A Survey of Game Usability Practices in North American Game Companies

Mikko Rajanen mikko.rajanen@oulu.fi
Interact Research Unit, University of Oulu
Oulu, Finland

Juho Tapani juho_tapani@hotmail.com
Interact Research Unit, University of Oulu
Oulu, Finland

Abstract

Game development market has become very competitive, so a game with bad usability can expect bad reviews and fewer sales even though the game design might be otherwise unique and captivating. This study investigates the views and practices of the North American game companies regarding game usability. A survey study was conducted in North American game companies to capture the meaning of game usability among practitioners, and the extent to which the game companies utilize usability methods, and the methods they use. The respondents, who had different roles in game development, regarded usability as being very important in games and defined game usability as the extent to which a game allows the users to complete their tasks with intuition and minimal frustration. The results were compared with results from Northern European game companies. North American game companies used multitude of usability methods, mainly playtesting, observation of live gameplay, usability testing and focus groups. Implications to research and practice are discussed.
Keywords: Usability, Game usability, Usability methods

1. Introduction

The popularity of video games has risen to new heights during the last decade, and the growth of the global market share of the video game industry has been faster than expected, since in 2012 it was estimated of being worth 67 billion US dollars and projected to grow to 82 billion US dollars by 2017 [8]. According to market research firm Newzoo the global market of the video game industry has already surpassed 100 billion US dollars in 2016 and in North America the game industry market share is 25 billion US dollars [16]. While children and teenagers still spend on average more time on video games than their elders, they only count for about 25% of the North American gaming population as in 2016 the average gamer is 35 years old. By revenue the video game industry has grown larger than the movie industry, but it's still behind television due to TV's unmatched advertising revenue of almost 200 billion US dollars [29].

In video games, the terms "usability" and "user experience" have become increasingly important, and HCI (Human-Computer Interaction) research plays an important role in defining gaming related terms, concepts, processes and methods. There is some ambiguity in a lot of the gaming related terms, and having common definitions for game usability would benefit both researchers and the video game industry. It is well known that games, like any other software, need to have good usability in order to achieve a great overall user experience. For more than a decade now, researches, for example Federoff [7], Schaffer [28], and Pinelle et al. [20,21], have actively designed methods to evaluate games in order to improve their usability, because they see usability as one of the key elements in creating a masterpiece of a game (see [1,2], [21,22]).

The concept of usability is from the HCI field, and it was created to assess the performance and efficiency of user interfaces. There are various methods to evaluate usability, and even though some methods might be more efficient than others, no method is indisputably the best [9], [12]. Similarly, there are many different usability standards, definitions and guidelines, which complement each other addressing the different aspects of usability, the level of detail and the different phases of system life-cycle [15]. Studies about usability methods and practices are necessary in order to detect the most used usability methods and their effectiveness in the development process, in order to evaluate and further develop these methods and practices [27].

Usability in gaming context is still a relatively young concept, so the definition of usability and different usability methods in general and in gaming context in particular still change depending on whom you ask (see [1], [7], [28]). One of the goals of this research is to find some common elements on how companies define usability and usability methods in order to stabilize the terminology in the video game industry, making communication a lot easier. Even under the same genre, different games can lead to completely different user experiences. Therefore, it's important to identify the factors that make great games great and poor games poor [12]. Furthermore, development of games can be costly, so having a game with superior usability instead of just focusing on graphics can provide a competitive advantage for the developers in the game development context [12] and in the gamification context [26].

Game usability research and practice is still not as established as a field of research and practice when compared with other HCI fields [28]. Furthermore, game development professionals do not typically use or recognize the established language and terminology of usability professionals [7]. Formulating an exact definition for the concept of game usability has been proven to be a difficult task for usability researchers and game researchers, as game usability can have completely different meanings to different researchers, from the concepts of quality of the user interface to concepts of flow, engagement and fun. Furthermore, different terms, names and concepts – such as game usability, player-game experience, game experience, game user experience, playability and player experience – have emerged and have been used either interchangeably or having completely different meanings attached to them. This has led to the need to find out what terminology, names, and concepts game developers and usability professionals use when they talk about game usability and what meanings they attach to it, in order to further develop, improve and ultimately standardize the concept of game usability for the benefit of game usability research and the game development in practice.

This study contributes to game usability research through answering the following research questions:

RQ1: How the North American game companies define game usability?

RQ2: How the North American game companies perceive game usability?

RQ3: What usability methods are used in the North American game companies to improve game usability and to what extent these methods are utilized?

The scope of this study was limited to North American game companies, North America being one of the leading market regions in game development and sales. In this study the North America is defined as consisting of Canada and the United States of America. To answer the research questions, we conducted a survey where companies were included based on the databases at www.gamedevmap.com and candevs.ca.

The paper is organized as follows. Section 2 presents an overview of research on game usability. Section 3 describes the research methods and the implementation of the survey. Section 4 presents the results. Sections 5 and 6 discuss the results and present our conclusions.

2.   Usability in Games

Computer and video games and productivity software share some similarities with each other but they are also fundamentally different from each other since games are voluntary to buy and to play, and there are vast catalogue of existing and future game titles to choose from, and games are played for fun instead of completing a task at hand [7], [18]. Because of this fundamental difference between games and productivity software, many researchers have tried

to formulate a specific definition for usability in computer and video game context, but there are not yet any commonly agreed on definition for it.

Federoff [7] divided game usability into three components: game interface, game mechanics, and gameplay. From these components gameplay is considered to be the most important, although all of these three components are needed for the game to be functional and satisfying. Federoff also observed that the term 'usability' is not very familiar among the game developers and that the term can be associated only to the interface, so therefore usability might be a more suitable term for productivity software where it's used to evaluate the interface of a product. With games, the term 'usability' becomes even harder to use because in addition to the user interface, game mechanics (for example movement) and gameplay have to be evaluated too. According to Federoff the concept of 'user experience' might be better for describing and evaluating all of these three components of game usability, because it might be a broader and more accessible term for the game developers [7].

Pagulayan et al. [18] pointed out that the subjective experiences and attitudes of the player towards the game has to be measured, because measuring game's usability through normal metrics such as number of errors and task times is not enough. Thus, attributes like ease of use, challenge, and pace are important when evaluating games, because they have an effect on game's overall quality or fun that is often the goal of usability testing. Pagulayan et al. [18] also promotes the importance of user experience by pointing out that traditional usability methods are not enough to determine the level of usability in a game, and the experiences and attitudes of the players also need to be measured. Ease of use, challenge, and pace are used as measurements. According to Pagulayan et al. [18], controls and interface that are easy to use are closely related to fun, and they describe ease of use as the gatekeeper of fun. Ease of use includes things like basic game mechanics, tutorials and instructions, behavior of the in-game camera, in-game interfaces, and learnable and intuitive controls [18].

Desurvire et al. [5] defined game usability as being one component of playability alongside with other components: gameplay, game story, and game mechanics. Their definition of game usability includes the user interface and the methods of player-game interaction. Korhonen and Koivisto [13] presented a very similar definition of game usability, but they have added a new module for mobile content and placed game story and game mechanic elements under gameplay. Like Desurvire, Caplan & Toth [5] and Korhonen & Koivisto [13], Laitinen [14] noticed that game usability definitions focus on user interfaces, but he also pointed out that gameplay, game type, and platform should also be taken into account, because they are connected to each other and must be addressed in order to make the game successful.

Pinelle, Wong & Stach [20] interpreted the game usability to be "the degree to which a player is able to learn, control, and understand a game"; entertainment, engagement, and storyline issues are excluded from this definition because of their ties to artistic and technical issues. Furthermore, Papaloukas, Patriarcheas & Xenos [19] adopted a similar definition as Pinelle, Wong & Stach [20], but they added extra elements of player enjoyment and intrigue as additional dimensions to it.

Febretti & Garzotto [6] approached the game usability through the interface that the games present between the player and the game itself. If usability issues come in the way of the player and the game, or rather between the players and the fun of the game, the players are very likely not to return to the game anymore. This means that the developers must take game usability into account and ensure that the players are able to interact with the game without usability issues hindering the quality of the player-game experience, and that the players are able to reach the fun in the game with minimum amount of unintentional obstacles. Therefore, it is crucial to find out any issues in the game and the player-game experience that may hinder or break this experience. To better understand player experience and player-game interaction, game developers need to get in contact with the potential customers, the players. In order to find out what the players think about the game, how they play it, and if there are any hidden issues in the player-game experience, the game developers turn most often to activities that measure the usability of their game [25,26]. Therefore, the largest and most influential testing activity in game development appears to be usability testing with assigned testing groups consisting of the players from the target demographic as well as other volunteers [11], [25].

3. Research Method

This study utilized a survey method in order to investigate the views of the North American game companies on game usability and the usability methods they use. A list of game developers located in the United States of America and Canada was gathered by visiting various websites that list game companies, but most of them were acquired from two websites. Canadian companies were found from candevs.ca and U.S. companies from gamedevmap.com. The Canadian website included lists of developers and their email addresses. If the email address wasn't included, it was acquired from the developer's website or by contacting the company via their Facebook account. Gamedevmap.com includes links to over a thousand U.S. game companies. Email addresses were first searched from their websites, and if there were none, the company was contacted via their Facebook account. The limiting factors in acquiring the email addresses were that especially larger companies don't usually have a public email address, and they don't allow everyone to send them a private message on Facebook. The survey was finally sent to 802 companies. This number excludes the companies that were originally in the list, but were removed for different reasons, for example having an invalid email address or having quit development. Also, one company replied that they are not a game company. The survey was created with a web application called Webropol at www.webpropolsurveys.com. A link to the survey was sent to all companies along with a cover letter on February 8th 2016. During the following two weeks, 26 companies completed the survey. On February 22nd a reminder letter was sent to all companies that had yet to submit the survey. During the following two days, 24 more companies completed the survey. A third and final reminder letter was sent on March 8th to which 9 more companies answered during that week. That gives a total of 59 submitted surveys. The survey was based on previous survey studies conducted in Finnish and Northern European game companies [25]. The questionnaire consisted of 39 questions: 29 multiple-choice questions and 10 open questions. The questions were in English. Multiple-choice questions utilized 5-point Likert scale where 1 was "Strongly disagree" and 5 was "Strongly agree". In this paper, we focus on those questions on the survey that were related to the research questions and analyzed the answers to find out how the North American game companies define and perceive game usability, and what usability methods they use and to what extent these methods are utilized.

4. Results

A total of 59 responses was received from the 802 game companies where the survey link was sent, the response rate being 7.4%. The response rate was therefore much lower than in similar survey conducted in Northern European game companies, where the response rate was 16.8%. The respondents were professionals with different roles in game development; the unit of analysis of the survey data was company.

The size of the game companies that participated in this study varied from very small (1 to 5 employees) to large (almost 4000 employees). The companies were mainly located in USA (44 respondents), while 15 Canadian game companies answered the survey. Most of the companies (75%) were relatively small, with fewer than 20 employees.

The most popular game development platforms were PC and mobile devices with 45 and 41 respondents, respectively (76% and 69% of all respondents, respectively) developed games for either PC, mobile devices or both of them. Consoles (PS4, PS3, Xbox 360, Xbox One and handheld game consoles) were the preferred platform for 21 game development companies developing games for either one or many of them. Action (26 respondents) and puzzle (19 respondents) games were the most popular genres among the respondents, while MMO (4), FPS (4), fighting (6) and racing (6) games were least popular genres.

4.1. Usability Evaluation

Respondents regarded usability to be very important in games (Table 1, average score 4.68 on 5-point Likert scale) and also in productivity software (4.78). In total, 50 companies (84.7%) reported some form of usability activity during game development.

In most cases (40/50), the company itself is in charge of the usability evaluation but there were ten companies which said that a publisher is in charge of usability activities jointly with the game company. The reason for using different usability activities varied a lot. Some companies wanted to know what makes the users frustrated and quit the game. Some focused generally on design and playability improvements. Others were concerned for example about bugs, gameplay and user interface issues, tutorial needs, game mechanics, and intuitiveness. The one word that kept repeating itself from answer to answer was "intuitive". One of the most important things for the companies seems to be to make the game intuitive in all possible aspects so to maximize engagement, immersion, enjoyment and flow.

Even though companies said usability to be important, nine game companies reported that they did not conduct usability activities. Most of these companies considered usability activities to be too expensive or too time consuming. Some reported that they did not have enough experience to conduct usability activities, and only one company reported that it is not worthwhile for them to do usability activities. Additionally, some companies mentioned that they are "*not a large enough studio to spend resources on dedicated usability staff*" or that they have not completed their first product yet. Interestingly the majority of the companies in this study not conducting usability activities were not among the smallest companies. There were 24 companies in the whole study that had five employees or less, but from the nine companies that did not do usability activities there were only three.

Most of the reasons for not conducting usability activities referred to the lack of expertise and resources (Table 2). However most of these companies were interested in conducting usability activities in the future and perceived usability as being very important in games.

Table 1. Importance of usability in games (5-point Likert scale: 1=not important, 5=very important, number of responses and percentage)

1	2	3	4	5	Total	Average
0	0	3 (5.1%)	13 (22%)	43 (72.9%)	59	4,68

Table 2. Reasons for not conducting usability activities (number of responses)

Reason for not conducting usability activities	Number of responses
They are too expensive	6
We do not have enough expertise to conduct them	5
They are too time consuming	4
We do not perceive them as worthwhile	1
Company is not large enough to have dedicated usability staff	1
We have not yet completed our first game production	1
Not specified	1

The game companies started usually to test and evaluate the usability of their games when a working prototype was available (39 out of 50 respondents). This testing and evaluation of game usability continued until the release version of the game. By conducting usability activities, the game companies were trying to find out issues concerning enjoyment, controls, interface, playing experience, intuitiveness, game design and gameplay. Table 3 illustrates the development phases where game companies tested and evaluated game usability.

Table 3. Different stages where North American game companies test game usability

Game usability is tested with	Game companies conducting usability activities (total 50)
Paper prototype or low-tech prototype	12
Working prototype or high-tech prototype	39
First playable version of the game or minimum playable game	43
Alpha version	45
Beta version	45
Release version	37
Competitors' product	17

4.2.   The concept of game usability

The respondents characterized the game usability consisting of user experience, controls, and user interface. Furthermore, the majority of the companies identified the level of challenge, game mechanics, gameplay, and flow being also important components of game usability. Fun was the least identified component of game usability, but regardless 61% of all the companies identified it as being an important aspect of game usability. There were no significant differences in the characterizations of game usability between the companies that conducted usability activities and the companies that did not conduct usability activities.

The respondents were also asked to give their own definition of game usability and 46 out of 59 companies gave their own definition. From these open answers emerged the characterization of game usability being about making the game easy and intuitive to learn and easy to use. Immersive experience was described as being reached when the interface layer of the game seems to disappear as the player does not have to make conscious effort interacting with the controls and the interface. The development of more easily understandable user interfaces and controls and finding problems in user experience and playability were mentioned as important goals in order to achieve good game usability. The following extracts are the best examples of definitions illustrating the diversity from respondents' answers to how would they define game usability:

- *"Making as much of the player interaction from launch to play as intuitive as possible with as little need for explicit "explanation" as possible."*

- *"How smooth and frictionless, intuitive, and painless the interaction is. There's a linear correlation between usability and experience."*

- *"The ability for a game to be enjoyed by a player without impediment."*

- *"Measurement of friction the player feels between using the game controls/UI and experiencing the fun/interesting aspects of the game."*

- *"The ease and comfort by which players of all types behave in accordance with the designer's intent."*

- *"Game is easy to pick up and navigate. Information is presented in an effective, intuitive, non-intrusive manner."*

- *"How easily and efficiently the players can navigate their way through, and access the options and features of the game."*

Some definitions were more general in their nature and some more focused on a specific game genre. Most of the definitions had similarities in some way, aspect, or characterization and the following words emerged from the coding of these open game usability definitions: intuitiveness, immersiveness, minimal frustration, logic, transparent interface, understandability, learnability, memorability, and efficiency.

4.3. Usability methods

Game companies used many different usability methods as part of their game development process. These methods have been tailored to fit the current needs of the company. Large game companies were using more usability methods than the smaller ones, likely due to having larger resources and dedicated usability personnel.

The surveyed companies used as test participants mostly the friends and acquaintances of their employees (41 of 50), own employees (39/50), players from the target group of the game (31/50), and random persons (25/50) when conducting game usability evaluation. Other answers included Youtube and Twitch streamers, local and global expert players, Expo/trade show attendees and industry advisors. The companies conducted the usability evaluation and testing mostly in their own office premises, but testing online, at home, in the test laboratory, or in the field (cafes, public events, and universities) were also reported by few companies. The types of tasks given to test participants were structured tasks, open tasks, and no tasks (observation of natural playing). Table 4 illustrates what kind of test participants North American game companies have in their game usability evaluation.

Table 4. Test participants of game usability evaluation

Test participant	Game companies conducting usability activities (total 50)
Friends and acquaintances	41 (82%)
Own employees	39 (78%)
Target group players	31 (62%)
Random persons	25 (50%)
Other	7 (14%)

The most used usability method was playtesting, which was used by every company (50 of 50 companies using usability methods). The second most popular method was observation of gameplay, which was used in 84% of the companies (42/50). Usability testing (27/50) was the third most popular method (54%), closely followed by focus groups (23/50), questionnaires (22/50), interviews (20/50), think-aloud (20/50), data logging (17/50), and recorded play-sessions (15/50). The least used methods were cognitive walkthrough (12/50), heuristic evaluation (10/50), empirical guidelines (5/50), pluralistic (3/50) walkthroughs and eye tracking (0/50). Although it was a company with five employees or less that used the least amount of methods while the largest company used the most methods, there was not a clear link between the number of methods used and the size of the company. Table 5 presents the usability methods used in North American game companies.

Table 5. Usability methods used in North American game companies

Method	Game companies conducting usability activities (total 50)
Playtesting	50 (100%)
Observation of live gameplay	42 (84%)
Usability testing	27 (54%)
Focus groups	23 (46%)
Questionnaires	22 (44%)
Interviews	20 (40%)
Think-aloud	20 (40%)
Data logging	17 (34%)
Recorded play-sessions	15 (30%)
Cognitive walkthrough	12 (24%)
Heuristic evaluation	10 (20%)
Empirical guidelines	5 (10%)

Pluralistic walkthrough	3 (6%)
Eye tracking	0 (0%)

When asked about what new methods game companies might try in the future, the most popular method was recorded play sessions (10 of 50), followed by data logging (9/50), questionnaires (8/50), usability testing (6/50), interviews (6/50), heuristic evaluation (5/50) and eye tracking (4/50). Table 6 illustrates which usability methods were considered for future use.

Table 6. Usability methods considered for future use

Test participant	Game companies conducting usability activities (total 50)
Recorded play-sessions	10 (20%)
Data logging	9 (18%)
Questionnaires	8 (16%)
Usability testing	6 (12%)
Interviews	6 (12%)
Heuristic evaluation	5 (10%)
Eye tracking	4 (8%)

Regarding the question if the usability methods and the way they are used have stabilized, only five companies chose the most extreme options for answer, emphasizing that the companies have not yet stabilized their usability methods and the way they use them (Table 7).

Table 7. Our usability methods and the way we use them have stabilized

Answer	Game companies conducting usability activities (total 50)
Strongly disagree	1 (2%)
Somewhat disagree	19 (38%)
Undecided	19 (38%)
Somewhat agree	16 (32%)
Strongly agree	4 (8%)

5. Discussion and conclusions

This paper aimed to answer the following research questions:

RQ1: How the North American game companies define game usability?

RQ2: How the North American game companies perceive game usability?

RQ3: What usability methods are used in the North American game industry to improve game usability and to what extent these methods are utilized?

Regarding the RQ1, the responses showed that the North American game companies define game usability as consisting of user interfaces and controls and in addition also a mixture of usability as it is traditionally defined added with aspects from definitions from user experience, fun, engagement, and playability. Thus, the surveyed game companies regarded game usability as a broad concept that includes aspects from definitions of usability, user experience, and playability, such as user interface, controls, user experience, fun, flow, engagement, level of challenge, gameplay, and game mechanics, in line with the definitions in [7], [10], [18,19]. Finding problems in user interface and playability, as well as developing more understandable user interfaces and controls were seen as important goals for game usability. 46 companies gave their own usability definitions in the survey. For the North American game companies game usability seems to be about making the game easily approachable for the players, intuitive to learn, and easy to use. The majority of the companies in this study thought that game usability consists of user interfaces, controls, user experience, level of challenge, game mechanics,

gameplay, flow, and fun. Some would isolate user interfaces, controls, and user experience as usability issues, and the rest as gameplay issues. Therefore, from the key words of these definitions and the frequency of their use, a new game usability definition can be formulated: "*Game usability is the extent to which a game allows the users to complete their tasks intuitively and with minimal frustration, the user interface not coming between the player and the fun.*" While there can be also other kinds of problems coming between player and fun, such as wrong difficulty level or bugs in game mechanics, this game usability definition means that the user does not have to infer or think too much to acquire the information needed to complete certain tasks. Therefore, the interface layer between the player and the fun should be as transparent as possible in order to give an immersive experience to the players. Other key words from the definitions that the companies gave are closely related to this definition, such as transparent interface, learnability, memorability, efficiency, and immersiveness. These results are in line with the study done in Northern Europe [25], with the exception that Northern European game companies did not consider fun as important aspect of game usability as North American game companies did. Overall, the definitions of game usability that the game companies gave in both North America and Northern Europe were surprisingly similar and words such as intuitiveness, learnability, immersiveness, and transparent user interface were the most common key words in both regions. These results are in line with other studies pointing out that also usability professionals refer to a variety of characteristics and attributes associated with usability and that a longitudinal studies might observe evolution of views on usability within different socio-cultural groups based on the usability maturity of that community [23].

Regarding the RQ2, the responses in this study indicate that the North American game companies perceived usability as a very important factor in game development. This is in line with the study done in Northern Europe, where the companies also agreed strongly about the importance of usability in game development context [25]. Furthermore, the North American game companies identified usability activities such as usability testing and evaluation as being useful and important. This result is supported by studies where game usability and the quality of user interface of the game are very important for players as a deciding factor when they want to buy a game [24]. One reason for this opinion among players could be that players do not want to invest money and time on games with poor usability and user interface, which most likely would be spoiling their fun. Usability methods can help game developers to find issues that hinder players from having fun while playing the game and also to help identify other problems in the game [4], [25].

However, although usability was seen as a very important factor in games, not all companies conducted usability activities to test and improve the usability of their games. This was the case primarily in small companies (1-5 employees), which responded that they lacked the expertise and resources to conduct usability activities as part of their game development. This perceived expensiveness of usability activities was reported by North American game companies as the main reason for not doing them. This is in line with the results from Northern European game companies [25]. For the North American game companies, time consumption was another major reason for not conducting any usability activities, while in Northern Europe time consumption was a concern for only one game company. Nevertheless, most of the North American game companies not currently doing usability activities were interested in conducting them in the future if required expertise and resources would become available. In this study, nine companies did not perform usability activities. Six of those companies said them to be too expensive to do. Even though it might seem that formal usability evaluation methods cost extra, the long term benefits of better usability will eventually surpass the short term costs of usability methods [26]. Based on the answers, the lack of human resources does not always have to be the reason for not doing usability activities. Some companies that had five employees or less used as many as ten different methods to test and evaluate their games, and there wasn't a clear correlation between the number of methods used and the size of the company.

Regarding the RQ3, the North American game companies in this study used multiple usability methods. These usability methods were tailored to fit the current need of the company. Large game companies used more usability methods than the smaller ones; this fact is not surprising and reflects also the status of usability work in "traditional" software development

companies (cf. [3], [9]). The game companies usually started testing game usability when they had a working prototype and the testing continued until the game was released. The most commonly used usability methods were playtesting and observation of gameplay, followed by a group of other methods that were almost equally popular and that were used in 40-54% of the companies. These methods were usability testing, focus groups, interviews, think-aloud, filmed play-sessions, questionnaires, and data logging. Among the least used usability methods were pluralistic and cognitive walkthroughs, empirical guidelines, eye tracking and heuristic evaluation. Three of the North American game companies used pluralistic walkthrough while none of the North European companies used it, while three Northern European game companies used eye-tracking while none of the North American game companies reported using eye-tracking. Pluralistic walkthrough is indeed more suitable for evaluating productivity software with "rich" user interface by employing paper prototypes, and this fact may explain the lack of use among game companies. However, the responses from North American game companies seem to somewhat disagree with the literature, which identifies think-aloud, Rapid Iterative Testing & Evaluation (RITE), heuristic evaluation, playtesting, and A/B testing as being the most common and effective methods for analyzing player experiences. The responses related to use of heuristic evaluation as usability evaluation method in North American and North European game companies is analyzed comprehensively in another study [27].

The companies in this study usually use their own applied versions of usability methods rather than follow pre-written instructions step-by-step. The methods and the way they are used have not yet stabilized for many of the developers, which is understandable for small and young companies still experimenting and trying to find the best methods and the ways to use them. Companies need to aim for stabilizing their methods in order to make the evaluation process more efficient. As an example, the biggest participant of this study was a company responsible for some of the most critically acclaimed games ever. Even though they might need to tweak their methods and create for example new heuristic lists to suit different games, the methods and the way they are used essentially remain the same.

The results of this study indicate that among the identified methods, only playtesting seems to be widely used in North American game companies, being used by all companies that were conducting usability activities. Gameplay and usability testing were used in over half of the companies (84% and 54%, respectively), while heuristic evaluation was used only in ten companies (20%). Furthermore, none of the companies responded that they were using A/B testing or RITE as a method testing. It seems that the North American game companies would need more information and expertise about different available usability, user experience, and playability methods. Twelve companies used cognitive walkthrough as one of their usability testing method and one company was considering using it in the future, which is surprising when considering the relative lack of published research on using cognitive walkthrough as a method for evaluating game usability.

This paper contributes to the game research, human-computer interaction and usability research and practice with providing a state of the art outlook of the game usability understanding and practice in game companies in North America. The paper provides a contrasting view on how game usability is defined by researchers versus by professionals in the game industry. The results of this paper support the "broader" definition of game usability (cf. [7], [10], [18,19] which includes aspects from "traditional" usability as well as user experience, and adding into it concepts such as fun, playability, immersion, and engagement, as opposed to "narrower" definitions of game usability (cf. [1], [5], [13,14], [20]) following more closely the traditional definition of usability by Nielsen [17]. This finding highlights the importance of the development of a standardized terminology and language to bridge the gap between game developers, usability professionals, and usability researchers with respect to their understanding of game usability. Furthermore, a clearer definition of game usability would make it easier to define which specific areas of game design (e.g., controls, interface, storyline) fall on the domain of game designers and which areas fall on the domain of usability specialists. Even though relatively small sample size and response rate are limitations of this study and the generalizability of the results, the findings provide interesting and valuable insight on how the

game companies understand game usability and apply usability evaluation methods and practices in their development process.

This paper also contributes to the HCI field; in particular, the game usability research and practice, and the game development industry with providing a better understanding of how well usability methods have spread into modern game development practices, and what usability methods are actively used by the game development companies, and how these methods have been adapted. Furthermore, this paper provides the game development industry with knowledge on usability methods employed by game development companies so to increase their professional expertise and competitive positions and provide users with high-quality games. Additionally, this paper contributes to the HCI and game usability research with highlighting the need for developing suitable and easy to use usability methods that do not require lots of expertise or resources; especially small game development companies (1-5 employees) which lack the expertise and resources to use the traditional HCI methods would benefit from this development.

References

1. Amaro, A. C., Veloso, A. I., Oliveira, L.: Social games and different generations: A heuristic evaluation of Candy Crush Saga. In: Technology and Innovation in Sports, Health and Wellbeing (TISHW), International Conference on, pp. 1-8 (2016)
2. Bernhaupt, R.: User experience evaluation in entertainment. In Evaluating User Experience in Games, pp. 3-7 (2010).
3. Bygstad, B., Ghinea, G., Brevik, E.: Software development methods and usability: Perspectives from a survey in the software industry in Norway. Interacting with computers, 20(3), pp. 375-385 (2008)
4. Davis J.P., Steury, K., Pagulayan, R.: A survey method for assessing perceptions of a game: The consumer playtest in game design. Game Studies: The international journal of computer game research, 5(1), pp. 1-13 (2005)
5. Desurvire, H., Caplan, M., Toth, J. A.: Using heuristics to evaluate the playability of games. In: CHI'04 extended abstracts on Human factors in computing systems, pp. 1509-1512 (2004).
6. Febretti, A., Garzotto, F.: Usability, playability, and long-term engagement in computer games. In: CHI'09 Extended Abstracts on Human Factors in Computing Systems, pp. 4063-4068 (2009)
7. Federoff, M.A.: Heuristics and usability guidelines for the creation and evaluation of fun in video games. Indiana University, Bloomington. (2002).
8. Gaudiosi, J.: New Reports Forecast Global Video Game Industry Will Reach $82 Billion By 2017. Forbes. (2012)
9. Iivari, N.: 'Representing the User' in software development—a cultural analysis of usability work in the product development context. Interacting with Computers, 18(4), pp. 635-664 (2006).
10. Järvinen, A., Heliö, S., Mäyrä, F.: Communication and community in digital entertainment services. Prestudy Research Report. (2002).
11. Kasurinen, J., Smolander, K.: What do game developers test in their products?. In Proceedings of the 8th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement, p. 1. (2014)
12. Kim, J. Y.: A Study on Comparison and Analysis of Usability Evaluation Model Gameplay. Advanced Sciences and Technology Letters, 99, pp. 227-230. (2015).
13. Korhonen, H., Koivisto, E.M.I.: Playability heuristics for mobile games. In: MobileHCI '06: Proceedings of the 8th conference on Human-computer interaction with mobile devices and services, pp. 9-16. (2006)
14. Laitinen, S.: Usability and playability expert evaluation. In: K. Isbister, & N. Schaffer (Eds.), Game usability - Advice from the experts for advancing the player experience, pp. 91-111. (2008)

15. Marghescu, D.: Usability evaluation of information systems: A review of five international standards. In: Information Systems Development, pp. 131-142. (2009).
16. Newzoo: Global Games Market Report. Q2 2016 Update. (2016)
17. Nielsen, J.: Usability engineering. San Francisco: Morgan. (1994)
18. Pagulayan, R.J., Keeker, K., Wixon, D., Romero, R.L., Fuller, T. User-centered design in games. In: J.A. Jacko & a. Sears (Eds.). The human-computer interaction handbook: fundamentals, evolving technologies and emerging applications, pp. 883-906. (2003)
19. Papaloukas, S., Patriarcheas, K., Xenos, M. Usability assessment heuristics in new genre videogames. In: Proc. 13th Panhellenic Conference on Inf. pp. 202-206. (2009).
20. Pinelle, D., Wong, N., Stach, T.: Heuristic evaluation for games: Usability principles for video games design. In: CHI '08: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, pp. 1453-1462. (2008).
21. Pinelle, D., Wong, N., Stach, T., Gutwin, C.: Usability heuristics for networked multiplayer games. In: Proceedings of the ACM 2009 international conference on Supporting group work, pp. 169-178. (2009)
22. Pyae, A., Liukkonen, T. N., Saarenpää, T., Luimula, M., Granholm, P., Smed, J.: When Japanese elderly people play a Finnish physical exercise game: a usability study. Journal of Usability Studies, 11(4), pp. 131-152. (2016)
23. Rajanen, D., Clemmensen, T., Iivari, N., Inal, Y., Rızvanoğlu, K., Sivaji, A., & Roche, A.: UX Professionals' Definitions of Usability and UX–A Comparison Between Turkey, Finland, Denmark, France and Malaysia. In: IFIP Conference on Human-Computer Interaction, pp. 218-239. (2017)
24. Rajanen, M., Marghescu, D.: The impact of game usability to player attitude. In: Proceedings of 29th Information Systems Research Seminar In Scandinavia (IRIS29), Helsingoer, Denmark, pp. 1-17. (2006)
25. Rajanen, M., Nissinen, J.: A survey of game usability practices in Northern European game companies. Selected Papers of the IRIS, Issue Nr 6, Paper 8. (2015)
26. Rajanen, M., Rajanen, D.: Usability benefits in gamification. In: Proceedings of the 1st GamiFin Conference. Pori, Finland. pp. 87-95 (2017)
27. Rajanen, M., Rajanen, D.: Heuristic evaluation in game and gamification development. In: Proceedings of the 2nd GamiFin Conference. Pori, Finland. (2018)
28. Schaffer, N.: Heuristic evaluation of games. In K. Isbister, & N. Schaffer (Eds.), Game usability - Advice from the experts for advancing the player experience, pp. 79-90. Burlington, MA, USA (2008)
29. Statista: The statistics portal. (2016)