From Usability to Playability: Introduction to Player-Centred Video Game Development Process

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Abstract. While video games have traditionally been considered simple entertainment devices, nowadays they occupy a privileged position in the leisure and entertainment market, representing the fastest-growing industry globally. We regard the video game as a special type of interactive system whose principal aim is to provide the player with fun and entertainment. In this paper we will analyse how, in Video Games context, Usability alone is not sufficient to achieve the optimum Player Experience. It needs broadening and deepening, to embrace further attributes and properties that identify and describe the Player Experience. We present our proposed means of defining Playability. We also introduce the notion of Facets of Playability. Each facet will allow us to characterize the Playability easily, and associate them with the different elements of a video game. To guarantee the optimal Player Experience, Playability needs to be assessed throughout the entire video game development process, taking a Player-Centred Video Game Design approach.

Keywords: Video Games, Playability, Usability, Interactive Systems, User Experience.

1 Introduction

Throughout history, humans have had the capacity to manage their own leisure time, this being a significant driver in cultural development. Nowadays, video games and entertainment systems collectively make up the biggest industry in terms of turnover, more so than music and cinema. From this we can deduce that video games have become the preferred game of choice, exerting significant social and cultural influence over children, teens and adults [1].

In this paper we present Video Games as interactive systems with special characteristics, with a focus on fun and entertainment that distinguishes them from traditional desktop systems. We analyse why Usability is therefore not sufficient to describe the full User Experience in relation to Video Games. Secondly, we present a definition of Playability to characterise and measure the Player Experience with these kinds of systems. Thirdly, we introduce the notion of Facets of Playability that will allow us to study Playability easily across the different video game elements. Finally we introduce a methodology based on Playability characteristics to develop more effective Video Games, taking a Player-Centred Video Game Design approach.

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2 User Experience in Entertainment Systems

When a *Desktop System* (DS), such as a word processor, is developed, the main objective is that *users can execute a set of tasks*, determined by a clear functional objective, in a predetermined context, for example working in an office. The overall utility of an interactive system has a strong functional component (functional utility) and another component that indicates the means by which users can achieve this functionality. In this context, *Usability* is a measure of product use whereby users achieve concrete objectives in varying degrees of *effectiveness*, *efficiency* and *satisfaction*, within a specific context of use [2]. Developing useable software improves the final quality of the User Experience. *User Experience* can be defined as the combined sensations, feelings, emotional responses, assessments and satisfaction of the user in relation to a system, and their resulting perception of their interaction with it [3, 4].

A *Video Game* can be considered a 'special' interactive system, in that it is used for leisure purposes by users seeking fun and entertainment. A video game is not conceived for the user to deal with daily tasks, like a word processor, but rather it has a very specific objective: *to make the player feel good when playing it*. They are more likely to be diverse and subjective.

We propose that analysing the quality of a video game purely in terms of its *Usability* is not sufficient – we need to consider not only functional values but also non-functional values, given the specific properties of video games. Additional factors to be considered might include, for example: storytelling techniques or character design. In other words, the *Player Experience* could be much more extensive than the *User Experience*. We need to establish a set of attributes and properties to identify the experience of players playing a video game and indicate to us whether a game is 'playable' or not – that is, they will identify the *Playability* of the video game.

Playability is a live topic in the scientific community; it has been studied from different points of view and with different objectives without consensus on its definition or the elements that characterise it. We have identified two specific strands of research: *Playability* as *only Usability* in video games context (understanding and control of the game system), and research based on particular elements of video games. In the former, we note Federoff or Desurvire research [5, 6] focused on applying Nielsen's ideas using Usability heuristic techniques to measure it in video games. There are some interesting studies on how to use heuristic and design guidelines with specific video game elements [7, 8, 9]. In the second line of research, we find references to: *Playability* in the quality of Gameplay [10]; types of challenges [11], the manner of storytelling [12] or the degree of emotion when players play video games [13].

There are few studies focused on defining *Playability* formally, exceptions being Fabricatore's proposition [14] and Järvien's work [15], but without specific reference to *Playability* attributes or properties to characterize it. The former puts forward a Usability quality design model, applied to action video games based on the analysis of some representative game elements. Järvien presents a multifaceted model Theories to identify *Playability* based on famous Csíkszentmihályi's Flow.

The main objective of our work is to propose a precise and complete definition of *Playability*, its attributes and properties and a multifaceted conceptual framework to facilitate the analysis, so as to be able to measure it as part of an in-depth analysis, and factor it in to video game development from the initial design phase onwards to optimise the Player Experience.

3 Playability: How to Characterize the Player Experience

As already stated, the User Experience in a Desktop System has two principal points of view which characterize it: *process* and *product*. They are motivated and enriched by the emotional user reactions, and the perception of non-instrumental qualities [16]. *Playability* is based on Usability, but, in the context of video games, goes much further. Furthermore, *Playability* is not limited to the degree of 'fun' or 'entertainment' experienced when playing a game. Although these are primary objectives, they are concepts so *subjective*. It entails to extend and complete formally the User Experience characteristics with *players' dimensions* using a broad set of attributes and properties in order to measure the *Player Experience*.

We define *Playability as: 'a set of properties that describe the Player Experience using a specific game system whose main objective is to provide enjoyment and entertainment, by being credible and satisfying, when the player plays alone or in company'*.

It is important to emphasise the 'satisfying' and 'credible' dimensions. The former is more difficult to measure in video games than in desktop systems due to the high degree of subjectivity of non-functional objectives. Similarly, the latter depends on the degree to which players assimilate and become absorbed in the game during play – also difficult to measure objectively. Playability is characterised by attributes that exist in Usability but that have different meanings in video game context. For example Effectiveness' in a video game is not related to the speed with which a task can be completed, because typically a player will play for the maximum time possible, this being one of the game's main objectives. *Playability represents the degree to which specified users can achieve specified goals with effectiveness, efficiency and specially satisfaction and fun in a playable context of use*, with an emphasis on the interaction style and plot-quality of the game or the quality of Gameplay. Playability is affected for example, by the quality of the storyline, responsiveness, usability, customizability, control, intensity of interaction, intricacy, and strategy, as well as the degree of realism and the quality of graphics and sound and son on.

Analysing several video games and their different characteristics, we propose a set of seven attributes to characterise Playability, namely: *Satisfaction*, *Learnability*, *Effectiveness*, *Immersion*, *Motivation*, *Emotion* and *Socialization*. In Fig 1, we present the Playability Model for Video Games with the different relationships among the Desktop System Usability and Video Game Playability attributes.

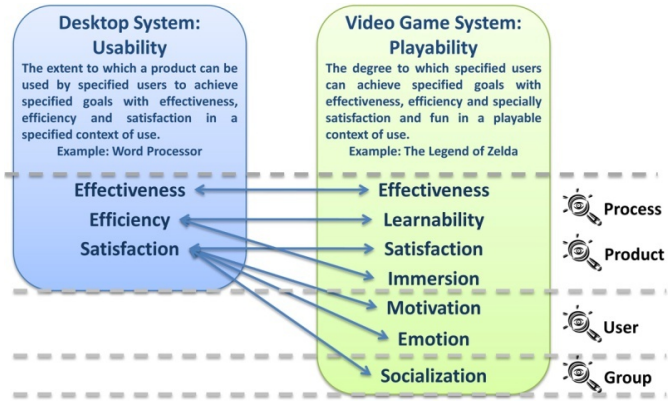

Fig. 1. Correspondence between Playability and Usability attributes

3.1 Playability: Attributes and Properties

Now we will outline in more detail the attributes and some examples of properties of *Playability*, to subsequently measure them:

***Satisfaction*:** We define this as the gratification or pleasure derived from playing a complete video game or from some aspect of it. We characterise Satisfaction using the following properties: *Fun*: the main objective of a video game is to entertain, hence a video game that is no fun to play could never satisfy players. *Disappointment:* we should ensure that players do not feel so disappointment or uneasy when playing a video game that they abandon it altogether. *Attractiveness*: this refers to attributes of the video game that increase the pleasure and satisfaction of the player.

***Learnability*:** We define this as the player's capacity to understand and master the game's system and mechanics (objectives, rules, how to interact with the video game, and so on). We propose the following properties to characterise Learning: *Game Knowledge*: a player's prior knowledge of a video game will influence the degree to which they are affected by the learning curve proposed by the game. *Skill*: it is demonstrated in how the player plays. Once they have understood and assimilated the game's objectives and rules (cognitive skill), how they address the game's challenges to reach the different objectives and rewards is a matter of skill (interactive skill). *Difficulty*: it may be higher or lower depending on how steep the learning curve is, relative to the player's skills and how long they have been playing. A high Difficulty level can provoke a greater effort by the player to learn how to play. *Frustration*: this property is often part of the learning process and is produced by the player's feelings of unease when unable to achieve a particular challenge or objective, or when failing to understand and certain concepts. *Speed*: The speed with which new concepts and contents are introduced into the game directly affects the learning process. *Discovery*: the different game resources support better assimilation of the game's various contents so that the player needs successively less time to improve his abilities to achieve the game's objectives.

***Effectiveness*:** We define this as the time and resources necessary to offer players a fun and entertaining experience whilst they achieve the game's various objectives and reach the final goal. We identify Effectiveness as having the following properties: *Completion*: a video game is more effective if the percentage of Completion is high. In other words, it can be considered effective in that the player found no parts of the game uninteresting. *Structuring*: a video game is well structured elements (that is, where, when and how they appear in the Gameplay) when it achieves a good balance between the various objectives to be achieved and the different challenges to overcome, such that the player remains engaged and enjoys himself throughout the entire game time.

***Immersion*:** We define this as the capacity of the video game contents to be believable, such that the player becomes directly involved in the virtual game world. To characterise Immersion we propose the following properties: *Conscious Awareness*: the degree to which the player is consciously aware of the consequences of his actions in the virtual world, understanding what happens as a result of carrying out a particular action helps the player imagine what to do next and to develop the necessary abilities to overcome challenges. *Absorption*: a player who is completely absorbed is involved in the Gameplay to such a degree that they focus all their all their abilities and attention on overcoming the game's challenges. *Realism*: the more realistic a video game (in the use of controls, presentation of contents, or atmosphere), the greater the Immersion of the player. Realism helps to focus the player on the game's challenges, rules and objectives by making the virtual world as believable as the real world. *Dexterity*: this refers to the player's ability to interact with the game's controls (interactive dexterity) and carrying out different movements and actions in the virtual world in which they are immersed (virtual dexterity). *Socio-Cultural Proximity*: video games have more, or less, immersive efficacy depending on the degree of socio-cultural proximity to the player – appropriate to their age or gender, for instance. The metaphors and atmosphere used in the game, even when realistic, can still reduce Immersion of the player if they do not reflect certain socio-cultural characteristics that the player can identify with.

***Motivation*:** We define this as the set of game characteristics that prompt a player to realise specific actions and continue undertaking them until they are completed. We characterise Motivation as having the following properties: *Encouragement*: the degree of player encouragement is affected by the level of confidence they feel when facing new game challenges and the possibility of reaching new game objectives. *Curiosity*: it can be generated by the inclusion of optional features, objectives and challenges that offer the player the freedom to interact with a greater number of elements and wonder what will come next. *Self-improvement*: it occurs when the player or their character develops their ability and skills – be it to overcome specific challenges, or simply because the player enjoys employing a particular skill. *Diversity*: The number of different elements makes the game more attractive to players and reduces the likelihood of monotony.

***Emotion*:** This refers to the player's involuntary impulse in response to the stimulus of the video game that induces feelings or a chain reaction of automatic behaviours. We characterise Emotion as having the following properties: *Reaction*: the player reacts to a video game because the system is a source of different stimuli. The

player's initial reaction may then trigger several types of emotion. *Conduct*: video games are behavioural mechanisms in that they can influence the conduct of the player during Game Time, by leading them through different emotions thanks to the stimuli they provide. *Sensory Appeal*: the game needs to transmit an interest or desire in aesthetic aspects of it to increase the emotion of attraction to the player; it needs to use different sensory channels, e.g. the audiovisual channel, to stimulate the player's senses and enables them to process the game whilst feeling the emotions it induces.

***Socialization*:** We define this as the set of game attributes, elements and resources that promote the social dimension of the game experience in a group scenario. This kind of collective experience makes players appreciate the game in a different way, thanks to the relationships that are established with other players (or with other characters from the game). Socialization is also at work in the connections that players make with the characters of the video game. Examples of this might include: choosing a character to relate to or to share something with; interacting with characters to obtain information, ask for help, or negotiate for some items; and how our influence on other characters may benefit, or not, the achievement of particular objectives. We propose that Socialization has the following properties: *Social Perception*: this is the degree of social activity used and understood by players, who experience a more extensive game in a multiplayer context than they do playing on their own. *Group Awareness*: this refers to the conscious awareness of players of being part of a 'team', and of sharing common objectives, challenges and game elements. Players must understand that they are a part of a group and that the success of the group depends on achieving shared objectives. *Personal Implication*: the player needs to be aware that individual achievement leads to group victory. Hence game resources need to be developed that help raise the player's awareness of their role in the group's success, and their identification with it. *Sharing*: when a player plays within a group, the objectives, de different resources and how they are managed are shared by the group. *Communication*: multiplayer video games should offer communication mechanisms that enable optimal interchange of information among players. *Interaction*: how the rules of the game are perceived by the group or how members will interact to achieve the objectives, that is the way in which characters or players relate to each other allows objectives and challenges to be overcome in different ways according to the interests fostered by interaction among group members. We highlight the following types of interaction: Competitive (when a player plays to achieve personal success, when one player wins the rest of the group generally loses); Collaborative (individual success is replaced by group success. Here the notion of ´team´ applies – the entire group shares and achieves a common goal) and Cooperative (players can have their individual goals whilst forming a group to benefit themselves, thanks to the help of other members, team approach is not essential to achieve the player's objective, rather it arises only circumstantially).

In Fig. 2 we show the Playability Model with the attributes and properties to measure the Player Experience in a video game that we have described previously.

3.2 The Facets of Playability

Playability analysis is a very complex process due to the different perspectives that we can use to analyse the various parts of video game architecture. In this work, we

propose a classification of these perspectives based on six *Facets of Playability*. Each facet allows us to identify the different attributes and properties of *Playability* that are affected by the different elements of video game architecture [17]. The first facet is *Intrinsic Playability*: this is the *Playability* inherent in the nature of the video game itself and how it is presented to the player. It is closely related to Gameplay design and Game Mechanic. *Mechanical Playability*: this is the facet related to the quality of the video game as a software system. It is associated to the Game Engine. *Interactive Playability*: this is facet associated with player interaction and video game user interface development. This aspect of *Playability* is strongly connected to the Game Interface. *Artistic Playability*: this facet relates to the quality of the artistic and aesthetic rendering in the game elements and how these elements are executed in the video game. *Intrapersonal Playability* or *Personal Playability*: This refers to the individual outlook, perceptions and feelings that the video game produces in each player when they play, and as such has a high subjective value. *Interpersonal Playability* or *Social Playability*: This refers to the feelings and perceptions of users, and the group awareness that arise when a game is played in company, be it in a competitive, cooperative or collaborative way.

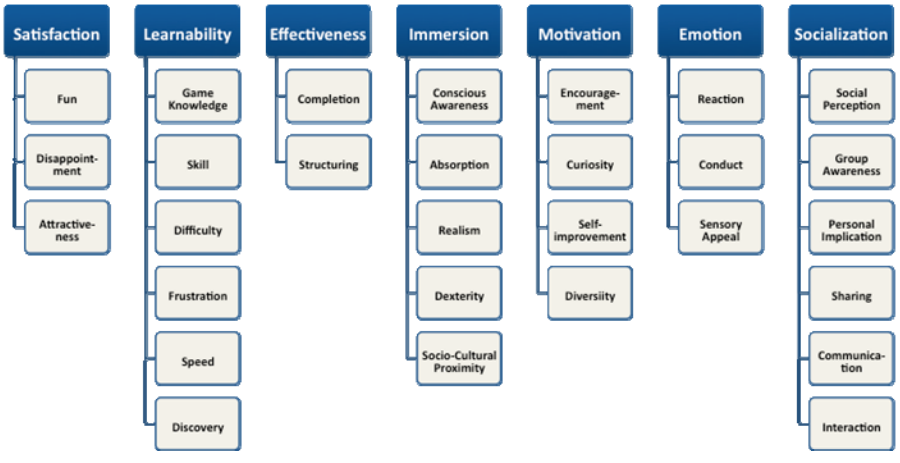

Fig. 2. Playability Model to characterize the Player Experience

The overall Playability of a video game, then, is the sum total of values across all attributes in the different Facets of Playability. It is crucial to optimise Playability across the different facets in order to guarantee the best Player Experience. Fig. 3 represents the different Facets of Playability and their relationship to common elements of a video game.

4 Introduction to Player-Centred Video Game Development

Nowadays, the methodologies used in video game development are similar to those used in software development, but with the addition of certain elements or phases

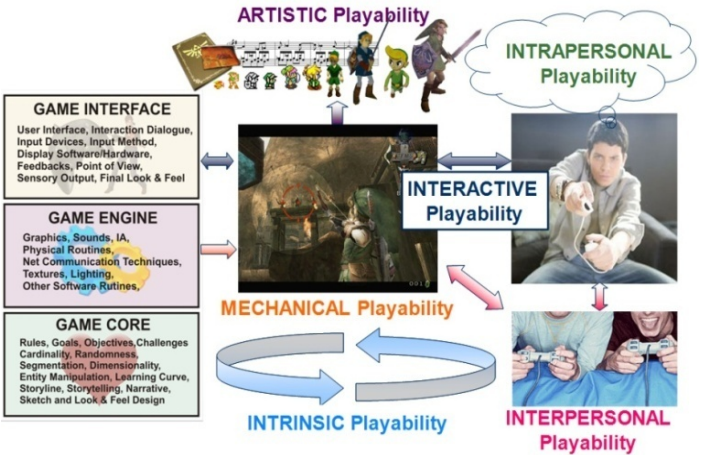

Fig. 3. Correspondence between Facets of Playability and video game elements

reminiscent of film production: screenplay, scenery recreation, virtual world and character design, and so on. Can we guarantee *Playability* in the development phase of every video game? We argue that *Playability* should be factored-in to every phase of video game development in order to guarantee quality. Typically *Playability* is only checked in the test phase of the product, using evaluation techniques to test specific aspects of the video game. However, we assert that the design of video games, as interactive systems, should be focused on users, by involving them directly in the development process, from initial specification through to final test stage Usability Engineering. We propose the use of a Player-Centred Video Game Development approach, using the principles of *Playability* throughout the different phases of development in order to achieve a high level of quality in *Playability,* in the same way as with traditional desktop systems.

We should start with a game specification that includes the *Requirements of Playability* [17] deduced from reference to the *Facets of Playability*, analysing which attribute is affected by which specific video game elements. In the creative video game design phase, we propose the adaptation of *Game Patterns* [18], introducing *Playability* attributes and properties to improve the efficiency and the effectiveness, in *Playability* terms, of these patterns. *Game Style Guides* [19, 20] will be necessary in order to design appropriate and playable elements according to the context of the game or player profiles. Finally, we recommend using *Playability Tests* during the entire development process using *Playability* properties to validate and verify the *Requirements of Playability* and ensure the quality of *Playability* in the final product. By using *Facets of Playability* we can check *Playability* properties in the different phases, for example using facet-by-facet heuristic to test specific video game elements or using more specific tests or metrics that help us to identify which attributes are more relevant in each phase, or to improve the attributes that are most suitable for the nature or genre of the video game or the Player Profile.

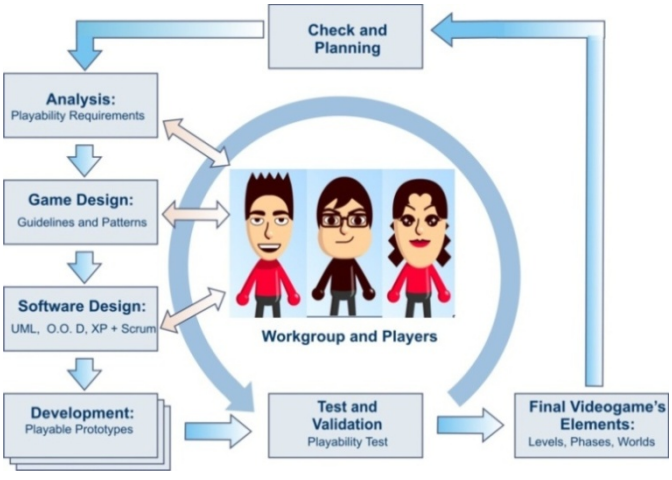

Fig. 4. Correspondence between Facets of Playability and video game elements

5 Conclusions and Future Work

In this paper we have presented video games as special interactive systems developed to entertain the user, concluding that Usability alone is an insufficient measure for determining the full Player Experience.

We have presented the concept of *Playability* as a complement of Usability applied to video games, outlining the attributes that characterise it and their properties, in order to measure and guarantee an optimum Player Experience. To facilitate the analysis of *Playability*, we have proposed the *Facets of Playability* to study every property in each attribute in order to identify the elements necessary to achieve overall *Playability* in different video games. We have shown the importance of Player-Centred Video Game Development wherein *Playability* must be taken into account in every phase of the game development, in order to, amongst other things, anticipate any unexpected or negative results for the developer and guarantee a high quality of playability and improve the Player Experience in the final product.

Currently we are designing a conceptual model of a video game which will enable us to specify and analyse *Playability* characteristics in the design phase, and to incorporate *Playability* techniques into software patterns, style guides and heuristic techniques, thus ensuring optimum *Playability* of the end-product. We are also adapting techniques used in Usability Engineering and User-Centred Design in order to include *Playability* in a quality model to enhance the Player Experience throughout the different phases of video game development.

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