billion by 2015. Asia has driven the rise in digital item markets, where the virtual item model has led to fast growth in the online games-related market. Asia/Pacific dominates the virtual good market and will continue to do so in the next future[15].

When considering the effects of this evolution in the underlying business models on revenue distribution between the supply chain actors, two simultaneous processes have to be taken into account. On the one hand, there is the overall trend of transformation of digital products into services, which also involves online games, and on the other, there are the processes of disintermediation and re-intermediation, both of which affect the supply chain. A reduction in the importance of distributors and retailers has to be expected, while ISPs and portals are increasing their presence in the new evolving scenarios. The new challenges provide a good opportunity for publishers and developers to increase their revenue shares, which were, in the past, rather small especially for developers in Europe.

[12] For a description see Wi, J.H., Chapter 2, "Business models and corporate strategy".

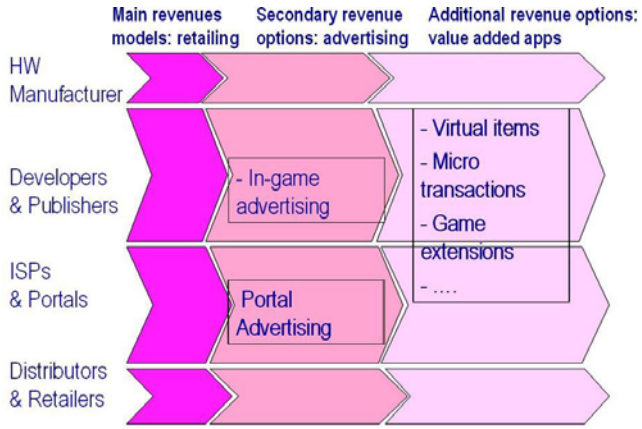
[13] Zynga clearly leads with $ 364 million in 2010, to be noted that the first EU firm, Bigpoint, ranks n°5 with nearly $ 55 million of revenues.

[14] See the presentation "Consumer Trends in Virtual Goods and Downloadable Gaming in North America and Europe", available online at: www.dfcint.com.

[15] Although with a slightly decreasing share by 2014 (61%) according to In-Stat (2011), at 50.

But these changes, represented by the vertical axes in Figure 2, have to be combined with what is expected to happen along the horizontal axes of the same figure. It is expected that an even bigger impact on revenue distribution will be brought about by the change in importance of revenue models. Retailing-based revenue models are shrinking as a result of the key role played by the F2P model. This change supports a strong increase in the adoption of additional revenue options based on value-added applications. Virtual items and game extension sales are expected to account for the biggest revenue share in a market ruled by micro-transactions, though some room is left for advertising. Advertising is a source of revenues but its formats are changing to become more compatible with the new distribution approaches (in-game advertising, portal advertising, etc.).

Figure 2. Business models in (re-) construction



VI. CONCLUSION

Innovation in the software game industry in general (McKinsey 2008) is expected to bring growth in the future. The major trends emerging over the last few years are connected to the evolution of software applications from products to services. Parallel to the this process, online games are integrating more and more digital content, and video games in general (with the exclusion of browser-based games making their competitive advantage out of their simplicity [16]) are making efforts to improve realism even further. Online games have a role in the digital content convergence process. This phenomenon is not only affecting the video game industry, but also the movie, video, music and mobile communication industries and the whole publishing sector in general.

The diffusion of MMOGs together with the persistence of virtual gaming worlds give rise to the need for the development of new business models to match the increasingly massive and evolving demand. New sources of revenues have been identified and, at the same time, the persistence of virtual world and the need to adapt the online game's core to the decisions and behaviours of thousands, if not millions, of users has been pushing forward another process of evolution. Nowadays, online games are becoming more and more like services, provided by the publishers, rather than mere products, packaged and finished once deployment starts. Complex MMOGs, whose servers are always kept online,[17] need to be updated continuously by the publisher, and this trend is also beginning to apply progressively to simpler browser-based games.

Demand has been a driving force, pushing all multimedia content towards convergence. Consumer behaviour has also evolved over the past few years and has allowed the viral diffusion of online gaming to take place at an unexpected pace. The increasingly active role of users has been sustained, on the other hand, by the interactive and social nature of the online gaming experience. It is argued that user engagement has been largely pushed by the social aspects of interaction in multiplayer games, where communities of users play a big role and communications among them are mandatory. This is seen as a first step for users towards interaction with the game itself, to the creation of content. Events in a game's virtual world are influenced instantaneously by each player's actions, and the game itself never stops, but is continuously changed by users' actions. Nevertheless, this trend could take time to establish itself and one should be cautious about predicting the different paths it could follow and also about its potential impact on industry.

The growth in social network online gaming is pushing this trend even further, and user-provided content is starting to be a reality. Virtual worlds as "Second Life" keep expanding as broadband penetration grows and critical mass is achieved. Innovative business models, combined with the availability of tools and digital market

One of the disruptive trends in the video games business is the emergence of new actors from different businesses, which may be able to bypass existing actors in currently dominant positions. New actors such as online portals (MSN, Google, Yahoo, pogo.com), Internet service providers, online social networks (Facebook) or even telecom operators (Orange, Vodafone) or telecom equipment manufacturers companies (e.g. Nokia) may become essential intermediaries in the video games value chain. These entries will bring new form of intermediation that may or may not be welcomed by incumbent players. At the same time, the technological move toward network gaming is also allowing some disintermediation, as the section on online games has clearly shown. Fewer parties involved in the value chain may mean more revenue for the remaining parties. For instance, developers may benefit from

[16] This might reflect another emerging trend in the economy: i.e. the "less-for-less" business models being tried out by multinationals like Nokia or Tata in India. The aim is to offer massive production of cheap basic-needs services to very large (poor) markets. The scale of the business makes its value.

[17] The game is played by a big number of users, who access at different moments and contribute in different ways to the development of the game's plot. Therefore, the "world" represented in the game must be always available (online). As a consequence, a server (or a number of servers) must be always connected and devoted to providing users with the "virtual world" they need to play.

direct contact with the consumers which will make them less dependent on the established publishers. Consequently new business models are emerging, however, it is not yet known which the most successful business models will be and when they will be in place.

To sum it up the videogames software industry appears to be one of the most innovative labs for the coming Digital Economy: it is developing and experimenting new digital services (on-line, offline and mobile) that manage to reach a growing share of the population. Born digital, the industry shows a digital growth that is taking advantage of many opportunities to offer user-friendly, intuitive services at a very large scale. Such services, mainly based on software development, are progressively invading other areas in the sector such as casual games,[18] advergames[19] or edutainment,[20] multiplying the supply-side actors.

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[18] Casual game: ease of use games (to learn, to access and to play) spanning all genres.

[19] Advergames: a subset of the so-called serious games (i.e. allowing for other uses than entertainment), sponsored and distributed for free to advertise a product or an organisation.

[20] Edutainment: entertainment-education, games with educational outcomes targeted at specific groups of learners.

Fewer and Bigger:
The rise of the über-blockbuster video game

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Abstract—**Drawing on media economics, critical theory and political economy, this paper will provide a critical reading of the blockbuster video game. While blockbuster games are considered to be highly innovative by constantly pushing technological boundaries, they are also considered to be formulaic and its themes and game mechanics fairly predictable. The hit-driven nature of contemporary console publishing translates into a particular mode of cultural production and circulation affecting all aspects of the video game's cultural form.**

Keyword-component: political economy, media economics, critical theory, innovation, blockbuster games

I. INTRODUCTION

The business of developing and publishing console games is one of high investments and a small chance to break even, let alone of high returns. Following the many indigenous and exogenous risks a game publisher faces today, as well as the structural challenges related to blockbuster publishing and a climate of constant uncertainty, one might wonder: Is the current mode of blockbuster production financially sustainable? The short answer is: yes. In terms of revenue growth the next-gen (seventh cycle) console market segment keeps growing considerably. But revenue growth comes at a price. The risk versus revenue dichotomy begs the question how leading game publishers, given the unabated volatility of their business environment, are able to keep growing their businesses.

Political economists agree that the capitalist mode of cultural production in general translates into a set of specific risk management strategies [1, 2, 3]. Over the years industry professionals on their part have pointed toward the reactive nature of the strategies deployed by traditional game publishers. Rather than a conscious strategy implemented with great care, the current strategy of growth seems to have evolved under pressure. My interest in this paper does not so much concern how game publishers deploy generic management strategies, for example the outsourcing of development tasks to low wage countries or revenue diversification strategies through the extension of publishing activities beyond the console segment. Rather, I want to consider how specific development and circulation related risk management strategies shape and affect the blockbuster's technological, economic and socio-cultural status. Before discussing the implications of the next-gen mode of blockbuster production, I will first argue that the blockbuster video game has in every way become a bigger value proposition for platform owners, game developers, publishers, retailers, and consumers.

II. THE WINNER TAKES ALL

Critics, journalists and scholars herald the information economy as the moment during which the mass-produced, mass-marketed and mass-consumed cultural commodity may either become less dominant or is complemented by a wide range of niche offerings [4,5]. Yet, it is exactly the networked nature of both hardware platforms, such as game consoles, e-readers, and tablets, as well as software platforms, for example Facebook, that make big hits bigger rather than smaller. "Network effects" equally apply to the inherently social practice of networked game play and they are a powerful catalyst of the concentration of capital, corporate ownership, and hit titles. The theory of network effects poses that the value or utility of a good or service (whether actual, perceived or anticipated value) is causally related to the number of goods or services sold (rented, or subscribed to), or anticipated to be sold [6]. For instance, when more people own an Xbox 360 and play online, there is a sizable user base to play against when booting a shooter at 3 o'clock at night. Indirect network effects concern the hardware/software integration of the console business and arise when the utility of a primary good depends on the availability of complementary goods. Simply put, gamers are more likely to buy a console when there is a sizable library of (quality) games [cf. 7].

Taking a step back and comparing the current mode of production and circulation of blockbuster games against similar offerings in the wider cultural industries, there are a number of interesting parallels. That is to say, the contemporary business of selling books, records, movies, and games epitomizes the notion of a so-called "winner-take-all market" [8]. The advent of digital distribution, often coupled with advanced recommender systems, might indeed open up niche markets; these complementary technologies do not spell the end of the blockbuster movie, the bestseller book, nor the blockbuster console game [9, 10]. On the contrary, hits are as

much a cultural phenomenon as they are economically motivated and driven by technological innovations. The next-gen era has game publishers not only seeking out hits, and hits only, but because of the game publisher's singular revenue stream combined with ballooning development budgets, blockbuster games are positioned to be bestseller games that garner a disproportionate amount of revenue and attention.

The cultural significance and the ever-growing sales figures of game franchises such as *Call of Duty*, *Halo*, *Guitar Hero*, *Grand Theft Auto* and *Assassin's Creed* show that the next-gen era still is extremely hit-driven. The financial success of these game franchises shows that, apart from putting an artificial cap on the number of blockbuster games published, hit-driven market dynamics are not purely techno-economic affairs. As Shirky [11] observes: "Whatever the technology, our social constraints will mean that the famous of the world will always be with us". The ability to generate a disproportionate amount of attention (a central tenet of the notion of fame) is as much a socio-cultural property as it is a techno-economic one. Success breeds success for the simple fact that consumers deploy various risk management strategies themselves:

> The time a player will invest in playing a major new game is typically at least twenty hours, a figure that in the case of multi-player or role-playing games may run into the hundreds or even thousands. This means that ill-made, disposable products simply don't work in the gaming mainstream [12].

In the end, I am not so much interested in gamer sentiments, perceived or real, either created by clever marketing or stemming from pure dedication to game brands; rather, I am interested in questions like how the blockbuster form has become the de facto standard across next-gen platforms and, above all, why big companies, franchises, investments and audiences, keep getting bigger. To find an answer to this question means a brief dive into media economics.

Drawing on the work of economist Sherwin Rosen [13, cf. 14], who was among the first to theorize the "economics of superstars", economists Robert Frank and Philip Cook [8] regard the phenomenon of hits and stars to be a logical element of so called "winner-take-all markets". These markets are characterized by "relative performance"; quality is based, or perceived, on a relative scale by comparing a product or person against others rather than on its own absolute terms. The result of relative performance is a reward structure that translates into attention or revenue for a small number of hits or stars. More so than non-durable consumer goods such as fabric softener or food, Frank and Cook found that the winner-take-all market dynamic is particularly strong in the cultural industries. Western consumers are all familiar with the notion of the bestseller book, the hit song, popular TV-series and blockbuster movies. To single out the latter, from the 1950's onwards, Hollywood "in terms of budgets, production values, and market strategy" has been "increasingly hit-driven" [15]. Starting with the mega-hit *Jaws* (1975), and followed by a slew of movies from directors George Lucas and Steven Spielberg, during the 1980's the blockbuster movie evolved into the "super-blockbuster". The super-blockbuster, as referred to by Schatz, is a heavily marketed, big-budget, super-hit that continues to generate revenue well beyond the box-office, primarily via "secondary markets" such as pay cable, rental revenues and turning it into a serialized property.

Historically, consecutive console cycles offered more complex technology and demanded bigger development budgets—another strong resemblance to the rise of the blockbuster movie. Film scholar Michael Allen [16] notes that movie related technological innovations, such as sound (1920's), widescreen (1950's) and digital post-production techniques (1980's) resulted in a: "[…] progressive shift toward the production of fewer, and more expensive, films using increasingly complex, and equally expensive, new technological systems". This, what Allen calls, "blockbuster mentality" means that such movies: "have to have an immediate and massive impact on the marketplace, earning hundreds of millions of dollars in a few weeks". We can see some clear parallels with the historical evolution of the super-blockbuster movie and the publishing logic of the next-gen blockbuster game.

"Fewer, bigger and better"

According to game industry management, hits are essential for the long-term survival of game publishers. Increasingly, executives of blockbuster game publishers emphasize the importance of developing and distributing successful blockbusters as the sole way toward profitability. Among many others, Electronic Arts CEO John Riccitiello singles out "driving hits" as one of the game publisher's key strategies. This approach to blockbuster publishing is labeled "fewer, bigger, better", meaning that a smaller slate of franchises—*The Sims*, *EA Sports Active*, *Dragon Age*, and *FIFA*—become bigger propositions, requiring higher investments, and hopefully better results. The 'fewer and bigger' strategy is a deliberate attempt to institutionalize the winner-take-all market dynamic.

Game publisher executives explicitly point to the blockbuster segment's hit-driven nature as a reason to, on the one hand, focus on bigger properties. Eric Hirshberg [17], CEO of Activision Publishing, stresses the lopsided revenue split among blockbuster titles: "[...] we continue to see the top ten titles in the industry grow disproportionately year-over-year". With the advent of the HD era, leading game publishers solidified the position of the hit as both an economic necessity and a socio-cultural phenomenon. Moreover, they live and breathe a permanent upgrade culture which stresses perpetual innovation and which has a particular forward-looking ethos.

Following Hirshberg's attention for the networked nature of the next-gen console, it is important to note, as Frank and

Cook [8] observe, that network effects are what help seed and grow a winner-take-all market. On the one hand, the explanation can be found in socio-cultural properties such as habit formation and acquired tastes. Much like television series, game franchises are a way to keep gamers inside the brand community: “Serialization rewards the competency and mastery of loyals” [18]. Put in negative terms, gamers seem to stick with what they know, avoiding search costs and the risk of regretting a purchase. As such, consumers can feel that they have locked themselves in through learning (e.g. the lay-out of buttons, the mastery of an interface or multiplayer strategies) or through investments in time or game enhancements (e.g. in unlocking game or franchise related achievements, buying peripherals like guitar shaped controllers, or strategy guides). What makes this dynamic all the more powerful is the fact that gaming is an inherently social practice. In order to play online with your friends, you not only have to have the same hardware platform, you also need to own the same game and optional downloadable content. Before discussing the risk reducing strategies employed by game publishers, I will briefly discuss the risky nature of cultural production.

A risky business

From big corporate behemoths down to the individual consumer, the many, often significant investments in social and monetary capital related to blockbuster game production, circulation and play are not only a necessity, they are also highly contingent and fraught with uncertainty. Historically, the business of selling cultural commodities and associated hardware has been a particularly high-risk endeavor [19]. Looking at the interactive entertainment sector, this means that a new hardware platform might underperform and diffuse too slowly, forcing a platform owner to lower prices and to suffer significant losses.

Apart from generic and more sector specific macro-economic challenges, the next-gen publishing strategy signals a number of uncertainties that are typical for cultural commodity production and circulation. In the words of Christina Teipen [20]: “The video game industry is faced with highly insecure market success, long product development times and costs as well as perishable products”. Focusing on the core business model underlying the console segment, one can discern two overlapping risks for game publishers. First, one of the notable properties of the video game in its commodity form is that of the high up front investments and subsequent low reproduction costs [20, 21]. Apart from design challenges, the transition to the HD era directly affected the size of game production budgets. Consider the development costs of *Grand Theft Auto IV* (2008), a reported hundred million dollar, *Too Human* (2008) $80 million, *Halo 3* (2007) thirty million, and *Metal Gear Solid 4: Guns of the Patriots* (2008) which cost $50 million to develop [23]. In comparison, analysts Pachter and Woo [24] estimate that on average a sixth generation title costs $2.5 to $4 million to develop. And second, there is the blockbuster segments singular business model which lacks the elastic pricing options seen in other hardware platforms; it also lacks the diversified revenue streams or monetization options found in other industry segments.

Considering the high risk of failure that accompanies the development and publishing of economically viable blockbuster games, one wonders who would want to take such risks? The simple answer is, of course, it still pays off. For stockholders the blockbuster investment logic is one which could be summarized as 'high risk, high return'. A hit can be turned into a franchise with growth potential, leading to more predictable sales and a significant return on investment. Game publishers are eager to convince shareholders in their annual reviews of the validity of their investment. Consider, for example, one of the opening statements in the Annual Review of the publicly traded game publisher Activision Blizzard [25]:

> Fiscal 2008 was an extraordinary year for Activision shareholders. The strength of our product portfolio, coupled with superb execution across all of our businesses, resulted in our 16th consecutive year of revenue growth and the best year in our company’s history. Over the past five years, we had a cumulative average growth rate in our share price of 50% per year and more than 30% per year over the past 10 years.

Next, I will argue that game publishers aim to create an environment in which high risks are transformed into a controlled gamble. The next-gen publishing strategy is as much about control as it is about standardization and predictability. The blockbuster game then, is inherent with a rationalized mode of production and a standardized commodity form.

Standardization

Today's development practices have become profoundly rationalized while the video game publishing business in general is many times more capital intensive than ever before in its history [26, 27, 28]. Particularly compared to the early days of publishing console games—the days of the Atari VCS in the late seventies [29]. Before arguing why the blockbuster game is a standardized commodity form, I will stress the technological continuities structuring the blockbuster game's production, circulation and commodity form.

The blockbuster game is by definition always a highly standardized piece of software. The console game is tied to a standardized hardware platform that translates into various technological requirements and game design constraints. The hardware dependency of the next-gen console game leaves its mark on the nature of game design:

> It is possible to argue that the adoption of the platform model stifles the creativity of games designers in forcing them to utilize standard hardware

> devices and software tools and that games may be, first and foremost, designed to suit the capabilities and strengths of the system rather than game designs preceding and dictating technical implementation [30].

As such, technological standardization aids, eases and from a game publisher's perspective necessitates, the reuse of game technology.

Structured and constrained by the possibilities of hardware platforms are so called 'game engines' which operate on top of game hardware acting as standardized software platforms. The game engine is the core piece of game software and consists of several components such as the renderer that visualizes the game space, a physics engine, networking code, artificial intelligence code, a sound system and other parts. A game's commodity form, Bogost [31] explains, shares the material, functional, and intellectual proprietary attributes of the core engine: “These confines both facilitate and limit discursive production, just as the rules of natural languages bound poetry and the rules of optics bound photography”. As such, the game engine offers developers a proprietary development platform, which further limits the game developer's design capabilities, standardizing the console game.

On top of that, furthering the standardization of the blockbuster commodity form is the fact that game engines are commonly reused. The proprietary game engine used for next-gen installments of the *Call of Duty* games are all updated versions of the “IW engine” which is originally based on engine code developed by id Software and then licensed to Activision [32]. Over time the IW engine has been significantly altered and enhanced; for example *Call of Duty 4: Modern Warfare* (2007) added an enhanced physics engine while later versions saw improvements in lighting, artificial intelligence, and so called 'streaming texture techniques' to allow for bigger game worlds. Game critic Tom Bissell rightfully points towards the art direction of big-budget games having “the cheerful parasitism of a tribute band”, turning console games into the “most visually derivative popular art form in history” [33]. An as any gamer can attest, the look, feel and overall game design of the next-gen *Call of Duty* games is rather homogeneous because of the use of a standardized software platform. How, then, to account for this specific modality of cultural production and circulation from a critical perspective?

III. THEORIZING STANDARDIZATION

Drawing on Marxist theory, political economists theorize the capitalist mode of cultural production by noting that a cultural commodity's exchange value takes precedence over its use value as a work of art [22, 34]. This process is anything but unique to games. What sets the blockbuster game apart from, for example, movies or music is the technology driven standardization of the blockbuster game because of standardized engine technology. Moreover, game publishers are boxed in by the market—the actions of competitors, the expectations of consumers and critics mixed with pressures from stockholders and industrial actors along the value chain—as to what kind of blockbuster games to develop, when to release them and how to market them. It is the game publisher's primary task, then, to manage risks, to generate surplus value—profit—by the strategic exploitation of intellectual property and to do so in a steady and preferably predictable manner.

Predictability in the cultural industries, however, is a double-edged sword. Publishing blockbuster games means constantly oscillating between exploitation and experimentation. On the one hand, game publishers opt for various ways to breed familiarity and keep players engaged with carefully crafted game brands. To achieve this goal game publishers follow two complementary strategies. One is to build a catalogue of blockbuster games consisting of familiar genres, the other is to serialize content. On the other hand, the contradiction underlying all cultural commodities is that: “[...] its uniqueness and originality are undone by reproduction, familiarity and over-exposure” [3]. In comparison to non-cultural commodities, once a blockbuster game is out on the market its value decreases rapidly. As a result, game developers and publishers are locked-in a continuous research and development cycle as hardware platforms continually evolve and competitors (re)act accordingly. In order for a game publisher to remain profitable there must be constant investment in new tools and technology, as well as in fresh input (knowledge) and highly skilled labor [35].

To be profitable in the next-gen era, a game publisher has to show tremendous restraint in the number of games a company releases and the publisher has to be highly disciplined in managing its portfolio. Recall Electronic Arts' “fewer, bigger, better” strategy. At the same time, relying too much on a publisher's existing portfolio and gamers might grow tired with the same old game. The balancing act of diversification versus standardization and of rationalization versus innovation, harks back to the classical argument of creativity versus capital and of art versus commerce, a theme that is at the root of the notion of (the) Culture Industry [21, 36]. Jumpstarting the debate on the implications of the commodification of culture were scholars such as Adorno and Horkheimer [37] and Benjamin [38]. They were among the first to draw attention to the capitalistic tendency of consolidation and the concentration of corporate ownership and how these issues relate to the production and circulation of culture.

It is the culture industry's homogeneous and confirmatory tendency against which Horkheimer and Adorno aim their most outspoken criticism at. The perspective as well as the intellectual challenges put forward by the Frankfurt School are still highly relevant today since contemporary cultural

production is: “[...] more commodified and commercialized than ever and so the Frankfurt school perspectives on commodification are obviously still of fundamental importance in theorizing our current situation” [39]. As such, the value of critical theory lies in the fact that it allows for a rethinking of positivist research paradigms such as media economics and helps to guide a critical perspective on the interplay between technology, culture and economics. Exactly by theorizing movies and music as cultural commodities, rather than as mere cultural artifacts, early industry critics paved the way for contemporary critical political economy and influenced countless critical scholars.

As Adorno explains [39], the notion of an industry is primarily meant to draw attention to “the standardization of the thing itself”, and to “the rationalization of the distribution techniques”. Drawing on critical theory and critical political economy, Ryan furthers the core of Adorno's argument by theorizing the institutional conditions constituting the production and circulation of culture. He replaces the concept of Culture Industry with the notion of “corporations of culture” and takes the dichotomy between the formalized and the rational economic process of cultural production and the creative and irrational process of artistic labor as a starting point to provide an empirically grounded understanding of contemporary capitalist cultural production.

The value of Ryan's work lies in his detailed analysis of how corporations of cultures, such as game publishers, counter the contradictions inherent to cultural production in its corporate form. In general terms, publishers are constantly deploying and refining strategies and business practices which are aimed at predictability to ensure constant revenue streams as well as growth. Similar to blockbuster game development, as political economist Prindle [40] notes in his study of Hollywood movie production, film studios are constantly trying to “replicate the unreplicable”. While consumers exhibit highly unstable taste patterns, at the same time they value “familiar plots, characters, and morals over more artistically innovative fare” [40]. Ryan [3] comes to a similar conclusion but also adds that cultural commodities, and this goes particularly for hits, have a truncated product life cycle therefore necessitating “recurrent production” to guarantee the constant flow of sales. The goal of game publishers and film studios trying to replicate the unreplicable, or rather build on previous successes and hits, guides design decisions, which commonly err on the side of caution.

The crux of Ryan's [3] argument is the fact that the creative stage of cultural production is formatted, meaning: “Creative work is performed to a management plan. Specific, fixed cultural rules are formulated as company policy by its creative managers and applied to members of the project team”. In this instance, the project team consists of the game developers working in game studios. To counter the risks posed by the “mental machinery” young, imaginative knowledge workers bring along, game publishers have put into place a system of managerial control [41, cf. 42). In his reading of the Culture Industry thesis, Kellner [43] stresses the wider cultural industries' reliance on formats: “Film, television, popular music, and other genres of media culture are highly codified into systems of commercial enterprise, organized in accordance with highly conventional codes and formulas.” In practice, variation on a theme, or what Ryan calls “type-based” products, far outstrip wholly original themes, narratives, and gameplay mechanics. This is not to say that game design is an uncreative, mindless practice. Congruent with the contradiction underlying the cultural commodity, the operational side of cultural production is relatively open and creative managers (studio heads, producers, publisher executives) do not stand looking over the shoulder of individual artists telling them how to work their magic.

Marketing and cataloguing

Next to technological standardization and formatting the creative stage of cultural production, there are two complementary and overlapping publishing practices which further standardize the blockbuster commodity form and which are commonly drawn upon by next-gen publishers. First there is the rationalization of circulation—blockbuster games are heavily marketed—and, second, blockbuster games are developed in such a way as to fit neatly into a publisher's catalogue. Similar to the formatting strategy, the ubiquitous business practices of marketing and cataloguing provide the game development team with additional design limitations. The “publicity complex” has a crucial role in marketing blockbuster games [3, cf. 45, 46, 47]. Yet, marketing and PR should be understood as encompassing a complex set of practices including “research, product planning and design, packaging, publicity and promotion, pricing policy, and sales and distribution” [3]. While advertising, publicity and promotion are the most visible and well-known instances of marketing and PR, it is through research, product planning and design that the creative stage as well as the cultural marketplace are rationalized.

Marketing and serialization reinforce each other and aim to discipline the market, add a layer of predictability and lower risks:

> Sequels have intrinsically lower market risk than unknown titles due to the higher level of brand/title recognition. The curiosity raised by the sequels provides sufficient marketing impetus that reduces the risk by providing a certain level of sales, which cannot be presumed in the case of unknown original titles [47].

Many blockbuster games have been audited by a test audience long before they go into production, a practice which Horkheimer and Adorno found fault with in a vehement manner: “Marked differentiations such as those of A and B films, or of stories in magazines in different price ranges,

depend not so much on subject matter as on classifying, organizing, and labeling consumers. Something is provided for all so that none may escape; the distinctions are emphasized and extended" [37]. The publicity complex, then, puts additional limitations to the work of blockbuster game developers.

Lastly, as Ryan notes, the logic of repetition guiding formatting is further operationalized through "type-based creative policies", or cataloguing [3]. Activision Blizzard (2010: 4), for example, relies heavily on a very small number of hits: "[…] our top three franchises, *Call of Duty*, *Guitar Hero*, and *World of Warcraft*, accounted for approximately 68% of our net revenues for the year ended December 31, 2009". As Ryan pointed out, the contradiction underlying the cultural commodity does mean that such a heavy reliance on such a small product slate introduces new risks as much as it avoids others. Yet, these conservative strategies permeate the blockbuster publishing business. There are certain game titles that have 'all bases covered'; that is, they are assured of a "built-in" audience, which is familiar with previous iterations of a title. Genre has an important signaling function, similar to film, but at the same time seems to be more rigid in the blockbuster segment.

The catalogue of a game publisher looks very much like a bingo chart to be filled with at least one action-game, a first person shooter, a racing game, sports games, and a music game, or a variation thereof. In the end, the strategy of cataloguing offers a formidable, self-enforced straight jacket for publishers. More so than arguably any other publisher in the blockbuster segment, Activision Blizzard rationalized every single aspect of a game's development and circulation. I will conclude this paper by illustrating the operationalization of this logic.

First, the publisher focuses explicitly on "proven strategies" which means that rather than developing and publishing original intellectual property the publisher focuses on the largest market in order to expand its margins by "growing recurring franchises" [48]. In a conference call with analysts from major investment companies, Kotick succinctly summarized the political economy of franchising: "[...] I think one of the great benefits of having a portfolio with 10 multi-million unit selling franchises is that you can expect virtually every one of those properties will be exploited on an annual or close to annual basis" (ibid.). Launching a blockbuster game based on original intellectual property has always been a challenge. Kotick [49]: "The single hardest thing to do in the video game business is to introduce original IP and that is why it does not happen very often". The majority of wholly original blockbuster games sold do not break even and are, generally, not nearly as profitable as franchises that were built up over time.

Second, in the rare case a new property is launched, it neatly falls within a well-defined genre and fills an open slot in the publisher's catalogue. How cataloguing ties into the rationalization of production and circulation is explained by Activision Blizzard Chief Financial Officer Thomas Tippl [50]: "We constantly evaluate our plate as part of our three-year planning process and decide which market segment we want to participate in, where we have a consumer-proven concept, [and] great development talent that can deliver those concepts". Genres, in this instance, are seen as clearly defined markets with their own demographic and potential revenue. It is the publisher's task, then, to (re)capture as much market share in a genre as possible and find a development studio, preferably an in-house one, to work on a concept. As Activision Blizzard's 'slate' lacked a solid non first person shooter, it published *Prototype* mid-season 2009. Ironically, the game competed head-to-head with *Infamous* (2009), Sony's mid-season attempt to capture the open-world super hero genre. Desperately seeking out a hit game to fill the summer revenue void, Activision made two similar attempts with the first person shooter *Singularity* (2010) and the racing game *Blur* (2010). Both games fell short of (revenue) expectations, leading to the closure of *Blur*'s development studio Bizarre Creations and *Singularity*'s developers mandated to work on the *Call of Duty* franchise.

The third instance of how Activision Blizzard standardizes the blockbuster game is by selected experimentation within brands coupled with a disciplined publishing schedule. Franchises are developed with serialization in mind and are preferably spun-off into infinity. Additional installments in a franchise follow the routine of a 'variation on a theme', aiming to extend consumption as well as to broaden the market. The 'Hero' music franchise is an example of how marketing practices such as audience research and segmentation rationalize the marketplace as well as the development of individual installments. Consider Activision's 2009 publishing slate for the franchise consisting of the September release of *Guitar Hero 5*, targeting "the rock-focused music gamer", the October release of *DJ Hero*, aimed at "club dance" enthusiasts, and the November release of the pop music focused *Band Hero* "which should appeal to a family audience". In terms of game design, a franchise means tweaking, upgrading, gradual refinement and minor innovations, rather than starting from scratch.

IV. Conclusion

During the next-gen cycle, the "super-blockbuster" movie [15] got its ludic equivalent in the next-gen blockbuster game. As a result, the first half of the seventh generation coincided with the rise of, to put it in gamer discourse, the 'über-blockbuster game'. These mega properties not only signal significant financial investments in terms of production, they receive a disproportionate amount of attention and investments of developers, publishers, retailers, consumers and critics. Consider the 20 million unit selling über-blockbuster *Call of Duty: Modern Warfare 2* (2009). Game publisher Activision Blizzard is reported to have spend $40 to $50 million to

develop *Modern Warfare 2*, whereas the title's launch budget—covering “marketing expenses and the cost of producing and distributing discs”—was $200 million, “on par with a summer popcorn movie—and extremely high for a video game” [51]. Super hits like these, figuratively speaking, suck the oxygen out of the air and are slowly but steadily becoming the be all and end all of console based interactive entertainment.

Political economists tend to agree about the accumulative nature of capital and its subsequent effects on cultural diversity [52]. To go beyond the mere acknowledgment of concentrated corporate ownership, I concur that the cultural industries' dominant market structures result "in the suppression of diversity" [53]. As Wayne [54] argues: “Because competition drives down profit margins there is an ineluctable pressure to diminish competition wherever possible, by driving competitors out of the market, by take-overs and mergers and by raising barriers of entry to a market”. In contrast, at first glance the diversity of output of the cultural game industry might seem overwhelming. In retail stores there are numerous games to choose from. “It is true that thousands of games are available”, Kline et al. [55] observe, however, “the logic of economies of scale and the fear of failure favour the serialization of success”. Moreover, as Mosco [34] notes, there is a “fundamental difference between the sheer number of voices (multiplicity) and the number of *different* voices (diversity)”. The diversity of voices, then, is rapidly shrinking.

Blockbuster games are in many ways seen as highly innovative and in many ways they indeed do have an innovative edge to them. Yet, as Kline et al. [55] note: “There is at the heart of the gaming industry a contradiction between “commodification and play”, a tension that paradoxically drives its frenzied creativity and subverts its own success”. That is to say, the underlying formats of franchises such as *Call of Duty* are highly formulaic. Games may be increasingly customizable—gamers can buy various sorts of additional content to tailor their game experience to their own tastes—these are oftentimes variations on a theme rather than true player freedom or creativity [cf. 56]. It might come as no surprise that political economists lament the conservative and mandated approach to game development, especially because rationalization strategies such as the flow publishing logic quite rapidly and without much opposition became taken-for-granted by consumers and critics. However, by accepting the current status quo and by taking the current mode of blockbuster production at face value, one overlooks the political and ideological implications of this particular economic arrangement.

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The Game Of Being Social:

a case study of social media games in Shanghai, China

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***Abstract* — Gaming and social media are now in a symbiotic relationship, and this recent integration of business interests, software and social experience has been important in the 'casual revolution' [1], in which the online monopoly of high-intensity 'hard-core' genres is being challenged by low-intensity and intermittent genres of game-play. While this growth in the popularity of casual gaming has been worldwide, in each location the types of games played, the motivations for game-play, and the lived experience of game-play differs, reflecting the local socio-cultural, linguistic, economic, political and technological factors. Increasingly, at the intersection of games and innovation we see that place informs the types of uptake.**

This paper explores a case study of social media gaming in Shanghai, China, in which both time and place are significant — time, in capturing some of the experiences of the *ba ling hou* generation, and place, in capturing some of their experiences of mobility. Here we see how a sense of place (as both a geographic, social and emotional terrain) increasingly plays a role in the types of social media gaming participation. We observe that casual games are important in maintaining interfamily relations in circumstances where children are mobile, and parents are less so, and are important in promoting cross-generational media literacy in circumstances where children are technologically skilled, and parents are less so. In so doing we demonstrate how parents are active users of games, thus subverting stereotypes about youth and gaming. We also note the wider socio-cultural, economic and political circumstances in which casual gaming occurs in Shanghai, and using Happy Farms as our exemplar, relate these circumstances to the subtext of the game architecture. Here too, time and place are important, and we argue that in addition to mediating family relations, the game's polemics resonates with a particular idealization of a past and a possible future.

Keyword-component: social media, online games, casual games, Happy Farm, cross-generational media literacy, China, youth.

I. INTRODUCTION

Over the last decade a number of important growth areas have occurred in the international world of online gaming, each of which serves as a barometer for popular cultural practices. For example, 'casual gaming' is challenging the 'hardcore gaming' monopoly, a trend that Jesper Juul [1] overstates as a 'casual revolution', real though the trend is. The monopoly on gaming hardware enjoyed by PCs and consoles has also been challenged by mobile devices, not just by porting PC games to mobile platforms, but more importantly, through a growth in games that deploy global positioning systems and location-based services to focus on mobility as the game-play itself. But while this growth in casual gaming involves players in a different experience of game time, and while the growth in geospatial gaming involves players in a different experience of urban space, significantly, there has been no shift in the sociality of games. Whether intense or casual, desktop or geospatial, the contemporary game is social.

In China, we can see two very different but interrelated phenomena evolving around online gaming communities — both intensively social, but one social in the name of politics, and the other political in the name of sociality. In the case of the former, where political action has a social context, or subtext, one might point to in-game protesting [2] and to the broader blogging culture [3, 4, 5, 6, 7]. Here, the role of the Internet as a form of public sphere for political agency is highlighted [8], and so too is the role of social networking in expressing that agency. In the case of the latter, where social action has a political context, or subtext, simple, child-like games such as Happy Farm, played on SNS such as QQ Zone (China's oldest social media), Renren (China's Facebook) and Kaixin001 (one of Renren's social networking competitors), attract millions of young and old who play to socialize with family and friends. Here, the role of the Internet as a form of private sphere for the expression of sociality is highlighted, but this private, intensely social sphere is also political in so much as the game architecture sits within the public world of China's historical and social circumstances.

Casual gaming in China is growing rapidly in popularity, as it is all over the world. According to iResearch, a consulting group specializing in Internet research, around 50 percent of the 26 million daily users of one of the main SNS, Renren.com, play online games [9]. These games generate around half of the website's yearly income. 'In terms of user groups, SNS games are totally different from traditional network games,' says iResearch senior analyst Zhao Xufeng. Whilst the number of traditional hardcore network games has remained relatively constant at 50 million, the number of SNS users have grown from nothing to tens of millions in a few years [9]. And one of the key priorities for SNS users is communication, especially

more novel and innovative ways of communicating — something that SNS games provide.

Moreover, the growing population of users migrating to these types of casual and social online games aren't the usual suspects — young students. Rather, it is their parents and even grandparents who are playing the games, often being taught to use the Internet by their children, who are living away from home for study or work. This cross-generational new media literacy emerging in China's increasingly mobile population sees social media such as QQ and online games such as Happy Farm, helping to alleviate the negative effects of cross-generational class mobility, by maintaining kinship relations.

In this paper we focus on Shanghai and through records of one-to-one interviews and focus groups conducted in 2009 and 2010 with 80 Fudan University students and their parents, observe the experience of social media gaming in this time and place.

The timing of these observations is important in the context of China's recent history. As the first generation to grow up in China's emerging net culture, the *ba ling hou* are a product of the first large-scale IT education project, initiated in 1994. This initiative comprised firstly the construction of a national network called CERNET (Chinese Education Research Network), followed by the rollout of the EISS policies (an acronym for 'Electronic Information Service System' or in Chinese *'xiaoxiaotong'*). Through these policies the government orchestrated, over a ten-year period (2000-2010), the deployment of computers, networking equipment and training programmes, to enable 90% of independent middle and primary schools to have access to the internet, accompanied by the provision of online content to be shared amongst teachers and students [10]. This EISS *ba ling hou* generation are now positioned in a particular narrative of progress in which technologies have played a central role. They are a generation which has high media literacy, and like their Western counterparts, view the Internet as essential infrastructure for everyday life. Through this IT literacy, and against the wider backdrop of China's growing economic prosperity and growing middle-class, many of *ba ling hou* generation can travel — often for study. This link between the Government's new media education initiatives, the provision of better access to new media technologies, and also the student's high levels new media literacy, have allowed *ba ling hou* to negotiate a sense of mobility unimaginable for previous generations, and current Fudan University students are a good example of these new media literates and their attendant forms of mobility.

A. CROSS GENERATIONAL USAGE OF SOCIAL MEDIA GAMES

> *If I was a fish then QQ would be my water.*
>
> (Bao, 25 year old, male postgraduate student)

Our informants are not only drawn from the generation to profit from growing up in tandem with China's Internet and technology education reforms, they are, interrelatedly, the first generation to collectively study away from home, travelling either within or outside of China for their tertiary studies. Given the traditional significance of family life in Chinese culture, and commonly as children from one-child families, our informants feel very strong emotional and obligational ties to their parents and grandparents, a feeling that is exasperated when they move away from home. In this physical relocation, social and mobile media plays a key role in their emotional identification with the imaginary "home", and in maintaining a sense of place and family.

Through social media and casual games, our informants are able to frequently experience a form of co-presence with family, and are also able to collect, archive and memorialize their "stories-so-far" to construct the patchwork that marks a sense of lived relation. Memories, stories, pictures and exchanges become paradoxically ephemerally memorialized within, and around, the vehicles of social media. The fleeting and transitory nature of the digital interaction perfectly matches the ephemeral everyday exchanges that circumnavigate both the phatic and poetic. These cartographies of the vernacular and everyday are performed and captured by social media, operating as contemporary versions of older forms of co-presence at a distance, such as the letter and postcard. However, the new media also produces new resources for co-presence and for re-imagining home and its interrelations.

In the need to maintain often-daily contact with their parents back home, our informants used a variety of mobile and social media. In many cases students explained how they taught their parents to use cheap (in most cases free) new media such as casual social media games, chat services and QQ's video service (similar to Skype) to maintain social connection despite the distances involved. In a typical report a female informant, aged 19, talked of cross-generational media literacy in this way:

> They have a lot of time to stay at home, so they will play the computer games and want to surf online. But my father and mother are not good at it yet, so we continue to teach them and with the help of QQ, we can contact them more often. For example, when we come back home, I find that my father's mobile phone has something wrong — it always happens and he can't receive my short message. I said he's a little old for it. He has played games in QQ and also, Happy Farm. He liked stealing vegetables. But my uncle is more of social media user. Several years ago, I taught him how to use the internet, how to connect — how to talk with others, by QQ or something like that. And now he uses it all the time. He even makes friends with strangers. And so, every time we come back to my home and we can talk a lot about this QQ, and games. I don't know if the technology is a very good thing for him. I don't know, because we think maybe he has spent a lot of time on this new technology, maybe too much. But from my side, we have no doubt he has a very, very young heart from this technology side. And we think he is enjoying his life very much.

Unlike her uncle, this informant was not an avid game player, but while doing an internship she did socialize with her

workmates through gaming, using Kaixin, a popular SNS among office ladies. She said,

> During my internship in the office, myself and the other four office people played the Kaixin games together at lunchtime. We enjoyed the games on the Internet, it was a great way for us to relax and talk to each other. I liked it a lot then, but after my internship there was no reason to play the games as my friends didn't play, and thus it was really boring.

Here the informant highlights that for her, unlike her uncle, the importance of SNS games was not the game-play as such, but the communicative interaction in the game world mediated by the game play, and this communicative interaction was only valued in so far as it involved her workmates. Whereas for her uncle, of the older generation, the connection between online and offline SNS friends was not significant. In fact, the respondent noted with great surprise how willing her uncle seemed to play with strangers online. She viewed her uncle's attitude as demonstrative of a type of youth or youthful attitude. Or what could be dubbed a type of kidults (adults adopting kid-type attitudes to lifestyle objects like new media). The elements of the game that seem important to the Uncle are the game-play and the symbolic communicative exchanges implied by the game-play. Communication around the game-play would appear not to be the key motivation, as it was with our informant, but nevertheless, communicative interaction did occur, to a point where strangers became friends.

Some of our young respondents were not as sanguine as the niece however, and were bemused, if not shocked, by their parents' usage. One of the unintended consequences of student-parent skill transfer was the parents' move from communication applications to the entertainment and consumption elements of social media, in particular games, gambling and online shopping. In a curious twist of the usual "youth media-addiction" phenomenon, some young respondents even claimed that their parents were 'addicted' to games — especially parents who had retired and had 'too much time on their hands'. One female respondent aged 20 complained that she believed her father to be addicted to playing games. She said, 'he has so much time on his hands, he just wastes it on gaming. Our generation don't have time.'

Another female respondent, aged 28, noted that her father loved playing games ever since he had retired. When asked whether she played with him at home she said no, as there was only one computer at home, and that was monopolized by her father playing games. She noted that he spent too much time playing games, but that didn't bother her as he only played games when he had finished all his other household chores! In a reversal of the usual generational arrangements for the guardianship of responsibility, when asked whether she thought it funny that her father played games so much she said,

> No, he gets a lot of pleasure from it. Sometimes he wins money. And if we ever ask him for help he stops playing it immediately to help me.

Another of the recurring themes emerging from the parent and student interviews was that the students had a much clearer idea of how the parents used new media such as social networking sites (SNS) and online gaming, whilst the parents had less of an idea of their children's usage. This perhaps is another reversal of generational roles, where parents surveille children more effectively than children surveille parents. For example, many parents thought their children used the internet mainly for information (i.e. study) rather than for socializing. This undoubtedly reflects the parents' idealized projection and the children's selective reporting of their habits, as well as the fact that the students were more adept at using the technology in every facet of their lives, including of course, their studies. Having in most cases taught their parents to use the Internet and SNS, students were mindful of their responsibilities to their parents, and felt the need to regulate and manage their use of technologies. Parents on the other hand noted that it was essential for their children to regularly engage with new media if they were to get a job, were not so aware of the "addiction" stories, and saw technology as an integral part of the younger generation's milieu.

Many *ba ling hou* also noted that their parents viewed the internet as a contemporary version of the TV, a metaphor not appropriate for the students' Internet, but perhaps more appropriate for the parents' Internet. The implications of the parents' 'inappropriate' SNS usage and their 'inappropriate' Internet metaphors remain to be explored. Were parents really addicted to games, and really thinking the internet was TV? What might the parents think about their children's usage if aware that their children were using the Internet predominantly for socializing rather than for study? And what might the role reversals we see across the generations imply for domains that are not socio-technical? These differences between the generations are questions for further study, but one usage pattern that was clearly applicable across the generations, and raised issues for all, was their shared usage of Happy Farm..

B. HAPPY FARM: SOCIAL INTERACTION AND SOCIAL POLEMICS

Happy Farm is a game played by millions in China, including most of our informants. Its game architecture invites play through a seemingly simple mix of farm labor, symbolic exchanges of gifts among neighboring players, and social exchange through chat and messaging, all brought together through a colorful graphical interface.

In relation to the farm labor, social theory has sensitized us to the extent to which online gaming has extended labor relations and the production process into a new domain. The production process requires forms of labor to produce commodities, markets to sell those commodities, and forms of work-leisure differentiation to facilitate labor and consumption. These traditional relations have migrated to gaming — employing people to produce games, making profits from commodifying and marketing games, and positioning time for the consumption of games as leisure time. But perhaps more interesting than the extension of this traditional model of production from ordinary consumer goods to the production of games, are the new forms of labor, commerce and time differentiation that have emerged in online SNS game playing environments, such as Happy Farm.

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Important in differentiating these new forms of production and consumption from the old, is the social and emotional labor that SNS gaming mediates. SNS games conflate production and consumption, rather than differentiating them. (As one consumes the game-play by playing, one is producing the resources for game-play). SNS games conflate work time and play time, rather than differentiating them. (SNS games are casual, designed for multitasking and gap filling). SNS games conflate commodification and marketing with the game-play, rather than differentiating it. (As one consumes the game-play by playing, one becomes the product to be marketed by the game's owners). In all these respects, SNS play is social labor.

For a female informant aged 23, the social labor required by Happy Farm became too much. She found that she had too many friends on her SNS, Renren, too many Happy Farm neighbors, and found it hard to leave those social obligations to fulfill work obligations. Work-time — leisure-time boundaries were crumbling as the obligations of her social labor intruded on the obligations of her paid labor. So now she mainly plays the online game on the local university server. As she notes,

> …. I think it [Happy Farm] is very good for socializing, but then it became too busy and it was hard for me to stop playing when friends were logging on. I now use a local game developed at Fudan University. It is good because we just play that one with my friends and roommates at the university. We play when we have all finished or need a break studying.

It is also about a particular kind of social capital that Cara Wallis [11] identifies as *guanxi*. As Wallis observes,

> In contrast to the individual-orientated nature of western cultures, where the autonomy of the individual is presupposed, Chinese social organization has been described as relationship-orientated. In traditional Chinese culture… there is no unique "self" outside of social relationships and the personal obligations that inhere in those relationships… despite the influences of communism, industrialization, urbanization, and westernization, many have still found utility in conceptualizing the Chinese sense of self as predominantly relationally focused (p.67).

For Wallis, *guanxi* is a 'widely used yet ambiguous' term that can mean many things: relationships, personal connections, and social networks. The term closely encircles the terrain marked by Pierre Bourdieu's notion of 'social capital' [12] whereby knowledge is not rewarded in what you know but who you know. The notion of g*uanxi* is significant in the uptake of new media like Jie Pang (like Foursquare). An early adopter will often persuade friends to join the new media networked with the promise that it isn't for everyone, but rather, just for them. Here we see that the *guanxi* fosters tightening amongst close social ties that often excludes other, less close contacts' — a phenomenon Ichiyo Habuchi called 'telecocooning' [13].

By deploying games like Happy Farm, users can play into existing notions of *guanxi*. Indeed, social media games highlight the increasing significance of the local and socio-cultural in determining types of gameplay. And while Happy Farm continues to be played by older generations, younger people are opting for new types of smartphone games like Angry Bird and the geosocial game of Jie Pang. Unlike Foursquare in the west that ignites debates around privacy and surveillance, Jie Pang highlight that notions like privacy, individualism and participation differ dramatically subject to the socio-cultural context. As the smartphone evolution grows, questions about the locality of "networked cultures" [14] will become increasingly salient. This is particularly the case in China where the cultural specificity of social capital, epitomized by the *guanxi*, is amplified. Here we see that social media games overlay social capital with social labor in new ways. This overlay between capital and labor is exemplified by Happy Farm.

Like all games, Happy Farm positions its players in relation to a specific framework structured by the game architecture and the affordances of the online game environment. The communicative and symbolic interactions of the players are in this sense "rationalized" [15] or "ordered" by these affordances, which place the players outside of the stream of unstructured interactions that constitute face to face communication in daily life, and also in a different place to that we occupy when speaking on a telephone, corresponding via text messaging, or email.

A coarse 3-way division of the affordances that "rationalize" or "order" social interaction through Happy Farm would place single player mode interactions on one side (e.g. planting or harvesting), symbolic interactions between players on another side (e.g. stealing chickens, helping to fertilize), and communicative interaction between players on a third side (e.g. chat, messaging around the game play). Single player game interactions simulate the dehumanizing obligations and tedium of repetitious manual labor. For example, writing about Happy Farm's western version, Farmville, Liszkiewicz [15] points out that a 14 by 14 square farm, though small by many standards, takes almost 600 mouse clicks to farm, that none of these clicks requires any precision or eye-hand coordination, and that the player is obliged to return to do it all over again, not at a time entirely of their own choosing, but within a timeframe set by the game. In Liszkiewicz's view Farmville is hardly a game at all, and is defined by routines and obligations that encroach on daily life, entail neither chance nor skill, and require neither emersion nor suspension of disbelief. So tedious is this game that it rewards player persistence by providing equipment such as tractors and harvesters specifically to relieve the player of the need to play! Yet the game's overwhelming popularity in China (and in the West incidentally) suggests that something else is going on here. As a 23 year old female informant notes:

> I liked playing Happy Farm very much. I think the plants we planted were very beautiful and we like to keep my farm looking neat. I also like visiting other people's farms and stealing some plants and flowers from friends. Often I'm playing in the same [physical] space as my friends. It adds to the enjoyment of the game.

Plenty of others agree, and Happy Farm has 23 million active daily users [17] and a growth rate requiring Tencent to protect QQzone's servers by capping the growth of new Happy Farm players to 2 million per day [18]. Happy Farm also

problematizes distinctions between work time and leisure time. Leisure has always been integral to the labor cycle in that it provides the physical and psychic recuperation, and the motivation, to engage in labor. In Fordist regimes one works in order to provide the resources for play, and play provides the motivation underpinning the desire to work. However, integrated though the two have always been in this sense, in another sense they were clearly bifurcated. Places for work were not places for play; time for work was not a time for play. This separation is clearly challenged by contemporary, Post-Fordist work-play practices. Contemporary work-culture suggests that the sort of psychic satisfaction, pleasure, excitement and out-of-self distraction that has traditionally been the domain of play can be obtained through work practices — and so for example, it is said to be fun and to be personally satisfying to compete in a team — whether "the team" is selling hamburgers or playing volleyball. Postmodern work culture also suggests that work infuses all times and places — we can and should take that client's call from the volleyball court; we can and should take a moment to play a game at work. So our informants commonly report having Happy Farm open on their desktop whilst doing other activities (such as work) to avoid being robbed. Rest time also loses its differentiation from work time and leisure time and some our informants set their alarms for the dead of night so that they can go online to steal when everyone else is asleep. (Stealing is part of the game-play, and those who are victims of theft are compensated with 'pious' points). In relation to playing at work, a female respondent, aged 23, notes,

> I use Xiaonei [Renren] very frequently because I enjoy playing online games such as Happy Farm. I played Happy Farm so much that I even played it during my working time and so my boss punished me. So now I don't play it at work now. I also download some mobile phone games. I like to change my statement a lot (status update).

Happy Farm's particular way of ordering social labor and work-leisure time differentiation characterizes casual SNS gaming world wide, but like QQ, Happy Farm is also rooted in its Chinese locale. For example, consider the game's scoring system in the local context. Happy Farm has a scoring system that is monetized, and rewards experience (though not skill). As money and experience accumulate through hours of play, they may be exchanged through an in-game market for the acquisition of land, capital equipment and consumer goods. Alternatively, real world money may be used instead of game-play, to buy land, capital equipment and consumer goods. In this way the scoring system and the modus operandi of Happy Farm mirrors the ideals and norms of market capitalism, wherein labor or capital may be exchanged for possessions. It may not be a coincidence that Happy Farm is so popular in a society that in this time in its history is fast moving from local subsistence farming to global industrial capitalism. The polemical sub-text of the game positions the player in this milieu – idealizing the agricultural past through the game's romanticized, "sugar-sweet" images of the farm and of farm work, and idealizing the future through its reproduction of a corruption free, transparent, and open market for farm produce and favor trading. In this way, play and games do reproduce an attractive polemical narrative, and an ideological take on the themes of real world life.

Not all games that are popular in Shanghai are romantic idealizations though, and some are elaborations of darker themes. One such game is "Nail Household Fighting Against Demolition Squad", a social-realist game that invites players to defend a four-story building that is repeatedly attacked and inevitably destroyed by a demolition crew. The players fight, but the game-play gives players no chance of final victory, taking up and mocking the social reality of intensely unpopular forced demolitions. In locations such as Shanghai, where spiraling real-estate prices and political corruption places tenants at the mercy of landlords, Happy Farm provides a stark contrast: an idealized place, where although there is plenty of stealing, there is also compensation; where corruption can't happen, and hard work is rewarded in an entirely predictable and consistent manner, and importantly, where families come together to work and talk in harmony.

So games are politically, culturally and historically located. But this having been said, it is also important that the game world is a place distinct from the real world, that the play provides something that is not real-world, for this otherness is the raison-d'être of gaming. Happy Farm is otherworldly, and the communication that occurs around Happy Farm play does not rely on the real successes and failures of the *ba ling hou* generation, or of the family for that matter, and importantly, does not hinge upon the powerful intersubjectivity of familial intimacy. Happy Farm provides a shared context that is not real, and without the context provided by Happy Farm (or mahjong, or cooking, or shopping, or other shared activities), nothing stands between mother and daughter except the naked relationship itself. Nothing stands between a father and son, and each is exposed to the other.

Consider that a relationship is exercised in communicative performances that are often resourced by meaningful content. To speak, we need something to say, though phatic communication and physical interaction are also very important. What we say might relate to the profundities of one's hopes, fears and desires, or might relate to banalities of the news of the day. Unstructured play with a doll or with a ball (or mahjong, or cooking, or shopping) provides us with shared resources for communication, as does Happy Farm. In each case, communicative interaction is facilitated by the symbolic exchanges that take place in the course of game play, and by the game-world's distinction from the intimacies and profundities of the real world. In the case of Happy Farm, communication is facilitated by an idealized world.

A game that is successful in drawing its players into the play world, suspending their disbelief in its premises, and buying into its narrative and its objectives, becomes increasingly reflexive and self-referential, and relies less and less on its symbolic references back to the non-game world, and more and more on its own internal coherence. One may be absorbed by the play world of Chess or mahjong for example, without making a connection to the realities of mediaeval warfare or the three cardinal virtues of Confucius. Chess, mahjong and the like, position a player in relation to the game-play, and in relation to the opponent — symbolically, through

the interactions of game play, and interpersonally, through their companionship in and around the game world. QQzone's Happy Farm and its game world position a daughter in relation to her mother, a son in relation to his sister. QQzone and the game stand between the family members, as a mahjong board might, and the game world provides their interactions with a structure in addition to language, and with communicative resources beyond familial intimacy.

A female respondent aged 25 frequently played QQzone mahjong (an online version of the traditional Chinese board game), because her mother liked to play with her. She said, 'the more we play, the happier my mother is. I like to make her happy'. A daughter might steal her mother's Happy Farm chickens and make her happy. A brother might give his sister Happy Farm fuel. A player might get very rich, double the size of her farm, build a Georgian mansion, spend her time helping others, and achieve success, all of which is evident to family. The point is not that this is "real life", or reproduces in symbolic form some significant aspect of real life (though it does), or even that the game depends upon its symbolic action for an affective potency that can only be located in the offline world (though it does). The point is that the game provides its own context for the performance of sociality. Happy Farm provides its own context for social order, and for the social agency of their users, as does mahjong, volleyball, dolls, and all other games that draw players into the special world of the game. One of our informants noted that online games were becoming an integral part of connecting with friends and family. As she said,

> I never used to play games but now we play many (online) games with friends and family. I will play with students whilst we are in a lab waiting for experiments to be finished. I play Happy Farm with my mum. She loves stealing my vegetables. I also play it with my roommate and often she will say aloud "I'm going to steal your vegetables!" and it makes me laugh.

Other informants did not play games on a daily basis, and did not rely on them to scaffold communication with family. For example, a male respondent aged 28 on played,

> … during the summer holiday, when I wasn't doing an internship I liked playing many games, especially QQ games. They are quick, fun and relaxing. But when I am in the semester, I am too busy studying to play games.

A traditional work-time — play-time differentiation is thus maintained, despite the erosion of the differentiation implied by the affordances of the casual game paradigm. In our various interviews with parents and children there were many differences in use. In general, parents didn't use technology as much as their children — apart from the mobile phone — unless their profession demanded it or they were retired. All parents and their children had used to oldest SNS, QQ. In the case of retired parents, they often quickly adopted the new media to do activities such as online shopping and playing games. Overall, many parents had little comprehension of how much their absent children used the internet for socializing — or that SNS games were an essential part of this practice.

II. CONCLUSION: LABOURS OF LOVE

The increasing popularity of SNS games has been associated with new forms of Internet gaming practices. No longer about hardcore, intense, subcultural gaming, this new form has been adopted in the mainstream as a way to playfully socialize. These shifts illustrate that new forms of labor are being played out — emotional, instructive, affective and social — and that the ongoing interplay between play, labor, and socializing on the Internet continues to reflect its particular time and its particular place. This situation is clearly evident in the *ba ling hou's* cross-generational use of SNS in general and Happy Farm in particular, and in the polemical content of the architecture that contextualizes their game-play. Through the lens of SNS games, China's cartographies of social and familial interaction can be mapped, its various modes of mobility — geographic, socio-economic, and intergenerational can be traced, and through observing social game-play and interpreting the polemical subtext of game architecture, its social idealizations can be made legible.

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The Four Different Innovation Philosophies Guiding the Game Development Processes

An Experimental Study on Finnish Game Professionals Development Processes

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Abstract—**In this paper, we examine game innovation practices and the emphasis of different elements within the game development processes. We were interested in what is critical for game development processes from the point of view of innovation. An experimental research approach was set. In total of 24 interviewees were asked to describe their innovation process with a help of a drawing exercise. The data was collected from 7 different Finnish game companies and the analysis was performed as grounded theory approach supplemented with content analysis. Four different approaches that we called *innovation philosophies* were identified: *idea, human, evaluation* and *iteration centric* approaches for innovating new games.**

Keyword-component: innovation, game development, innovation philosophy, experimental method, game industry, game design, game idea

I. INTRODUCTION

Games are touted as idea and innovation centric products [18] and innovation intrinsic to the field [11]. However the depth of the innovation processes within games industry has not been rigorously explored. In what way games are idea and innovation centric products and how does that show in their production processes? On the other hand it is also noted that game ideas are bound to be changed throughout the production [10]. Developers express that "ideas are cheap" and the magic is in the execution [18]. How well these views fit to the same picture? How about the process itself? What is the role of innovation within the game production process and how ideas relate to this?

In his article "Balancing the Tensions between Rationalization and Creativity in the Video Games Industry" Ted F. Tschang [18] discusses that game companies use certain kind of balancing acts in order to survive in the cross pressure of execution complexities and innovation seeking consumers. There is a need to have more secure products with less experimentation to keep the money flowing as well as to make more experimentation in order to stand out and keep consumers interested. How does this show on the level of the process itself?

Games industry is characterized by the volatile business environment with constant changes that the industry undergoes [2]. For instance for the past five years, we have witnessed several major changes that have molded the processes that game companies need to consequently update.

As the changes provide possibilities for new innovations to thrive, it also creates the instability among the pre-existing actors. The innovation processes have to be flexible enough to react to the merging of new trends and the change of the platforms. Even though the critical part of the innovation processes in general are touted to be the new ideas [3], game developers needs to emphasize and support creativity not only on the pre-production and idea management, but throughout the whole production process. Creativity is vital part of it from the idea phase all the way to the maintenance of the game.

Games are highly challenging targets of design and creativity: the subjective and experiential nature of game experiences [16] moulds the design process. This is also acknowledged in the literature of game design handbooks. For instance Salen and Zimmerman talk about game design as "second order design" [14], which means that one cannot directly design the game experience or how the experiences will turn out. Games can only be indirectly designed by designing the game system. Oftentimes the idea is possible to evaluate only after a playable demo is made. Tracy Fullerton [5] speaks about the importance of iterative processes and the playtesting of the game concepts. It is different to imagine the game than to actually engage in the activity.

The way that games are innovated in practice is not thoroughly studied. Several design books have been written by game professionals to record the game design practices [e.g. 5, 1], but rigorous body of academic perspectives to same issue is lacking. The design books look mostly at the target of the design: games themselves. The practice of making games as design activity is left untouched [9]. The body of game innovation studies is also fast read through. From the perspective of management studies, for instance F. Ted Tschang [15, 16, 17, 18, 19] has published several studies that are relevant for the investigation of innovation practices. He has examined games as a cultural industry and the manner of their development processes. Our previous studies have dealt with the practice of coming up with new ideas [10], the ways that such processes could be enhanced [12, 13] and the tools

for recording ideas [8]. Hagen [7] has studied the influences that games may have. However, the previous studies do not really look closely on the level of execution. The more important part of the game innovation process is the process of making the ideas alive. The role of a game idea is to provide a starting point for the design process [10]. In this way, the innovation process and activities cannot be studied separately from the production process and its nature. Thus the purpose of this study was to examine innovation in the context of the everyday development process.

Based on the previous experiences, we did not want to rely solely on the interview data, as it easily produces too abstract notions. On the other hand, although ethnographical approaches would suite better for this kind of a deeper examination [see 15, 16], it was not in the scope of our resources. The time frame provided us only two separate two-week observation periods on two of the companies to provide background material. We were interested to explore the nature of innovation process on a micro-level and wanted to see how the production itself was formed to suit the innovation need of the game companies.

II. METHOD AND DATA

The research was conducted as part of the Games Industry Innovation Processes (GIIP) project. During spring and summer 2010, seven Finnish game companies were examined with an experimental approach. The basis for the study was thematic semi structured interviews with 1-2 interviewers at a time. We mixed the interviews with a drawing exercise. The informants were asked to describe their production process from the point of view of innovation at the same time as they answered to thematic questions and concretized their views by producing their model. This approach allowed us to get deeper with the practice of game innovation without having to witness several production processes from the beginning to the end by observation.

We interviewed three to six people from seven different Finnish game companies taking part to the experimental study case. In total, 24 interviewees representing different roles on the production process: hands-on (game designer, junior game designer, artist and writer), mid-level (senior game designer, producer, lead graphic artist, lead programmer, team leader, project manager and community manager) and top level (CEO, creative director, VP of technology, artistic director and art director) took part of this study.

The selected Finnish game companies varied in size, age and domain of design. The smallest company in this study had personnel of six people, the biggest with 300 staffers. The companies were designing for various platforms (mobile, iPhone, Facebook, different game consoles, hand-held devices, PC and Linux) and genres (casual, social, shooter, platformer, sports, puzzle and racing games).

All the interviewees were male, 54% of them were 26-30 years old, 8% were over 40 years old, rest somewhere in between. Most of them had some level of university education, but 13% had only secondary or lesser education. The interviewees' experience at the games industry of varied as well, 8% having less than three years of experience and 13% being the veterans of the industry. The roles were divided quite evenly, having slightly stronger emphasis on the top level.

A specific mixed approach method was designed for the needs of this particular study. The approach included themes for the interviews and set of words and elements for the drawing exercise. We run an evaluation workshop (see Figure 1) with a handful of game professionals and researchers to iterate the form of the method. In the workshop we used three different variations to this approach and based the final research tool for the feedback and observation at the workshop.

The drawing exercise was structured with a set of words written on small papers slips and other elements to focus and get inspired. The final set of the words was purposefully quite large to prevent the drawing session becoming an organizing exercise (see Figure 2). We wanted to prevent the screening the whole word set, so that the tool would provide a common ground but encourage the interviewees to use their own words. We also noticed that the large set of words overwhelmed the informants and we thus took specific attention in how we grounded and directed the whole exercise. The pen-and-paper (see Figure 3) variation was not successful in the testing workshop because of the difficulties of interpreting the composed, complex picture. The test interviewee was given only pen and paper and some sticky notes to help the drawing. We saw the pictures potentially to be on very different levels of abstraction.

Figure 1. Testing the different variants of the research tool.

Figure 2. Test interviewees organizing the word sets.

Figure 3. The pen and paper approach resulted in too complicated picture.

The initial word-set was formed based on the game design and innovation literature and publications [4, 6, 14, 15, 18]. The words were chosen to represent the most basic components needed in a game development process.

The word set was cumulated during the interviews, but the amount of words was kept approximately the same from a session to another. If there was time between the interviews, the word set was stripped down to its approximate original set. Sometimes the sessions were so tightly scheduled that this was not possible.

The set of words was purposefully hand-drawn to lower the threshold of the interviewees to add new words to the set. The interviewers asked if they could assist with drawing a new word, if suitable word was not found fast enough. In the end, the initial word set worked as an inspiration and as a starting point to the discussion and picture forming and many words were added during the interview sessions. Naturally some words were overlapping and some words were used by one or two interviewees.

In total there were over 600 words used, with almost 300 unique words. The initial word set was only 134 words, from which 42 words were not used at all. At the end, the amount of added words was 191. Thus enough words in the pictures were added by the interviewees themselves to validate the pictures as their own conceptions.

The sessions were audio and video recorded, the final state of the pictures were also photographed (see Figure 4). The interviews were later transcribed into text and the pictures were clarified by redrawing them with drawing software and adding elements, arrows and texts to them with the help of the video material. The questions addressed in this paper were only partial interest of the whole study.

This method provided us rich data to examine. There were at least three different levels of data representations for the analysis: 1) the pictures produced by the interviewees (the innovation process models) 2) audio material (discussions during the drawing exercise) and 3) video material (sometimes the interviewees were pointing the pictures and explaining the complexities that were not possible to capture by drawing).

We based our analysis on the grounded theory approach and content analysis. Whereas the pictures provided us a concrete reference for comparison, the discussions provided a possibility for the triangulation of the data. However, the lack of the body of the previous research has forced us on relatively shallow interpretations. The main purpose of the study has been to provide an outside view to the companies themselves. On the academic level, this analysis could be further elaborated by using related theories and studies from the areas of management studies, creativity research, social psychology and design research to name a few.

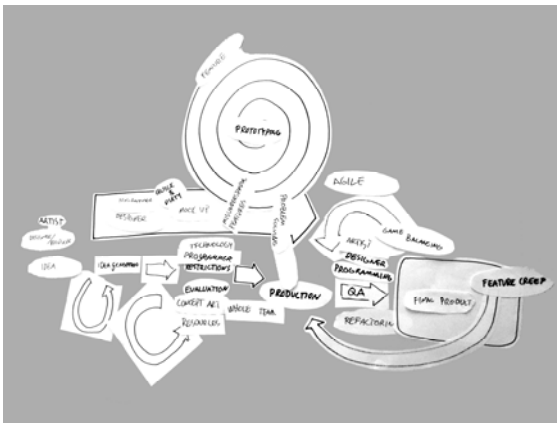

Figure 4. An example of the pictures at the end of the session.

After collecting the data, a content analysis using the words on the formed pictures and transcriptions of the study was conducted and four types of underlying philosophies for game innovation were discovered. After this we analyzed the emphasis of the different philosophies in the pictures and compared the emphasis on the level of individuals and the companies.

III. INNOVATION PHILOSOPHIES

Our initial hypothesis was that the data would include statements on the importance of the ideas, their selection processes, the right kind of atmosphere or other human factors, user studies, user inclusion and other R&D practices, as well as the emphasis of iteration, prototyping and experimentation. Centrally, the topics were concentrated around four different emphases. The cumulated topics were the importance of the personnel, the importance of the ideas, the importance of the selection process and the iterative practice of making games. Other views were weakly highlighted.

We call the emphasis of certain aspects in the innovation process as an *innovation philosophy*. This is the ground beliefs behind the process, what is thought as being central, critical or important for the innovation itself. As these might not necessary be hand in hand with the intentional emphasis on the production, we do not call them as *innovation strategies*, even though the strategy might be in sync with the proposed innovation philosophy. With our data, it came evident that the principles that guide the innovation process are not very complex in practice. The overall view could be essentially put into simple formulation of game innovation process: Game innovation is the process where the game ideas are carried, selected and iterated by the creative people.

Based on the data, we formulated four different archetypes of innovation philosophies:

1) **Idea centric innovation philosophy** reflects the belief that ideas are central for the innovation: The original idea is the key to an innovative end product. The core idea may be modified during the development, but it always exists and guides the development process. This could also include the notion that ideas come before the production and they stay at somewhat unchanged. The production is about the implementation and refinement of the idea. In this kind of process the original idea is critical and consequently the production process is about how well it is implemented and preserved. This is the way that game production is sometimes characterized by players or outsiders of the industry.

2) **Human centric innovation philosophy** reflects the belief that people and human resources are central for the innovation: Being able to produce innovative end products is about having the right people to do the right things. Recruitment and management are important. This could also denote the belief that innovation emerges from the (collaboration of) people, for which reason the production process is heavily about labor division, collaboration and communication processes. In this sense it is critical to the company how they select and attract the talented people. This is often seen as a way that people from the inside of the game industry is talking about the innovation processes.

3) **Evaluation centric innovation philosophy** reflects the belief that evaluation and selection processes are central for the innovation: There is always more than enough ideas. What is essential is the skill to pick the right ones to the production. Evaluation is present throughout the development and unsatisfactory features are cut off. Evaluation is often done both internally and externally, e.g. by publisher. This philosophy reflects the belief that the production should be controlled so that the high quality of right kind of ideas are used and exposed and that the resources are not wasted for something that is not in the core of the company. Critical to innovation is the selection and filtering processes and the development of such practices.

4) **Iteration centric innovation philosophy** reflects the belief that iteration and flexibility are central for the innovation: What matters is the execution. While one cannot know beforehand how the idea works in practice, it is important to keep iterating and testing different solutions allowing the product to change its direction flexibly. Ideas are only the starting point, from where the production moulds into the direction that it actually can.

Even though these views should be treated more or less as Weberian ideal types, as none of the interviewees represented only one type of innovation philosophy, it is interesting that neither other philosophies nor more sophisticated thoughts rose from our data. For instance, there were barely any mention at all of user centered design or systematic R&D practices. If such mentions were present, they were often time disengaged from the production process itself. The innovation models and production models can be easily thought of as being something separate from each other. On the other hand, whether the discussion is about the production model or the innovation model, they should have reflections from each other.

It is also notable that even though only the first view states that ideas are central, the following two views are also somewhat *idea centric*. The picture of games industry as idea centric practice could be challenged, but only to the level rethinking what is the actual role of the idea and ideas. Innovation process of making games is not solely based on one overarching game idea, but different idea acts: producing game ideas and further ideas to design problems, nurturing creativity within the company as well as selecting and molding the ideas throughout the whole production cycle.

Many interviewees did talk in terms of ideas or about the first idea and its variations. One company used a term idea 2.0 representing the second version of the game vision that was done after the initial idea was reworked by the creative director or CEO. Even though some of the companies had somewhat person centric processes with one dominant creator, in general the ideation was described almost all through as democratized process. Many of the pictures formed by the interviewees were human centric. They told the story of the production from the perspective of labor division or group dynamics. The selection processes were guarded by the top management or the designers, depending on the company. Sometimes this role was also the publisher's role. Evaluation of ideas was also present in the pictures: some interviewees were describing the practice of pitching the game ideas internally or to the funders. Some companies referred to special meetings where the ideas were presented. Further check points were also included into the process. It was also mentioned that a concept could be discarded after preproduction or even in the production state, as the stages were not so clear. Iteration was mentioned usually without any strong emphasis. This tells about the everyday role of iteration within the game companies rather than the absence of it.

We looked at the emphasis of certain word groups in the pictures to highlight the differences in the processes. In this case, we were mostly interested on the composition of the whole process. What were the most dominant factors in the processes and how they were emphasized in different pictures?

We were interested to see, whether these views were differently emphasized in different companies and their personnel. The target of the analysis was the word set presented in the drawing exercise pictures. The words were interpreted to reflect the philosophies flowingly: All words referring to the production roles, such as "*designer*" or "*programmer*" were interpreted as reflecting human centric innovation. Some words were not so easy to interpret, for instance word "*idea*" was regarded as a reflection of idea centric philosophy, whereas "*demo*" could reflect both the idea and the iteration centric process and was placed on both categories. There were also other words in the pictures, such as "*development*" which were seen so general that they were put into the category of "*other*". This fifth category did not seem to bring about any new category, as it stayed relatively small. However, it seems to indicate a substantial difference in the understanding of the process, if the person's picture was emphasized with this category.

In general, there seemed to be some kind of balance in the division between the different innovation philosophies. The human factors were usually a little bit higher than the other factors and evaluation was slightly lower factor as an emphasis (see Figure 5.).

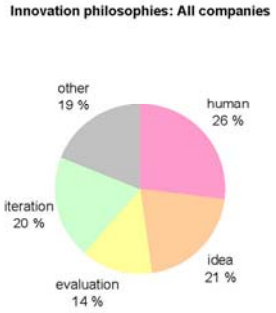

Figure 5. The division between the innovation philosophies among all companies.

On the level of individuals, the pictures were varying (see Figure 6). Many interviewees (10) had more human-factor emphasis; some had more emphasis on ideas (4), iteration (3) or other factors (5). Some pictures did not have one of the factors present at all and there were also relatively balanced pictures (4).

Figure 6. Differences on the emphasis of innovation strategies.

There were a couple background issues that seemed to explain the differences in innovation philosophies: For instance interviewees with the producer or project manager role had more emphasis on human factors (see Figure 7). Conversely, the lack of higher education correlated with notably smaller emphasis on human factors (see Figure 8). Also the industry experience correlated negatively with the emphasis on the other factors (see Figure 9). This was also visible on the level of the maturity of the company: the younger the company was the more other factors there seemed to be (see Figure 10). Size of the company did not remarkably affect to the balance between the approaches, nor the object of design or platform.

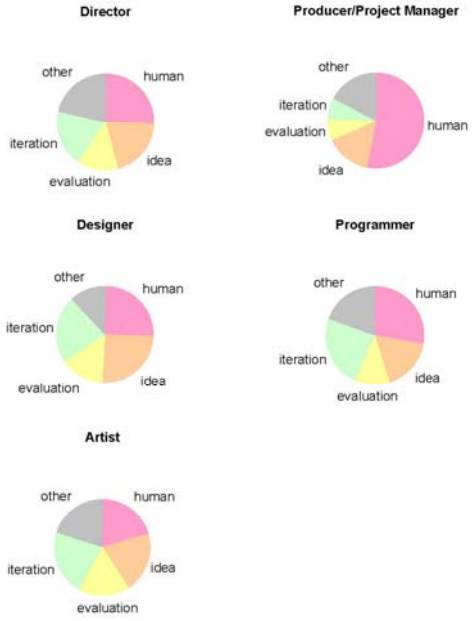

Figure 7. Producer and project manager posts correlatewith human factors .

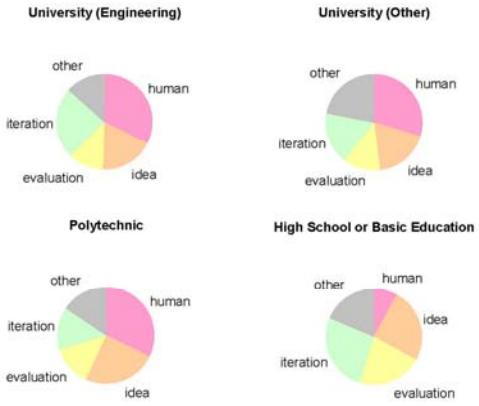

Figure 8. Education correlating with human factor emphasis.

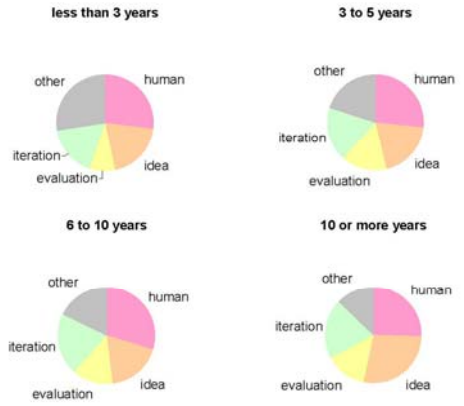

Figure 9. Industry experience seems to correlate with other factor emphasis.

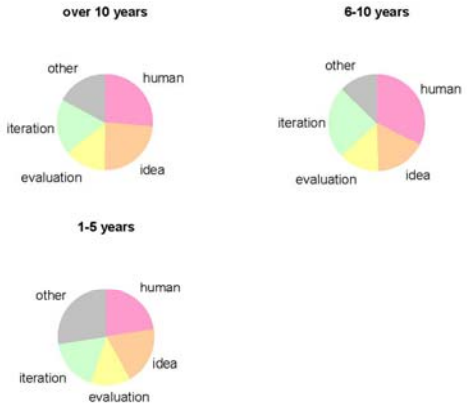

Figure 10. The age of the company correlated with other factors.

IV. Discussion

By analyzing the emphasis of the elements in the innovation process models we were able to examine the core of the innovation processes more profoundly. In the interview studies, the attention draws easily into the recent topics and it might be difficult to understand the whole picture. The different levels of the data in this study helped us to interpret the discussions. For instance, in one of the companies the discussions during the drawing exercise concentrated a lot to the evaluation practices of the company. However, the emphasis on the pictures were more human centric than in the average of the whole data. Compared to the other companies, in this company the human factors were more central to the whole process. The company seemed to be currently seeking to develop their evaluation practices and the interviewees were eager to express the opinions about them. Some opinions were mildly negative; frustrations were expressed towards the complicated evaluation and review processes. This might be an indication of tensions between the innovation philosophies.

The dynamics of a game innovation process may not be unique to the industry, but it certainly gives us a view what the developers see as central. Despite the archetypes presented in this analysis, there is no one that represented one view only. The average pictures are somewhat balanced and there are also individuals that build their own pictures with a balanced set of the elements. All the four innovation philosophies seem to be important for the production process and it would be interesting to see whether there is an optimal level for the emphasis on each. What we were able to tackle with this study is more of a descriptive level of the processes. Some of the background data may give an indication of a normative theory for the emphasis of the different philosophies. Experience seemed to be in connection with the level of "other" factors in the picture. However, a deeper analysis would be needed in order to actually form a theory based on this data.

The analysis of the innovation philosophies was conducted only by looking at the words in the pictures. However, iteration loops were strongly present with arrows, spirals and twirls in the pictures. Also as the iteration loops were seen sometimes so difficult to describe that the interviewees felt more comfortable to point the pictures during the exercise and describing different loops from one part to another. Thus it is probable that the emphasis on iteration would have been higher with most of the interviewees, had we included the arrows and other elements in to the analysis.

V. Conclusions

In this paper, we have discussed the emphasis of different "innovation philosophies" within the innovation processes of game professionals. The body of the data has been part of the Games Industry Innovation Processes (GIIP) project study, where the state of the innovation processes within the Finnish game industry was examined with an experimental research approach. The informants were describing their developmental processes from the perspective of innovation with a help of a drawing exercise specifically designed for this study. The element in the innovation process denotes at least four different approaches that we have named ***idea centric***, ***human centric***, ***evaluation centric*** and ***iteration centric philosophies***. The content analysis of the pictures formed as a result of the drawing exercise gives us a generally balanced picture of these four, with a slight stronger emphasis on the human centric elements. The deeper analysis gives us reasons to believe that the processes could be more iteration centric than what our analysis on the level of the used words can expose. The seemingly simple view on innovation within game production is actually a composition of different approaches that might be different from individual to another.

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Game Design Prototyping

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***Abstract*— Prototyping is an important part of the game design process. In this paper a study is presented where different views on prototyping in game design is presented. The focus lies on prototypes that are targeting the design teams' members. The data has been collected by doing interviews with a number of game designers in leading positions in AAA and indie companies. This data has been transcribed and relevant sections extracted in a qualitative content analysis. Three different analytical frameworks serve as lenses through which three definitions of game design prototyping is suggested. These frameworks are variation theory, activity theory and rhetoric. A unifying definition is not presented since this may be more limiting than liberating.**

Keyword-component: Game Design; Variation Theory; Activity Theory; Rhetoric; Prototyping; Sketching

I. INTRODUCTION

Design practice and research have been expanding their boundaries for some years. This paper will investigate computer game design. Prototyping is a well-studied activity in interaction design, but its role in computer game design is relatively unexplored. Earlier research in game design has presented ideas for how to go about when prototyping but what practicing game designers actually do in terms of prototyping has been unaccounted for in empirical studies.

It is clear that prototyping is an important part of game design [10, 11, 12, 25, 26]. New game technologies are rapidly developing, which means that new game design possibilities arise [22, 26]. These possibilities can be explored in short iterations with prototypes. Games are furthermore, more than average software, a piece of art [7, 27, 29] although this issue has been heavily debated outside the academic field, [9, 21]. These characteristics of game design may put prototyping in a new perspective when compared to prototyping in other software industries.

Games, seen as a medium, are complex. Not only do they incorporate many different forms of expression, such as image, sound, music, storytelling and acting. A game design team also has to manage the *game play* and the balance of the game system. Game play is here viewed as the experience a player gets from playing a game, following its rules [25]. When they are designing the game, there are furthermore all the constraints of software development. The designers consider communication of ideas crucial but difficult, in this context [14]. Prototypes fulfill an important role in creating ways of communication.

The aim of this paper is to shed light on prototyping in game design. This has been done by conducting interviews with games designers. Prototyping is here viewed as a tool that mediates the designers' activities. The study uses qualitative content analysis on the empirical data, which consists of interviews conducted with 27 game design practitioners in Sweden and Poland. The result is viewed through three theoretical frameworks. This overall approach is inspired by variation theory, which also is one of the frameworks used.

A. Research question

In interaction design and traditional software development, prototypes have been conceived as early versions of the final product. Distinctions that exist are whether they have high-fidelity or low-fidelity and whether the prototype is made as a physical or digital artifact [3, 5, 6, 19, 30]. The prototype is also seen as something completely different than a sketch [6]. Whether these and other distinctions are valid for game prototyping as well may be answered through researching how prototyping can be defined. In this study different aspects of defining prototyping in game design, based on our analysis of the data will be discussed and a number of definitions of game prototyping are suggested as an answer to the question: How can prototyping be defined based on game design practice?

B. Previous work within the project

The data has earlier been analyzed using activity theory, more specifically The activity checklist [17]. Different functions and views of prototyping have been identified and the aim is to work further into this using variation theory and rhetoric. The data has shown that game designers consider prototyping to be a very important part of game design, and they conceptualize game design prototypes in many different ways. They are conceived as sketches, visualizations, communication of a function, tests of a function, design aids, specified parts of an intended outcome and an experience of an idea.

When the data has been analyzed the prototype has been identified as a filter that focuses attention on certain aspects of the design idea. It also highlights a specific region of a design space. A fundamental characteristic of a prototype is that it is a manifestation or an externalization of an idea or a design problem.

C. Prototyping in general and in game design

In the early ideation process, prototypes can take the form of game sketches made in, if not minutes, at least hours [1]. The aim of such early sketches is to open the design space for new alternatives [6]. Early prototypes can be put together swiftly, preferably using existing technology to get a feel of the idea. This is valid in general [2, 6, 28] as well as for games in particular [4, 10, 25, 26]. Both physical prototypes using paper, game boards, miniatures, or actors and software prototypes can

be useful. When choosing prototyping method, game designers need to consider the purpose of the prototype, the game type, the project type and the phase of the project [23]. When prototyping is mentioned in this paper it is referring to game prototyping specifically.

II. THEORY

In our interviews we have collected data about how game designers use prototyping in their practice. A challenge in design of games, electronic as well as analogue, is that they are rule based and that changes in rules produce emergent effects that are difficult to predict [25]. This calls for short iterations and frequent prototyping. Early testing of game play and game ideas, on the first versions of a game, is recommended [18]. Electronic games share this emergent quality and have in addition all the complexities of software development, often at the brink of hardware and interface evolution. Prototypes are valuable tools in this process [10]. To find a final definition of prototyping is likely not a fruitful task since prototypes can fulfill so many different roles depending on the discipline of the person using it.

A design process, in particular when it comes to games, is certainly difficult to sum up in one statement. Game design is an art of experience design [26] and the gameplay is elusive in nature in a way that you need to play a game, you need to experience it, in order to understand its gameplay [24]. When a practice concerns something elusive and emergent as in this case this classic statement ascribed to Heraclitus is highly relevant "Ever-newer waters flow on those who step into the same rivers". Because of this the ambition here is not to find the final definition of what a game design prototype is but rather to discuss different aspects of its nature based on empirical data.

The aspects chosen are three:

- Variation theory, as a development of phenomenology, and more specifically the notion of change and variation in views of something.
- Activity theory and the concept of externalization and internalization.
- Rhetoric and the correlation between topos, deliberation and synecdoche

A. Variation theory

Phenomenography is a qualitative research method. Special features of phenomenography as a method are that it aims at describing the fundamentally different conceptions of phenomena. The goal is to try to observe a hypothetical range of human understanding of phenomena. One way to approach the task is to analyze interview transcripts and compile different types of statements into description categories. Through this procedure, statements describing conceptions of the investigated phenomenon are collected and statements of similar meaning can be grouped and defined. Relationships between the description categories can then be sorted in a phenomenographic outcome room in which the relations between the descriptions and between the descriptions and the phenomenon can be examined and ranked using an ordinal scale [31].

Phenomenology has in more recent years been developed in a direction called Variation Theory which is more focused on how things are experienced, in the sense of how the object is being perceived. The object receives its meaning from the relation between the object perceived and the subject, i.e. not as an object in itself but rather in how the subject experiences the object. In a given situation, all aspects are never discerned by the subject simultaneously but some are. This experience of an object is constituted by the simultaneous discernment of certain features in the object. (Runesson 2005).

Variation theory is primarily focused on pedagogy and learning. Central is that the learners experience, i.e. what is learned. A focus lies on conditions necessary for learning, where learning is defined as a change in the way something is seen, experienced or understood. (Runesson 2005).This is affected by previous experiences and by how the present situation is experienced. How something is perceived affects how we makes sense of it and acts in relation to it. We create meaning not in relation to the situation in an objective sense but in relation to how we see it [20]. A game design process can be viewed as a learning process directed towards the yet unfamiliar game being created.

Variation theory has inspired the overall structure in this paper, the development of different definitions. It is also fits well with the data which consists of a number of practitioners different views on similar tasks. The possibility of acting on, or handling in a situation depends on how we make sense of it. We act in accordance with how we perceive the situation. This links variation theory to Activity theory.

B. Activity Theory

Since earlier analysis of the empirical data has shown that *internalization* and *externalization* are notions that resembles the way prototyping activity is carried out a focus on those concepts will be set in this paper when attempting a definition of game prototyping based on activity theory. Internalization and externalization originates from Vygotskys thoughts on higher psychological functions [16]. Humans use artifacts as psychological tools to mediate our relationship with the world. There is a distinction between physical artifacts (maps, pieces of art etc.) and symbolic systems (such as language, algebra etc.). And through experience physical tools can become internalized i.e. they are still mediated but by internal rather than external signs. Activity theory maintains that internal activities cannot be understood if they are analyzed in isolation from external activities [16]. These concepts have clear connections to how prototypes are made and used. Important to note here is that internalization and externalization traditionally apply to the human mind in an activity. Here we also try to expand the view and take a standing point in the game. We view the prototype as an externalization of a part of the game.

C. Rhetoric

Rhetoric has a wide variety of analytical tools and terms. Some are chosen here and used on prototyping practice although they were initially intended for spoken language. But this approach has been fruitful.

A prototyping process can be described as a negotiation. The prototype is in this context viewed, not as an object, but as

a process, as part of the game design process. It is in the creation and the use of the prototype that its value occurs. This sits well with the prototype seen as a tool in a negotiation process. In rhetoric terminology negotiation is represented by the term *deliberation.* To deliberate means to negotiate and to weight the various aspects in order to arrive at consensus. When something is turned into consensus the participants get *pistis* relative to this. Pistis can be translated into trust. Pistis is needed in order to be convinced. Pistis may exist in relation to various objects such as a person, company, a State, a tradition, an idea, etc. [15]. One example could be an object in a game design process, such as an operating mechanism, a level layout, a characters ability or similar. When the object reached pistis within a person or a team that object receives her/their trust in that, in this case, it is functional and good.

A *Topos* is defined as a recurring and familiar way to describe, understand and communicate something within a specific culture. It can be described as a perspective, an approach or a belief. A topos is a way to structure our thinking. It originates from a mental landscape that describes what is important for the group in a given area, which in our example could be the game design group's idea of what is important in a game and what a game is in general. A topos works as both an aspect and a way to negotiate this aspect. The understanding of a specified aspect of a game in a game design process constitutes a topos. A topos works as a node in which both consensus and controversy can exist (generally not at the same time) [15]. A prototype can be described as a language if we view language in a broad sense, (such as there are languages of images, films and music). Thus, one can see the prototype as a tool for the negotiation which takes place in a topos node of controversy. In a game design process countless design decisions are being made, all perceivable as topos. When a topos is transformed from a node of controversy to a node of consensus, the process can be viewed as a deliberation.

When a prototypes is used to deliberate a topos it functions *synecdochically* as a tool in the game design process. A synecdoche is an understanding of the whole developed by an understanding of parts that are associated with the whole (rather than parts that are similar to the whole, as is the case of metaphors). Conversely a developed understanding of the whole may deepen the understanding of an associated part of the whole [8]. Prototypes generally focus on a distinct part of a game and make this element playable. In itself, the part can be very different from the proposed game as a whole but the experience from playing with the prototyped part develops the understanding of the whole game.

III. METHOD

Interviews were conducted with 27 respondents, 16 game designers, ten game design students and one game design teacher. All of the respondents work primarily with digital games. Each interview lasted one to two hours. They were semi-structured focusing on issues such as ideation, documentation, communication, inspiration, game experience, design methods, the role of prototypes, kinds of prototypes and quality criteria for prototypes. The interviews were recorded and transcribed. Some were transcribed in their entirety, whilst others only select sections of interest were transcribed. The empirical material was analyzed with qualitative content analysis [13] and interpreted using activity theory and The activity checklist [16], to identify core points of interests in game designers' prototyping activities.

A. Participants

Eight of the 16 game designers were from AAA-game developers (six different companies, five in Sweden and one in Poland) and eight from indie game developers (four different companies, two in Sweden and two in Poland). They were all lead designers except for one participant who was a junior designer but was interviewed jointly with a senior designer at that company. No designer at the AAA-companies had any specific game related education. Most of them were autodidact and had no university degree. At the indie-companies, five had game related university degrees (all in Sweden) and three were autodidact in the game field. All respondents were male and between 25 and 40 years old.

Four of the game design students study game design at a university and six in more practice-oriented school settings. The university students all study 3-year bachelor programs, the six at the practice-oriented all study 2-year programs. All students study in Sweden. The teacher interviewed worked at a practice-oriented school. All respondents were male and all in their twenties, except for the teacher who was in the mid-thirties.

B. Steps Taken in the Qualitative Content Analysis

When doing a qualitative content analysis the data is coded in a way that content units and sub-categories are extracted. Typically a table is used, (containing rows, columns and cells). In this study an excel workbook served this role. Higher and higher levels of abstraction are coded horizontally so that every line starts with raw quotes and end in high level categories. In this way traceability is easy since every point in the transition of every used part of the data is shown along cells in the row. [13] Virtually any material can be coded into the table but in the case of this paper the base material is only transcribed audio recordings of the interviews. Later in the analysis the result from The activity checklist will be returned to the qualitative content

An important distinction when working with qualitative content analysis is whether the material is coded seen as manifest content or implied content. [13] Manifest content means that the obvious meaning is used. Implied content means that an interpretation of the material is of interest and that the underlying meaning is used. In this study the coding is done focusing on implied content.

After having coded the raw transcriptions into implied content they have been further coded into sub-categories and a theme. The sub-categories, or rather the categorization activity has served as a form of lens through which the data supports the perspectives from the theories.

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To set a ground for finding a definition of prototyping in a game design context the sub-category *Defining prototyping* was inserted. The content units were observed through this lens and sorted as different statements and meanings into categories

of prototype use. Due to many practically oriented statements in the data a second category was also introduced during this work, *Use/problem.* In the subsequent analysis, the resulting material has been viewed through the three aspects presented in the theory section above (variation theory, activity theory and rhetoric). Raw data was traced back when needed during the process.

IV. RESULTS

Before discussing how the data relates to the three aspects variation theory, the data will be presented and exemplified. To make this clearer it has been sorted in three sub sections, one for each aspect.

A. Variation Theory

In this section the focus lies on different views of the prototyping process, the experience generated in the game and prototyping in general. Experience is central to game designers ideas of what they are designing. Statements concerning how the design progress evolves, what is learned through the prototyping is also included here.

Several respondents talk about how prototypes are important when one want to find out how the game experience works. Whether a game works as intended and whether it is fun. One designer talks about prototypes as something that test the moment of play, how it actually plays out.

> *You can have different goals with your prototype, but the most common, one might say, is to get what is going on during most of the playing, I mean, second to second. What is it that you do when you're playing the game? That is what you often want to find out through your prototype.*
> *(A Game Director at an AAA-developer)*

Early in the game design process a vision is formulated along with some initial ideas on gameplay. One participant describes how they normally, based on the main idea, build a prototype as soon as possible to test and verify this idea.

> *[in a prototype] you try to put together your loosely shaped ideas, to make them playable in some way*
> *(A Game Director at an AAA-developer)*

Later on in the process the prototype is used to evaluate different parts of the game to find what is in need of modification.

> *[a prototype is] a part of working… working game, in which we can ... evaluate, and, you know, we can, eh, something is good or is not good, we can change this or this or all.*
> *(An Implementation Lead at a AAA-developer)*

In connection with the player experience there is often a focus towards what the player feel. This is in many cases manifested in a question around what feelings the designers themselves experience when playing the ideas (often tested within the team though). The designer uses themselves as test subjects. Their experience gives the design ideas meaning. Through the prototyping activity the way they see or understand the experience of the game is evolved.

To refine this process of understanding the game experience different ways of prototyping are used. One example of a specialized prototype is a scalable visualization. Parts of the visualization are easily modifiable based on the game parameters that are tested.

> *For example if you are making a car game or something… and you want to see how much detail you have to put into the surroundings for example… We do a prototype where travel as a small ball through the thing in 250 mph for example so we can see… how much detail is needed at different speeds… that is a kind of prototype that doesn't need to be playable.*
> *(A Lead Designer at an AAA-developer)*

In order to solve this design problem a specified function in the game is highlighted by a prototype. The understanding of how the players experience the details in the surroundings can be developed through this prototype.

As seen in this variation theory section the designers need to understand the experience that a game generates. This is unpredictable and difficult to plan and prototypes help the designer to learn about the game they design. It is a knowledge process based on experience.

B. Activity Theory

An externalization takes place when the prototypes are viewed as a way to externalize a specific part of the game so that this part is made conscious to the designer or the design team. Possibilities for simulating target actions, or intended design choices, before their actual implementation were discussed by several of the participants. In particular the possibility to pinpoint certain functionalities that need to be tested and "felt", as several designers explained it. As in the example concerning the intended feeling of movement the player is supposed to have:

> *…to see how to, eh, well, tested the first prototypes, for example: 'how would it feel if a character has acceleration?' like in a rally game… so that she didn't run full speed right away.*
> *(A Lead Designer at an AAA-developer)*

This is also something game designers do as a way of moving forward in their own design process (more on self-monitoring below). The complexity of computer game design makes it hard to foresee effects of design choices. Prototypes are needed to check the current design against the design vision.

> *And we did some tests with prototypes where one could jump in first person, because we're talking about the feeling again, so… things we really wanted to mediate was like… we had seen movements in other games… like where our character could be able to do stuff like jumping up on walls and things you don't usually see in*

first person games.
(A Lead Designer at an AAA-developer)

In both these cases the designer is focused on the experience generated by the actions the player may take in the game.

Prototyping is a form of self-monitoring through externalization. Participants talk about to the notion of feeling, but more in the sense that they need to feel the idea rather than functions, as one designer says.

> *When you do a prototype, I guess it is connected a bit to…one start to prototype, not always but often, when you're doing your concept discovery and you want to start to feel the things right away.*
> *(A Game Director at an AAA-developer)*

The prototypes also serve a purpose for externalizing the interface in connection with the game play.

> *[important to prototype interface] We don't have the words, I think, to explain that even, so you need to … all the things you [as a player], the movement of your hand and stuff, it's, it's, it is important to prototype this. To check if it is too hard to press four buttons at the same time.*
> *(A Lead Designer at an Indie-developer)*

The participants mention paper prototyping, though this seems not to be used to a great extent. Several participants also talk about using prototypes as a sketching board to refine their ideas before going to the team. Or as a place were high flying ideas meet reality.

Another designer discusses the prototype in terms of reality checks; something that forces you to realize what can and cannot be done. He argues that a prototype forces vague ideas to become playable.

As seen in this activity theory section the designers need to test their design and this is done by focusing on a specific part of the game and by making it conscious. Design problems generated by the ideas need to be manifested, externalized, in order to make the design move forward.

C. Rhetoric

> *…the most important thing in a prototype is of course that it communicates the idea of something.*
> *(A game design student at a practice-oriented school)*

Prototypes work as a language in the design process among the people in the design team. To communicate the idea is very important in order to keep everyone on the same track and according to the design vision. It is also important in order to check that everyone has more or less the same idea of what the design vision is, or what a specific design solution implies. Prototypes often serve this purpose within the team they work with. It has also been pointed out that a bad prototype can cripple an originally good design idea because of what it fails to communicate.

> *If you have a super duper idea that you try to explain to your team, but don't manage to do so in a good way, and they think it's a boring idea, then the idea is still good but the prototype is bad.*
> *(A game design student at a practice-oriented school)*

Again this refers to prototypes as a form of communication and implies prototypes as a natural way of communicating ideas within the team.

A strong trend in the game industry is to make shorter and shorter descriptions of what is supposed to be done. A document named The GDD, (The Game Design Document), used to be something everyone used. In this the exact content of the game was described. Now days the GDD works more as a documentation tool. Everything that has been done is continuously noted in the GDD. Instead they work with other ways of communicating what is supposed to be done, such as concept art, vision statements and prototypes.

> *But, now days, and on the hole, if one has resources and if things are done right, one should never document for documentations sake, so it's much more, like, write as little as you can and show as much as possible by using images and prototypes.*
> *(A Lead Designer at an AAA-developer)*

A professional language is usually developed as a part of the games system of topos, but this is not always enough. Prototypes complement the lacking language and the deliberation catalyze the development of a professional language based on the prototypes.

> *Well, like, 'you've getted the pic?' What is that? Really?... yeah, but to find a common language is to a large extent what you are trying to do in a prototype I think.*
> *(A Game Director at an AAA-developer)*

Participants stress that mutual learning between the content of the work and the possibilities of the technology is important in the process. Shared representations are, according to our participants, often used to support collaborative work. Several different tools are used, such as *white rooms* (i.e. prototyping in the game engine).

> *Let's say you want to test for example… a thing… do we have enough moves or have we stringed together enough things to make it fun to progress upwards. Then you can make a prototype, or a white room of a level for example, where we only place… almost everything is cubes.*
> *(A Game Director at an AAA-developer)*

The white room usually persists through many prototyping sessions so many topos can be tested and evaluated in it over a length of time. It constitutes in that sense a mix between a prototype where the deliberation works as a synecdoche and a part of the real game (the engine), and thus in some aspects providing a smaller part of the whole that has the same

properties as the final game. But the general function and game play differs so the main function is still synecdochical.

As seen in this rhetoric section the prototype constitutes a useful language that compliments other forms of communication when a design problem needs to be negotiated.

D. Links between the theories

Externalization also fulfills an important role when a team works together since activities need to be performed externally to be coordinated [16]. Game design is in most cases a collaborative effort. The interviews show many accounts for this and for prototyping as a form of communication.

Participants spoke almost without exception about project-wide visions and people responsible for keeping these and developing them. In the process of redefining the target goals, they are decomposed into sub-goals that can be externalized. Many designers point out the usefulness of focusing on one specific function of the game in a prototype.

> *You can have… effect prototypes were you just have something that… is triggered again and again, just to see how things look…'that looks too bad to be our demolition system' maybe isn't good enough or something like that… and then you get to see what one… want to focus on or how to solve it.*
>
> *(A Lead Designer at an AAA-developer)*

Here it is clear that the prototype plays an important part in the process of evolving the design. Still the prototype is not a representation of the whole game but rather a very small part of the game. The evolution of the specific game topos is driven by a synecdoche. A game consists of several mechanics. Prototypes can test them one by one, each one in themselves not resembling the game as a whole. In the example above a lead designer is discussing an effect prototype. This is used over and over again to generate slightly different results. The result is observed by the design team and evaluated. The differences between the different simulations and the differences in input from all who takes part in the effect prototyping is the basis for what looks good enough to bee "*our demolition system"*. The group bases their view on how their demolition system is perceived and builds on their general topos in the process.

The experience or feeling of the game is important as well as prototyping well defined parts of the game.

> *A game usually consists of several different mechanics and different features and a prototype can be good in this. Instead of trying to get everything to work, get everything in place, one chooses to look only on one thing. You make a prototype for a specified mechanic. Because one doesn't really know, this is difficult, one has to kind of feel the idea to see whether it may work or not.*
>
> *(A Game Director at an AAA-developer)*

V. DISCUSSION

The prototype works as a vehicle for communication. This is one of the most recurring and seemingly important conceptions that the game designers in our study have of a prototype. A prototypes audience ranges from the designer herself and the design team; to beta testers and publishers but in this paper the focus is on its role as a part of the design process where the design team is the primary audience. The prototype also works as a language in itself when our normal language falls short. Experiences can be difficult to describe in a way that transfers the experience of one person to another. It is quite different from information or facts which our language is well suited to communicate. A prototype is a language of experience. To prototype is an activity of communicating experiences.

That's almost a definition right there, but in the same prototyping contains more elements than this. There is also an element of transformation, a change of the prototyped experience, a controversy becoming a consensus. Let's start by viewing the data through variation theory.

How something is experienced is central in variation theory. The differences in perspective contribute to the knowledge about the process in which a change of view is taking place. Game play is an important factor to prototype. It may be the most elusive part of a game. It may be the one that in combination with the mechanic contribute the most to games emergent nature. So it is necessary to get the ideas into a format that can be experienced.

In the prototype designers get to test a part of the game in order to see how it works. Often the prototype gives them the opportunity to transform the prototyped part of the game based on different tests where different factors can be tweaked. Normally several people in the design team take part in creating and using the prototype and contribute their different thoughts on how they experienced this. A continuous valuation and negotiation of these experiences takes place during this work. The team members work out how the prototyping experiences will change the course of the game design, based on their respective professional roles.

Using experience as a starting point and focusing on how different views plays a part in the game design a definition as seen through the variation theory lens could be:

> *Game prototyping is a process in which the team learns how to evolve a specified part of the game based on their individual experiences from using the prototype.*

Prototyping is here seen as a process since the focus lies on the team members developed knowledge.

Although externalization and internalization are two instances of a process the core focus in those concepts are the activity. The externalization of a function or an idea facilitates coordination and communication in the design process. Activity theory also states that externalization is often necessary when an internalized action needs to be "repaired" or scaled [16]. This is an almost exact description of the role a prototype fulfills as an activity in the designing of games,

according to the respondents, although most designers tend to define it as the testing of an idea or feature that has been brought to attention in the design process. As seen in the data the designers need to prototype is often driven by the need to feel the ideas, to get it out of their heads. It is quite clear that this is due to the fact that they can't grasp how the idea will play out let alone how the experience of playing it will be. They are motivated by an uncertainty around the quality of the game play and the player activity. Viewed through the lens of activity theory a definition of prototyping could be:

> *Game prototyping is an activity where a part of the design is externalized where the object of the activity is to modify it through evaluation until it can be internalized into the evolving game.*

Prototyping is in this context (naturally) seen as an activity. In activity theory an activity always oriented towards an object. Objects separate one activity from another and analysis of the object is necessary to understand the activity [16].

It is possible to link activity theory to rhetoric. When seen through the theories of rhetoric the process between externalization and internalization is a deliberation of topos from controversy to consensus. When consensus is achieved and pistis exists in the team relative the topos the object is internalized in the game design again. When a disagreement arises, by new insights or new ideas, a topos where consensus existed is transformed into a node of controversy, where pistis is lacking. To address this, the topos, or the part of the game, is externalized in the design process and made conscious through a prototype.

The prototype has shown to be a useful language. Our normal spoken language does not suffice when it comes to communicate fine-tuned aspects of an experience in a game. Prototypish is also a language understood by many different work disciplines and without language barriers, which is useful in a game design team, which usually consist of a multitude of competences. As a language a prototype is used to suggest ideas and explore uncertain areas. A prototype is a conversational tool. As mentioned in the introduction Buxton define a prototype as something that is not a sketch [6]. This seems to differ between many other disciplines and game design. And the function as a language is one clear evidence of that. In game design, especially during early ideation, but also later on in the process, a prototype is used to present an idea to others in the team. Or even to present it to oneself. This is a typical sketch-like function. A sketch can represent the intended result in different ways for example metaphorically, metonymically or synecdochically. In its role as a sketch a prototype is clearly synecdochical. It represents a part of the whole and supports the development of the understanding of the game as such. When considering a white room the synecdoche is rather the opposite, a whole that supports the understanding of a part of the whole.

When it comes to defining prototyping through rhetoric one way of doing it is to use the rich terminology of the field:

> *The game prototype deliberates synecdochically a topos into pistis.*

Impractical as it is, let's exemplify this condensed sentence before attempting a more practical definition. The above states that prototype highlights an element from the game design that needs to be negotiated or explored, since a controversy has occurred around that element. The prototype used for this does not necessarily resemble the whole game. Transforming this element into a playable prototype is a process in which the understanding of the element increases. It can be modified until it is operating as (at the moment) intended or the understanding of it can be evolved so that the controversy transforms into a consensus and a trust for it is established.

But this is a highly theoretical and rhetoric-oriented definition. Another definition, more on the same abstraction level as the ones inspired by variation theory and activity theory, seen through the lens of rhetoric could be:

> *Game prototyping is a negotiation where a part of the design communicated using an interactive sketch or artifact until trust in that part is restored*

Prototyping is in this context seen as a negotiation and a tool of communication, which is clear that it serves as referring to the data.

A. Future research

Participants in the study mentioned prototyping with low-tech materials, but game designers largely overlook it today. Earlier research has noted its importance, and the findings in this paper show that a game prototype often works as a sketch. To developing practical methods for lo tech game prototyping would be a worthwhile research effort.

Rhetoric theory has been used as a lens on game design and prototyping. It has become clear that the term topos would need to be refined. It would, at least in the specific case of game prototyping, benefit from a split into four views. These views would be as the topos of the subject (the design teams existing valuations), as the present topos of the object (the view on the game being designed), as the resulting topos created in the process and as the way to understand and transform different topos, namely the *hodos*. Hodos exist in rhetoric literature but is not a widely used term. It means a road and can in this context stand for the road that bridges different topos in the mental landscape. This includes bridges between present and resulting topos of the object.

Rhetoric has proven to be a fruitful source of analytical perspectives in this work. An interesting continuation would be to focus more on rhetoric, in order to find a raster for analysis of how a prototyping process works as it is being conducted. A way of doing this may be to keep some ideas from activity theory.

VI. CONCLUSION

It is at this stage tempting to try to combine the three definitions proposed into one unifying final definition that encompasses all facets of prototyping. But I refrain from that. A lesson learned doing the interviews and analyzing the material is that prototyping is a search and an exploration and that exploration need to be flexible and free of constraint. To carefully think through and conceptualize what is actually

going on is still valuable of course. So a number of suggested definitions are a better answer to the research question than one final solution.

Based on game design practice three suggested definitions of game design prototyping have been presented. They differ in the perspective taken, namely if prototyping is seen as a process of knowledge development, an activity or a communication in a negotiation. They are similar in that the game takes one iterative step closer to the finished game. All three can serve e purpose of clarifying a prototyping step. Which one(s) to use should be based on the situation, on what perspective that needs to be taken on the prototyping practice at the moment.

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Prototyping Video Games with Animation

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***Abstract*—This paper outlines a proposed design for PlaySketch, a new video game storyboarding system. PlaySketch borrows ideas from the K-Sketch animation sketching system, which allows short animations to be created in minutes or seconds. We build on K-Sketch in four ways. key frame animation capabilities, a branching timeline view, microphone and web-cam support, and hooks to connect to online game design documents.**

Keyword-component: storyboard, animation, sketching, video game, pen based user interfaces

I. INTRODUCTION

As the market for video games becomes more competitive, designers are looking for ways to produce better designs faster. Rapid prototyping is now widely regarded as an essential part of the video game design process [10]. Animation sketching is a novel prototyping method that could revolutionize game design by making it possible to create animated prototypes in minutes or seconds. Furthermore, these prototypes are flexible enough that they can be created and modified quickly during discussions with other designers or evolved into higher-fidelity prototypes. We are using animation sketching techniques to build a new storyboarding system called PlaySketch that will support the video game design process. PlaySketch will allow game designers to incorporate high-quality graphics and audio, work with complex, branching timelines, and produce better design documents to guide game development.

Many game designers begin their work with paper prototypes [10]. By acting out sequences of game play with small paper cut-outs, a group of designers can develop a rough idea for a game. Often, this results in a pitch document (also called a high concept document or a one-pager) that gives a brief overview of the game and describes any important features. Over time, this document evolves into a more detailed game design document that gives a longer synopsis of the game and goes deeper into the characters, goals, game play, and user interface. It may also describe the music and sound effects in the game. The game design document is continually revised and sent to the technical team, which uses it as a reference for development.

Storyboards are a common tool for fleshing out aspects of a design [9]. Small scale storyboards may focus on the play-by-play of the game in chunks of about 30 seconds. Larger scale storyboards will describe higher-level aspects of the game that take place over longer periods of about five minutes. By showing these storyboards to others, designers can get feedback and modify their design. Storyboard frames can also be modified during meetings or re-arranged quickly (if they are kept on separate sheets) to evaluate different possibilities.

Storyboards are a powerful tool, but they have two significant limitations. First, they are static, and they cannot effectively communicate many design details for a dynamic video game. This limitation prompts many designers to create animatics, which are storyboard frames presented with a sound track and some simple animation. The motion and sound in these animatics communicate game design ideas much more effectively than drawings and text. Alternatively, designers may produce interactive prototypes, because they are more enticing and communicate game ideas better than either storyboards or animatics [7]. However, animatics can take hours to produce, and interactive prototypes can take days, making these methods unsuitable for early-stage prototyping.

The other disadvantage of storyboards is that they are linear. Time in a storyboard always advances in a straight line, but the timeline of a game can branch depending on a player's actions. Designers need to explore these branches and work out story details together. Some designers use flowcharts for this purpose, but a flowchart cannot easily capture the visual nature of a video game, and it shares a storyboard's limitation of being a static medium.

Because storyboards are static and linear, they can often be misinterpreted by a development team. It may take several storyboard frames and a page of text to explain how art, motion, and sound combine to create a single game event. Such events can often be explained quickly and more effectively with a single animation or short interactive prototype, but producing these prototypes for every game event is too costly. Designers need a prototyping tool that combines the advantages of storyboards, animatics, and interactive prototypes to produce more effective game design documents.

Our storyboarding system, PlaySketch, will preserve the simplicity of storyboards, but it will use animation to make storyboards dynamic, and it will support branching timelines. This will give professional game designers a powerful new way to get ideas out of their heads quickly and into a group's consciousness where ideas can be refined. Furthermore, designers will be able to embed these animated storyboards in online game design documents and replace rough graphics and audio with high-quality versions as the design evolves. Animated storyboards will therefore serve as a reference, facilitating communication between designers and developers during the game development process. This paper presents a preliminary design for PlaySketch.

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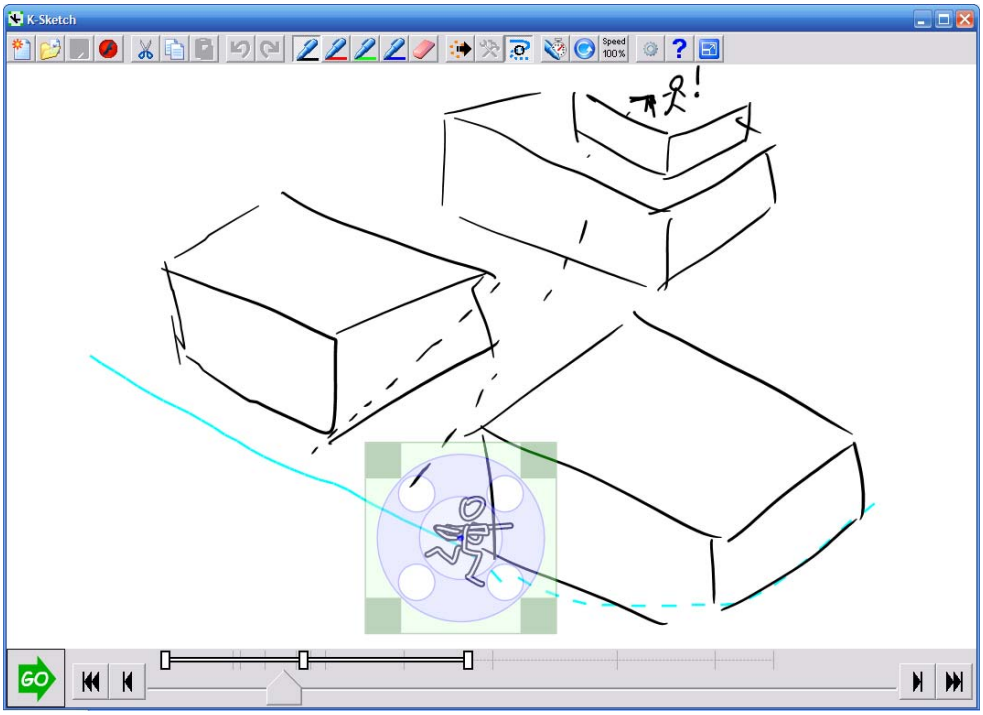


Figure 1: The K-Sketch User Interface. Users sketch and move objects in the center canvas. The slider bar at the bottom indicates the current moment in time. The symbols above the slider show the time span of motions applied to the selected object. Users create animations with a series of instantaneous movements or by demonstrating motions in real time. The blue lines show a demonstrated motion path for the character.

II. Related Work

Storyboarding has long been regarded as an important skill in the entertainment industry [12], and researchers have made other attempts to enhance storyboards. Some take advantage of traditional storyboarding behavior to speed up the production process (for example, by generating animations from storyboards [5]). Other researchers have sought to improve the process of creating storyboards for interactive systems. DEMAIS is a pen-based system with a visual language for designing multimedia content [3, 4]. StoryCanvas is a more conventional system that helps designers produce storyboards for interactive dramas with complex story lines [11].

Like DEMAIS and StoryCanvas, our PlaySketch system seeks to improve the storyboarding process for interactive systems. Like DEMAIS, PlaySketch is a pen-based system, but PlaySketch uses demonstrated animation rather than a static visual language, making it better suited to the action sequences found in video games. Our focus on action sequences also distinguishes PlaySketch from StoryCanvas, which focuses on plot lines. Like PlaySketch, however, StoryCanvas does seek to manage the non-linear structure of interactive stories.

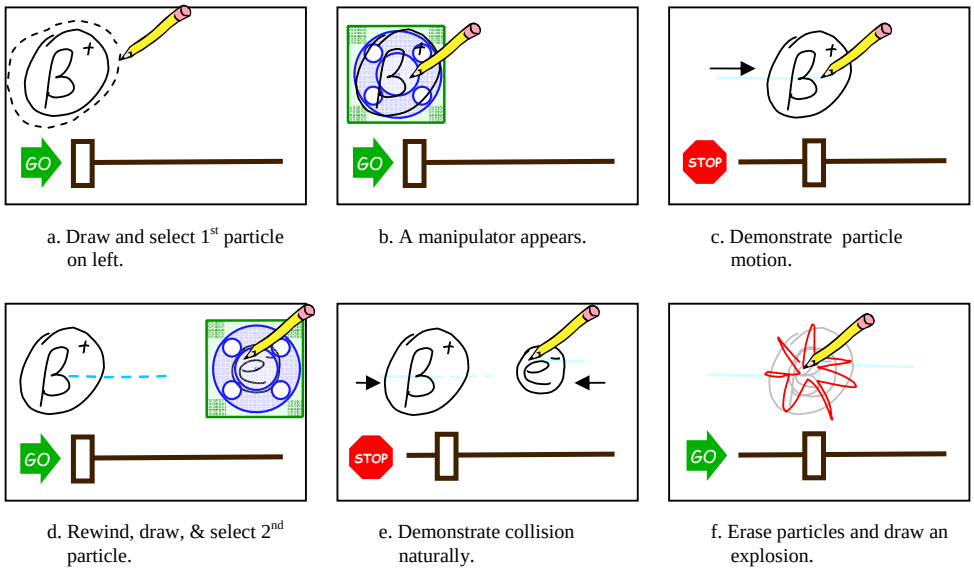
Animation sketching systems speed up the animation process by allowing designers to quickly specify rich motions with simple commands or gestures. Such systems have existed for over forty years [2], but they are receiving increased attention due to the wider availability of powerful computers with pen or multi-touch display surfaces. Some, like ASSIST [1], use physical simulation to generate motions. Others capture real time demonstrations of motion, as in K-Sketch [6] or As-rigid-as-possible shape manipulation [8]. Our system is based on K-Sketch, and we explain how this system works in the following section.

III. Animation Sketching with K-Sketch

K-Sketch is the animation sketching system that forms the foundation of PlaySketch. With K-Sketch, designers can make short, rough animations in seconds by drawing objects on a tablet computer and demonstrating their motions in real time. K-Sketch uses fluid pen input and is highly tuned to make common operations easily accessible. With as little as 30 minutes of practice, animating with K-Sketch can feel as natural as drawing.

The K-Sketch interface is shown in Figure 1. Designers begin by drawing a scene in its initial state. The animation is then created through a series of editing steps. Some edit operations move objects instantaneously at the time indicated by the time slider bar, and other operations demonstrate motions in real time (see Figure 2). This simple interface allows rough but complex animations to be prototyped very quickly.

Conventional animation tools have complex timelines that show all the transformations applied to each object over time.



a. Draw and select 1st particle on left.

b. A manipulator appears.

c. Demonstrate particle motion.

d. Rewind, draw, & select 2nd particle.

e. Demonstrate collision naturally.

f. Erase particles and draw an explosion.

Figure 2: Creating a particle collision animation with K-Sketch. The animation is built up with a series of editing steps. Motions are recorded in real time.

In contrast, K-Sketch has a simplified timeline that shows only the most important events, highlighting those related to the currently selected object. In addition, a motion path appears when a designer records a motion. This motion path serves as a reminder of how an object moves. It can also be selected and modified to change the trajectory of an object or copied to move other objects in the same way. These timeline and motion path tools help designers quickly modify animations as a design evolves.

K-Sketch has been released to the public and can be downloaded online from www.k-sketch.org. It is already proving itself as a prototyping medium. In particular, one research study showed how children can use K-Sketch to prototype video games [1].

IV. PlaySketch Modifications

PlaySketch will be implemented on top of K-Sketch by adding key frame animation capabilities, a branching timeline view, microphone and web-cam support, and hooks to connect to online game design documents. Key frame animation, was requested by designers during our exploratory research. Some designers are uncomfortable using K-Sketch because demonstrating motion in real time is unfamiliar. These users are more comfortable using key frames to define some types of motion.

The most visible addition to K-Sketch will be the branching view, shown in Figure 3. The view will show one or more scenes, which contain a progression of thumbnails moving from left to right, branching or merging at various points. The thumbnails in this view represent scene fragments, which are short animations that can be edited independently (or semi-independently) from others. Selecting a fragment in the branching view will cause it to become editable in the main canvas. Branches can then be created by issuing a *Branch* command within an existing fragment. This will split the current fragment into two at the branch point (if necessary), create a copy of the fragment after the branch point, and add branch and merge connectors before and after the new fragment. Other operations, such as merges and deletions, will be done through direct manipulation of the thumbnails and connectors in this branching view.

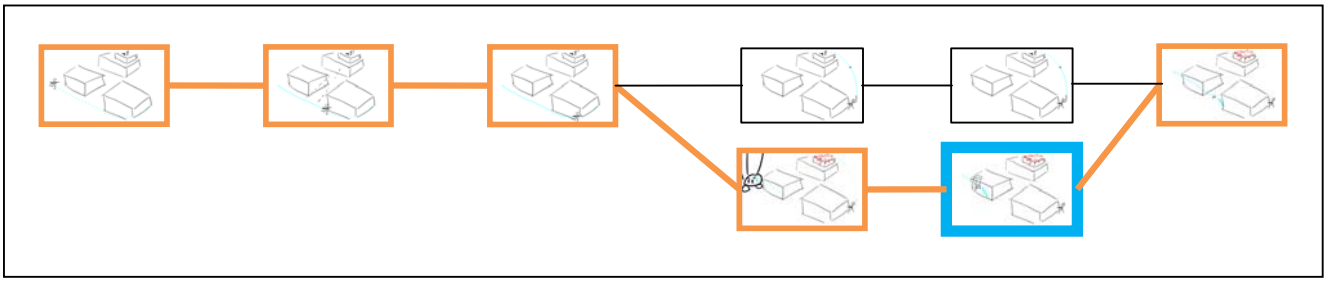
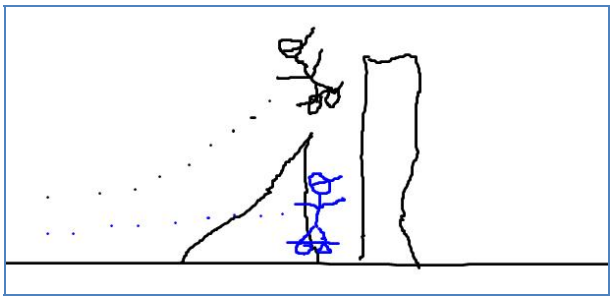
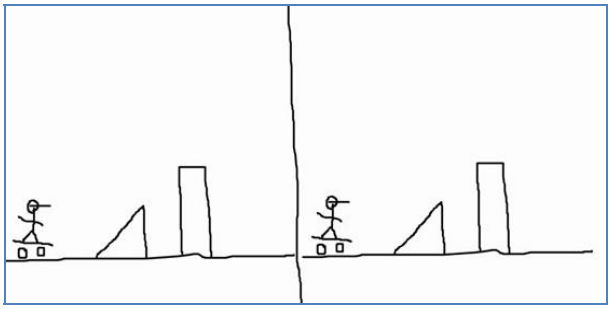


Figure 3: A rough sketch of the PlaySketch branching view. The current scene fragment is highlighted in blue. Designers can use pen strokes to quickly select paths through the network of fragments (highlighted in orange). Playing the storyboard advances through a particular path, allowing designers to evaluate that path or show it to colleagues.



a. Overlay approach



b. Split-screen appraoch

Figure 4: Two approaches to viewing timeline branches. Both were suggested by designers during our exploratory research.

Branches can serve both as a memory for design alternatives and as a repository for different story paths. It is therefore essential to provide easy ways to view different paths through the story. With a stroke of the pen, designers will be able to select a sequence of fragments for playback. During our exploratory research, some designers also requested the ability to view different sequences simultaneously for comparison. We are considering two approaches to simultaneous viewing: an overlay approach and a split-screen approach (see Figure 4).

Since audio is such an important part of animatics, PlaySketch will also allow audio tracks to be associated with scenes. Using their computer's microphone, designers will be able to record vocal sounds while demonstrating motions. They may also hum a background tune that plays throughout a scene. As a design evolves, audio designers can replace these vocal sounds with more polished audio tracks.

Some designers find that no computer interface can compete with the pleasing feel of physical tools. Because of this, PlaySketch will allow designers to take quick snapshots of pen-and-paper drawings (or other objects) using their computer's web cam. With automated tools for importing snapshots, adjusting light levels, and removing backgrounds, this process could be about as fast as drawing directly in PlaySketch.

Finally, PlaySketch will make it easy to incorporate storyboards into online game design documents. Our current plan is to make a PlaySketch plugin for the open-source XWiki platform[1]. This will make it easy to create and distribute game design documents with PlaySketch storyboards to a design team. It will also make it possible to evolve game design documents collaboratively over time, capturing refinements gradually as they are made and distributing them instantly to a team.

V. CONCLUSIONS

We have presented a preliminary design for PlaySketch, a new prototyping tool that preserves the malleability of storyboards, but uses animation to make them dynamic. PlaySketch also supports branching timelines to better support the needs of video games designers. We are basing PlaySketch on the K-Sketch animation sketching tool and adding key frame animation, branching timelines, audio support, web-cam capture, and wiki support.

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GDD as a Communication Medium

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***Abstract*—Inquiry into the current development methodologies used by the major players in the gaming industry of Sweden has uncovered many abandoning the Game Design Document(GDD) paradigm. We speculate that the move is primarily because of the long unaddressed shortcomings of the GDD in the rapid paced game industry. We set out to design a new GDD medium, especially designed to expedite communication between different teams of a game production.**

Through published criticisms, post-mortem reports and in combination with our own experiences, we have distilled a set of preliminary general requirements for a new GDD medium. The complete design of this medium will take place in three distinct phases. Aside from the general requirements, this article reports on the first structuring phase, substantiating the general results. The derived structure was tested for its ability to bind pertinent GDD information and support communication between the different production teams.

Keyword-component: game design document; gdd; communication; structure; medium; requirements;

I. INTRODUCTION

The Game Design Document (GDD) has long been said to be the development paradigm of the gaming industry. [1] The GDD is simultaneously a development methodology and a medium for the design of a game production, most often a video game. The GDD is often initially created by the Lead Designer(s) [1]. It can then serve as a written contract between parties as to what shall be implemented. Designers, artists and programmers of a development team then reference it or update it during the development progress. Continual updates during production put the GDD in an ever changing state, which is why it is often referred to as a '*living document*' [1][2]. After development it can serve as documentation to what has been implemented.

There isn't a consensus on what exactly constitutes a valid GDD. Each company might utilize the GDD to their own liking. The Game Design Document can hold any number of (sub-)documents within it [4], each with a different purpose or audience; examples include the High Concept Document, Game Treatment Document, Character Design Document, World Design Document, Level Document, Game Script Document, Flowboard and/or Story. These documents might be authored or consumed by people or groups of people with the role of Lead Designer, Game Designer, Level Designer, UI Designer, Writer, Art Director and/or Audio Director. [5]

One of the largest complaints of the GDD is that it can become bloated [1][6]. A single lead designer can already produce a design document that is quite lengthy. With the production sizes of today, it can be argued that the GDDs have become so large that they are "write only", never read. In addition to this, each individual of the production team, keeps a record of their own development progress in the GDD as well. It used to be that the Lead Designer would have written the design in one long flat file. Other mediums have come into existence that can also serve as medium for the GDD, but none seem to satisfy the needs of the game industry. An inquiry into the current development methodologies used by the major players in the gaming industry of Sweden [7] has uncovered many other methodologies in use, including audio/visual design techniques, mnemonics, themes and catch phrases. [7] It would seem that the GDD is being abandoned.

A key factor in how the GDD is used is dependent on the company or team size. Smaller core teams will rely more on direct communication using the GDD as more of a documentation tool. When the production is large and/or distributed over teams in different locations, good communication becomes imperative and so participants rely on the GDD more for communication. [1]

Recognizing the shortcomings of modern mediums to serve as GDD, we set out to design a new medium; the only medium especially designed to serve as GDD and expedite communication between different teams of a game production. The complete design and development will take place in three distinct phases: (1) devise a structure that will hold the GDD and communication data; (2) design the user interface and interaction model to further facilitate communication and effectively visualize the information; and (3) finally build a prototype implementing the results of the previous two studies. Research was first done into the design of the GDD medium at a high conceptual level, which gave us a set of general design requirements and an educated notion of how to build an effective GDD medium. These general requirements were then used in the first structure phase and will be used in the subsequent two phases. Throughout the phases, we will employ user studies to guide the design iterations and allow industry partners to validate our results.

This article will report on the findings of the overall study into the GDD and present them in the form of a list of general requirements. We also report the results from the structuring phase; how this phase implemented the general requirements in

an iterative process to obtain a structure for the GDD medium and a structure specific set of requirements.

II. INPUT FOR THE DESIGN REQUIREMENTS

A. Published criticisms and post-mortems

Many mediums have been tested for the GDD; each with its own set of advantages and disadvantages. Cook [8] and Lang [9] have collected lists of pros and cons for different possible mediums, which ranged from a flat file or document to a blog or wiki. Much of the information that we used to specify the design requirements came from these surveys.

One critical aspect was the demand for linearity, or in other words the demand for "one voice" narrating. A lead designer can sit down and produce a nearly complete set of requirements in the same narrative style and can choose to remain in complete control of the text. But, if we have a common medium and allow multiple editors, we undoubtedly lose the one narrative voice. According to Danc [8], blocks of loosely linked text written by multiple users are unconvincing when one must sell the design, to publishers for example. The purpose of the document called "*The Pitch*" is exactly that, sell the game design to publishers, and, it is usually placed in the GDD [1]. One way to work around the loss of narrative voice is to devote one single person to collect texts and edit them into one presentable narrative. [1] But, this is provided that the company has the resources for this. Some mediums implement editor roles assigning different levels of write permissions to different authors. With these editor roles it is possible to require changes to a document to be signed-off by a lead editor, mimicking that one single person remains in control of the document. [10]

Another aspect that was complained about was the lack of support for importing Excel sheets (XLS). [9] We take this one step further by recognizing that most mediums lack support for a number of media types. We will expound on this later.

Along side the search for criticisms and surveys of mediums, we also studied the post-mortem's of gaming companies that failed. It was obvious that two of the prevailing reasons for a company failing were due to problems with communication and documentation. [11][12]

B. Survey of existing technologies as potential mediums

At the time of this writing, technologies such as blogs, wikis and flat files are readily available and can easily be put to use by a production team. The criticisms of these technologies as medium for the GDD have been well covered in published material, so we shall not go into individual descriptions of their characteristics. Instead we shall discuss a technology that has not widely been considered as medium for the GDD, but which proves interesting.

Google has developed a number of technologies for collaborative editing, including an "office suite" that is essential the same as the single user versions, but made collaborative. One of these is Google Docs which can be described as a flat file, but online and readily available to multiple users simultaneously. Google Wave gives users a tree structured editing platform where updates to a common wave are reflected immediately towards other users. Users are allowed to break in at any point in a running text block and start a new conversational branch. The advantage is that users can visually see where all conversational branches started, because each comment is bound directly to its relative text. Disadvantage being that the original text becomes severely mutilated with ongoing conversations, making it hard to read. What is missing from the technology is the ability to reorder blocks of conversation into different views. A more specific example being, gathering those blocks of text, which are important conclusions of conversation branches.

SWC Technology Partners presented the Pivot Browser at the TED conference in March 2010. The appearance of this technology is of particular interest, because it fills exactly the gap we mentioned was present in Google Wave. The Pivot Browser is especially designed to reorder information. [13] It does not use a tree hierarchy, so it can therefore reorganize data on the fly according to user selected criteria.

Before we leave this section on technology, it is important to mention the significance of *mind mapping*.[2] The concept and term has become almost mainstream in modern day and we see a particular similarity between how a mind map links relevant data and what we must do to track information in the GDD.

C. Design aspects from our own experiences

In order to design a new medium for the GDD, we have to go beyond what has already been done. In this section we shall pinpoint two major design requirements.

We have already stated that if we want the GDD to be a communication tool, we must make it a collaborative. But, if the tool is accessed and updated by a large amount of people, we must resolve the issue of the GDD becoming bloated, reducing the possibility of users finding pertinent information efficiently. Users are only interested in a subset of the GDD. If we break up the monolithic GDD into smaller blocks, we must only present each user with those blocks that are of interest. The reorganizing of data was what we recognized as missing from Google Wave. To exemplify, it should be possible for the marketing team to gather unique selling points (USPs) into The Pitch in order to sell the game to a publisher.

Through our survey of technologies and own development techniques, we recognize an extreme lack of support by the GDD medium for a multitude of media types. We have already mentioned the complaints that others have had about the lack of support for XLS sheets in the GDD. This is just one example of an unsupported media type. To give another, say two game designers happen to brainstorm in a cafe and come up with the famed '*napkin design*', then it should be possible to import that napkin in the GDD somehow. The same applies to whiteboard notes in a design meeting. The only way to easily capture the

[1] It might be interesting to note that Danc has also analyzed the use of a blog as GDD[8], which neatly allows one person control over the editing by collecting comments made by users and re-posting the changes to the blog.

[2] The Brain was the first mind mapping tool that influenced this work. http://www.thebrain.com

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drawn up notes without tediously copying them (possibly incorrectly), is to take a snap shot of the notes with a camera. The GDD medium should support the import of those photos. Images of an entire whiteboard or an entire design workshop are monolithic. Not only does this information need to be in the GDD, but users need to be given the tools to operate on the information *i.e.,* adding notes or dividing up the information making it more accessible. If one person speaks to another in a long recorded audio session or a design workshop is recorded, those recordings are vital elements in the design stage and should be added to the GDD.

It should be obvious that there are many multimedia types that need to be supported by the GDD. We want support for images, sound, video and even project prototypes in the GDD. And if all else fails, we should at least be able to link to the data.

III. DESIGN REQUIREMENTS/IDEOLOGIES

After having considered the different aspects we uncovered, we compiled an initial list of general design requirements. It should be noted that some of these requirements might have contradicting aims, so a compromise will have to be sought. We present a short list and then go into detail below.

Communication based requirements for the medium include

- collaborative user editing with enabling communication mechanisms;
- being readily available at all times to all users *e.g.,* web based;
- ensuring changes are communicated to the users [1], with differentials; and
- support for a variety of different discussion channels *e.g.,* real-time and non-real-time based on video, audio or text.

The medium must also support

- a mechanism to allow for narrative linearity and linear printing;
- editor roles with an option to force edits to be approved by a lead editor [10];
- a familiar user-interface and intuitive interaction model;
- quick updating, with fast access and editing;
- many media/file types *e.g.,* audio, video, images, spreadsheets, et cetera;
- the ability to link relative information, with auto-linking;
- and revision control tracking and a backup system.

In addition to the requirements, we stress the importance of communication and visualization in the design, while targeting as audience either large companies and/or those which are highly distributed.

A. Communication based requirements

In order for the GDD to be an effective communication tool, the most basic requirement is that the medium must be readily available to many users simultaneously. Web-based is usually the most straightforward approach. Not just that the Internet is always available, but that most everyone has an Internet browser installed, so it takes very little time or effort to start the browser and surf to the right page. Both wikis and Google Docs are examples of this.

Once the medium has been accessed by the user, the changes in the information there serves as a form of communication between parties because it is a contract of what shall be developed. We will discuss revision control in detail later, but here revision control is particularly interesting because it shows, who changed exactly what information, at what time. This is usually shown with differentials so that the user can see exactly what parts changed and what the original information was. Note that revision control is also relative to non-text media as well. Images and video can also have edits.

Notifications are another form of communication, in which alerts are presented to the user that particular parts of the GDD have been updated or to other events that require attention. Websites use RSS as their form of notifications and Wikipedia has a very extensive "watchlist" feature, which allows users to keep track of changes to pages of interest.

Aside from a user being able to directly edit the information in the GDD, it is important to point out that the user needs a number of ways to **discuss** what has been written. The spectrum of communication types stretches from real-time to non-real-time communication. On one end of the spectrum is chat and voice, while at the other end is perhaps email and blog comments. These channels often have beneficial additional features, such as being able to see who is online and addressing multiple people simultaneously. In this spectrum of channels we also have different media types that can be used *e.g.* video, audio or text. We strive to support as many different communication types as possible in the GDD, but we do not want to stand in the way of users using third party communication applications. Ideally we would like to allow all media types to be added or linked to the GDD.

B. Additional requirements

In addition to the communication-based requirements, we have a number of requirements that guarantee the usability and efficiency of the GDD. The first requirement we shall discuss is the important concept of narrative linearity and the one voice. With the advent of wikis, we have support for multi-user editing and a rather unstructured way of organizing text, by linking different blocks of text together. There is no one set path through the web of inter-linked texts unless some structure is explicitly imposed. This is an example of how we lose narrative linearity. Similarly, we lose the one voice because merely stating the medium is multi-user suggests the contrary. This is also affects printing, since one might want to print the entire GDD, linearly.

One possible solution is to explicitly impose structure by using *transclusion*; creating a single page that contains only page "includes" of other pages, so that the result is one long

ordered list of blocks of text.[3] Using transclusion alone runs the risk that the text becomes hard to maintain. Most wikis that support transclusion have it only implemented for an alternate purpose, such as creating templates.

A second work-a-round option is to require all edits on certain pages to be validated by a lead editor. [10] In order to preserve narrative voice in the GDD, one person can be responsible for its moderation and modification. It should be immediately obvious that we lose some of the multi-user collaborative aspects by doing this. We can implement this feature by using editor roles, but we should be careful not to enforce them by default. Not all adopters of the GDD will want to go this route. This type of security is not at all new and already implemented in many fora and wiki.

We have mentioned wikis quite a lot. But, if you look closer at a wiki, there is a strange syntax, which must be learned in order to be efficient in editing. What we want to state is that we require the user interface and the interaction model be familiar to users. But, this is quite a paradox. In order for an system to be familiar to users, it must be popular, but it can't be popular if the system is strange and new to users. We get around this by building upon already widely popular constructs to ease the learning curve.

Besides intuitiveness, we also require a fast edit loop. Namely, users must be able to access the medium fast, edit and commit with minimal delay. The reason for this being that the GDD is often neglected leaving documentation outdated. A fast edit loop lowers the burden of editing in hopes of keeping the production crew updating the GDD.

Here again we would like to stress the design ideology that the GDD should encompass all information relative to the production. The gaming industry is loaded with multimedia, so it is highly needed that as much of this information as possible is included. Also, an important distinction needs to be noted here. The GDD needs to be accessible by all members of the team. Depending on the implemented architecture of the GDD medium, how the information is saved in the GDD can be tricky. If the GDD is centrally located, then information must be moved to the central location to be made available to all users of the GDD. Except, of course, if we have a link from the GDD to an external source. In this case the external source needs to be available to all users of the GDD. We can also have a distributed model as well. To keep it simple, we state the requirement to be to incorporate the media directly into the GDD and if this is not possible, then attempt to link to it. The GDD is relinquished of the responsibility of how to access the linked information. This type of link we refer to as an external link **out** of the GDD. Similarly, third party applications should also be able to link to information in our system through an external link in to the GDD.

In addition to this, we have two types of internal links as well. We require a way to link **in** and **out** of an information block in the GDD. We justify this with an example, referring again to a very long audio recording of a design meeting. The likelihood of someone listening to the entire audio file more than once is about as small as someone reading a very long monolithic GDD more than once, in other words, next to none.

If the GDD medium is able to link into the audio effectively creating chunks of audio relative to designated subjects, then the chunks of audio become more readily accessible. We could also have internal out links from the audio that lead to different sections elsewhere in the GDD.

With the internal/external in/out links we specified, we can implement *auto-linking* and *autocompletion* with little effort. A game usually gains its own lingo during design and development. Auto-linking is a feature which allows users to predefine a set of terms which always link to their respective definitions. This saves the user from having to redefine common terms over and over. If the definition were to change, all references would remain up-to-date. Autocompletion just saves the user some typing by having the system offer the user the common definitions while typing. Both auto-linking and autocompletion are quite superficial.

If the GDD is to hold all the data mentioned, then it has a responsibility to maintain it. We can use revision control to grant certain desired features. During the development process, it is often desirable to revert to a previous version of your work; this is called a *rollback*. In addition to this, branching the version tree should also be possible. This means that the revision control system is maintaining two differing copies of the data with a common ancestor, allowing for a branch merge, if necessary. Having revision control on a body of text is a common tactic and is employed by some wikis; on the GDD it is mandatory.

Many revision control systems often double as backup *i.e.* committing changes to "off location" data centers with redundancy mechanisms. We want to explicitly state backup as a requirement. Source files must be kept available during production, contrary to lost or deleted.

IV. THE STRUCTURE PHASE

Given these problematic aspects and others, we attempt to design a medium specifically tailored to the chaotic and creative development process found in the gaming industry. Starting from the requirements stated above we have refined and augmented them to obtain what we believe to be a list of design requirements that encompass what is needed to implement a structure capable of holding the data for the new GDD medium.

Dominate structure design elements include

- a node graph structure similar to that found as the basis of a wiki;
- collaborative editing of each node with revision control tracking changes;
- each node supporting different media/file types;
- each node having one or more links to other nodes;
- an option to save nodes into user customized views;
- one more ways a user can monitor or be notified of pertinent changes; and

[3] a technique similar to what we define as a "view" in our design.

- a wide variety of operations allowing for communication in and about the GDD.

A. *Method for structuring phase*

In order to test our design ideas we utilized an iterative process; three iterations and ending with a final workshop. Each iteration consisted of designing a prototype, testing it through a workshop, analyzing the user experience and refining the prototype for the next cycle. The final workshop included all feature tests from the previous iterations.

In each iteration we organized a design workshop, three in total. Each consisted of a one-hour session with two or three people participating and a final workshop consisting of two sessions, of one and a half hour, with five and six people participating. Users were introduced to the stages of game design [14] and given a chance to figure out different ways to document and store the information using the paper prototype. Our first objective was to test the validity of the structure proposed. Our second was to simulate problematic situations that could take place during game development due to misunderstandings or lack of communication. The users were expected to solve situations using only the GDD for communication and documentation.

B. *First version of the structure*

We required a structure to store the GDD satisfying the requirements. We started with a basic structure similar to that of a wiki; blocks of text with links to other blocks. The GDD, therefore, is the collection of all these blocks of text. We refer to a linkable block of text as a node. Users were able to interact with the nodes through a list of simple operations, which were: define a new node, define a new link, delete a node or split a node into two nodes. In addition to the operations, users were given a collection of communication options, which were: chat, email, VoIP and collaborative editing.

We chose paper prototypes for the design process, because we considered them flexible, allowing for modifications during design. Even during workshops, the users were able to propose small changes to the design, which could be tested on the fly. The paper prototype consisted of small pieces of paper notes with a template printed on them representing the nodes of the GDD. The fields of the template contained: title of the node, parent of the node, list of links to other nodes and summarized content of the node. Users were also handed a sheet of paper, which listed all operations or communications a user could perform on the nodes. An empty desk was used as the workspace and users were allowed to physically arrange and organize the notes in a way they felt most comfortable with. The users interacted with the nodes in the workspace by choosing an operation or communication action listed and then updating the GDD as the action specified. If communication was text based, paper notes were used for to record it. If communication was audio or video based it was direct conversation between users.

C. *Iteration 1*

The results from the first workshop were quite positive. A first impression was that the position of the notes on the workspace facilitated the understanding of the content to the users. Because the task was to generate a lot of content in a short period of time, the users were forced to organize the notes as well as they could, to keep track of the growth of the documentation. The prototype also allowed users to easily sort and order the notes to create new documentation based on previous contents. However, the users got confused when the number of notes grew quickly. It was complicated for them to keep many under control simultaneously. Users communicated using only the communication mediums allowed, which was mostly real-time mediums such as VoIP and chat.

During a period of reevaluation we focused our efforts on solving the problem of the GDD growing severely fast. To promote order, we included a new feature called a "*view*". We defined a view as a subset of nodes defined by users. Views do not affect the node structure of the GDD or the other views, it is just a way to visualize and sort the GDD information. The objective was to keep the workspace manageable and to facilitate work by reducing the amount of simultaneous content. The workspace was now defined to contain one or more views. Another small change was to remove the parent link from the nodes. The paper prototype was altered to reflect the new features and some of the fields of the notes were removed to make note creation faster during workshops.

D. *Iteration 2*

Views were successfully used to represent the sub-documents from the game development process (for example The Pitch) through customized subsets of the GDD. This iteration's workshop also had a specific section focusing on the links and the relations between the nodes. But, users were confused during this section, due to the high number of links and the disorder they created on the workspace. In our opinion the links between the nodes are an important feature of the design, but due to the limitations of the paper prototype we

were not able to get any conclusion. As for communication through the GDD, it fomented debate and discussion between users pertaining to the game design features. The users reached several conclusions from the debates that were important for the development of the game.

It occurred to us that the discussions and conclusions that took place between workshop participants should be integrated into the GDD as well. Instead of just incorporating text communication into the GDD, we generalized GDD nodes from a text block to any kind of media. Again the prototype was updated, this time with audio and video nodes allowing audio and video communication to be recorded.

E. Iteration 3

During the last workshop the users were allowed to "share" views to exchange information. One example of this was a user creating a "starter packet" [1][7] as introduction to their game in order to facilitate the integration of a fictive new designer into their production team. Due to lack of a context, orphaned nodes (those without any links) were the cause of user confusion, this iteration. Users also had problems selecting nodes, which could be important for them to add to their personal view, effectively tracking their updates. Some users added conversations, which happened during the workshop, to the GDD.

To the list of operations and communication actions, we added the option to "share" a view along with a user-defined description. In the previous iteration, nodes were defined to allow for audio and video and because of this we want users to be able to operate on those nodes also. Either the GDD needs to build in tools to manipulate those nodes or users should be able to use third party applications to operate on the nodes, with the results being incorporated into the GDD. With such tools in place, users should be able to split audio/video nodes or link in to or out of them. A notification system was added to views, in order for a user to better track changes to nodes they are working with. If any new nodes were created related to the users view due to links, a notification was generated for these as well. Nodes were required to have at least one link to another node to avoid the lack of the context *i.e.*, no orphans were allowed.

F. Final workshop

The final workshop was intended to test all the new features, which were added to the design during all of the iterations. The main difference in this workshop was the presence of three designer teams, two of them working in the same room simultaneously and a third working in a entirely different room, preventing direct communication and awareness of the on goings of the other two teams. The objective of this workshop was to validate the real-time and non-real-time communication mediums. The workshop was divided into three parts (one for each of the main features of the design): (1) to introduce proposed GDD structure to the users and check its capabilities, (2) scrutinize the communication mediums, and (3) see how well the information generated during the communication integrates into the GDD.

G. Results of the structure phase

To recapitulate, the final GDD structure design consisted of an interconnected node based structure and customizable views which reflect a subset of the GDD. A node contains any kind of media type, including but not limited to text, audio, video, images or XLS. The GDD design supports communication and a notification system is in place to alert users to changes in the system. Through the structuring phase, we have been able to reaffirm some of the general requirements and also distill requirements specific to the GDD structure. We shall discuss the, node structure, views and communication in detail now.

The node structure we devised satisfies the definition of directed graph, with each link equal to a directed edge between nodes. We have required each node to have at least one link in order to exclude orphans and guarantee each node has a context.

Introducing the concept of views was a turning point in the design. Views make it possible for designers to define their area of interest in the GDD, without interfering with another designer. Designers can customize a recognizable version of the GDD on their workspace through a collection of views, with notifications to keep them informed about events and changes relative to their workspace. Views can define the sub-documents of the GDD.

Dialogs and debates between workshop participants generated important conclusions and decisions for the design. The possibility to document all communication in the GDD improves the quality of the documentation.

V. VERIFY WITH COMPANIES/GAME DESIGNERS

The final step in the design process was the validation of our work through a major company in the gaming industry. We chose Digital Illusions Creative Entertainment, DICE, [4] in Stockholm, Sweden as a creditable representative to gauge our work, particularly because they are owned by Electronic Arts, EA, in California, USA and are currently the largest gaming company in Sweden. We were counting on their company being highly distributed internally and also externally through outsourced work. Upon contacting them they presented us with two Senior Designers with opposing, for and against, views of GDD. Upon meeting the designers, they confirmed the distributed nature of the company. Pertaining to the GDD, they confirmed or added (1) the lead designer is **far** too busy to be a responsible document editor, (2) no documenting just for documentations sake, (3) the GDD should be a contract of specifications between parties, but it isn't used that way, (4) lots of design materials (images, audio, text, ...) are potentially lost in the fray, but room walls remain as the most influential design reference, in combination with the "vertical slice" [1], (5) and, the layering of information is very important *i.e.*, those individuals that need to can dig deeper into the GDD.

Our overall impression was that we are definitely on the right track, but that perhaps we can aim even more toward multimedia types than we had anticipated. The meeting was immensely beneficial.

VI. CONCLUSION

There are three noteworthy conclusions drawn in this work. Through extensive research into the published criticisms and post-mortems, in combination with our own experiences, we have been able to distill a set of preliminary general requirements for a new GDD medium. This set of general requirements has been used throughout the first phase of the design and development and shall be used throughout the two subsequent phases as well. This set of general requirements in an important conclusion.

The next two conclusions we have drawn from the structure phase of the project. The first being the set of requirements specific to the structure of the new GDD medium. Some of these requirements overlap with the general requirements, but it is therefore obvious that they substantiate them. Others are specialized and refined to the functionality of the structure.

The design of the structure itself is the last of the conclusions we wish to bring attention to. We believe the derived structure to be encompassing enough to hold all pertinent information and flexible enough to allow for the needed interactions and communication mechanisms. There were of course some concepts that we could not test without a full working prototype. This reminds us that this is a work in progress and we can therefore expect the two additional project phases to further improve the design of a new medium. This is perhaps the only medium especially designed to serve as GDD and expedite communication between different teams of a game production.

[4] Digital Illusions Creative Entertainment, DICE http://www.dice.se

ACKNOWLEDGMENT

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Game Innovation through Conceptual Blending

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Abstract—**In this paper I wish to apply implications of the Conceptual Blending Theory to computer games. I will analyze chosen examples and discuss them as a result of video game innovation made possible through "conceptual blending." Conceptual blending links *at least* two so called "input spaces" at the same time in a "blending space" which produces a new third concept with emergent qualities integrating the initial input spaces. In this paper I will introduce basic elements of conceptual blending like its structure of the integration network consisting of at least two input spaces, a generic space and a blended space as well as its governing principles consisting of composition, completion, and elaboration. With the help of these instruments I analyze computer games like *Tuper Tario Tros., Hell.* The purpose of my approach is not so much to validate the ideas of conceptual blending theory through another field of examples (computer games) but to name and analyze characteristics of the mentioned games with the help of a given method.**

Keyword-component: conceptual blending; innovation; creativity; Tetris; Super Mario Bros.; metaphor; cognitive linguistics

I. INTRODUCTION

When typing the word "innovation" in the search field of Britannica Online Encyclopedia there is no article which tackles the notion of innovation directly. Instead the search engine suggests several other topics in which innovation plays a role such as "business innovation," "innovation […][in the] history of technology," "growth and innovation" and several more [1]. However, the first hit that shows up is called "innovation (creativity)." Whereas the keyword "innovation" has no own entry in the encyclopedia, "creativity" does. Creativity signifies "the ability to make or otherwise bring into existence something new, whether a new solution to a problem, a new method or device, or a new artistic object or form" [2]. The striking characteristic of creativity is apparently to produce novelties on different levels and in different spheres of human productivity.

In language and literature metaphor is often regarded as the creative means which conveys a certain meaning in an innovative way and thereby renews language as well. As such metaphor has been regarded as the creative motor of language development [3]. However, as opposed to the classic theory of metaphor which regards metaphor primarily as an artistic and decorative means of speech Cognitive Metaphor Theory has found out that metaphors are part of our everyday thinking [4]. This does not mean that metaphor is not creative – the scientific discourse distinguishes rather between conventional and creative metaphors –, it rather means on a more basic level that human thought as such is structured to be creative. Closely related to metaphor theory from the cognitive linguistic perspective is the theory of Conceptual Blending [5].

Researching the relationship between metaphor and games I try to find out to what extent and under which conditions games can be regarded as metaphors or show metaphorical structures. Phenomena like *Tuper Tario Tros.* [6] and *Hell* [7] could be considered in the realm of games what metaphor is in the realm of linguistically realized concepts. However, metaphor theory turned out not to be sufficient to describe these games. Instead the Conceptual Blending Theory is more promising to do this. Thus, in the following I will introduce the basics of Blending Theory. Furthermore, I will analyze the game hybrid *Tuper Tario Tros.* as a blend and point out the specific characteristics of this blend. In addition I will analyze the game *Hell* which is a blend of a game with a non-game concept. Finally, I position the idea of blending in the context of remixing and mash ups.

II. BLENDING THEORY

Blending Theory belongs to the broad field of cognitive linguistics. It emerged out of preceding research in Cognitive Metaphor Theory and Mental Space Theory [5]. The main representatives of Blending Theory are Gilles Fauconnier and Mark Turner who published the book *The Way We Think* which contains the basics of Conceptual Blending Theory in 2002.

"The crucial insight of Blending Theory is that meaning construction typically involves integration of structure that gives rise to more than the sum of its parts" [5]. For instance one of the examples I will discuss later is *Tuper Tario Tros.*, it integrates two games *Super Mario Bros.* [8] and *Tetris* [9]in one game which does not only add one specific gameplay to another but which results in a new gameplay and can thus be considered as being more than the sum of its parts. Already the aspect of integration makes it a "more" as *Tetris* and *Super Mario Bros.* have so far not been regarded as having a close relationship except that both games were major selling propositions for Nintendo consoles such as the GameBoy and the Nintendo Entertainment System and both are classics of computer games.

Comparable with the Cognitive Metaphor Theory the basis of Blending Theory is the integration of at least two domains of

meaning. However, as opposed to the Cognitive Metaphor Theory one does not speak of two domains (source and target domain in Cognitive Metaphor Theory) but of the integration of two mental spaces. Furthermore, as opposed to Cognitive Metaphor Theory Blending Theory consists of a bidirectional integration of at least two mental input spaces instead of a unidirectional mapping of one domain onto another.

Like Cognitive Metaphor Theory is based on the claim that metaphors structure our everyday thinking and are thus not *only* a rhetorical means Blending Theory assumes that blending is "a general and basic cognitive operation which is central to the way we think" [5]. Thus, we automatically and often unconsciously blend experiences, ideas, concepts and so forth as this is simply part of our way of thinking according to cognitive linguists.

In the beginning conceptual blending has been considered as an aspect of language with regard to meaning construction and "particularly 'creative' aspects of meaning construction like novel metaphors, counterfactuals and so on" [5]. Meanwhile research has come to the conclusion that evidence for conceptual blending can be found in language as well as in many other areas of "human creativity, such as art, religious thought and practice, and scientific endeavour" [5]. For now this theory has been applied by researchers of numerous fields. However, the field of game studies and game design is still underrepresented.

III. The Mechanics of Conceptual Blending

Blending Theory is mainly concerned with "dynamic aspects of meaning construction" [5] and its foundation in mental spaces. It especially solves problems which Cognitive Metaphor Theory could not account for. According to Cognitive Metaphor Theory the utterance "this surgeon is a butcher" was simply considered as a metaphor in which the source domain butcher is mapped on the target domain surgeon. That means a surgeon is understood in terms of a butcher (for a definition of metaphor see [4]). This interpretation works to a certain extent however it cannot explain the negative assessment of a surgeon which is usually communicated in this utterance.

The basis for conceptual blending is the so called integration network which consists of three different kinds of mental spaces. Mental spaces "are small conceptual packets constructed as we think and talk, for purpose of local understanding and action" [10]. They are furthermore connected to "long-term schematic knowledge" also known as "frames" and "long-term specific knowledge" [10]. Thus, mental spaces consist of actual knowledge as well as long-term schematic and specific knowledge.

In the integration network (see figure 1) the first type of space are so called input spaces which contain the knowledge of the at least two blended concepts. These input spaces are the content which becomes interrelated in a blend. For instance if the utterance "you are a butcher" is spoken to a surgeon the surgeon is a butcher blend gets activated. The knowledge of surgeons and the butchers frames the input spaces. Schematic as well as specific knowledge about surgeons and butchers helps us to process the blend and thus to understand it. Both spaces become cross-space mapped [10]. Thus, counterparts of the input spaces become connected. As such for instance the butcher and the surgeon show structural commonalities. For instance both have agents: the one as butcher the other as surgeon, both have objects they work on: those are patients in the case of the surgeon and animals in the case of the butcher. Furthermore, both work with different instruments: the one with a scalpel, the other with cleaver. Finally, both have goals: the butcher's goal is to severe flesh and the surgeon's goal is to heal, and means: the butcher's means is butchery and the surgeon's means is surgery [5]. However, in a blend not all elements and relations between the inputs are projected to the blend. Thus, one speaks of a selective projection [10].

The commonalities between the two input spaces such as goals, means, roles etc. are part of the generic space: "A generic mental space maps onto each of the inputs and contains what the inputs have in common" [10]. The generic space helps identifying the counterparts of the two input spaces which are cross mapped in the so called cross-space mapping [10].

The last space is the so called blend [10]. This is the blended space in which the actually distinct things are fused together. Here the surgeon and the butcher are seen as identical. Furthermore, in the blended space emergent meaning arises which is only possible through the blend and not predetermined in the single inputs. In the case of the surgeon as butcher blend this is the space in which the surgeon's goal to heal and the butcher's means of butchery produce incongruence which emerges in the negative assessment arises from that a surgeon who is a butcher is considered to be incompetent [5].

The emergent structure follows the three principles of *composition*, *completion* and *elaboration* [10]. The composition aspect refers to the relations of the elements given in the input spaces which do not exist outside of the blend. The aspect of completion adds elements to the input spaces which stems from unconscious background knowledge and enriches the blend. Finally, the aspect of elaboration denotes the "the on-line processing that produces the structure unique to the blend" [5].

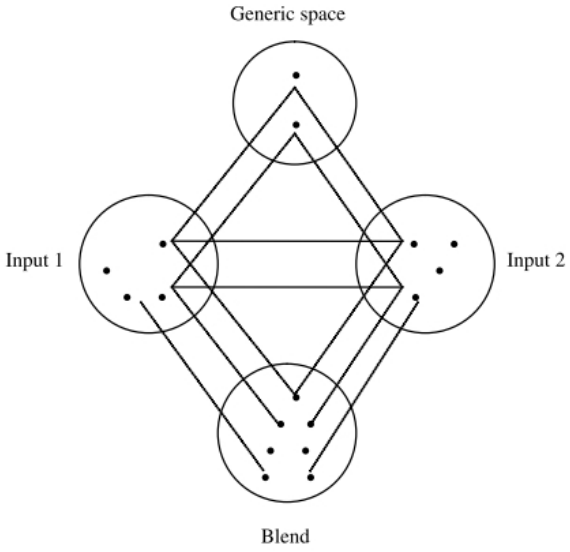

Figure 1. Integration network [5].

All the just mentioned elements are simultaneously at play in a blend [10] and as the blending is pretty much a capacity of our imagination "we can run the blend as much and as long and in as many alternative directions as we choose. […] The creative possibilities of blending stem from the open-ended nature of completion and elaboration" [10].

IV. Conceptual Blending as a Means to Describe Creativity in Games

As I have announced in the beginning of this paper I will now take a closer look at two games which I have chosen for analysis for this paper. Those games are *Tuper Tario Tros.* and *Hell*. Both games were chosen as they are innovations of existing games through conceptual blending. Both the games exemplify different kinds of blending. Seen the other way one can assume that they are the product of a blending which has been processed by their respective designer who, in his capacity to process blends as they are part of human cognition, is responsible for the results.

Tuper Tario Tros. integrates two games into each other; consequently this blend consists of two preexisting classical games which are integrated in a blend. *Hell* integrates a concept of hell into *Tetris*. In this case a concept of hell becomes integrated into *Tetris*. Let me start with *Tuper Tario Tros.*

A. *Tuper Tario Tros.*

Tuper Tario Tros. (figure 2) by Swing Swing Submarine was one of the games which brought me to think about games and conceptual Blending Theory. The specialty of the game is that it integrates two classic video games which emerge into a third game.

Already the game's title hints to the blend since all initial letters of *Super Mario Bros.* have been exchanged by a "t" which results in "*Tuper Tario Tros.*" Most commentators complain about the childish and somewhat low title. However, the designer's in their blog argue that it could also have been called "Platris" or "Metris" whereas *Tuper Tario Tros.* is the better solution (David 2010). Nevertheless, coincidence or not the title of this game indicates the nature of conceptual blending not only because two names are merged into another but because of its threefold character indicated through the three words of *Tuper Tario Tros.* and the letter "t" which could referring to the greek numbers mean three or trio. This coincides with the threefold character of conceptual blending consisting of three different kinds of spaces taking part in a blend; the at least two input spaces, the generic space and the blend. It furthermore indicates the emerging third out of two source games (*Tetris* and *Super Mario Bros.*).

Figure 2. *Tuper Tario Tros.* (2009). Left: the Mario mode. Right: the *Tetris* mode (www.loadblog.de).

In *Tuper Tario Tros.* The player guides Super Mario (or Tuper Tario) and steers him through the gameworld like one is used from the original Mario games. However, as opposed to the original games the player faces obstacles which he cannot overcome with the usual abilities of Super Mario. In a usual Super Mario game the player has to overcome for example gaps or heights which he most likely does by jumping over gaps or on bricks. However, in *Tuper Tario Tros.* the gaps either on the ground or between two platforms are sometimes too broad or the platforms are too high to be overcome by jumping.

This is where *Tetris* comes into play. By pressing the space bar the player switches the game mechanics from *Super Mario Bros.* to *Tetris*. Out of a sudden the well known *Tetris* tiles fall from heaven and the player can turn and navigate them and thus build platforms which help him overcome the obstacles. The player can also try to build a *Tetris* and thus erase blocks which decrease the height of the obstacle. However, while navigating the falling blocks the screen moves continuously from left to right so that it is possible that Mario gets stuck between the limit of the screen and an obstacle in the gameworld which causes death.

The integration of both games provides the player a new way to kill enemies with a falling tetromino, an ability which was not implemented in *Super Mario Bros.* before. Furthermore, the player can lock enemies as they can mostly not overcome vertical hurdles by positioning tetrominos left and right of them. Consequently, one can observe that the game mechanic of *Tetris* allows to play new strategies in *Super Mario Bros.* Thus, the integration of the *Tetris* game mechanics allow for new ways of playing a game.

On the other hand in order to make sense and fulfill a certain function in the game the gameworld of *Super Mario Bros.* had to be modified as well. As such gaps had to be broader as usual, fewer platforms were distributed, and seemingly insurmountable vertical hurdles were implemented in the game. Thus, the integration of *Tetris* into *Super Mario Bros.* resulted in a new gameplay. In order to get the bonus points at the end of the level the player would in *Super Mario Bros.* normally have had to climb on a pile of bricks to climb a pole and descend a flag. The higher the player gets the more points she earns. To climb on top of the pole in *Tuper Tario Tros.* the player has, of course, to use the *Tetris* mechanics an build a pile of bricks himself which help him to jump to the top of the pole and gain the most points.

1) The Blending in Tuper Tario Tros.

Having roughly described the essential characteristics of *Tuper Tario Tros.*, one can now analyze the nature of the blend in this example. Taking into consideration that the theory of conceptual blending mainly describes a mechanism how we construct meaning out of two seemingly unrelated spaces "on the fly" *Tuper Tario Tros.* seems to be the resulting materialization of such a process of meaning construction. As opposed to the idea of an unconscious on-line process of everyday meaning making, the blend in *Tuper Tario Tros.* seems to be somewhat forced and conscious. Nevertheless, the game can be taken as a result of such a blending which turned out to be interesting enough to follow the implications it offered and materialize it in an actual game.

In order to follow the blend and to make assumptions about the generic space of that blend which enables the counterpart connectors we would now have to find out some structural counterparts between the two input spaces. It seems therefore useful to have a look at the system level of the game(s) (as opposed to the audiovisual and the affective level (Begy 2010:38)) which "includes the rules, mechanics, all of the information needed to play the game, and the space in which it takes place. Other properties that fall under this level include unit operations that occur within the game, goal structures and game states" (Begy 2010:38). In the following I will comment on game mechanics and challenges as elements which are blended in the game. Game mechanics and challenges are thus the structural aspects which inform the generic space. As opposed to the generic space, both source games can be considered as the input spaces and *Tuper Tario Tros.* as the blend or the blended space, the third kind of space of the integration network according to Fauconnier and Turner.

2) Blending of Game Mechanics

One can, for instance, clearly say that the initial input spaces are the games *Super Mario Bros.* and *Tetris* with their individual characteristics. For instance, in terms of game mechanics (Sicart 2008) *Super Mario Bros.* relies on an avatar as the center of the player controlled game action. Even if one does not favor the focus on the avatar in games research one can say that all player controlled game action comes from the same avatar; as there are jumping, running, shooting. On the other hand, in *Tetris* the player controlled game action comes from the respective tetromino falling down at a certain moment of gameplay which is navigable during that short period in terms of moving, turning, speeding up. Both mechanics are brought together in *Tuper Tario Tros.* as they necessarily complement each other in order to overcome the challenges of the game.

3) Blending of Game Challenges – From Vertical to Horizontal

The challenges of both the games have been blended, too. According to Claus Pias [11] one can describe the challenges of both games as mainly time critical which qualifies them to be action games as opposed to decision critical adventure games and configuration critical strategy games. Action games are characterized by the need to take certain game actions in a short amount of time. They signify "the interaction in the presence", they demand "attentiveness while processing temporally optimized sequences of selections out of a repertoire of standardized actions" [11] (translated by me; italics in original).

Despite this structural similarity of both source games they differ in the spatial characteristics of their challenges. Whereas the challenge of *Tetris* consists of the avoiding the horizontal threat of the top container limit by erasing lines of tetrominos, the challenge of *Super Mario Bros.* is rather horizontal as Mario has to cross the gameworld from left to right. In addition, the screen which determines the visible section of the gameworld moves from the left to the right.

The player can erase lines in *Tuper Tario Tros.* but the quality of this *Tetris* mechanic in *Tuper Tario Tros.* lies in its function to erase piles as well as to pile up tetrominos. Thus, the vertical capacities of either piling up or lowering an accumulation of tiles by erasing lines in *Tuper Tario Tros.* help to overcome the horizontal challenge from *Super Mario Bros.* as the challenge of the threatening gamespace limit is rather determined by the left limit of the scrolling screen than by the top limit. As such here we find an example for the emergent structure in the blend.

Finally, after having climbed the pole the player does not simply move Mario to a castle at the end of the level where he usually finds out that the desired princess is not there. Instead he has to build the castle himself, of course, out of tetrominos which he has to place in a form of a castle. This is perhaps the moment in the game where the blend between *Tetris* and *Super Mario Bros.* is the most obvious. While the player tries to fill in the form with tetrominos little Goombas threaten to kill Mario constantly. While navigating the falling tetrominos in the form the player also has to navigate Mario to jump on the Goombas, to avoid them or to navigate the tetrominos to kill the Goombas. Thus, the player has to switch regularly between the Mario and the *Tetris* mode.

B. Hell

Another interesting example for conceptual blending occurred to me in the game *Hell*. This game was initially published as a comic by Randall Munroe in 2010 [12] (figure 3). Thus the comic contained the visual concept of what *Hell* in *Tetris* could mean. It showed *Tetris* with two essential modifications. Firstly, the lower gameworld limit is curved so that the tetrominos can hardly form any horizontal lines which are necessary in the source game in order to being able to erase lines and thus avoid the vertical challenge of *Tetris.* Secondly,

this implies another physic in the game which is better demonstrated by the conversion of the initial comic into a Flash game by Kaolin Fire [7] (figure 4) just a few hours after the publication of the comic. The tetrominos are not rotatable as usual in steps of 90 degrees instead they obey to a physics system which makes them fall almost uncontrollable.

Since this game modification is called *Hell* it provokes the question how a concept of hell is integrated in the game? Can this also be understood as a conceptual blending of two input spaces such as *Tetris* and a concept of hell?

Therefore it is necessary to determine the properties of the input space hell and to figure out how they match with properties of *Tetris*. The Oxford English Dictionary Online (OED online) offers plenty of different meanings for "hell." For instance it signifies "the dwelling place of the dead; the abode of departed spirits; the infernal regions regarded as a place of existence after death; the underworld; the grave; Hades" [13]. However, I do not believe that hell has to be considered as the place of existence after death in *Tetris* because the after-death in *Tetris* is a new life or a new game. In that respect *Tetris* follows the logic of an everlasting cycle of death and rebirth. Another notion in the same dictionary understands hell as "infernal regions regarded in various religions as a place of suffering and evil; the dwelling place of devils and condemned spirits; the place or state of punishment of the wicked after death." Especially aspects of suffering and punishment seem to be of interest for this analysis.

One might object that some kind of suffering and punishment is already implied in the original *Tetris* in terms of the ongoing challenge the game (like many other games) offers and the missing solution as the player can only lose. The only possible salvation would be another high score but in fact the game has no winning condition. Even after 999.999 points the highest possible score the game goes on.

But we are not talking about *Tetris* and its relation to a religious or secular (if that exists) concept of *Hell* but about how a concept of hell in the world of *Tetris* would look, play and feel like. Thus, we accept the suffering which is implied in the never ending challenge of navigating falling tetrominos (with an increasing speed in higher levels) as the normal characteristic of playing *Tetris* or as the gameplay condition [14]. This is similar to the challenges and tasks of our everyday lives as researchers as part of the human condition or the condition of possibility of being researchers. Although, as soon as the conditions become so difficult that the normal everyday tasks are not solvable anymore we might consider this to be like *Hell*. Like this is the case in different European university systems where researchers work 40 hours and more a week, get paid a part-time salary, and to spend most of their work time to ensure their own funding. This is a situation which could be described as *Hell* as it signifies "a place, state, or situation of wickedness, suffering, or misery" [14].

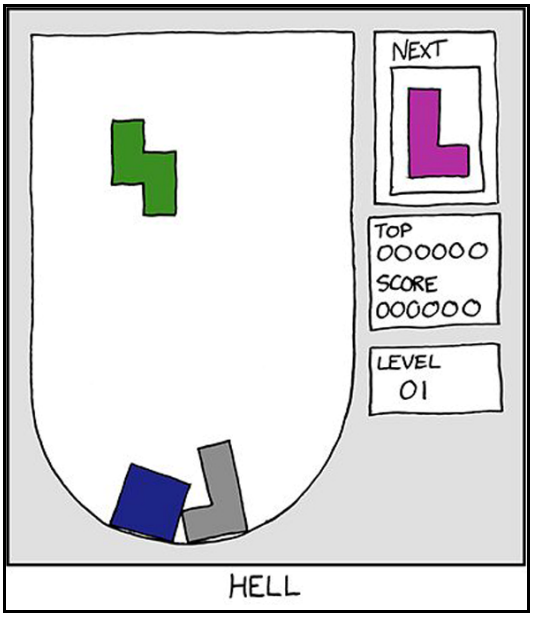

Figure 3. "*Hell*," comic by Randall Munroe [12].

Besides the usual misery of Tetris (the game challenge that can be handled by the player applying the game mechanics and some skill) we have another misery in the game Hell which consists in the impossibility of handling the challenge by erasing lines of bricks. The game challenges and the game mechanics do not match anymore. Instead, the only thing the player can do is to distribute the bricks as good as possible in the game world in order to delay the game over as long as possible. In Tetris the player has at least the illusion of being able to win the game as the game mechanics and the challenges match.

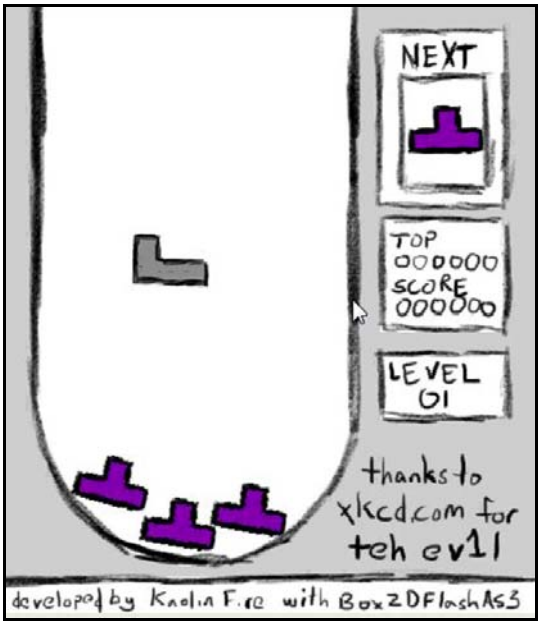

Figure 4. *Hell*. Flash game by Kaolin (2010) (Screenshot).

One can conclude that the game *Hell* is only understandable as a blend because it refers likewise to the input game and a concept of *Hell*. Otherwise one would simply understand it as another game with its own game mechanics.

V. The blend as re-mixing

This kind of blending in the given examples can be filed under the modding culture in video games [15] and a broader cultural and artistic technique. As such some commentators compared the structure of *Tuper Tario Tros.* to cultural practices such as mash-ups [16], [17] and re-mixes. Indeed, *Tuper Tario Tros*. can be seen as part of this meanwhile established form of cultural expression executed in other arts and media which perhaps began with "the collage as an artistic genre [that] had its breakthrough about one hundred years ago (Picasso, Braque)" [18]. Grønborg points rightly at that matter of fact which shows that blending of ideas is by no means a new idea to create novelties. Instead, this could rather be seen as an argument for Fauconnier and Turner that conceptual blending is rooted in the way of human thinking. When commenting on remixing in video games James Newman refers in his book *Playing With Videogames* only to remixing of video game music [15]. The example of *Tuper Tario Tros.*, however, shows that one can also remix game structures.

This leads to a further question: Has conceptual blending thus always already taken place in game design? For instance, we could accept that *Grand Theft Auto IV* [19] is a blend of a racing game and an action adventure in which the emergent structure of the blend would be shooting while driving which also exists in games like *Micro Machines V4* [20] or *Super Mario Kart* [21]. Given these examples and the fundamental role blending plays in human reasoning and experience it is to conclude that blending has always taken place in the development of games which can furthermore be observed in the merging of game genres into each other. The difference in *Tuper Tario Tros.*, however, is that both input games are still clearly recognizable as their unique characteristics have been integrated in each other. That is why it is interesting to see how the characteristic game elements inform the blend by keeping their original properties as opposed to an addition of game feature like racing and shooting in the previous examples. Thus, the creative challenge in the given examples lies in the constraint posed by the individual properties of the source game objects, mechanics and challenges.

VI. Conceptual Blending as a method to create new games out of existing ones

Thinking this line further one could imagine to re-mix other games and develop new games. For instance, the initially a bit macabre sounding idea to mix football and Counter-Strike [22] would be worth to think through. One could thus take the game objects, rules, mechanics and challenges of football and blend these with the ones of Counter-Strike.

This idea is obvious since both games have structural commonalities. They are for example played with two opposing teams, weapons or weapon-like game objects (the ball in football) and potential strategies as defensive play and offensive play. Furthermore is our understanding of football mostly structured in terms of war. Which means that our language of football is very much structured through war metaphors as we say "we defend our goal", "he shot like a canon", "the striker" and so on. The blend allows firstly to play virtually through the possibilities of how the games would match. Secondly, materialized as a computer game it is much possible to realize such a blend of two games and see how they would be played.

Taking football and *Counter-Strike* as the input spaces one could start taking structural game elements (generic space) and mix them into a new game (blend). As such one could for example focus on two central game objects, a ball and a short range weapon, furthermore the players could likewise shoot either the ball in the direction of a goal or their weapon and try to fire it at an opponent. Furthermore one could set two game goals which equally determine the final score of a match. The first winning condition could be to shoot more goals than the other team. The second winning condition would be to eliminate all players of the other team. Of course, the elimination of the other team would make it easy to shoot goals afterwards. Furthermore, one could define the playing field with two goals, and many walls and obstacles in between. This sketch could of course be driven much further; nevertheless, for the moment I assume the idea is clear.

However, taking the basic elements of both games does not necessarily guarantee a good and compelling game to emerge out of them. It will surely be subject to many gameplay iterations and adjustments of game mechanics and challenges in order to make a game compelling. Nevertheless, the example of *Hell* shows that a compelling game might not even be an intended result of a blending.

VII. Conclusion

As we according to conceptual Blending Theory construct creative thoughts we of course do the same with games. As I have tried to show there exist different approaches on how games can be blended with each other (*Tuper Tario Tros.*) or with a specific topic (*Hell*). The discussed examples are by far not exhausting the number and characteristics of other existing examples. They can rather be regarded as a first tentative step to see how conceptual blending helps to understand games like these.

Conceptual blending of existing games with different games or concepts can furthermore be regarded as a self-referential strategy which has the effect that the characteristic game elements of the source game(s) come into focus again. Especially in cases of games like *Tetris* and *Super Mario Bros.* which count to the computer game canon and are part of many gameplay biographies the characteristic elements seem to be so natural that their individual properties might not be reflected anymore. On the other hand one can observe that especially classic computer games are very often subject to further reflection in other media for instance. Be it in the form of poems about *Tetris* [15], Machinima or other kinds of reflections. Thus, conceptual blending as discussed in this paper is just one form of medial self-reference among others.

Questions which were not tackled in this paper but seem to be interesting to ask: Can a specific play style project another

game concept on a game (e.g. “lawn chess” = playing football like chess)? Can we play a game in another way is it is meant and appears to be another game? In line with that one would of course have to think to what extent the blend is finally completed through play? The blending of two game concepts in the game design process does not necessarily imply that an interesting game emerges out of it. Games will still need to go through several playtest iterations and need to be adjusted over and over again until they can be regarded as compelling.

Further research will need to be done would be to look how conceptual blending is already applied in other fields such as arts etc. Furthermore, it might be helpful to get a deeper insight into theories of creativity such as Arthur Koestler’s *The Act of Creation* [23], Rob Pope’s *Creativity. Theory, History, Practice* [24], or Marc A. Runco’s *Creativity, theories and themes, research, development, and practice* [25] just to name a few as they deal with very similar problems and examples.

Especially Koestler has a perspective which regards bisociation, a concept similar to conceptual blending, as being the core of the three major domains of creativity: humor, art and science. The same mechanism thus creates novelties which can be humorous, aesthetic and scientifically relevant. Both examples in this paper clearly can certainly be observed from the perspective of humor, as well. This will be one of the next steps to go.

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Towards Game Evolution Planning Through Simulation

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Abstract—**Game development has changed more and more into the direction where a game's development continues long after the game's release. Many games, especially those published in social media, are constantly evolved and changed throughout their life span. Social media makes it possible to test the changes on real users and evaluate the changes based on data collected from the users. However, it may be difficult to evaluate beforehand what the changed game will feel like for the end user and what the effects of the change are on a wider scope, especially in social games. This paper presents a method for facilitating the evaluation of potential changes to a game before the actual implementation. With the help of the DisCo software package, a simple Facebook game in development was changed and tested through this method. The test confirms that with this method it is possible to plan and evaluate changes and the changed game experience more simply and without actually implementing the changes to the game.**

Keyword-component: game development; game evolution; formal methods; simulation; experimental

I. INTRODUCTION

In the era of social networking services, it is becoming more and more common to release games in an unfinished beta state. Many of these games stay in beta for their entire lifetime. For instance Digital Chocolate's games *Army Attack* and *Zombie Lane* still state to be in beta phase after running for several months, and *Safari Kingdom* never left beta before being shut down after being playable online for over a year. This kind of extended or perpetual beta makes it possible to change the game in both radical and non-radical ways, without a warning. These changes might be planned beforehand before releasing the game, or they might be implemented based on collected data and user feedback. With the help of the user data, which Facebook or other corresponding sites offer to developers, the developers can use the platform as a test area to see user reactions and respond to them [2].

This kind of utilizing of user data to see what changes to keep and what to remove can be a very useful way to test the changes – you can quickly add content and see if people use it or not, and act accordingly. However, changing the game directly and watching the reactions of the players may be risky, as if the changes are unsuccessful or problematic, they may cause malcontent among the players. Especially if you have to change things like balance in a game several times, the gamers are due to get distressed and even leave the game, in the worst case in masses like in *PackRat* after importing the micropayments [7] or in *CityVille* after changing the inventory item caps [12]. Furthermore, implementing changes that later on prove futile requires work and time, and seeing their influence on the game beforehand would save resources as well.

In this paper, we will try to answer these challenges as we will present a method for facilitating the evaluation of potential changes to a game. The changes may be evaluated be they at the very beginning of development or at a later stage when the game has already been released. With this method, the developer can see how the game changes without having to implement it into the actual software of the game. For this method, we will utilize an updated version of the DisCo software package [1]. We will demonstrate the usage of the method through a case study of the game *Monster Therapy*.

II. DISCO

DisCo is a software package for creating and executing formal specifications. It features an action-oriented execution model [5] and its semantics have been defined with the Temporal Logic of Actions [6]. It has later been updated to be more suitable for usage in areas such as game development. The changes enable the use of probabilities [9, 10] and the possibility to control and visualize the execution from an external user-interface through XML-files. Before these updates, DisCo specifications have been created for various systems, including a mobile robot case study [4] and an on-board ozone measuring instrument [8]. With the probability features, specifications have been created, for research purposes, of such games as *Tower Bloxx* [11] and *Mythical the Mobile Awakening* [10].

A complete specification in DisCo is composed of several parts. One or several text documents that are written in the DisCo language [3] form the textual specification. The documents contain actions, classes, relations and other supported features of the language inside of a layer. Layers allow extending a specification in another file, so that the original specification does not need to be touched. This textual specification can be compiled and opened with a graphical

editor in order to make a creation. In this graphical editor, the state and content of the system is specified by creating objects based on classes in the specification and by specifying other things such as the state of relations. The creation can then be executed using DisCo's execution model.

Actions represent everything that can happen in the specified system, and are thus the most important aspect of creating a DisCo specification. In DisCo's action-oriented execution model, those actions are executed based on whether they are enabled (their guard function evaluates to true) and are not initiated from within objects. Actions are not contained in objects but still require objects as participants to be executed. Executing an action changes the state of the system in a way specified in the actions body and through parameters that may give input such as integer values. They may however only alter the state of participating objects and new objects may not be instantiated during execution. Which actions are selected for execution can be controlled in various ways. The action can be chosen by hand from the list of enabled actions, it can be randomly chosen, with a weighted draw, or by XML-input from an outside source. The participants for the action can also be selected from possible candidates in various ways. They can be picked by hand in the animator, selected randomly, selected by probabilities or by XML-input from an outside source.

III. Evaluating evolution possibilities through simulation

As the basis of our method, the game back-end is modeled as a DisCo specification and contains all of the game logic. We do not model the user interface, but create a working version of it, excluding any game logic. We connect the user interface to the DisCo specification. We can then test both the user interface and the game logic and its design. This process can be done at the very beginning of development or later on.

With the specification created, and a user interface implemented, it is possible to easily create variations of the game as other versions of the specification. We can either use the user interface in its current state, or make changes to that as well. Creating the variations can be done with minimal effort, as the specification works on a much higher level of abstraction than a fully developed application. A small change to the specification can mean a big change in the game design.

It is thus possible to plan ahead by creating various versions of the specification. As the specifications can be executed, they can be evaluated in various ways such as testing the game experience through the game user-interface or by analyzing possible game progression paths of players. Simulating other players of the game is also possible [10, 9], thus making it easier to test the game with only one player while still having it feel realistic. As an added benefit, the correctness of the game logic gets tested thoroughly due to the utilization of formal methods.

The evaluation results can be utilized to plan viable development directions and also to have an idea of unsuitable development directions. With this knowledge in hand, it is much easier to change the game when it has been released and react to user data and feedback that can be gathered from the game. It is also possible to better know what data to gather from the users when the possible changes to the game have already been evaluated beforehand.

IV. Case Study

A. Monster Therapy

It is argued that instead of shipped products, digital games are turning into services [13] and conceptualization has to cover also the concept of change through time within the product itself. Many Facebook games are in a state of perpetual beta, which means that (i) the game is never completed and (ii) the stability of the player experience is not guaranteed. Further, this is also considered as a possibility to test ideas with real players. These Facebook games are published with the idea that they will evolve, and everything can be changed according to user data. If some features are not popular among game players, they will be cut out or will not be further developed.

To study these changes and their effects, a game concept

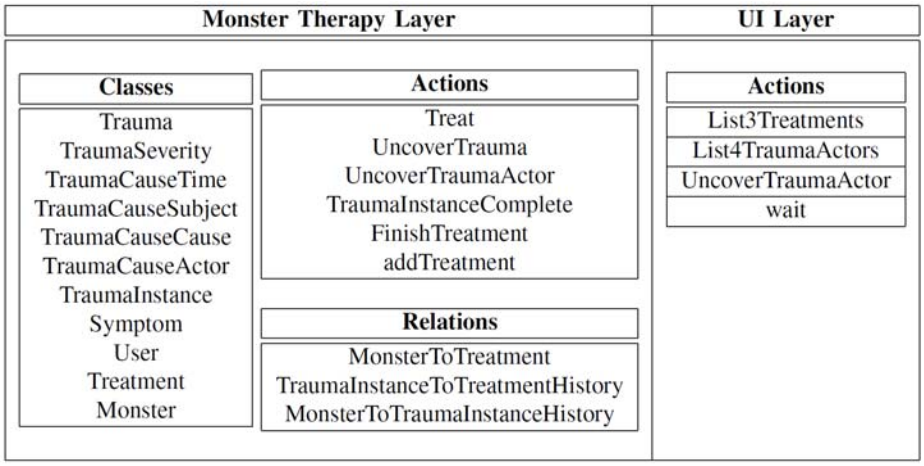

Figure 1. Classes and Actions in the Monster Therapy DisCo specification.

called *Monster Therapy* was created. *Monster Therapy* is currently being designed as a simple Facebook game. The main character of the game is a cute monster with emotional problems. The problems are diagnosed by a doctor. The doctor verifies the symptoms and with the help of inkblots reveals the cause of the problems, resulting in a trauma. Players treat their monsters, which eventually only gain more mental problems, remembering more and more traumas as the game proceeds. The game itself is designed as a Flash application to be embedded in Facebook. The symptoms and traumas are randomly generated creating more or less funny combinations such as "yellow hydrophobia" and traumas such as "10 year ago, my dog ate my hat". As the game progresses, the monster gains extra body parts that players can attach freely to their monsters manifesting a level up in the game for the fellow players.

A formal DisCo-language specification of *Monster Therapy* has been previously created during its development and also to research connecting a user interface to DisCo. The specification is designed to represent the bare minimum functionality the game could have when it is launched and thus does not contain all of the features described above. The gameplay progresses in the following loop:

1) The monster gets traumatized with a trauma that requires a certain amount of healing to be cured.
2) The player picks out the entity that caused the trauma from a list.
3) The full cause of the trauma is presented.
4) The player picks treatments for the monster to take, each treatment heals the trauma a certain amount. The healing happens instantly.
5) The monster is cured when it has been sufficiently treated.

A list of classes and actions that are present in the specification is given in figure 1. The specification is very small and simple, but contains the essential core logic of the game. The *Monster Therapy* layer contains all of the actual game logic, while the UI layer contains additional actions to make the user interface integration work. The creation for the specification also contains a minumum set of data to test the specification with.

B. Change

The previously created game model was changed to make it necessary for the monster to recharge after each treatment before a new treatment could be applied. In addition to changing the DisCo-language specification, the creation that describes its content needed to be updated to support the change.

The change to the specification and creation included the following:

- Adding the *rechargeTreating* action to the Monster Therapy layer (figure 2).
- Adding the field *rechargeRemaining* to the *Monster* class. The field represents the time the user needs to wait before it is possible to treat the monster again.
- Making the *Treat* action set the *rechargeRemaining* value of the participating instance of the Monster class to match the strength of the selected treatment.
- Making it a requirement for the *Treat* action that *rechargeRemaining* is 0.
- Updating the creation to support the added field *rechargeRemaining*.

```
action rechargeTreating (mon : Monster)
is
  when (mon.rechargeRemaining > 0)
    do
      mon.rechargeRemaining:=mon.rechar
      geRemaining-1;
    end;
```

Figure 2. *rechargeTreating* action in the DisCo specification language. The action subtracts one from the time a monster needs to wait to apply a new treatment.

The changed specification was executed with the DisCo animator and the execution was connected to the *Monster Therapy* user interface (figure 3). The meaning of the change for the actual game was not especially evaluated, as the focus was in finding out if it is feasible to test changes with the presented method. Still, some observations were made on the effects of the change. Most visibly, the gameplay experience was clearly different as the player was forced to wait a certain amount of time before continuing playing after each treatment. We could also see that the reason for waiting was not directly apparent in the user interface and the information displayed to the player would have to be changed.

Most importantly, creating a change like this was simple and fast to do and only required small changes to the specification. With the change implemented into the model, we could instantly see the game advance differently in the user interface. However, while it was possible to use the new model without any changes to the user interface, some problems were revealed in its initial design and implementation as the user interface advances one extra step when waiting for treating to recharge, where it should stall.

V. CONCLUSIONS AND FUTURE RESEARCH

We have shown that it is clearly possible to use formal models to simulate possible changes to game designs and that there are changes that are very easy to make to a formal specification model of a game. However, the technique presented in this paper is not yet mature enough for wide spread usage. Also, more research must be put into figuring out the types of cases where this method is most useful and what are its limitations. With our approach, it is possible at any time to test possible changes that could be done to the game and also test those changes with the actual game user interface without

implementing any real changes to the games back-end. In this way, we make it possible to accurately plan the development of the game at any point. This is especially helpful for games with simple user-interfaces but with complex server implementations that require a lot of work to implement. Also multiplayer games benefit, as it is easy to simulate players. A perfect use for the method is thus the development of simple Facebook games with social features.

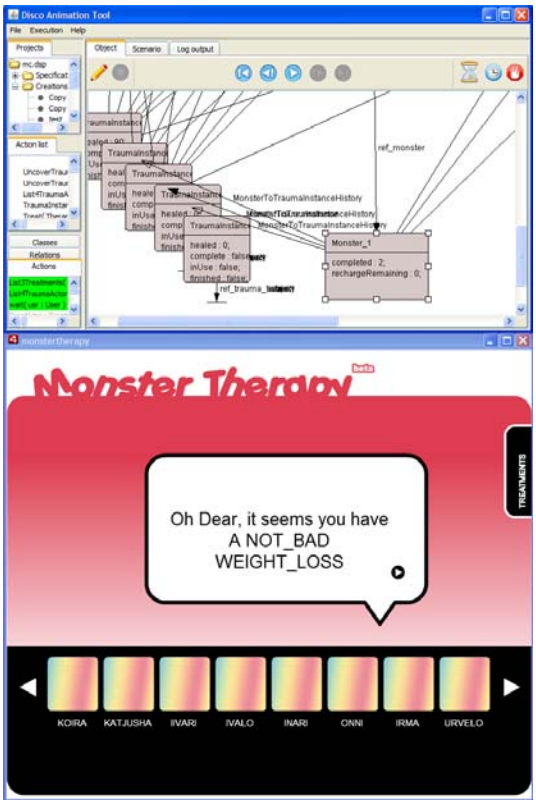

Figure 3. Executing the changed model of Monster Therapy.

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Useless Innovators?

Re-evaluating the Role of Users in Digital Co-creation

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Abstract— **The aim of this brief research paper is to present an understanding of game design that allows us to start conceptualising user participation in new ways. New technological agency and the users' assumed empowerment will be situated in the gradual change of the game industry. I will argue that the participation fostered by the internet has allowed online game players to become much more powerful than previously in their relationship to the game industry. In fact, many forms of games practically depend on player participation in the design process for their success. I will conclude that within social games, players' appropriation and domestication practices work more effectively than in many of the other, more traditional technological contexts.**

Keyword-component: Game industry, game design, participatory culture, user, agency, script, user representation, I-Methodology, social games.

I. INTRODUCTION

The internet and ICTs more generally are sometimes thought to represent a shift in our co-existence and evolution with technology; among other things, they are regarded to provide new forms of engagement and empower the user in radically new ways. Digital technologies are considered to enable their users to participate in the creation and maintenance of cultural artefacts on an unprecedented scale [e.g. 2, 11], and computer networks are thought to intensify especially the grassroots-level (sub- and counter-) cultural movements. But on what terms is it possible to contextualise this 'new' technological agency within the *longue durée*? And how can we conceptualise the participatory logic of cultural creation? What kind of theories can help us understand and situate the current practical examples of co-constructive design?

My aim in this research is to understand how new technologies contribute to the distribution of agency over the diverse user groups. At the core of this discussion, there is the idea of technology's *interpretive flexibility* [29], which grants active agency to its users. This is not a novel idea; in fact, it has been one of the main points of the social construction of technology (SCOT) for decades. Like many socio-cultural theories, SCOT has been based on the notion of users and technology as co-constructed, as if two sides of the same problem [18: 3-7]. The question about agency is not only theoretical, since determining "who or what is endowed with what kind of capacities to intervene and change the co-production of science, technology and society" has profound political and normative consequences [8: 15].

Also, in this study design and innovation are seen as closely connected. They can be conceptualised, as Kerr [13: 279] puts it, as "the act of getting a new process or product to the market and the related organisational, knowledge, social and other changes associated with this process. […] To investigate design is also to investigate the relationship between structure and agency in society and the degree of freedom which individuals have to act within a wider set of relationships."

The practical context in which the new technological agency and the users' assumed empowerment will be discussed in this paper is situated in the gradual change of the game industry under way. The digital games industry is similar to other media industries in the sense that it is still rather concentrated: it is controlled by a few transnational corporations that operate from a small number of centres. Games, in general, are developed for large markets and localised for others, and allegedly only in segments like PC games one can see some diversity of producers and content [14: 155-156]. At the moment, however, the gaming sphere at large is going through transformation – the emphasis is shifting, e.g., to casual gaming, smaller scope products, digital distribution, thinking about games as services and divergent forms of social play. Also the methods of participation are changing.

In this study, the design and use of new technologies are regarded as interconnected and thus they must be analysed as such, as closely entwined. To conceptualise this connection, certain terms from technology studies will be utilised here – such as the notion of *script*, which Akrich [1] introduced to visualise the way in which innovators' representations of users shape technological development. The other important theoretical notion considers the user representations that designers configure and rely on in their work. These two notions are closely linked, as Oudshoorn et al. [17: 85-86] summarise:

actors construct many ,In the design phase different images of users and objectify these The very .choices representations in technological act of identifying specific individuals or groups as users may facilitate or constrain the actual role that specific groups of users are allowed to play in .shaping the development and use of technologies s of users and useThe inscription of representation in artifacts results in technologies that contain a they attribute and delegate specific :script and responsibilities to users ,actions ,competencies .and technological artifacts

The starting point of my research is that production and consumption are not separate, discrete categories, but rather like modes of activity that manifest differently depending on a variety of factors (social, institutional, economic, cultural), situations and levels of engagement. It has to be remembered that many of these factors also constrain the possibilities of user participation, especially in an area like digital games, so the liberating or 'democratic' potential of ICT utopias need to be placed in a context and valued critically. This research builds on a feminist tradition of technology studies, where attention is paid foremost to users instead of experts and producers whose voices have so far been dominating the academic discourse (especially in actor-network theory, ANT) [21]. The aim here is to present an understanding of game design that allows us to conceptualise user participation in new ways.

II. TECHNOLOGICAL INNOVATION AND CO-CONSTRUCTION

In the twentieth century, the making of the modern society became invested in technological development, but up until recent decades these large processes of system building have primarily been studied from a design and production perspective. In the production-focused research, consumers were destined to remain anonymous – or they were granted a kind of 'group identity' – and in research, their role was often reduced to that of purchasers of new products. On the other hand, consumption-oriented studies in this era have tended to take consumption for granted, focusing on consumers' individual choices, and thus the impact of the producers' and designers' perspectives and representations of users and technological agency have been obscured [21: 229-230]. There has been a clear tension between production- and consumption-orientation in technology-related research.

For a couple of decades now, however, the idea of an active user (or consumer) has been in the centre of research in science and technology studies (STS), media studies and gender studies, as well as other disciplines. The main motivation behind this line of thinking has been the co-production or co-construction of technologies [8: 12-14] and the importance of mediation processes in it [21]. Although some of the early understandings of users that were developed in economics-oriented innovation studies stated that the (collective of) users are active, agentic, and they play an important role in technology development [e.g. 9], this did not become the mainstream paradigm in technology studies until perhaps the 1990s. Similarly the sociology of technology, such as actor-network theory, has firmly directed its attention primarily towards experts and producers as well as design and innovation in understanding socio-technical change. ANT has been criticised for assuming power relations where users of technology are always thought to be disempowered relative to the designers and experts [18: 6-7].

The focus on the innovative activities of users has therefore not always been self-evident in STS. The main question behind the competing approaches looking at technological change lies in the power positions that the various actors are thought to assume in the processes of technological diffusion. There are also major debates that seem to give priority to the design context in order to understand the relationship between user and technology. Sometimes, from strictly the production perspective the creative processes resulting in new innovation are considered to be highly individual, difficult, chaotic and unpredictable, and the participation of users is regarded 'useless' [25]. The same attitude has come up in studies of game industry professionals as well as in game design guides, where digital game development is largely seen as an intuitive process, relying on game concepts that originate from the work of the designers themselves [13: 278-].

Nevertheless, participatory culture in the field of digital games *has* existed for a long time, and it clearly has had a significant impact on game design and development [22]. However, the term itself has come to denote a rather idealistic paradigm that defines media users' and fans' productive aspirations and activities within the sphere of digital media and cultural production. These 'social production practices' have been enabled and directed by the tools provided by the industrial actors for use by the emerging non-market actors, individual players and internet denizens [2]. It is clear that digital technologies have been encouraging their users to take part in the production and modification of cultural artefacts, letting them participate in the core operations of the culture industry [10], but the ever-growing role of the internet (for instance, social networking sites such as Facebook) as the facilitator or inhibitor of these processes has not yet been thoroughly investigated.

Participatory design (PD), such as some forms of game modding, can be considered an important implication of 'social software' based on user-led content and knowledge creation. In the context of analysing the economic impact of games and their development, PD has been regarded as

post-industrial unwaged labour (playbour), where game developer companies have ultimately been reaping the benefits of the work done by the recreational player communities [15]. In a more positive framing, it can be regarded as creative consumption [26], or the collaborative and continuous building and improvement of existing content [3].

Re-reading Silverstone's contribution to *Consuming Technologies* [23] and thinking about his concept of 'domestication' in this context has inspired me to apply its four phases in my research setting. His first phase, *appropriation* refers to the process where technical product or service is acquired and someone can claim its ownership,[i] which in *objectification* (the second phase) is expanded to include characteristics that display and communicate its owner's norms and preferences. Third, *incorporation* occurs when the technology in question is incorporated into the routines of everyday life. Finally, *conversion* refers to the situation where the use of that particular technology shapes relationships between different users and outsiders. "In this process, artifacts become tools for making status claims and for expressing a specific lifestyle to neighbors, colleagues, family, and friends" [24: 46].

How can Silverstone's idea of domestication be applied within the context of game development? In the ongoing research on social gaming that I am conducting [the results of which are not yet visible in this paper], my aim is to analyse, first, in what ways domestication can be regarded as interlinked with the players' participatory design practices, and second, how consciously it is or can be utilised in the processes of game development.

III. THE I-METHODOLOGY

Over the long period of time, even though actual users may not have had much control over the technologies that have been marketed to them, *imagining* or *configuring* the user has always been a crucial aspect of technology development [e.g. 24]. User representations [1] are the result of designers aiming to understand and project the (potential) users of the products or artefacts they are developing while the design process is still ongoing. These representations are produced through either explicit or implicit techniques: Explicit user representation techniques include market research, questionnaires and surveys, as well as user tests and interviews, whereas implicit and informal techniques rely mainly on designers' own ideas and conceptions of their users.

Contrary to what one might expect, informal techniques to represent the user are habitually used in ICT companies, and the dominance of these representation techniques has often had a major impact on the script of the first prototype [17]. A commonly used example of the implicit practice is regarding designers' beliefs about the assumed differences between men and women as resorting to gender stereotypes. In general, relying on implicit techniques in user representation is far more common than utilising explicit methods among designers [19].

One of the most common implicit user representation techniques is the so-called I-Methodology (term coined by Akrich [1]), where the designer takes himself as representing the user. In a way, the developer then inscribes his own image into the artefact. Since the users form a heterogeneous group, designers always privilege certain user representations over others, and often this process is not subjected to critical reflection – instead, it is done rather instinctively. It is in a way natural, then, that designers take their own preferences and skills as representative of the future user [17].

However, recent studies indicate that there is little understanding about all of the implications of this process, or how it actually works, and how it might be linked to user socialisation and perceptions concerning the differences between various users. For instance, since women or the elderly are underrepresented in this domain, technological objects have habitually become attuned to the interests and skills of young, middle-class men. Digital game development provides good examples of how this process works in practice [4: 169-176; 14; 20; 30].

In a number of studies, the I-Methodology has been considered a good way of describing of how game designers have traditionally seen and configured their users, the future players of their games. In her research concerning small to medium-sized game development companies, Kerr [14: 97; see also 13] noticed that most of these developers relied on intuition about their market demand, which was based on their personal knowledge of competition as well as personal preferences in the initial design and prototype stages. Resorting so heavily to the I-Methodology has been regarded as a hindrance to the growth of the industry, however: game development has been criticised for relying too much on certain market demographics while neglecting others, and catering to the tastes of hardcore gamers, in particular, while excluding other groups and preferences at the same time. There seems to be a clear tension between publishers wanting to focus on their traditional core market consisting of 13-25-year-old males whilst desiring to invest in new player groups, game genres and design strategies at the same time [14: 97-98].

It could be speculated that perhaps senior and veteran game designers are valued so high in the game industry at the moment because game development still relies so heavily on the I-Methodology and implicit methods of user representation – practical experience on these scripts and 'market research' methods really pays off. For instance, a recent article on *Gamasutra* tackles the hiring of two esteemed game developers by Zynga, the social games giant du jour, acclaiming that "stunned the industry when it hired veteran PC strategy developer Brian Reynolds to head up its Zynga East studio – but the success of

FrontierVille put to rest any questions about the decision"; and that this was a strategy of hiring "'traditional' game developers from outside of the social space to inject tried and true methods and design philosophies into an emerging area" [7].

IV. TRANSFORMATION OF THE GAME INDUSTRY

Is there an alternative to the use of the I-Methodology and other implicit user representation methods in game development? The game industry is undergoing a change that might affect not only the players and their games but also the whole development cycles and trusted methods of user representation and participation as well. The current situation was already alluded a decade ago by researchers like Kerr, who conducted studies on the development of an online game which was constantly updated and contained multiple feedback channels. She was interested in examining how users could be excluded or alienated through design – the script of the game – and discovered a lot of evidence that, for instance, the existence of female players was not considered worthy of the developers' attention at all [13: 287-291].

Nevertheless, in the context of online gaming at large, it can be said that game developers have always relied on acquiring information about their players and maintaining an active dialogue with them, both directly and indirectly. Certain game developers, particularly those with relatively small communities, have perhaps preferred to establish a direct relationship with a handful of the most active and most vocal members of the community, as it seems to have been the case in the research Kerr was doing ten years ago. These active and committed players have then been consulted through user groups or message boards, or even personally, as to their thoughts concerning alterations and additions to the game and the social structure of its play dynamics. In these cases the players have acted as conscious participants in the game design process, and the developer and player have worked knowingly together, contributing to the continued stability and balance of the game environment. However, in this form of relationship, not all players have had access to the development, and the types of players that have had their voices heard have often been the hard-core gamers or the most socially active participants, not necessarily akin to the majority of players.

On the other hand, some game developers, such as those of *World of Warcraft* (Blizzard, 2004), have always made use of silent participatory design [27; 6]. In this form of development process, the logged actions of all players accessing the game world contribute to defining the limits of change in order to keep a balance within the environment. Here the player acts as an unaware participant in the game design process, and only the indirect consequences of the players' actions contribute to the continued stability of the game environment. In this form of relationship, although all players are equally represented, the foundation for development decisions is also limited, as the player's actions within the game and the interaction between the player and the game (especially in the social or economic sense) do not always match up.

In both of these instances, the direct and indirect forms of participation, the underlying aim is to work towards maintaining a balance of the game by involving both the player and the developer in the process of game design. However, the manifestations of this relationship are far from uncomplicated in practice. In this sense participatory game development acts as a sound example of the more general problems pertaining participatory design. Theoretically speaking, PD has been conceptualised in terms of technologies turning into instruments for conceptual thinking and creative expression on the part of the users, as well as tools for social change [5].

Originally, participatory design started in a political context, and it has been motivated by a belief in the value of democracy which manifests itself in the strengthening of disempowered user groups, resulting in better services and products [16]. Currently the field of PD consists of a diverse set of theories, practices and methodologies related to users as full participants in activities leading to software or hardware development and various ICT-based activities. Every critical study on PD admits that there are serious challenges in putting the theory into practice. For instance, online multiplayer game development has customarily resulted in arduous and time-consuming iterative cycles where it has often been too difficult in the end to incorporate player perspectives, despite each participant's best interests.

This situation seems to have changed somewhat when it comes to Facebook games. In them, players work individually and together to take part in the design process. These games are typically launched rapidly, updated frequently, and they seem to stay indeterminately in the 'beta' phase. Everything that the players of these games do is part of the design process – from sending gifts to their friends to not accepting upcoming quests – and these actions are carefully monitored by their developer companies [28]. I am proposing that this type of approach could be called a kind of 'casual game design' in the sense that despite its far-ranging effects, it still mostly remains rooted in the indirect player participation. My hypothesis is that many of the players of social games participate in the design of these games because it is 'fun' and 'easy', and the entry barrier in this activity is exceptionally low. Although players have the power to adjust and contribute to the development of many social games, the question remains how these forms of participatory design affect Facebook gaming on a larger scale.

In the end, what makes these social games 'social' may not be the default assumption that it is the direct interaction between players, but rather the relationship between player and game developer, and the cumulative result (the game

itself) that all players, within their own unique developer-relationships, socially produce.

V. CONCLUSION

It looks like the participation fostered by the internet has allowed online game players to become much more powerful than previously in their relationship to the game industry, as many forms of games practically depend on player participation in the design process for their success. What is unprecedented in the context of social networking sites is the scope, extent and ease with which the users of technology (players of games) can have an impact on the design and development of it. Thus it can be argued that within social games, players' appropriation and domestication practices work more effectively than in many of the other, more traditional technological contexts. The players of social games, how trivial the play act itself may seem, are participants in the design environment of these games, and that their efforts challenge the official game producers.

What remains to be seen is whether game developers' explicit and implicit representations of their users (players) are also changing. Robust evidence shows that in order for the I-Methodology to be successful it is crucial that the designers are very similar to the players of the game. Also, the large number of male employees in the game industry might still be a hindrance to the expansion of the market. On the other hand, many of the current social games have proved out to be massive hits, so it looks like the combination of rapid prototyping, iteration and participatory design is working well at the moment.

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i Silverstone, like many other British scholars involved in STS were quite focused on the domestic sphere – the household and the politics of family life. In my treatise, I want to expand the theory into the “virtual” realm, on social networking sites. This jump may not be as wild as it first seems: many of the same issues and critical points (concerning identity, performance, privacy etc.) are raised in both contexts.

Shaping a Digital Me

An Introduction to Avatar Customization as Interactional and Engaging Feature in Videgames

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Abstract— **Customization in videogames can be understood in many levels, but generally involves a variety of options enabled by the game designers to the player. Avatar customization is one of the most powerful tools of immersion to the player since the avatar is the main mediator of the player's interaction. This article discusses some points of view in this subject.**

Keywords – avatar; customization; personalization; avatar customization.

I. INTRODUCTION

When thinking about innovation, one often relates it to something new or unpublished. Cumming [8], however, brings different position of innovation as a concept. Author alleges that, in 1970s and 1980s, the understanding of innovation revolved around innovation as a process, as the introduction of change or even as generation of new ideas. Nevertheless, in the 1990s, decade in which the article was published, the process of idea generation was considered for most authors as 'creativity' and innovation became tied to successful concept. In this sense, the "new thing" must be a success in order to be considered innovation and success, in Cumming usage, means commercial success. Thereby, the idea, the change in the habitual order of things, must sire satisfactory use in such a way that this change may even become a new standard for future ideas and products in order to be considered an innovation. It is as if a change without being recognized isn't enough to belong into the innovation standard.

This concept can be largely applicable to videogame industry, as Kati Alha has beautifully pointed out in her article in this same publication. Innovative games are not the ones that have *implemented* a new idea but those that have implemented it and managed presenting it in a satisfactory use while achieving public relevance. However, it's hard to say right away when the change is first implemented and used a couple of times if it is to be considered an innovation or not.

For instance, online multiplayer trait is an example of innovation; the internet popularization and the huge success of some MMOs, as Lineage and Word of Warcraft, and multiplayer FPSs, such as Counter-Strike intensified its spread. Besides, it had consolidated in the field in a way that, nowadays, multiplayer gaming is almost a must-have feature in any game title and have a considerable impact in social (as Nick Yee and Constance Steinkuehler discuss), cultural and even economical (as Castronova so well states) affairs. Avatar customization is not a completely new feature in videogames, existing in a simple way for a long time in RPGs, however it is a trait that is becoming more and more complex and more and more common lately. If it is by one hand somewhat unclear yet if it is an innovation that will shape and influence most games from now on or if it is only a fad, by the other hand, it is quite a promising feature. Hemp [9] states that players currently spend a combined total of more than $100 million a year on Internet auction sites for skills and accessories - digital weapons earned or crafted by others, all of which are used for avatar argumentation, a kind of avatar customization. And yet, avatar customization still isn't a very prolific research theme.

In this article, we propose to assert some considerations about avatar customization. Since not much have been said in the subject, most of the theories discussed were collected in studies that didn't deal directly with the subject of avatar customization. In this way, the main objective in this article is to foment the discussion in the subject of avatar customization and introduce some theories in the theme.

II. MAKE IT BETTER, MAKE IT CUSTOM

The word *customization* comes from the English word *custom*, which, according to the Oxford Dictionary, comes from Latin *consuetudo* meaning habit or practice, the act or state of being habituated with something. However, this word convey different significance nowadays, mainly because of its use in the sales department.

The market concern to meet, satisfy and make loyal customers while beating competition causes companies to seek different strategies. One of the many strategies used today by marketing business is customization. As one of marketing most respected authors put it, customizing is the consumer's chance to choose in his own ways between different options given by the company [10]. It's also a way of "fitting" the product to the consumer requirements. In this same sense, Baudrillard [3] marks out customization as something that dwells inside the

choosing system characteristic to the contemporary consumer society:

> *No object is proposed to the consumer as a single variety. We may not be granted the material means to buy it, but what our industrial society always offers us 'a priori', as a kind of collective grace and as the mark of a formal freedom, is choice. This availability of the object is the foundation of 'personalization' (p.151).*

According to Pine [14], the key of mass customization is that customers desire different offerings at different times under different circumstances. However, making this customization possible may be quite an inconvenience for contemporary industrial system. Making the whole product as the consumer desires would imply almost in a handmade process, which would increase drastically product's manufacturing time and costs. That's when what Pine defines as "mass customization" steps in. In order to offer a customization to a customer (either offering a physical good, intangible service, or memorable experience), Pine affirms that the provider must "break it apart into modular elements like LEGO", enabling the customer to personalize product traits while affording the provider to produce it within his framework. In this sense, customization is the offering to custom some feature so that one can suit a product or an experience to her preferences.

III. Customization and Interaction

Though those definitions are good enough for market and business affairs, they don't encompass the full dimension of customization in videogames. Thus we will not deepen the concept through market literature but rather use it as a starting point to understanding customization. However, a closer look to the media known as videogame is needed in order to go on in this line of thought. There is a principle liable for this "bigger" definition which is also responsible for the idea of the game itself: a videogame is digital interactive object so as the whole idea of the game is based upon a certain kind of choosing. For instance, one can choose one path of another or even decide whether to kill or not another character while playing. This interactive process is based in electing between different possibilities was defined by Cameron [5] as

> *the possibility of an audience actively participating in the control of an artwork or representation. Until now, what we call culture has not allowed for a great deal of interaction from the audience.*

This interactivity is completely different, according to Cameron, of any kind relation possible between the consumer and the media so far, since it allows for the first time the spectator/interactor to make a meaningful interference in the artwork and not only reading or interpreting it differently "Thus interactivity in music would mean the ability to change the sound, interactivity in painting to change colors, or make marks, interactivity in film the ability to change the way the movie comes out and so on."

To fully understand the nature of this customization, first one needs to understand the digital nature of videogames. Manovitch [12] has catalogued five main characteristics of digital media in general, which are: numerical representation, modularity, automation, variability and transcoding. The numerical representation assert that underneath all digital objects, from spreadsheet software to videogames, there is a numerical binary layer guiding procedures, a "machine language" basic guide. The modularity principle declares that all digital objects have multiple layers, which are

> *represented as collections of discrete samples (pixels, polygons, voxels, characters, scripts). These elements are assembled into larger-scale objects but they continue to maintain their separate identity (p.30)*

The automation principle attests that some processes and layers have their function automated through an algorithm, such as certain commands and buttons have certain actions in most software pieces. The variability principle avows that, because of the automation between layers, slightly different incomes resulting in different outcomes are possible allowing different experiences to the interactor. Finally, the transcoding rule asserts that the logic of the computer, which is to act upon the previous principles, influences culture and digital production into a both way system. An example is how internet memes or methodology are "leaking" into real life, and vice versa. These principles can be explained with videogames, a platform game, for instance. The basic binary code, which is obligatory to all videogames, represents the numerical representation. The discrete existence of buttons, background, player's avatar, each enemy, and scenario, which are independent but have interaction between them, attests the modularity principle. The artificial intelligence, and even the graphical representation of controls, are automatic responses. The different player trajectories possible in-game show the variability of the system; and at last the fan-made games, machinimas and all sorts of cultural responses to games, that end up influencing other games and games cultural production at a whole, are examples of transcoding.

In this article, we understand customization as an interactivity feature. Therefore, Cameron's definition of interactivity is the base of the customization notion here. This level of interaction and customization are viable thus Manovitch's principles, but mainly the modularity and variation ones. Overdue those interaction characteristics, it's possible to the player to manipulate some game aspects. It's interesting to point out how this interaction and even customization aspects are all predefined by designer and made available through somewhat *modular elements*, just as Pine defines mass customization.

Those modular elements go from simple options to more sophisticated ones, but apart from complexity the customization can be understood in two main spheres: the ones related to the system's material components, which make part of the player's general experience and have little relation to the game meaning cosmos, and those that make part in the significant universe inherent to the game general context. The material components include all customizations that refer to

changes in the mediation between the player and game system, such as control the sound effects or tracks, camera options, display arrangement and even the joystick arrangement. The context element changes count in all kinds of options which can sire modifications alongside the game course, for instance changing some character's name, scenario customization (as in Little Big Planet, The Sims, Halo 3 and Warcraft 2) or in choosing different items that may provide different outcomes to the player.

Those changes alter the game and the way it's played, but the game itself, its numerical representation, remains the same and so do the automation features, which are responsible to present the game in such a different way to the player. In being on control of so many variables, the player is able to modify or build the game according to individual or personal specifications by himself in a way that can change the player's game experience as a whole. This process of varying the game original features, adapting it to one's need or preferences is understood in this article as customization.

IV. Avatar and its Customization

Therefore, according to Manovitch and Cameron, digital media is interactive and, in this way, allow some kind of customization. Videogames are digital media, therefore have the same characteristics. However, interactivity and customization can be expressed in different ways in videogames. For instance, interactivity through gameplay is the most basic feature defining a videogame in its essential concept. Avatar customization is other rather common type of interaction at the present time and has spread to many different game genres. However, it isn't available in all games and wasn't so common until recently. In the beginning of the videogame history, it is even hard to find game traits that could be considered avatars. Adams [2] points out how in those days, most games or allowed the player to control a vehicle or just an abstract object (as in *Pong*), and how "human" counterpart in the game were a huge innovation in this scenario. Avatar rising popularity may be a result that in choosing or adapting your avatar no or little technical knowledge is required (differently from, for instance, video customization, which depend on the player's knowledge of this computer graphical hardware and of video characteristics, as gamma or bright) or generally few changes are required in the game itself (some videogames have a whole different history/environment for different characters but some have minor changes, as choosing between Mario or Luigi in Super Mario World only makes your avatar jump a little higher). As Adams and Rollings [1] puts it, "[o]ne of the most useful, and at the same time easiest to design, features you [developer] can offer your player is to allow him to customize his input devices to suit himself." But there might be more intrinsic motifs, related to the avatar itself.

The word avatar comes from the Hindu and means "other world embodiment" as a result, in this sense, all digital appearances (from abstract objects like in Pong or tetraminoes in Tetris to deep human characters as Alan Wake or Arthas Menethil) that represent player's embodiment in a virtual world can be understood as a kind of avatar. But the avatar is not a mere virtual player's representative. Many of the environments that allow incorporating an avatar allow experiences that could *only* be lived though the avatar's virtual body and when in this virtual spatial representation almost no other medium of interaction is possible as well. The spatial notion of the environment itself is made through the directing of the avatar's body. Castronova [6] declares

> *When visiting a virtual world, one treats the avatar in that world like a vehicle of the self, a car that your mind is driving. You "get in" look out the window through your virtual eyes, and then drive around by making your virtual body move. The avatar mediates our self in the virtual world: we inhabit it; we drive it; we receive all of our sensory information about the world from its standpoint (p.4-5).*

Thereby, once existing as a virtual body in the cyberspace, one is part of a brave new world, being able to make it happen there through her new individual personification. Once into the avatar, one is on her own responsibility for her experience in the virtual world, independent if it's a predefined avatar, like Mario or Pac-Man, or a customizable one. In this way, the avatar can be understood as the representation of the player herself in the virtual world, a projection in her likeness at cyberspace. Therefore, one's limits, abilities and even the looks in the virtual environment are defined by the avatar virtual embodiment and all contact with the virtual environment is mediated by the avatar. Consequentially, being able to change one's virtual representation in the game provides to the player the choice of being able to change or modify her mediator and therefore the game context and her experience while playing it.

But changing player's experience is not the only result that rises from allowing avatar customization. When one starts a videogame which she never played before, at first, some of its aspects seem weird, *defamiliar*[1]. A learning process about the game begins, and soon the player notices and starts to get acquainted to the camera angle, to the icons and head-up display (HUD) arrangement, to the gameplay, to the event methodology, etc., all the videogame elements while experiencing it. According to Basbaum [4], human perception through sense is active, namely

> *it seeks the best solutions in order to locate us in a satisfying way in the condition in which we found ourselves. Thereby, it is at large dependent of the context, wherein we search the most satisfying solution (freely translated from Portuguese).*

Therefore, we can't change reality that comes upon us but we can change the way we deal with it. That can be done through modifications on ourselves and, in the case of videogames, in changes that are allowed. In this way, one is continually trying to locate oneself within a culture in order to feel comfortable with it, with oneself and all others. Likewise, when penetrating into a new context, even a digital one, one pursues to situate herself in the best possible way in order to be

[1] Defamiliarization is a term first used by Shklovskij. To synthesize, it's the process through a current and familiar concept is replaced by an unfamiliar and strange one. After sometime, the formerly strange becomes familiar and current.

able to experience good and meaningful experiences. The will of undergoing a new experience can only be supplied if it makes sense to us. Furthermore, it must bring us a feeling of being truly inhabitants of that world, residents capable of existing and interfering in this world, and not only follow the course of events, since according to Murray [13], we assimilate these "staged" events as if they were really personal experiences. By this means, if the avatar is somewhat known, familiar, one can express and identify herself in the videogame in a way that can ease her defamiliarization and feel more comfortable and able to focus on other game features.

Thus, avatar customization must be taken into consideration as a catalyst factor in the process of player's representation, projection or even empathy in the game. But not all games have, customization or even avatar customization options, and that's no reason for them to be diminished in anyway. The avatar customization is a tool, which encourages some desirable player reactions.

V. Brave New Avatar

Adams and Rollings [1] calls the power of being able to change the mediator in a digital environment as self-defining play, and indicate three main categories: avatar selection, which is being able to choose between many available ready-to-use characters; avatar customization in which the layer can modify appearance and/or abilities from some options; and avatar construction, which allows the player to build his avatar in the smallest details. The avatar selection is common in fighting games, in which player selects one fighter or another, each one with its own fighting features and appearance. The avatar customization was most common in RPGs but it is making its way rapidly through most genres, including platforms. In this category, the player chooses some appearance traits, like clothing and even hair style, but can't change the character itself. As for avatar construction, it allows the player to manipulate minor details of the character and even create it from "blank", as in Elder Scrolls IV Oblivion, Dragon Age, Tony Hawk's Pro Skater 2 and most MMOs. The main feature in this category is allowing the player not only to choose but manipulate visage and body features, performance attributes and control the character history inside the game, building her online persona.

Though the three levels of avatar manipulation defined by Adams and Rollings act upon player experience, it is mostly in games that allow the two last categories (avatar customization and avatar construction) that the player has a more important role in choosing how to engage in the game. Those two categories are the ones that will be mainly discussed in this article and though authors name one of them as customization (as if the other wasn't customization at all), both categories fit, in different levels, the customization understanding of this article and will be analyzed as such. Still according to Adams and Rollings, there are two main kinds of customizable characteristics: the ones that interfere in the avatar interaction to the environment, which are known as functional attributes, and those that only have a decorative role, which the authors name as cosmetic attributes. The functional attributes, according to Adams and Rollings [2], are designed to give a better performance, which can improve some aspects of the avatar relation with the environment.

For instance, in Doom II, having a shotgun or a plasma gun provides a completely different interaction and sense of meaning in the game. Likewise, good single player games match more powerful functional attributes with more challenging level design and so on. Using the same example, in Doom II finding new weapons coincides with a gradual and progressive rising in the difficulty level. However, in a multiplayer game, offering items that increase performance to just a few players will impair the balance of gameplay, probably harming the experience to some players. In this scenario, functional attributes must be planned so as to balance the game in a way that different avatars with different attributes in a similar experience are somewhat equivalent. These features are controlled in MMORPGs with levels, while ranking and achievements are more used in FPSs.

The cosmetic attributes add ornamental traits and are generally the space in which the player can express herself more freely. This category of customization is more common in multiplayer games since the individual can express herself to all other players, but can be found in plenty of single player games. Ninja Gaiden Black and Assassin's Creed II are examples of single player games that offer customization items which are functionless but are only unlockable through completing demanding achievements and many players still travail in obtaining them. But it is in multiplayer games that ornamental attributes prosper. In many MMOs, avatar ornamental attributes can be sign of social position, game performance or even that some specific season is approaching and some social games are even based upon avatar customization. One of those games is PetSociety, a Facebook game in which the player's main activity is to buy clothes and furniture and then customizing her avatar and her avatar's homes. Practically all items have no other function than the aesthetic one but it is important to keep everything neat and clean in Pet Society because all the player's (avatar) friends can visit is avatar and its home. Pet Society sounds like a plain or even simpleton premise, but this simple idea has more than nine million monthly active users.

Nevertheless, in most games nowadays when equipping any item (even a functional one), something in the avatar appearance changes. For example, in World of Warcraft, different weapons and armors not only change the avatar battle performance but also change what the avatar holds and its costume. There are even some cases in World of Warcraft of players that have two sets of gear (armor and weapon), one that has a better appearance in player's opinion for social events and not very important battles and another that have better features but less attractive in player's opinion, therefore is only used in important battles such as boss battles.

In some games, attributes thought to have only an ornamental role end up being also a functional attribute. That's the case of shooter games, in which bigger or smaller avatar body size defined the difficulty in aiming to adversaries or teams colors in soccer games. But in bringing purpose to ornamental attributes also have a more personal side.

Manninen [11], highlights the importance of attributes such as appearance or even a name of avatar in some games:

> *Avatar Appearance can be used to reflect players' styles and attitudes, honestly or dishonestly. Equipment carried by avatars indicates the power they possess, and even the names of the avatars can indicate a purposeful dramaturgical act. [...] In games in which the appearance of the avatar is modifiable (e.g., by acquiring special equipment and clothing), appearance is one of the most distinctive features separating veteran players from beginners.*

A FPS called Team Fortress 2 presents an interesting story in this case. In this videogame, players can choose through avatar selection between different roles they may take in the armed assault. This avatar is presented in a standard, with no variations between players in same roles except for different color in different teams. That's quite typical in most FPSs and the introduction of a completely ornamental item as headwear in an early update wasn't exactly out of the box. However, for different reasons as the low drop rate and scarcity of some styles, hats in Team Fortress 2 have become a sort of social indicator, presenting promptly the status of the player wearing it, being some kind of functional attribute. Other interesting use of ornamental attributes being used as functional is the genre case in MMOs. Some male players create female avatars so that they can get help, attention and items more easily than if other players though they were male.

VI. Underlying Motivations for Avatar Customization

Therefore, customization attributes can't be easily separated in two independent categories; though some might be entirely ornamental and other can be entirely functional, most are a mix of these two possibilities. Understanding the purpose of the avatar customization induct to another point in the subject: the use of this customization, the motivations underneath them. For instance, what motivates those World of Warcraft players to have one "social" set of gear and another "ready to battle"? Having multiply gear not only involves the discomfort of changing the whole set before any important action, armor piece by armor piece, but also impractically occupy player's stash (which is limited) with the gear items not in use.

Customization doesn't have the same appeal to all players. Even considering the same game, players have a different approach to the game itself and to customization. Insofar determinate options are offered, player begins to rank between them which ones are the most desirable, the least desirable and shades between these two extremes of the scale. Factors such as sex, age, cultural and social background, geographic location, player's aesthetic taste and even her understanding of the game can strongly influence the way player looms into the game and how she ranks these options. As Yee puts it, "different people choose to play games for very different reasons, and thus, the same video game may have very different meanings or consequences for different players" [17].

For instance, Yee [17] points out how females show to give more attention to social and immersion features (including customization) than males in MMORPGs, who generally come out to be more concerned with achievement and performance matters. Based on that, it's possible to say that females have more potential in being interested in cosmetic avatar features while males may be more inclined to make use of functional attributes. That's probably one of the reasons behind the female players surplus in social games, a kind of videogames that have cosmetic features in abundance and not much direct competition or performance traits.

Regardless of gender, that distinction may also be noted depending on how the player *faces* the game itself and how she ranks in-game priorities. Some players show very competitive behaviors while playing, focusing mostly or only in winning competitions and beating harder challenges. In this scenario, avatar customization would fit almost as a science aiming performance. However, other players focus on exploration of the virtual world or interacting with other players, while are not interested in big disputes. To these players, having an esthetically pleasant avatar is possibly much more relevant [17]. It's important to highlight that players who have a tendency to each of those extremes won't, necessarily, be interested *only* in this or that kind of avatar customization, but *have a greater propensity* in preferring one kind to another.

The kind of game for itself can also influence player interaction. According to Manninen [11], games such as RPGs usually enable a more lengthy relationship between players and their avatars, "encouraging players to make an effort in developing the character of the avatar as a symbol of personal achievement". The act of build and customize the avatar through out the game narrative may cause the player to feel greater control or even sympathy over the body that mediates her contact with the game world. Also, being able to construct her own avatar choosing by her own may lead the player to feel closer to the character as if he was witness to the creation and transformation of the persona "inside" the avatar and what she is able to do or how she looks. Games in which the online persona is not as persistent or noticeable as in RPGs, like in FPS, building a personal digital representation may be less relevant than having good in-game performance.

VII. Conclusion

By these means, it is possible to suggest that avatar customization may be used as a game design feature to catalyze player engagement, increasing her intimacy in-game and consequently her immersion level as well. Therefore, in this process of choosing or editing between predefined elements, the player can also develop and build sense and meaning of the game by himself. In making the avatar more to her linking makes it even more desirable and its presence assist the player in feeling comfortable in the game. In other words, videogames that allow certain customization freedom may be considered and more potential immersion in motivational terms.

Although there is still scarce literature regarding customization directly related to videogames or videogames avatars, it is possible to identify some evidence that link customization features to immersion and diminish the starting

distress on virtual environments. Furthermore, it's possible that customization allow an additional engagement that encourages the player to go further that the need to conclude an objective, involving her in a bigger scale of motivations. Consequently, we hope that through this article to cast a small light in the theme of avatar customization and open opportunities to forthcoming researches that aim to explore is feature of videogames.

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Co-Creative Interface Development in MMORPGs

The Case of World of Warcraft Add-ons

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Abstract— **This article argues that the innovation in the interface design of the MMORPG World of Warcraft is to a substantial part originating in the user-created interface modifications called add-ons. This is shown in an analysis of the connection of the development in interface design to the creation of interface modification add-ons by players. The analysis is informed by interviews with specialists in the community of add-on programmers and focuses on the content and functionality of the add-ons mapped against the respective standard interface elements including an explanation of the problem they solve for the player and a measure of the similarity between them. The article will also give an outlook on the influence of these interface-modifications on the actual practice of game play as well as on game design and interface design by the game producer.**

Keyword-component: innovation in game, interface design, game communities, MMORPGs, player created content

I. INTRODUCTION

The problem of the management of innovation and creativity in the cultural industries and the tension between big production companies and small creative businesses is not new [1]. The games industry is now facing the same problem where innovating becomes hard in big, centrally controlled companies but where their power is required for commercial success. One possibility for getting some innovation back can be the use of player-created content. Outsourcing innovation to the players is already industry practice in the video game industry and can lead to substantial financial gains if managed well [2]. There are different kinds of player-crated content in connection to computer games. Sotamaa is in his dissertation writing about modding and machinima movies, one kind of player-created content, as a starting point for analyzing the culture of computer games [3]. In his article Sotamaa discusses the influence of the game industry on the culture and vice versa. Following this idea I want to look at the interaction of a different kind of user-created content, interface modifications, and their interaction with the industry. These interface modifications, or add-ons, can be observed well in the game *World of Warcraft* [Blizzard Entertainment Inc, 2004]. *World of Warcraft* as an MMORPG does not allow for mods (short for modification) like new levels or missions to be created by players as the game features a persistent world populated by the players and hosted on a company-owned server. However, *World of Warcraft* allows third parties to create interface add-ons providing new functionalities and displaying information in sophisticated ways. These add-ons have become a such central aspect to the practice of play in *World of Warcraft* that there are lively discussions between the community and the game developers and community managers around this topic one of which occurred during an *Ask the Devs* event in the official forums. I present you here three of the questions chosen by the game developers to be answered to show a part of the online discourse and the importance of add-ons and related questions for play and players as well as developers.

> *Q: Are there any plans to implement further things into the standard UI that we currently rely on add-ons to provide? More specifically I mean things like Recount and Omen. - Bauertehpala (Europe [English]), Актинидия (Europe [Russian]), 柴德洛夫 (Taiwan), Terini (North America/ANZ)*
>
> *Q: Some Addons are so powerful they simplified the game content to a degree (e.g., boss fights). Do you think that when the majority are using these Addons, the original reasoning behind the game design is violated? And isn't it unfair for players who don't use Addons? - 冷影幽光 (Taiwan)*
>
> *Q: Will the Default UI ever be moveable and re-arrangeable without the use of mods? – Ruind (North America/ANZ)*
>
> **- Three of the answered questions in the Ask the Devs - Answers #3 "UI" from 28th of March 2011, posted by Bashiok, Blizzard Community Manager**

There is research for example by T.L. Taylor [4,5] and Mark Chen [6] describing the use and importance of interface modifications for different play styles in *World of Warcraft*. For another account on the multi-faceted nature of game play in MMORPGs and the influence of the community around the game on these practices see Taylor [7], Lee[8], and Steinkuehler and Ducan [9].

This article will analyze the history of add-on creation by the community and interface development by Blizzard Entertainment, the owner and creator of *World of Warcraft*. Another source of information will be interviews with add-on producers and central figures in the add-on development community. A comparison of the dates of add-on production and of interface changes as well as of the look and functionality of the add-on and the new interface feature together with interviews with the add-on developers to provide an understanding of the actual practice of add-on development will make it possible to point out where an add-on was basically included in the standard interface marking a product innovation that was created, designed and tested by fan labour. While not the focus of this article, the issue of fan labour is very relevant for this topic and heavily discussed in scientific literature. For a critical analysis of labour in the digital economy see Terranova [10] and for a case study of the use of player labour in game creation see Banks and Humphreys [11].

II. METHOD

A. Interviews

To get a basic understanding of which add-ons are in question of having been included into the standard user interface semi-structured interviews with three people in the add-on community have been conducted. The interviews have been conducted over Skype and recorded for further analysis. Each of them took about two hours. The interviewees volunteered their time. The three interviewees where asked for their view of the influence of add-ons on *World of Warcraft* interface design and especially for a list of add-ons that they felt got included into the standard user interface. The interviewees where all heavily involved in the community around *World of Warcraft* add-on development.

Ackis, my first interviewee, is community manager of wowace.com, a *World of Warcraft* add-on developer community website, and also the author of a number of smaller add-ons. Kaelten, the second interviewee, is the founder of wowace.com. He sold the site to the company curse inc. at which he is currently employed as team leader over the linux systems, php and python developers, in-house add-on development, and server infrastructure. Kaelten is the liaison between the add-on developers and the company and he oversees integration of new sites joining into the existing infrastructure of curse inc. The third interviewee is Cladhair, a prominent add-on author who has written two books about *World of Warcraft* add-on programming and participated in a third one and who is running a website related to the books that is an important part of the community. Cladhair is also the add-on author who has the most add-on downloads on wowinterface.com, the second biggest website after curse that is distributing add-ons. Cladhair and Ackis, highly qualified and skilled individuals with a rare and important skill set, are volunteering their work on the community.

B. Content Analysis

A content analysis was conducted to evaluate if an interface feature was inspired by an add-on. The standard interface feature and the add-on were compared in terms of functionality, graphical presentation of information, and in terms of the problems they solved for the players. Other factors that contributed to an add-on being seen as the source of innovation for an interface feature was that an add-on lost a lot of downloads and was made obsolete or at least heavily reduced in popularity by the introduction of the corresponding interface feature which suggest that the problem the add-on solved before was now taken care of the standard interface. Only add-ons that existed before the introduction of a corresponding interface feature were taken into account. The list of these add-ons then compared to the patch notes of WoW related to the user interface since its beta phase to control it for completeness. There is the possibility that the list is still not complete also because my experience is very limited especially in relation to the early phases of *World of Warcraft* raiding where a lot of the add-on development happened. This list of add-ons is used as a base for the next step of the analysis. You can see the list in Table 1.

C. Evaluation of the Similarity

The similarity between the user-created add-on and the standard interface feature will be evaluated comparing function, look and the problems solved by of the add-on and standard interface respectively. I will present a table with the most relevant add-ons mapped against the respective standard interface elements including an explanation of the problem they solve for the player and a measure of the similarity between them. In the interviews that evolved around the interviewees activities in and knowledge of the add-on development community the interviewees developed a list of add-ons with me that had been included into the standard UI.

To describe the importance of the influence of add-on inspired features for the user interface of *World of Warcraft* I will use a screen shot of the game I made on which I marked all the standard interface elements that are in some way connected to user-created add-ons, Figure 1.

D. Remark on the Researcher as a Player

I am playing World of Warcraft since late beta and I am raiding, playing with a group of up to 40 players to fight giant boss monsters, by many considered the pinnacle of MMORPG play, since the first expansion, *The Burning Crusade.* I have thus a decent knowledge of the game as a player and am an avid user of add-ons. However, I have never made an add-on and got in contact with the add-on scene only through my research.

I do not have first-hand experience of the add-ons facilitating raiding in this early development of the game and the interface. For all the information concerning this time I rely on the knowledge of the interviewees first and use my experience mostly to guide my questions and to make sense of online sources and discussions. I use my position as an advantage to ask meaningful questions in my research while I try to overcome my limitations and biases as a player of a certain kind and to take my personal preferences and play patterns out of the picture when doing the analysis and the interviews.

Figure 1: Standard interface of World of Warcraft with highlighted elements that originate from add-ons.

III. Content Analysis

The next step is the content analysis of the add-ons and interface features. If an add-on is in its functionality and graphical representation nearly identical to a later implemented interface feature then I assume that it has inspired the feature and that the innovation in interface design is on the side of the add-on developer.

An easy example is the add-on *Druid Bar* and the implemented druid mana bar while shape-shifted. Druids, a class in *World of Warcraft*, are shape shifters at times playing as a magic-user in humanoid form and at times use rage or energy as a resource in bear or cat form. A problem for druid players was that they could not see how much mana, the resource for casting magic, they had left while in animal form. They could for example not know if they would have enough mana to shift out of cat form, heal themselves, and shift back. This problem was solved by the add-on that simply gave druids a movable mana bar also in animal form. This gave players information they needed to play more efficient and that had been omitted by the game before.

Figure 2: Druid bar.

For the purpose of understanding the reasons for design differences between add-ons and the standard interface already at this point I want to consider some reasons for omitting this information by the game. The shape shifting mechanic is central to the design of the Druid class in *World of Warcraft*. The changing resource mechanics are therefore central to be understood by new and inexperienced players who picked up this class. It is more complex than other classes in that players need to learn to use the rage resource that is normally used by Warriors and the energy mechanic that is normally used by Rogues while also and partly at the same time managing their mana mechanic. In order not to confuse players on which resource mechanic to deal with in which form the game designers might have chosen to omit the mana bar in animal forms. Another reason might be that it is more immersive for the player to only have the rage bar while in the shape of a massive wild bear and not the mana bar associated with a magician and it might have been intended that the players run the risk of losing overview over their mana while shape shifted as their character embraces its animal form and forgets about its humanoid shape while in the middle of a battle as an enraged beast.

These reasons are only educated guesses on my part. The point with this is that there are reasons for leaving away this information like interface simplicity and the creation of an immersive playing experience. However, whichever reasons the programmers had they changed their mind and added a mana bar for druids in animal form to the default interface following the course of the add-on community modifying the interface to empower the players and make it more effective for advanced users. The default mana bar is not movable and fixed in place next to the health and rage bar.

This simple example is showing a possible reason for differences between the design of an add-on and its implementation into the standard UI. The interviews as well as discussions in forums show that developers are designing basically for their own use. They are sharing their add-ons, improve them and keep them up-to-date. However, the people who they share the add-ons with, their audience, are players who go to websites like curse.com and wointerface.com or use tools like the Curse Client, "an add-on management desktop application used to find, install and update user interface plug-ins" that "has 2.2 million active users"[http://www.curse.com/content/AboutCurse.aspx, accessed 06.04.2011]. This means that the users of their add-ons are a subset of all players and are engaged and interested enough in the game to go to these websites and download add-

ons, have the knowledge to find them and are technology-savvy enough to be able to do it. These factors might be fulfilled by a big part of the WoW player base which has lately overgrown the 12 million player mark [http://us.blizzard.com/en-us/company/press/pressreleases.html?101007 accessed 13.04.2011]. However, it means that the add-on developers can design their programs for advanced users. When add-ons get adopted that means that they become baseline user interface for 100% of the player base. That means that the design philosophy that can be seen in add-ons is different to the one in the standard WoW UI favouring customizability and complexity over simplicity and inclusivity.

Another good example for this is the Add-on *Power Auras* and its implementation in the standard UI. Here is the description of the add-on as found on curse.com and wowinterface.com:

> *This addon was created to provide visual cues (auras) when you gain buffs, debuffs and many more. Very useful for shorts buffs or debuffs, it allows you to draw in the center of the screen, or around your character, very customizable visual effects, rather than having to look at or mouseover buff/debuff icons/actionbars.Initially created to give visual cues for short duration procs like "clear casting" or some boost trinket you activate, many more aura triggers have been added since. It now works with debuffs (whatever their name), debuff types (like Magic or Curse), combo points, harmful area spells, weapon enchants, Health, Mana, Rage or Energy thresholds, action cooldowns, aggro, pvp status and stance or shapeshift form* [http://wow.curse.com/downloads/wow-addons/details/powerauras-classic.aspx accessed 11.10.2011].

The displaying of certain crucial information as some sort of auras around the avatar has since been included into the standard UI. However, the version of the standard UI only provides a given, unchangeable visual effect for a number of class-specific situations in the game. It is not possible to customize it at all. The original add-on, *Power Auras*, is highly customizable. The triggers for the effects can be chosen from a wide array of possibilities and the effect can be changed and customized into the last detail in order to adapt it to one's preferences and play style. This means that it takes a profound understanding of the game and its mechanics and a considerable amount of work to set up the add-on, customize it and have it working the way one wants it to. A player who does not have a clear picture of the different effects, statuses, mechanics and tactics existing in the game will not be able to use this add-on well and a new player might be overburdened with setting this up. However, it also means that the possibilities the add-on offers are very wide and that nearly any kind of status change can be displayed with this add-on.

Figure 3: Power Auras menu with example in comparison to standard WoW user interface showing a frost death knight's auras.

The way this innovation of displaying information in the form of an aura has been implemented into the standard UI is the opposite. It cannot be customized at all but it is very easy to understand and to use even for new or returning players.

The third example for an add-on that has been copied in a way into the standard UI is *Item Rack. Item Rack* is a mod to make swapping equipment easier. It also offers the functionality of creating gear sets and facilitates automated swaps. The central functionality of this add-on is that is saves sets of gear and makes it possible to equip these sets with the press of a single button. This functionality has been included into the standard UI again leaving out some features of the original add-on, here for example automatic swapping of gear sets depending on certain triggers, and the customizability of it, for reasons of simplicity.

Figure 4: Itemrack in comparison with the equipment manager in the standard user interface.

Another example for the way add-ons get implemented into the standard user interface is *Gladius*. *Gladius* is an add-on for arena PvP (player-versus-player). It shows the basic information about the enemy team like their health, mana, names and classes and a number of other important information about them like the availability of their crowd-control immunity ability and other immunity effects and the diminishing returns of crowd control effects on them. It also makes it possible to select the characters as targets by clicking them on *Gladius* and it is possible to use abilities on them by clicking on them in the add-on. This information about the other team as well as the add-on functionality provides a tangible advantage in the arena. This meant that players who used the add-on gained a lot in comparison to those who played with the standard user interface. This created a kind of pressure on the standard interface to adapt not only to make it fair for players who stepped into the arena without add-ons but also because e-sport tournaments in *World of Warcraft* arena are played without add-ons.

That has a number of implications. First of all it means that the professional players who are participating in competitions are training and playing normally without add-ons as well so that they are not missing them in tournaments. If add-ons now provide a to big advantage it would mean that the professionals would not be the best players during normal playing seasons as they would have to play with the disadvantage of not using add-ons. This would be like a situation in other sports where the best swimmers who would go to international competitions would get beaten by others on the domestic championships because the international athletes have to stay clear of doping as it is tested on the international tournaments but not on the domestic ones. This poses an obvious credibility problem for the discipline.

Second the professional players and e-sports teams do have influence on the e-sports culture in the game. Being practiced as an e-sport on tournaments and competitions is beneficial for a game in terms of providing another way of playing the game and increasing sales or subscription numbers. Making the life easy for the professional gamers and giving a good impression of the game as an e-sport is thus a central interest of the producer of the game.

Gladius as one of the add-ons that are central for competitive arena has thus been included into the standard UI. Following the pattern of simplification and inclusivity described above the standard version of arena enemy unit frames provides hardly any customizability besides that it can be moved and increased in size, it displays much less information and it even lacks some functionality like e.g. broadcasting messages to team mates.

Figure 5: Galdius with menu in comparison to the arena enemy frames in the standard user interface.

All the examples until now are rather clearly cases where an innovation coming from add-ons has been included in the standard interface. However, there are also cases where the analysis and comparison is not so straight-forward. I want to present two examples here.

The first example is *Totemus, Totem Manager, Flo Totem Bar* and the shaman totem bar. *Totemus, Totem Manager* and *Flo Totem Bar* are three add-ons that are doing roughly the same thing and try to solve the same problem, the clunky totem mechanic used by the shaman class in *World of Warcraft*. A shaman can use up to four totems at the same time, one totem of each of the four elements earth, fire, air and water. Totems are central to the shaman class and the way they had to be used was by casting them like a normal spell, one at a time. There are a high number of different totems and many of them are situational. That led to a situation where many totems needed to have a button in the interface and ideally a key bound to them even though they were hardly ever used.

Different add-ons tried to solve this problem. *Totemus* used a number of small buttons organized according to the different totem elements and added a number of other shaman-specific abilities. In a similar fashion *Totem Manager* shows the totems as organized buttons and adds information that is specific for shamans and timers for the totems. *Flo Totem Bar* shows the different totems in bars ordered after their element and has a small timer for the active totems build in.

This design using bars with the totems has been use in the implementation of the standard interface, the shaman totem bar. This interface element was introduced together with a change in the game mechanics making it possible for shamans to create sets of four totems, one of each element, and set them together with the single press of a button. The three allowed sets where name calls. This is a major change in game mechanics and game balance as it allows the Shaman player to perform what used to be 4 actions before in one. Each action in *World of Warcraft* triggers a global cool down of 1.5 seconds. That means that after this change a player could perform 6 seconds worth of actions in 1.5 seconds.

The shaman totem bar implemented in the standard interface did solve the same problem as the add-ons but it did more than that. It changed the way the game worked. Doing this would not have been possible for an add-on. This becomes visible when looking at a new version of the *Flo Totem Bar* that has been made after the release of the shaman totem bar. This version features the call spells and adds functionality by displaying the selected totems for all three call spells at the same time. The add-on has adapted to the change in the game mechanics and is now solving a new problem that was introduced with the shaman totem bar.

Figure 6: The add-ons Flo Totem Bar on the top left, Totemus on the top right, and Totem Manager on the left in comparison to the totem bar in the standard interface in the middle on the right and the new Flo Totem Bar on the right bottom.

The point with this very detailed and illustrated description is to show that there are cases where it is hard to say if an interface feature has taken its innovation from an add-on. The shaman totem bar has added functionality to the game that was not present in any predating add-on. It solved a problem that has been so pressing that many add-ons where created around it. However, it did this by changing the game mechanics doing something that an add-on would not have been able to do. It copied the graphical presentation of an add-on in some way. But then again, there are only so many ways to represent a number of buttons so that it becomes hard to say that the shaman totem bar copied an add-on when add-ons actually covered all the possibilities to present the information so that any solution would appear like a copy. As the result of my analysis I see the shaman totem bar as a hybrid between add-on and game programmer innovation.

The second example is *Augmented Virtual Reality* (AVR) and the raid world markers. AVR was an add-on that made it possible for players to draw on the game world so that other players in their group who also used the add-on were able to see it. One purpose of the add-on was to make it possible to communicate positioning in raids in an effective way. Added functionality automated the add-on to a certain extend so that it would for example draw the zone that would soon be hit by an attack on the floor making easier for raiders to move out of it without actually paying attention to more than the information the add-on provided. Players found another use for AVR which is drawing on the game world. This potential to alter the game world together with the ability to somewhat trivialize raid encounters where stated by Blizzard community manager Bashiok to be the reason for them to break the functionality of the add-on.

"We're making this change for two reasons. The invasive nature of a mod altering and/or interacting with the game world (virtually or directly) is not intended and not something we will allow. (...)The second reason is that it removes too much player reaction and decision-making while facing dungeon and raid encounters."

- Bashiok, Blizzard Community Manager

Figure 7: AVR example pictures, AVR in action in a raid showing the automated graphical information display in the game world (the red circles are where you should not stand) and a drawing of Mega Man with AVR on a busy square in the main city.

AVR is the last big controversy around add-ons in *World of Warcraft*. When the add-on got disabled some players requested more advanced tools to communicate and mark positions in raids. There was a forum discussion where a raid leader explained that he had deaf raiders in his team and that AVR had made it do much easier if not possible at all to explain positioning. He pointed out that the standard UI did not offer this functionality and that this was a design flaw. The introduced raid markers can be seen as the answer of this request. The raid markers make it possible to place the colourful markers seen in Figure 8 on the ground while being in a raid. The raid markers solve the same problem that AVR solved in a much simpler way leaving away functionality and reducing customizability and complexity but also preventing abuse. As for this articles analysis the raid markers are seen as somewhat inspired by AVR. However, this is again a fairly unclear case for the origination of the innovation.

Figure 8: Raid markers in the standard user interface.

IV. Evaluation of the Importance

In order to evaluate the importance of add-ons for innovation in interface development in *World of Warcraft* I have already shown a graphic representation in Figure 1. Another way to attempt this evaluation can be seen in Table 1 below. The table maps add-ons to the respective inspired interface features in the standard *World of Warcraft* interface. It also mentions the problem that is solved by the add-on and the interface feature and gives a degree of similarity between them. The degree of similarity shows how similar the add-on and the standard user interface feature are. There are a number of common setups that are coded in this similarity level where the key is as follows:

1. Nearly the same in functionality and design. Examples for this degree of similarity are the discussed add-ons *Druid Bar* and *Item Rack*.
2. Similar in functionality and design and solving the same problem. An example for this degree of similarity is the discussed add-on *Gladius*
3. Similar in functionality but different design, but solving the same problem.
4. Somewhat similar, but the standard UI solution has came with a change in the game that would not have been possible for third-party add-ons to make and therefore an added functionality that would not have been possible for them to offer. Examples for this degree of similarity are the discussed add-ons *Totemus, Totem Timers* and *Flo Totem Bar.*

c. The standard UI feature is lacking the customizability of the add-on. This note is added to the numeric degree of similarity. Examples for this are the discussed add-ons *Power Auras* and *Item Rack.*

Name of the Add-on	Inspired Interface Feature (Name or Description)	Solved Problem	Degree of Similarity
1. Auctioneer	New Auction House Interface	Poor usability of the auction house interface for advanced users with many transactions. Collecting of information about the market as business intelligence.	1, c
2. Augmented Virtual Reality	Raid World Markers	Communicating positions in raids was difficult.	4, c
3. Bartender, Bongos,	Multiple Action Bars on the Screen	There were not enough buttons on the screen.	2, c
4. Color Blind Extras	Color Blind option	Spelling out color-coded information.	1, c
5. Deadly Boss Mod	Raid Boss Warnings	Offering timers for raid boss abilities and more.	3, c
6. Druid Bar	Druid Mana Bar	A mana bar for shape-shifted druids.	1
7. Enemy Casting Bar	Spell Alert (Enemy Cast bar)	Information about the enemies cast is crucially important in PvP.	1
8. Item Rack	Equip Manager	Changing sets of gear now with the press of a button. No more searching for gear in bags and waiting for others to dress.	1, c
9. Focus Frame	Focus Frame	A frame for the focus target.	1
10. Free Bag Slots	Display back space	Always visible empty bag slots.	1
11. Gladius	Enemy Arena Frames	Enemies in the arena are hard to keep track of and target. With this the enemies' status is visible and they can be targeted easily.	2, c
12. Loot Link	Vendor prices in tooltip	No information on vendor priced for items when not in the city.	1
13. Power Auras	Spell Allerts	Missing an important buff, proc or mechanic can be avoided by showing it clearly graphically in the middle of the screen.	1, c
14. Floating Combat Text	Floating Combat Text	Central Combat Messaged where hidden in the Combat Log. This displays them in the middle of the screen.	
15. Quest Helper, Carbonite,	Quest Tracking Feature	Questing was complicated. With these there is always the next way t go and the level of progress visible and clear.	2, c
16. Raid Frames like Grid, CT Raid, Healbot, Perfect Raid,	Raid Frames, Pet Frames, De-/Buffs, …	Without functioning raid frames raiding was much harder as targeting and healing was more complicated and needed more input for a command thus being slower.	2, c
17. Ready Check	Ready Check	Checking if everybody is ready before a boss pull.	1
18. Snowfall Key Press	Casting on key-down by default	Speeding up the interaction accepting more mistakes.	1, c
19. Talented	Talent Preview	Offering the possibility to plan talent distribution in-game also avoiding mistakes.	1
20. Threat meter (KTM and Omen)	Agro Warning and threat percentage display	Making threat management in a raid easier/possible.	4, c
21. Totemus, Totem Manager, and Flo Totem Bar	Shaman Totem Bar	Offering a solution to the clunky totem mechanic.	4
22. Unit Frames like X-Perl	Changes in Unit Frames for groups and raids	See raid frames.	2, c
23. Necrosis	Spell fly-out UI warlock pet feature	Summoning spells for all the demons had hardly any use but needed to be in the UI taking up space.	2, c

Tabel 1. The Table maps add-ons to the respective inspired interface features in the standard WoW interface features.

V. DISCUSSION

Evaluating the importance of innovation from add-ons for the user interface development of *World of Warcraft* is problematic. Many interface features can be traced back to add-ons. However, in some cased the similarity is not clear enough to establish a clear evidence of user-innovation. Despite these difficulties it can be said that the innovations of add-on developers are crucial for the development of the interface of *World of Warcraft* and that the interface of this game would not be as sophisticated and effective as it is now without them. It is also important to note that there is a difference between many add-ons and their implementation into the standard interface in terms of complexity and customizability. This can be explained with the different design philosophies and target groups of the add-on programmers who design for themselves and their peers and the game programmers who design for everybody.

Managing and open interface that allows players to write add-ons and modify it is thus on the one hand a big possibility for game designers. This open innovation model can help propelling the quality of the interface far ahead of what the concurrence can offer and can make sure that virtually every player has the possibility to adapt the user interface to her wishes. However, an open interface is also a big liability. The add-on community has to be managed and communicated with. A game developer has to employ community managers and have his user interface designers work with the community. This can be expensive and thus impossible for some developers. As shown with the AVR controversy there is a risk for the game quality coming with an open interface. It can be said that the game creator loses some control over the game and the playing experience. If problems occur and add-ons effectively reduce the quality of the game the developer has to take action and deal with the problem which can require a complicated technical solution as well as an outcry in the community of players and add-on developers alike. Again, communication with the community is needed to avoid or deal with these problems.

VI. FURTHER RESEARCH

The aim of the article was to analyze the connection of innovation in interface and game content design in an online game, *World of Warcraft*, to the creation of interface modification add-ons. This connection has been explained to some extent. Some practical advice for the game industry in terms of using an open interface permitting add-ons can be found here. However, there is need for further research.

For further research it would be interesting to document and analyze the history of add-on development in *World of Warcraft* and take a closer look at the controversies connected add-ons. I think that there is a lot to learn about user-created interface modification here. Another possibility would be to look at add-ons as social actors much like Taylors analysis of a damage meter in *World of Warcraft* raiding as a social actor. As game companies are just now launching new MMORPGs like *Rift* [Trion, 2011] and *Star Wars: Knights of the Old Republic* [Bioware, expected 2011] it is important for them and us to understand the social implications of add-ons on a game, a community, play and the players.

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