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CONTRIBUTIONS TOWARDS A
PARTICIPATION-CENTERED GAME DESIGN

December 2021

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Contributions Towards a Participation-Centered Game Design

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Aos meus pais,
à Carolina,
ao Manuel.

ABSTRACT

This research proposes a new conceptual model – the Participation-Centered Game Design Model – that serves as a creativity support tool for helping creators consider the experience design space mediated by the video game medium, and their analysis of the ensuing gameplay experience.

The model conceptualizes gameplay through six perspectives of participation: Playfulness, Challenge, Embodiment, Sociability, Sensemaking and Sensoriality. These perspectives are operationalised at three levels: Intention (setting of gameplay experience goals), Artifact (characterization of the videogame object) and Participation (evaluation of the game play experience). To operationalise the model in design praxis, it was transmediated into a canvas consisting of a set of guiding questions designed to promote ideation along each of the participation dimensions, at the three operational levels.

To evaluate the model and canvas, they were deployed in a set of game design exercises in a master course, and used by a total of 33 teams of game design students. Based on qualitative evaluations of their influence in game design learning processes, the tools were iterated three times, and were shown to be an effective aid in the generation of diverse game design ideas. To evaluate the participation model as support for game experience evaluation, three case studies were carried out, where gameplay metrics from three distinct video game artifacts were analyzed with support of the model, to assess whether their game play experience goals had been achieved. Data collected from these experiments showed that the model and canvas assisted design practitioners in their creative exploration of the design space, and evaluation of the resulting game play experience. Therefore, we concluded they can serve as an effective design support tool for these two moments in the development process.

Keywords: Game Design; Gameplay Experience Evaluation; Participation; Videogames;

RESUMO

Este trabalho investigação propõe um novo modelo conceptual - um Modelo de Game Design Centrado na Participação - que serve como ferramenta de suporte à actividade de game design para ajudar os criadores a pensar sobre o espaço de design da experiência de jogo mediada pelo meio videojogo, e a análise da experiência de jogo subsequente.

O modelo conceptualiza a actividade do jogo através de seis perspectivas de participação: Brincadeira, Desafio, Corporealidade, Sociabilidade, Criação de Sentido e Sensorialidade. Estas perspectivas são operacionalizadas a três níveis: Intenção (definição dos objectivos da experiência de jogo), Artefacto (caracterização do objecto do videojogo) e Participação (avaliação da experiência de jogo). Para operacionalizar a utilização do modelo na prática do design, este foi materializado num canvas que consiste em questões orientadoras que promovem a idealização do design ao longo de cada uma das perspectivas de participação, nos três níveis operacionais.

O modelo e o canvas foram utilizados numa unidade curricular de Game Design, e utilizados por um total de 33 equipas de estudantes. Com base em avaliações qualitativas da sua influência nos processos de aprendizagem de game design, as ferramentas foram iteradas 3 vezes, e demonstraram ser uma ajuda eficaz na geração de ideias de concepção de videojogos. Para avaliar o modelo de participação como apoio à avaliação da experiência de jogo, foram realizados 3 estudos de caso, onde foram analisadas métricas de actividade de jogo a partir de 3 videojogos distintos com apoio do modelo, para avaliar se os seus objectivos de experiência de jogo tinham sido alcançados. Os dados recolhidos a partir destas experiências mostraram que o modelo e o canvas ajudaram os alunos de game design na sua exploração criativa do espaço de design, e na avaliação da experiência de jogo consequente. Por conseguinte, concluímos que estes instrumentos podem servir como uma ferramenta eficaz de apoio ao design nestes dois momentos do processo de game design design.

Palavras-chave: Game Design; Avaliação da Experiência de Jogo; Participação; Videojogos;

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

1   INTRODUCTION

1.1   Research Context

Video games have become a popular form of entertainment and expression in the last decades, acquiring an increasingly important role in contemporary culture (Muriel & Crawford, 2018). The diversity of genres, formats, themes, and platforms (personal computers, consoles, smartphones, tablets, etc.) enables a wide range of video game experiences, and exposes the medium to a wide audience, catering to people with different tastes, wants, and expectations.

The development of video games has also been closely related with the development of computer technology. To name but a few: advances in computational processing opened up the possibility of simulating physics "Asteroids" (Rains & Logg, 1979) and other real-life processes (from city management in "SimCity" (Wright, 1989), to personal life management and growth in "Sims" (Wright, 2000), to civilization evolution in "Civilization" (Meier, 1991), etc); increasing graphics processing led the way to near photo-realist visual representations (see, for example, "The Last of Us Part II" (Naughty Dog, 2020) or "Red Dead Redemption 2" (Rockstar Games, 2018)); the advent of the internet and social networks potentiated the development of multiplayer experiences of all kinds, from MMORPGs where players compete and cooperate and organise themselves in complex social organisations like guilds, to competitive e-sports, to ARGs where players from all around the world must work together to tackle high difficulty challenges; new modes of interaction enabled novel forms of physical interaction with videogames, from touch technologies in mobile devices to gesture and voice recognition in the Wii, Kinect, and VR headsets.

Like in the history of art, new technology brought new mediums, new materials, and new tools that opened up the landscape for creators to seek out and explore new expressive directions. There is little, if any, connecting legacy to allow us to linearly relate "Pong" (Alcorn, 1972) with "Super Mario Bros." (Miyamoto, 1985), "Street Fighter II" (Okamoto, 1991) to "Silent Hill

2" (Tsuboyama, 2001), "Doom" (Romero, 1993) to "ICO" (Ueda, 2001), "GTA III" (Benzies, 2001) to "Minecraft" (Persson, 2009), and so on. With each new technology came a myriad of new design directions, and with each of them, players were invited to enter new interactive experiences, in many ways fundamentally divorced from their forebears. The ultimate consequence of this process of continuous evolution is that any design processes, models, templates, guidelines, and conceptual approaches, must necessarily face a continual challenge to evolve, lest they fail to keep up with the novel design languages sprouting from the fertile ground of an ever evolving technological medium.

Besides being widely accepted as means of entertainment, video games have also steadily gained recognition as a means of expression, and an artistic medium of cultural relevance (Smuts, 2005; Bogost, 2010). For instance, game creators such as Tale of Tales, Jevona Chen, Dan Pinchbeck, and Nicholas Clark have drawn attention to the expressive qualities of the software and video games in particular (Isbister, 2016). Video games by these authors are also noteworthy examples of projects that use the expressive qualities of this medium in a perspective that goes beyond ludic challenge and playfulness (therefore not being restricted to formal game definitions (Craveirinha & Roque, 2011, 2016). Despite the greater or lesser visibility that these projects may have had for the general public, the popularity that certain projects have achieved (e.g. Journey ; Chen, 2012), indicates that there are audiences receptive to videogames beyond the usual competitive game dimension.

The multiplicity of forms that a videogame can take associated with the subjective and holistic nature of experience challenge a comprehensive and systematic approach to design in the videogame medium. If on one hand, the aim of a videogame object is to support an experience, on the other, the design of this experience is not directly within the designer's reach in view of the non-deterministic nature of our relationship with technology and of the subjectivity associated with the experience (Roque, 2005; Fullerton et al., 2008); This challenge is compounded with the difficulty in characterizing what constitutes a videogame in the first place (Juul, 2005; Tavinor, 2009), mainly because of its conceptual multiplicity.

The multidimensional nature of a videogame has allowed its study through the lenses of a wide range of disciplines such as Literature, Computing, Psychology, Sociology, Design, Aesthetics, etc. Literature might focus on game's textual qualities, how its symbols can be read and interpreted and how creators convey meaning through them; Computing might focus on how to write the

algorithms needed to summon increasingly realistic simulations and rendering technologies; Psychology may be concerned with how players learn to play, are motivated to keep playing, or the nature of their emotional responses to video game stimuli; Sociology can be concerned with emerging forms of organized behaviour between both players and synthetic actors; Design can be concerned with the processes needed to successfully achieve video game production project's goals; and Aesthetics may be concerned with the new styles and artstic movements that emerge from the medium. While these multiple viewpoints enrich the analysis and discussion of the nature of the videogame medium, they also make it difficult to achieve a unified language that allows a comprehensive analysis of the play experience, while simultaneously accepting the complexities of the design process.

Videogames are paradigmatically distinct from interactive computing systems that perform a more utilitarian role where the focus on interaction efficiency and functionality appears to be a sufficient concern. Essentially, videogames' purpose is to promote an experience (Fullerton et al., 2008). This rationale, although obvious in a certain way, requires the adoption of conceptual instruments to enable us to rationalize the nature and production of the videogame medium, in a way to support a game-specific view of design and evaluation activities (Mekler & Hornbæk, 2019; Bopp et al., 2021).

Given all these challenges, several models and instruments intent on supporting game design and development have been proposed. These might assist, for example, by providing conceptual frameworks or ontologies that promote finer, more formal understanding of the nature of videogame artefacts (Björk & Holopainen, 2004), the resulting experience of the artifact (Csikszentmihalyi, 1991; Ermi & Mäyrä, 2005; Calleja, 2007; Chen, 2007), and how the former mediates the latter (Hunicke et al., 2004). While immensely valuable in of themselves, we contend that a common feature of these instruments is that it is not always clear how these proposals can be instantiated for guiding the practice of videogame design.

Other proposals offer artifacts aimed at promoting the practical adoption of such conceptual frameworks into the game design activity as a way of supporting and empowering practitioners (Järvinen, 2005; Schell, 2008b; Lucero & Arrasvuori, 2010; Alves & Roque, 2010; Bekker et al., 2015). In this instance, they are nonetheless limited by not offering an instrument with which to relate the properties of a game's design intent with the evaluation of their influence on the gameplay experience.

The research project presented in this thesis aims to tackle both these limitations. On the one hand, to help explore the design space supported by this medium in an open and comprehensive way, not being limited to a particular game experience ideal, or video game archetype. On the other, to help structure the analysis of gameplay activity in a way that is informative to the game design process. We aim to contribute with a conceptual proposal, named the Participation Centered Game Design Model, that both supports the creation of solutions across a vast design space, and helps creators analyse the associated game play experience, so they can evaluate how close they are to converging on their intended goal.

The contribution of this work initially had, as target users, beginner game design practitioners, who likely would benefit from design guidance and exposure to the design possibilities the video game medium supports. This research was developed in the context of the teaching practice of the Game Design discipline of the Department of Informatics Engineering of the University of Coimbra. Thus, it was possible to develop the Model proposed in this dissertation, and test derivative design instruments with the cooperation of 137 students from the courses of Informatics Engineering and Design and Multimedia, throughout four academic years, revealing in the process some of its potentialities and shortcomings.

In the next section, we present and discuss the research questions that guide this research project.

1.2   Research Questions and Contributions

The global research problem underlying this work focuses on the challenge of obtaining a conceptual framework that allows creators to think of the experience design space mediated by the video game medium. We aim to enable this generative process in a comprehensive way while using the model as support for game design and game experience evaluation activities.

We argue that at the base of this challenge is the need for game design practitioners to develop a comprehensive conceptual understanding of the design dimensions, a challenge that we can see as both ontological and epistemological, and a weakness behind the imitative practice. We consider it pertinent to try to deepen the reflection on the possible origins of this ontological fragility of the video game medium in the hope of gathering concrete ideas for a better foundation of our research questions.

At the base of this ontological fragility will be the challenge of the very definition of the object of design that we understand as a videogame. In fact, the designation videogame encompasses a panoply of object typologies with diverse formal and material characteristics, therefore supporting distinct exploration styles, modes of engagement, cultural associations, and, ultimately, experiences. It helps to clarify the apparent diversity of typologies of artefacts that we call videogames if we consider the affinities and differences between examples such as "Pong" (Alcorn, 1972), "Tetris" (Pajitnov, 1984), "The Legend of Zelda" (Miyamoto & Tezuka, 1986), "The Secret of Monkey Island" (Gilbert, 1990), "Super Marios Bros" (Miyamoto, 1985), "SimCity" (Wright, 1989), "Myst" (Miller & Miller, 1993), "Alone in the Dark" (Raynal, 1992), "Doom" (Romero, 1993), "World of Warcraft" (Pardo, 2004), "Wii Sports" (Nintendo, 2006), "FarmVille" (Zynga, 2009), "Flower" (Chen, 2009), "Dear Esther" (The Chinese Room, 2008), "Journey" (Chen, 2012), "Pokémon Go" (Niantic, 2016), "Among Us" (Bromander, 2018), to name a few.

As a knowledge domain or area of study, when we talk about game design we are referring to knowledge organized into various disciplines. This presents an intersection of various body-of-knowledge which, in themselves, pose challenges of coherence. If on the one hand, it will be easy to identify examples of 'play' activity, it will not be so simple to define it across these domains, which can be anchored to disciplines such as psychology, sociology, mathematics, computer science, design, and art, etc. While it may be accepted that the different roles within a videogame development project tend to specialise, it will also be important to share a language and perspective of the object, experience, and development of a game concept for those who are beginning the study of game design.

Still, on a third level, we can think of the challenge of purpose or finality. This challenge comes from the non-utilitarian character, in its essence, of the video game medium. Fundamentally, a videogame has as its purpose to propose an activity and support a potential experience. The difficult definition and characterization of experience (Hassenzahl, 2010), together with the malleability of appropriation of the medium itself, further intensify the challenge of characterizing the nature of the video game medium.

Having discussed the challenges that we consider to be at the origin of obtaining a conceptual framework for the videogame medium, we define the following research question as an overall guideline for this research.

How can we facilitate the exploration of the design space supported by video games in a comprehensive way that includes supporting the experience evaluation of the resulting gameplay activity?

As such, the goal of this work is to obtain a conceptual framework that helps to understand and explore the possibilities of the video game medium in a comprehensive way, while at the same time facilitating its use in design practice, aiding rationalisation about the design space that this medium supports and structuring the identification and evaluation of original game experiences.

In order to answer this question more pragmatically, clarify the research problems at stake, and the analysis of the solutions we proposed, we divided this quest into several sub-questions. The remainder of this chapter describes each of these sub-questions, provides a synthetic description of our answers and the scientific contributions that materialised them.

a) How can we conceptually frame the videogame play activity to encourage exploration of the design space in a broad and diverse way?´

To answer this question we are interested in the selection and organisation of concepts that serve as vocabulary to help think about the design space supported by the video game medium. We are looking toward the organization and proposal of concepts that are fundamental for an enlightened and informed game design practice, but not confined to dominant game typologies, trying to promote a less instinctive, more rationally conscious design practice, while explicitly seeking to achieve a set of experiential goals.

The result of the first research sub-question is a game design support model we called "Participation-Centered Game Design Model" (see chapter 3). Supported by the idea of the videogame medium as a participatory context, this model proposes six perspectives to help think about the design and evaluation of the game experience, organizing these perspectives along three foci of analysis: the intention of the game experience, the video game artefact, and players participation in the game activity. The resulting model, its rationale and literature support, were partially presented in the following peer-reviewed publications:

Pereira, L. L., & Roque, L. (2012). **Towards a game experience design model centered on participation.** In CHI'12 Extended Abstracts on Human Factors in Computing Systems. Association for Computing Machinery, New York, NY, USA, 2327–2332.

Pereira, L. L., & Roque, L. (2013). **Understanding the Videogame Medium through Perspectives of Participation.** In Proceedings of the 2013 DiGRA International Conference: DeFragging Game Studies, DiGRA 2013, Atlanta, GA, USA, August 26-29, 2013. Digital Games Research Association.

b) How to operationalize the conceptual proposal into an instrument that supports the game design activity, promoting its rationalisation and collaborative discussion between practitioners?

After achieving the conceptual framework as an answer to the previous question, we are interested in finding an instrument that can help instantiate the framework in the game design practice and empower practitioners to come up with concrete and original game concepts. To this end, we foresee two challenges: on the one hand, to surface and stimulate thinking about the proposed concepts and, on the other hand, to promote discussion about them among practitioners.

The result of the second research sub-question is a practical instrument which we have called "Participation-Centered Game Design Canvas" (see chapter 4). For each of the perspectives of the above-mentioned model, the canvas shows game design questions that can help practitioners consider and develop concrete intents, enabled by each particular technological medium, design theme, and interaction motives. More than providing guidelines, by using questions we wanted to pull designers through the multidimensional design space, from design intent to artifact properties, to imagine witnessing player participation. Each game design question is accompanied by examples in order to clarify possible interpretations. We have chosen to propose this instrument in the shape of a physical object to allow a freer way of registering game design ideas and fostering face-to-face collaborative discussion among practitioners. The resulting canvas was partially presented in the following peer-reviewed publications, where we describe the design of the canvas, and how it was appropriated in several game design exercises:

Pereira, L. L., & Roque, L. (2013). **A Preliminary Evaluation of a Participation-Centered Gameplay Experience Design Model.** In Human Factors in Computing and Informatics - First International Conference, SouthCHI 2013, Maribor, Slovenia, July 1-3, 2013. Proceedings (pp. 332–348). Springer.

Pereira, L. L., Craveirinha, R., & Roque, L. (2019). **A Canvas for Participation-Centered Game Design.** In Proceedings of the Annual Symposium on Computer-Human Interaction in Play (pp. 521–532). Association for Computing Machinery.

c) How to support player experience evaluation using the proposed conceptual proposal?

By evaluation support we mean to provide guidance for practitioners to plan out evaluation of players' activity and experience, helping them assess if the game artifact is mediating the intended experience. To support the definition of an evaluation strategy we will help formulate key design questions to be answered when evaluating the game experience, based on the proposed conceptual model. By sharing the same key concepts for both the design and the evaluation of the game experience, we seek to contribute to a more integrated process, that goes from conceptual intent to game artifact creation to game experience evaluation, and thus a potentially more reflective, at times divergent and at others convergent, mostly coherent design practice, always coalescing towards the driving idea of player participation.

To answer the third research sub-question we carried out three game design case studies where the Participation Model was used to support the analysis and evaluation of players participation in a game. The three game design cases demonstrated how diverse participation perspectives could play a guiding role in the definition of gameplay questions, indicators and metrics in this analysis, as well as guiding the interpretation of results. These case studies were partially presented in the following peer-reviewed publications:

Pereira, L. L., & Roque, L. (2013). **Gameplay experience evaluation centered on participation: the fátima game design case.** In 2013 ACM SIGCHI Conference on Human Factors in Computing Systems, CHI '13, Paris, France, April 27 - May 2, 2013, Extended Abstracts (pp. 1131–1136). ACM.

Pires, D., Furtado, B., Carregã, T., Reis, L., Pereira, L. L., Craveirinha, R., & Roque, L. (2013). **The Blindfold Soundscape Game: A Case for Participation-Centered Gameplay Experience Design and Evaluation**. In Audio Mostly 2013, AM '13, Piteå, Sweden, September 18-20, 2013 (pp. 9:1–9:7). ACM. <best paper award>

Pereira, L. L., & Roque, L. (2014). **Fátima postmortem**. Online-Heidelberg Journal of Religions on the Internet, Vol 5: Religion in Digital Games. Multiperspective and Interdisciplinary Approaches, Institute for Religious Studies, University of Heidelberg.

Pereira, L. L., Portela, M., & Roque, L. (2018). **Machines of Disquiet: Textual Experience in the LdoD Archive**. MATLIT: Materialidades Da Literatura, 6(3), 59-71.

1.3   Research Approach

The general research problem approached in this work is that of designing conceptual instruments that can support the game design activity. To answer the research questions presented in the previous section we needed a methodology that supported the proposal, development, and evaluation of these types of artefacts. Design Science Research (DSR) is such a research methodology that accurately fits these needs.

Design Science Research "involves the analysis of the use and performance of designed artifacts to understand, explain and very frequently to improve on the behavior of aspects of Information Systems. Such artifacts include - but certainly are not limited to - algorithms (e.g. for information retrieval), human/computer interfaces and system design methodologies or languages." (Vaishnavi & Kuechler, 2004). Research outputs of DSR include constructs, models, methods, instantiations, and theories (Vaishnavi & Kuechler, 2004).

To assess whether the proposed design artifacts fit the research questions at hand, DSR proposes artifact instantiation to ensure the design validation, for "artifact instantiation demonstrates feasibility both of the design process and of the designed product" (Hevner et al., 2004). Thus, through the instantiation of artifacts, it is possible to "determine how well an artifact works, not to theorize about or prove anything about why the artifact works" (Hevner et al., 2004).

Design Science Research consists of an iterative process, which includes several phases. The phases are Awareness of Problem, Suggestion, Development, Evaluation, and Conclusion, see figure 1.1 (Vaishnavi & Kuechler, 2004). Design Research starts with an Awareness of the Problem from which it is generated a proposal for a new research problem. In the content of this work, the problem is the lack of conceptual guidance for the game design activity in a comprehensive way. The output of this step is the Proposal for a new research effort. In the Suggestion step, a possible solution is created through abduction, based on the knowledge gathered previously. The output of this step is a Tentative Design, which can be seen as an initial draft proposal for the actual solution; this "is an essentially creative step wherein new functionality is envisioned based on a novel configuration of either existing or new and existing elements" (Vaishnavi & Kuechler, 2004).
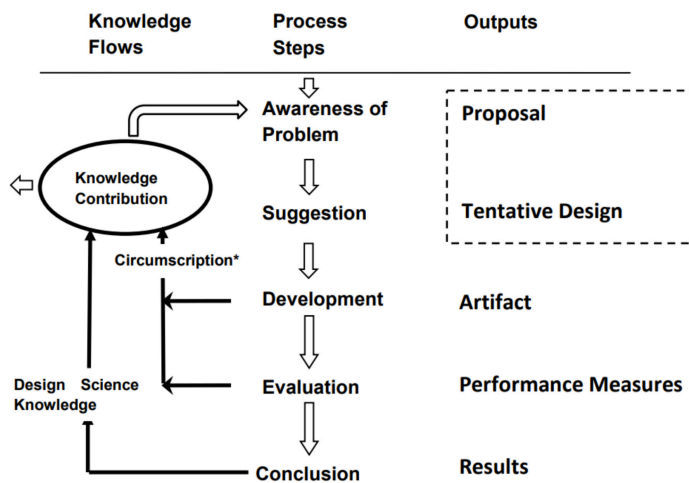
Figure 1.1 Design Science Research Phases (Vaishnavi & Kuechler, 2004)

In the Development stage, the result of the previous stage is materialized in an artifact that can be used in practice, allowing us to move on to the next stage of Evaluation, where the solutions are assessed against the requirements initially defined. This process is typically iterative until the research results prove to be satisfactory, achieving the Conclusion step.

In figure 1.2 we present a diagram of the research plan put into practice in this work. The research plan was developed following the DSR steps and organized in three major phases, each seeking to answer one of the research sub-questions:

Phase 1. Model Creation

This phase sought to propose the conceptual model for game design support and is described in chapter 3. It began with the recognition of the research problem we aimed to solve (codified in the research questions), and which resulted both from analysis of related literature and the author's game design teaching practice (which would be the context in which this research work would eventually take place).

In the suggestion step, we began by sketching our conceptual approach, the Participation Centered Model, based on related literature (see section 3.2). This model was structured around the idea of the video game medium as a context of participation, and composed from six perspectives of participation (in themselves, the result of synthesis of related proposed models and theories) to meet the criterion of comprehensiveness (section 3.3).
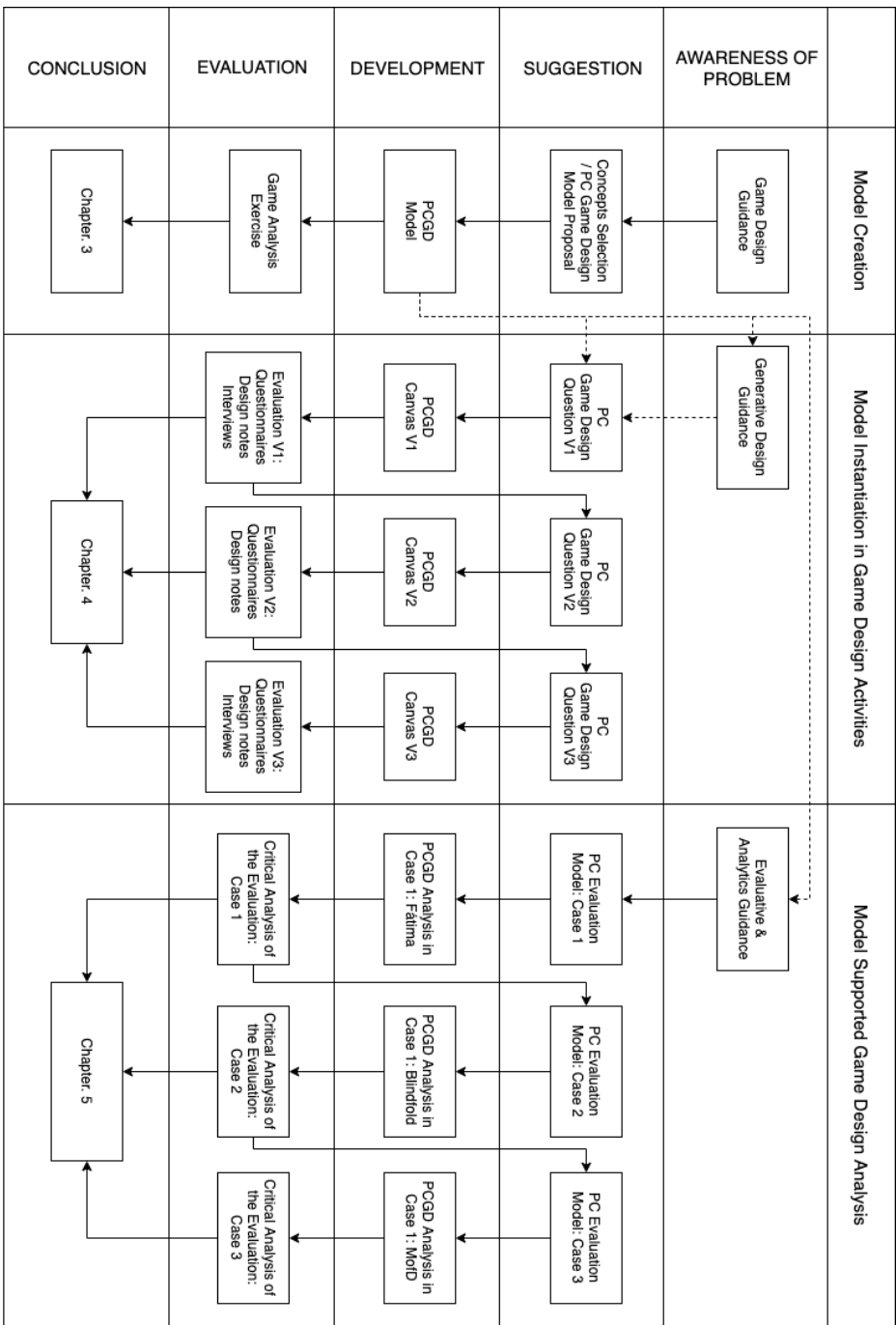
Figure 1.2 The research project is divided into Design Science Research Phases of Awareness of Problem, Suggestion, Development, Evaluation, and Conclusion

In the development phase of the model, we organised the perspectives into three foci of analysis: the designer's intention for the game experience, artifact properties, and the aesthetics of player participation. These foci were incorporated to facilitate instantiation of the model in the game design activity, by structuring the design into a 3-stage process: clarifying the intent, defining how intent could be materialised into a set of artifact properties, and then planning how players would experience and participate in the game activity (when interacting with the game-artifact).

In order to make a pre-assessment of the proposed model, an analysis of 6 vastly different video games was made using the model's 6 participation perspectives (section 3.3). This allowed us to assess if the model was comprehensive enough to support rational analysis of these different objects, and doing so confirm the plausibility of its usefulness for further research. Conclusions from this phase were then extracted and are materialised in this thesis's chapter 3.

Phase 2. Model Instantiation in Game Design Activities.

In the instantiation phase of the Participation Centred Model, the goal was to operationalize the proposed concepts into instruments that could empower practitioners to make concrete game design decisions; see chapter 4. Our suggestion was to elaborate a set of game design questions for each of the Model's six participation perspectives, with each question intent on prompting practitioners to create novel design ideas, e.g. "What roles do players play?" (see section 4.2).

In the development stage, we developed the Participation Centered Game Design Canvas, a physical, printed map of the questions, laid out in a suggestive manner to prompt designers to write their answers/design ideas on paper. The canvas was intent on supporting groups of practitioners ideating their designs collaboratively, hence providing space for written annotations.

The use of the canvas was then tested in the evaluation stage, in an academic context with the collaboration of game design students. Students used the canvas to generate game design ideas for their course projects. This allowed us to collect evidence of the Canvas' use through self-report questionnaires, analysis of their design annotations, and post-workshop interviews with the students. Following the DSR methodology, this process was repeated over 3 cycles across several academic years, with the canvas being iterated and refined upon based on findings from the previous cycle (among others, the number of canvas' questions and their vocabulary changed, and examples of alternative elements to each

question were added). A total of 33 game designs were created supported on the Canvas and audited by this research process. As above, this phase's conclusions were materialised in this report's chapter 4.

Phase 3: Model Supported Game Design Analysis

The third phase of this thesis focused on exploring the Participation Centered Model as a guide for the evaluation and analysis of players' experience with the game.

In the suggestion step we planned out strategies for evaluating 3 game cases (one per cycle of this phase, see section 5.2 and 5.3 and 5.4) using a Goal Questions Metrics Approach (or GQM, see Basili et al., 1994). For each of these artifacts, the Participation Centered Model's perspectives were used as basis for deriving the set of goals, probing questions and gameplay indicators in the GQM.

The development step corresponded to the actual gameplay experience analysis, where the GQM approach was implemented to evaluate three games. Data was collected from hundreds of game sessions, and we conducted analyses to determine whether player participation was convergent to designer intentions for each of the game's artifacts. In this way we demonstrated the use of the model as a guide for experience evaluation in three cases of game design (see section 5.2, 5.3, and 5.4). Critical analysis of the outcome of the preceding evaluation procedure was done in DSR's Evaluation step, and the strengths and weaknesses of this process were identified; this served to assess the model's applicability for gameplay experience evaluation across these 3 different games (see section 5.2 and 5.3 and 5.4). This phase's conclusions were then materialised in this report's chapter 5.

1.4   Document Structure

In this section, we present how the document is organised. In chapter 2, we present an overview of related literature, while discussing models and instruments that informed our own proposals. The first sub-sections present the key concepts within this research's domain. We then discuss the steps of an iterative game design process, providing the context in which the Participatory Model would be introduced. In the Game Design Tools section, we review different types of competing game design support tools, highlighting their strengths and weaknesses. Finally, in the Discussion section, we present the conclusions we extracted from the literature review and how it informed our own proposals.

In chapter 3, we present the Participation-Centered Game Design Model, our conceptual approach intent on answering the first research sub-question. We start by arguing the reasonability of using Participation as the key organising concept within our proposal. We then present our model constituted by six proposed perspectives of participation and three foci of analysis. In order to pre-assess its comprehensiveness, we applied the model as a lens to describe and reflect on the design of six videogames. We end this chapter by discussing the potential weaknesses of the conceptual proposal, as well as the opportunities that were to be explored in the ensuing chapters.

In chapter 4, we present the construction of the Participation-Centered Game Design Canvas, an instrument aimed at helping to operationalise the model. This chapter is organised into three subsections (4.2, 4.3, 4.4) for three DSR iterations. In each iteration, we describe the respective version of the instrument canvas, how it evolved from the previous DSR step, how it was applied in the corresponding game design exercises, and an evaluation of the use of the canvas. Finally, we summarise the evidence obtained over the three DSR iterations.

In chapter 5, we show how the Participation-centered model was used to guide the game activity analysis of three games: Fatima (5.2), Blindfold (5.3) and Machines of Disquiet (5.4). In the end we discuss the potentialities and weaknesses found in a critical analysis of the game evaluation process

Finally, in chapter 6, we summarize our current contribution to the body-of-knowledge in answers to the proposed research questions, discuss the limitations of the instruments (6.2) and, finally, paths for future work (6.3).

2   BACKGROUND

2.1   Play and Games

Play and games are the objects of design on which this research work reflects. Understanding their nature is essential for an enlightened game design activity. Play happens all around us; however, it is complex to define. A cat playing with a ball of yarn, a baby playing with a ball, a carnival procession, an erotic role-play fantasy, locating pokémons in the middle of a street — these are all examples that can configure a play activity. The universal and diverse character of the play phenomenon makes it easy to identify examples, but at the same time, it increases the difficulty in finding a definition that both limits what constitutes it, while encompassing and capturing the essence of its myriad forms. The challenge in defining play is at the origin of "The Ambiguity of Play" by Brian Sutton-Smith (1997), where the author points out three orders of reasons for the ambiguity that characterizes play activity: the diversity of play activities and experiences, the diversity of players and scenarios in which play occurs, and the diversity of areas of study where play demands our interest.

Johan Huizinga and Roger Caillois are two influential authors in the field of game studies, especially for characterizing the concepts of play and games. Huizinga (1971) analyzes the play phenomenon as a cultural element in different fields such as language, war, poetry, philosophy, art, etc. Various attempts to summarize a definition of play can be found in this book, such as:

> *[Play is] a free activity standing quite consciously outside "ordinary" life as being "not serious", but at the same time absorbing the player intensely and utterly. It is an activity connected with no material interest, and no profit can be gained by it. It proceeds within its own proper boundaries of time and space according to fixed rules and in an orderly manner. It promotes the formation of social groupings which tend to surround themselves with secrecy and to stress their difference from the common world by disguise or other means.* (Huizinga, 1971*)*

Play is a voluntary activity or occupation executed within certain fixed limits of time and place, according to rules freely accepted but absolutely binding, having its aim in itself and accompanied by a feeling of tension, joy and the consciousness that it is 'different' from 'ordinary' life. (Huizinga, 1971)

In these definitions, certain play characteristics can be highlighted, such as: it sits outside of ordinary life; it is utterly absorbing; is not to be associated with material interest or profit; takes place in its own boundaries of time and space; proceeds according to rules; creates social groups that separate themselves from the outside world (Salen & Zimmerman 2004; Juul 2005). As well as the operational value that these characteristics may have for the organization and systematization of game design instruments, it is important to consider the pedagogical value and culture, as it is one of the first comprehensive reflections on the play phenomenon.

From a critical view of Huizinga's work, Caillois (2001) comes forward with a more precise definition in which the play activity is characterized by six qualities, namely:

Free: *in which playing is not obligatory; if it were, it would at once lose its attractive and joyous quality as diversion*
Separate: *circumscribed within limits of space and time, defined and fixed in advance;*
Uncertain: *neither the course nor the result of which can be determined beforehand, and some latitude for innovations being left to the player's initiative;*
Unproductive: *creating neither goods, nor wealth, nor new elements of any kind; and, except for the exchange of property among the players, ending in a situation identical to that prevailing at the beginning of the game;*
Governed by rules: *under conventions that suspend ordinary laws, and for the moment establish new legislation, which alone counts;*
Make-believe: *accompanied by a special awareness of a second reality or of a free unreality, as against real life.*

Along with these characteristics, Callois proposes two concepts to classify the play activity according to a spectrum ranging from paidia (a free-form, spontaneous, child-like type of play) to ludus (rule-based, structured play). We believe that in the context of the practice of game design, this idea of a spectrum

on the structuration of play activity may be useful to think about opportunities for freedom or restrictions defined in the design of a videogame. To illustrate the relevance of these concepts, we consider that it is worth quoting the following paragraph.

> *[Games] can [also] be placed on a continuum between two opposite poles. At one extreme an almost indivisible principle, common to diversion, turbulence, free improvisation, and carefree gaiety is dominant. It manifests a kind of uncontrolled fantasy that can be designated by the term paidia. At the opposite extreme, this frolicsome and impulsive exuberance is almost entirely absorbed or disciplined by a complementary, and in some respects inverse, tendency to its anarchic and capricious nature: there is a growing tendency to bind it with arbitrary, imperative, and purposely tedious conventions, to oppose it still more by ceaselessly practicing the most embarrassing chicanery upon it, in order to make it more uncertain of attaining its desired effect. This latter principle is completely impractical, even though it requires an ever greater amount of effort, patience, skill, or ingenuity. I call this second component ludus.* (Callois, 2001)

Combined with the concepts of paidea and ludus, Caillois proposes four basic categories of play (see figure 2.1), namely agôn (competition), alea (chance), mimicry (simulation) and ilinx (vertigo). The four categories are briefly explained as:

- Agôn: Competitive play, as in Chess, sports, and other contests
- Alea: Chance-based play, based in games of probability
- Mimicry: role-playing and make-believe play, including theatre and other exercises of the imagination
- Ilinx: Playing with the physical sensation of vertigo, as when a child spins and spins until he falls down

When presenting the characteristics and concepts about play and games, more than looking for an exact definition, we are interested in identifying a conceptual basis that can serve as a starting point for the creation of instruments to support game activity design. Caillois classifies 2 extremes of the play activity and 4 categories of play offer precisely just that: a first approximation to framework for us to conceptualise and categorise play activities.

	AGÔN (Competition)	ALEA (Chance)	MIMICRY (Simulation)	ILINX (Vertigo)
PAIDIA Tumult Agitation Immoderate laughter	Racing Wrestling Etc. Athletics } not regulated	Counting-out rhymes Heads or tails	Children's initiations Games of illusion Tag, Arms Masks, Disguises	Children "whirling" Horseback riding Swinging Waltzing

Kite-flying
Solitaire
Patience
Crossword
  puzzles
 	
LUDUS
	Boxing, Billiards
	Fencing, Checkers
	Football, Chess
	
	Contests, Sports
	  in general
		Betting
		Roulette
		
		Simple, complex,
		  and continuing
		  lotteries*
			
			Theater
			Spectacles in
			  general
				Volador
				Traveling carnivals
				Skiing
				Mountain climbing
				Tightrope walking

Figure 2.1 Classification of Games (Callois, 2001)

In the context of game design literature, "Rules of Play" by Salen and Zimmerman (2004) is probably one of the earliest influential books, mixing practitioner and academic perspectives. Not only for the breadth of the themes it addresses, inherent in the multidisciplinarity of the game design activity, as well as for the collection of references and authors from different areas. In this book Salen and Zimmerman propose the following general definition of play:

> *Play is free movement within a more rigid structure.*
> (Salen & Zimmerman, 2004)

Although this definition can also be considered too comprehensive and synthetic, its metaphorical character can be useful to think about the nature of the opposition (and support) between the "free movement" and the "rigid structure", from which play emerges. This theme mirrors, to some extent, Caillois paidea to ludus spectrum.

Based on Huizinga (1971), Caillois (2001), Avedon and Sutton-Smith (1979), Salen and Zimmerman (2004), Gonzalo Frasca (2007) proposes the following definition of play.

> *Play is to somebody an engaging activity in which the player believes to have active participation and interprets it as constraining her immediate future to a set of probable scenarios, all of which she is willing to tolerate.* (Frasca, 2007)

Frasca begins by defining play as a subjective activity, both from the point of view of the player and the observer, that the recognition of an activity such as play can

vary from person to person. The activity is described as engaging in the sense that it is a source of pleasure, in the words of the author, "which should not necessarily need to be understood as fun", and that holds the player's attention. Also in this definition, active participation of players is not seen as a requirement of play activity; play activities also include gambling activities, in which players believe they are in control, even if they do not influence the activity result.

With the remaining characteristics set out in the definition (the constraining of immediate future and the willingness to tolerate foreseeable probable consequences), the author differs from an understanding that play activity is a phenomenon separated from real life, as advocated by other authors, such as Huizinga (1971) or Jesper Juul (2005), who state that the consequences of a game are optional and negotiable.

Concepts such as ludus and paidia, when viewed as a spectrum of structure and formality in the play activity, can help distinguish games from other forms of play. Salen and Zimmerman (2004) also reflect on the relationship between play and games that, in this case, are seen as mutually constituting concepts. That is, that games are a subset of the activities that we can consider play, and that play is an element of games. The authors describe this idea as follows:

> ***Games are a subset of play:*** *Games constitute a formalized part of everything we might consider to be play. Playing catch or playing doctor are play activities that fall outside our definition of games (a contest of powers with quantifiable outcome, etc.). However, although not all play fits the category of games, those things we define as games fit within a larger category of play activities.* (Salem & Zimmerman 2004: 303)

> ***Play is an element of games***: *In addition to rules and culture, play is an essential component of games, a facet of the larger phenomenon of games, and a primary schema for understanding them.* (ibid)

With the development and consolidation of the game studies field, more detailed proposals for defining the fundamental concepts of this area arise, namely game definitions. As an example, we present three "systemic" game definitions that we will analyze below.

> *A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome.* (Salen & Zimmerman 2004)

> *A game is a rule-based system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels attached to the outcome, and the consequences of the activity are optional and negotiable.* (Juul 2005)

> *A game is a form of play where players agree on a system of rules that assigns social status to their quantified performance.* (Frasca 2007)

These authors thus define a game as a system of rules. However, in the development of the definition, Frasca considers that a game can either be understood as an object or as an activity. This conceptual framework helps us come to a clearer understanding of the object and outcome of the game design activity.

Another common aspect here is the valorization of players' performance due to the quantifiable result, another significant characteristic in the differentiation of play and game. In the definition of Frasca, there is also reference to the social dimension of a game.

According to the concepts presented in this section, instruments intended support game design, should take into account the following aspects: the diversity of the play activity, its different categories, how they provide different experiences (Huizinga, 1971; Caillois, 2001; Sutton-Smith, 1997); the free and voluntary nature of play activity (Huizinga, 1971; Caillois, 2001); the possible levels of formality of the play activity (Caillois, 2001); the significant dimension of play activity (Huizinga, 1971; Caillois, 2001); the formal aspects of a game, such as the valorization of the player's effort and the quantifiable result around the resolution of a conflict (Salen & Zimmerman, 2004; Juul, 2005); the social dimension of a game (Huzinga, 1971; Frasca, 2007). In the next section, we will analyze if and how these definitions and key concepts can be used and expanded upon when discussing and studying videogames.

2.2   Videogames

We will employ the word videogame in this thesis, when referring to computational mediations (Roque, 2005) of the play activity; i.e. forms of play where the activity is partially or completely supported by computational artifacts. With the creation of the first electronic games, such as Tennis for Two

(Higinbotham, 1958), Spacewar! (Russell, 1962) and, later, Pong (Alcorn, 1972), a new form of play emerged that became a widespread phenomenon comparable to other types of entertainment, such as music or cinema, both at a cultural and industrial level.

The diversity of forms that the play activity can take was then changed, expanded, and empowered by the expressive opportunities offered by computational media. When studying the videogame design activity, one must consider the different experiences a videogame can enable, and towards that end, we must consider both the characteristics of play in its broadest sense, as well as the specific characteristics the play activity acquires when computationally mediated.

One aspect that is usually pointed out as unique to the videogame medium is the possibility that a videogame can actively influence the course of the game activity.

In Cybertext (1997), Espen Aarseth analyzes textual works that demand readers play an active role, reconfiguring and exploring the textual space, instead of just a passive, interpretative one as is usual in literature. The author proposes "ergodic" as an alternative concept to "interactive", defining ergodic literature as texts where "nontrivial effort is required to allow the reader to traverse the text". Aarseth defines interactivity following Peter Bøgh Andersen (1990), stating "An interactive work is a work where the reader can physically change the discourse in a way that is interpretable and produces meaning within the discourse itself….". Aarseth's contention is that "What it describes, however, seems coincidental to the term interaction and is perhaps better described as participation, play, or even use". The author's reservations come from interactivity being a vague concept, and its connotation in industrial rhetoric as to mean something "new" or "better" than earlier technology.

Within the context of this research work aiming to propose design tools for an interactive medium, it seems relevant to have an awareness of these different perspectives on what might be considered interactive. The term of interaction has been used in the Human-Computer Interaction field and community with different meanings. In a recent publication, Kasper Hornbæk and Antti Oulasvirta (2017) review the literature in this area and summarize diverse models or paradigms underlying the study of interaction: dialogue, transmission, tool use, optimal behavior, embodiment, experience, and control.

Defining what is or is not a videogame can be a more challenging task than it appears at first sight, as Mark Wolf suggests. In the book "The Art of Videogames" Grant Tavinor (2009) proposes the following definition of a videogame.

> *X is a videogame if it is an artifact in a visual digital medium, is intended as an object of entertainment, and is intended to provide such entertainment through the employment of one or both of the following modes of engagement: rule and objective gameplay or interactive fiction.*

In this definition, the author tries to combine diverse theoretical approaches found in the game studies literature, such as the perspective of a videogame as a game system, usually framed as the ludological approach, and the narratological view that emphasizes the fictional elements of a videogame.

Although the author also considers the perspective in which videogames are analyzed as narratives, narrative is not considered an essential feature for a videogame. While we recognize the value of combining different perspectives found in the literature, we consider a limitation to have such a dichotomous view of what may be a videogame. Also, the definition poses a videogame to be an artifact in a digital visual medium, therefore excluding artifacts that do not make use of the visual medium, such as audio-only videogames (e.g. Blindfold (Pires et al., 2013)), physical playgrounds (e.g. Johann Sebastian Joust (Fabrik, 2014)) and likely other boundary videogame artifacts. . It is essential here to recognize the challenge in finding a comprehensive and unanimous definition, though this first definition offers an interesting framework to conceptualise the term.

More important than finding an exact description of what a videogame is, for the design activity, it is to understand the possibilities of what it can be, by understanding the characteristics of computational media when supporting the play activity. Salen and Zimmerman suggest to think about four qualities of digital media in the context of game design:

- Immediate but narrow interactivity: digital technology allows immediate interactive feedback reacting dynamically to players' decisions. This interaction is at the same time limited to the type of interfaces digital technology supports;
- Manipulation of information: the capacity of storage and information manipulation allows videogames to make use of

different types of data elements like text, images, audio, 3D elements, etc; these are not only explored in audiovisual representations but also in the their internal logic e;

- Automated complex systems: digital media allow videogames to automate complicated procedures, and move them forward without input from the players;
- Networked communication: digital media facilitates the interaction between players, particularly real-time communication, which offers opportunities to create multiplayer games.

These main features help us think about how the digital medium can support the game activity, on an abstract level. However, for a more grounded analysis of the building blocks of a game s, more concrete conceptual approaches are needed.

From practitioner textbooks on game design it is possible to identify a set of approaches typically considered in a game design activity, such as, videogames as ludic systems, videogames as a narrative system, videogames as simulations, videogames as virtual worlds, videogames as social systems, etc (Salen & Zimmerman, 2004; Fullerton et al., 2008; Schell, 2008b; Adams, 2010). Each of these approaches allows the creation and analysis of specific elements that may constitute a videogame, contributing with the conceptual legacy of each of the background areas, with their values and tropes. The creation of instruments to support design in this work should consider the various perspectives existing in the literature on game design, trying to contribute with a comprehensive view of what a videogame can be, without privilege, a priori, a specific approach.

2.3   Gameplay Experience

One can consider the main product or outcome of a gameplay activity (whereas or not mediated by a videogame) to be the experience it(s) participant(s) undergo. For this reason, this subjective experience can be framed as the central focus of the game design activity, whether explicitly stated or not. Hence, it is important to study any conceptual instruments that can help us conceptualise this vague concept of experience more concretely.

Research on experience and experience design has gained interest both in the field of game studies and Human-Computer Interaction. In "Technology as

Experience", McCarthy and Wright (2004) propose a framework to understand what an experience is, particularly how technology-mediated experience can be defined. Based on John Dewey and Mikhail Bakhtin's pragmatist philosophy, they arrived at the following definition:

"experience can be seen as the irreducible totality of people acting, sensing, thinking, feeling, and making meaning in a setting, including their perception and sensation of their own actions." (McCarthy & Wright, 2004)

Hassenzahl (2010), in his book "Experience Design - Technology for All the Right Reasons", defined experience as:

"an episode, a chunk of time that one went through [...] sights and sounds, feelings and thoughts, motives and actions [...] closely knitted together, stored in memory, labeled, relived and communicated to others, [. . .] a story, emerging from the dialogue of a person with her or his world through action".

Through these two definitions, the diverse and multidimensional nature that characterizes experience becomes evident. It involves continuous processes of perception, cognition, creation of meaning, physical involvement, etc. A common aspect of these two definitions is the active dimension of experience, understood as a phenomenon that emerges from the actions of the subject(s) who engage in it . A holistic approach is presented by Wright, Wallace, and McCarthy (2008), suggesting four intertwining threads to analyze experience:

- **The sensual thread**: it regards our sensory and bodily involvement in a situation, which guides us towards the concrete, tangible, and visceral nature of the experience.
- **The emotional thread**: it refers to the judgments that attach importance to others and to things about our needs and desires.
- **The spatio-temporal thread**: it covers the space-time component of the experience, how experience is situated in time and space.
- **The compositional thread**: it deals with the narrative structure of experience, how we understand the relationships between the parts and the whole of an encounter.

To provide an initial understanding of thinking about experience in the context of design, Hassenzahl (2010) presents four key properties of experience:

- Experience is subjective: an experience emerges from the relationship between the participant and the situation, objects, people, and therefore is a personal phenomenon. The deduction of the objective qualities of the circumstances in which the experience takes place, for the experience itself, is a rarely straightforward process, underlying the person's appreciation and motivation.
- Experience is holistic: an experience simultaneously involves processes of perception, action, motivation, cognition, which are integrated into a meaningful, inseparable whole. To address the different levels of interaction with technology, a conceptual tool is suggested, organized in three levels of goals: be-goals (meaning, motivation and emotions); do-goals (desired outcomes of activities and plans to achieve those outcomes); motor-goals (operational level).
- Experience is situated: an experience emerges in a dialog with the world at a particular place and time. Since the world is continually changing through our activities, two experience events are never the same. However, in different situations, we can recognize similarity between experiences, what we can call "experience patterns". Being aware of the existence of these patterns and their application is the basis of the experience design activity.
- Experience is dynamic: an experience evolves over time. The duration, timing, order, etc, have an impact on overall experiences. Thus, an experience design activity involves thinking about how time influences that experience, as much as a sequence of events is organized to achieve a given objective, as well as thinking about how an experience involves, through recurring activities over time.

These characteristics, as well as the four threads of experience proposed by Wright et al. (2008), seem interesting to us not only to help think about the nature of the experience itself but also to help reflect on the conception of instruments to support the game design activity.

Flow

In the field of game studies, concepts such as flow, immersion, and embodiment are used to address gameplay experience. Flow is possibly one of the most used concepts when talking about gameplay experience; originally

defined by Csikszentmihalyi (1975) in his study of the "psychology of optimal experience". Flow is a term intended to describe a psychological state of pure enjoyment, found in activities like book reading, games, sports, work, etc. (Csíkszentmihályi, 1991). Csíkszentmihályi describes flow as a peak experience, the "holistic sensation that people feel when they act with total involvement."

Referring to Debold (2002), Chen (2007) notes that Flow represents the feeling of complete and energized focus in an activity, with a high level of enjoyment and fulfillment. In his work, Chen (2007) argues on how to improve an experience mediated by videogames, while taking into account Flow theory principles. The argument is based on the balance of an activity's inherent challenge and the player's ability to perform it, as Csíkszentmihályi originally argued that flow is likely experienced when opportunities for action are perceived to be in balance with an individual's perceived skills. This balancing would be better achieved in what is defined as the Flow Zone, illustrated in figure 2.2.
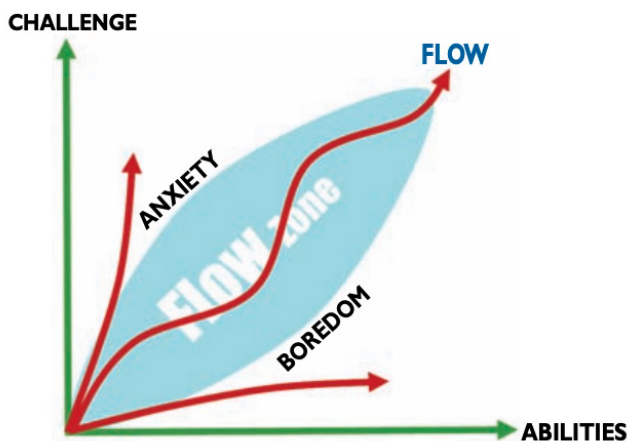
Figure 2.2 Flow Zone factors (Chen, 2007).

To reach the Flow Zone some components were identified (Csikszentmihalyi, 1975): a challenging activity requiring player skill; a merging of action and awareness; clear goals; direct, immediate feedback; concentration on the task at hand; a sense of control; a loss of self-consciousness; an altered sense of time. Chen concludes that, for a game to provide an interesting experience to the broadest number of people, the design should follow a four-step methodology: mix and match the components of Flow; keep the user's experience within the user's Flow Zone; offer adaptive choices, allowing different users to enjoy the Flow in their own way; embed choices inside the core activities to ensure the flow is never interrupted.

Nacke (2009) analyzes how some authors have been using the Flow concept in the videogame domain, like Jones (1998), Cowley et al (2008), and Sweetser and Wyeth (2005). The nature of this author's contribution is mainly about translation from a more general domain to the more specific one of videogames. Nacke analyzes each one of these models and suggests a categorical summary presenting four categories of gameplay experiences related to flow:

- **Effectiveness**: It describes the growing sense of empowerment of players when they can witness the impact of their actions.
- **Identification**: The change in perception of identity has been identified as important for the experience of flow, but it can also be related to concepts of escapism.
- **Transportation**: Primarily described as the feeling of being immersed in games. Transport may be responsible for immersion as a process of transporting the player's mind as being inside the virtual world.
- **Mental Workload**: Many elements of the flow contribute to or are a result of players' mental workload. The distortion of the perception of time that is witnessed in the flow is probably the result of the loading of the attention resources of the players continuously during the game.

Despite these proposals highlighting different perspectives on the gameplay experience, authors do not clarify how these concepts are to be translated to the game design activity. In particular it remains unclear how they inform or guide gameplay experience ideation.

Immersion

Immersion is another concept used in the study of gameplay experience. Paradoxically, it is generally assumed as a vague concept, incorporating other various concepts within its scope. Murray describes immersion as the pleasurable "experience of being transported to an elaborately simulated place" which results from the "sensation of being surrounded by a completely other reality, as different as water is from the air, that takes over all of our attention, our whole perceptual apparatus" (Murray, 1998). Even though the "being transported" metaphor has been criticized, its core idea of the immersion concept as "shift attention" is still accepted.

Ermi and Mäyrä (2005) propose a Gameplay Experience model based on the immersion concept. They highlight three types of immersion:

- **Sensory immersion**: the player becomes immersed in the sensory information – visual, auditory, and tactile - that a game provides.
- **Challenge immersion**: immersion resulting from a balance of challenges and skills, requiring motor skills and/or strategy.
- **Imaginative immersion**: immersion in the fantasy of the game, the plot, the game world, and identification with the characters.

Thon (2008) revises the immersion concept from authors such as Emri and Mäyrä and proposes a multidimensional model. The author introduces two key notions to understand the immersion in terms of "shift of attention" and "construction of situation models in the process of playing". Besides, it presents several "levels of computer game structure" and develops how these levels create different experiences. This game structure model was developed considering mainly avatar-based games in 3D environments. The four levels of this model are presented as:

- **Spatial Immersion**: described in terms of the player's shift of attention from his or her real environment to the game spaces;
- **Ludic Immersion**: described in terms of a shift of the player's attention to the interaction with the game (rules) and the construction of a situation model that contains not only the relevant elements of the game space but also the possibilities for action within it.
- **Narrative Immersion**: refers to the player's shift of attention to the unfolding of the story of the game and the characters therein and the construction of a situation model representing not only the various characters and narrative events but also the events, and the fictional game world as a whole.
- **Social Immersion**: described in terms of a shift of attention to the other players as social actors and the relationship between them, and the construction of a situation model of the social space that is constituted through the communication and social interaction between the players.

Thon's decomposition of immersion in these four levels allows us to relate them with the formal elements normally considered in a game design activity, such as the definition of the game world, game objectives, narrative elements,

etc. As described by Thon, the concept of Immersion is rather fuzzy and can arise from different dimensions of the videoludic artifact. Players can immerse themselves (or become deeply engaged) in as divergent a videogame properties as its rules (Ludic Immersion), or its story (Narrative Immersion); hence, while psychologically the player experience might be fundamentally the same (immersion), what gives rise to it is fundamentally different (rules, story, social actors, etc). Therefore, this somewhat vague nature of Immersion when divorced from further references to videogame qualities makes it – from our positioning – inoperative as a basis for models and tools that seek to support and guide the game design activity. As we need to provide design foci to work with, the lack of a firmer conceptual ground makes Immersion as an unfit candidate dimension for the model. However, the Immersion dimensions – sensory, challenge and imaginative, or spatial, ludic, narrative, and social – that underpin the Immersion construct as presented by Ermi and Mäyrä (2005) and Thon (2008), seem to be materialized on far more concrete grounds, which makes them better candidates., This relationship will be further developed in the conceptual proposal to support game design presented in chapter 4.

Embodiment

Another theme found in the literature on gameplay experience is the body's role in the experience's fruition. Henrik Nielsen (2010) suggests that the experience of playing videogames is grounded and enjoyed as an activity that arises from the player as a situated and embodied subject-in-the-world. To support this thesis, Nielsen adopted Richard Shusterman's somatic notion of lived experience and the unity of mind and body (Shusterman, 2000), to avoid dualistic wondering, which reduces the bodily to the physical. The experience of playing videogames is approached here from a phenomenological first-person perspective. To help understand the diversity of experiences that computer games offer, Henrik offers a framework that goes beyond examining the game's structural and formal elements.

Nielsen starts by referring to the concept of the intentionality of technology (Verbeek, 2008), in the sense that it isn't neutral in its mediation with the subject. Nielsen opts to refer to this concept as the word directness, alleging that intentionality is a specific characteristic of human beings. Another concept adopted by Nielsen is the concept of transformation. It is suggested that aesthetic experience can be understood as the process of habituation, that Verbeek calls a composite relation, as the composition of a human's intentionality and an object's directedness.

Considering Shusterman's concept of somatic experience, the author states that the game activity exists in a "continuum of experiential and representational somatic practices" and suggests that the analysis of the game activity occurs in three dimensions - experiential, representational and performative - presented as follow:

> **Experiential**: *From an experiential perspective, it is a somatic experience felt from within, where I constantly displace my bodily subjective space. I habituate the controller and relate to changes in the technological directedness of the game; an experience that is appreciated pre-reflectively as empowering and potentially nauseating.*
>
> **Representational**: *In a representational perspective, the experience emerges as the relation to other bodies in the game always exists in a cultural context; both my own character and role, and other bodies encountered (their audiovisual appearance, intertextual references, and/ or possible actions).*
>
> **Performative**: *In a performative perspective the experience can be described as conscious relations to the context, situation, and act of engaging as a somatic whole and watching others do the same.*
> (Nielsen, 2010)

Considering the nature of this work, the contribution is a theoretical basis for the understanding of gameplay experience, from a phenomenological perspective. This approach identifies useful concepts to help us consider the human-technology relationship in creating game design instruments.

Personalities and Players Types

Research concerning players' motivation to play a videogame and player profiling based on its preferences are also part of an approach to think about gameplay experience. Lazzaro (2004) conducted a study to know about "the role of emotion in games and identify ways to create emotion other than story scenes". The study consists of inquiries made to thirty gamers during and after a play session of their favorite games. Results were based on three types of data: video recordings of players playing games and answering questions, their questionnaire responses, verbal and non-verbal emotion cues during the play sessions. The author used as criteria to assess the data collected: what players like most about playing; what creates unique emotion without the story; which elements are present in popular games; what can be supported by psychology theories and other studies. The resulting key factors for emotion elicitation were:

> **Hard Fun**: *Emotions from Meaningful Challenges, Strategies, and Puzzles; Players like opportunities for challenge, strategy, and problem-solving.*
> **Easy Fun**: *Grab Attention with Ambiguity, Incompleteness, and Detail; Players enjoy intrigue and curiosity.*
> **Altered States**: *Generate Emotion with Perception, Thought, Behavior, and Other People; Players treasure the enjoyment from their internal experiences in reaction to the visceral, behavior, cognitive, and social properties.*
> **The People Factor**: *Create Opportunities for Player Competition, Cooperation, Performance, and Spectacle; players use games as mechanisms for social experiences.*

The motivation to play a game was also an object of Yee (2006, 2016). Yee has studied what motivates players' actions in the context of online games. He formed a model of play motivation by carrying out factor analysis on survey data collected from 3000 players regarding several different MMORPGs (Massively multiplayer online role-playing games). This model divides motivation to play into three main categories: achievement (advancement, mechanics, competition), social (socializing, relationship, teamwork), and immersion (discovery, role-playing, customization, escapism).

In a later study (Yee 2016) using survey data from over 250 thousand games, the author updated gaming motivations and identified 6 identified clusters: Action (Excitement & Destruction), Social (Collaboration & Competition), Mastery (Strategy & Challenge), Achievement (Power & Completion), Creativity (Design & Discovery), and Immersion (Story & Fantasy).

In the context of virtual worlds, already in 2004 Richard Bartle (2004) wrote about what people enjoy doing in a MUD (multi-user dungeon). Considering the kinds of pleasure they seek are embodied in the way they play, Bartle designates four main players types:

> **Achievers** *are proud of their formal status in the game's built-in level hierarchy, and how short a time they took to reach it;*
> **Explorers** *are proud of their knowledge of the game's finer points, especially if new players treat them as fountains of knowledge;*
> **Socializers** *are proud of their friendships, their contract and their influence;*
> **Killers** *are proud of their reputation and of their oft-practiced fighting skills.*

According to Bartle, the four-player profiles correspond to different motivational sources. As we can see, it is possible to find elements of common ground between these three approaches presented like the play activity

Based on neurobiological research literature, BrainHex (Nacke et al., 2011, 2014) is presented as a player satisfaction model in which different players archetypes are proposed. These player archetypes were established through a survey with around 50000 players, and were intended to model personality type motivators. The authors highlight the difference between skill-oriented archetypes (Conqueror, Daredevil, and Mastermind), aesthetic-oriented archetypes (Survivor, Socializer, and Seeker), and one goal-oriented archetype (Achiever). The players' archetypes founded in BrainHex model as described as follow:

> **Seeker**: *curiosity about the game world and moments of wonder;*
> **Survivor**: *enjoy the intensity of the terror and fear experience, at least within the context of fictional activities such as horror movies and games;*
> **Daredevil**: *enjoys the thrill of the chase, risk-taking and playing on the edge; seeks excitement solely as a positive experience;*
> **Mastermind**: *enjoys puzzles, problems that require a strategy to overcome, and making the most efficient decisions;*
> **Conqueror**: *motivated by challenge-oriented activities, enjoys struggling against adversity, defeating impossibly difficult foes, and beating other players;*
> **Socializer**: *enjoy being with people they trust, talking to them and helping them;*
> **Achiever**: *enjoy goal-oriented activities, motivated by long-term achievements;*

The authors state that archetypes can be used to design with a specific audience in mind, focusing on the game elements that the target group might find appealing. In fact it is quite common for practitioners in the field to witness a certain plasticity of profiles as players engage with and adapt playfully to the gameplay proposal.

In this section, we started by presenting fundamental properties found in the Human-Computer Interaction literature on the concept of experience, and identified key concepts about gameplay experience. Next, we identified models about players' motivation or personality. The analysis, organization, and synthesis of the concepts presented in this section will be fundamental to develop

instruments that support game design, enabling designers to think about the gaming experience in a comprehensive way, in a way that can capture as much of these differing perspectives as possible. Next we will need to focus on a characterization of the game design activity.

2.4 Game Design Activity

The Activity

The game design activity deals with second-order design problems, in the sense that gameplay experience design is an indirect process with an unpredictable result; e.g. designers create rules, but gameplay emerges only when a player actively engages with them. As Aarseth (1997) claims, "the complex nature of [videogame] simulations is such that a result can't be predicted beforehand; it can vary greatly depending on the player's luck, skill and creativity". The distinctive aspect of the videogame medium, which is the malleability and flexibility of appropriation by the players, is what makes the game design activity particular and challenging.

Hunicke, Leblanc, and Zubek (2004) argue that "the difference between games and other entertainment products (such as books, music, movies, and plays) is that their consumption is relatively unpredictable. The string of events that occur during gameplay and the outcome of those events is unknown at the time the product is finished". Chris Crawford (1984), in his seminal book "The Art of Computer Game Design", the first book on the design of digital games, puts forward this issue stating that "game design is primarily an artistic process, but it is also a technical process". So, a conscious and informed game design activity implies understanding the structures and principles that can be used to transform the formal characteristics of a game object into the qualities of a gameplay experience.

The structures and principles that can be used by a game design process can be approached from several perspectives and different levels of abstraction. As suggested by Kuittinen and Holopainen (2009), looking at different game design manuals can be useful to analyze how the authors organize these structures and principles. Rules of Play by Salen and Zimmerman (2004), even if older, is still one of the fundamental references in-game design literature. This book provides an organized and systematic view on the elements of game

design through their concept of game design schemas, which are grouped into rules (formal), experiential (play), and cultural schemas. For each one of these schemas, the authors provide some perspectives such as "Games as Emergent Systems" (formal schema), "Games as Systems of Conflict" (formal schema), "Games as the Play of Pleasure" (play schema), "Games as the Play of Meaning" (play schema), "Games as Cultural Rhetoric" (cultural schema), "Games as Open Culture" (cultural schema).

Schell (2008a), in his book "The art of game design", approaches the question through a higher-level model of mechanics, story, aesthetics, and technology. Schell presents one hundred lenses to look at the game design activity, starting from the initial goals for gameplay experience and the role of the game designer until the development and game publishing. Examples of these lenses are "The Lens of Essential Experience", "The Lens of Pleasure", "The Lens of Challenge", "The Lens of Balance", "The Lens of Playtesting", "The Lens of Transformation".

Iterative Processes

Fullerton et al. (2008), in their book Game Design Workshop, formulate games' design through a generalized structural model of gameplay consisting of formal game elements (e.g. objectives, rules, resources, outcome), dramatic elements (e.g. challenge, character, story) and system dynamics (e.g. games as systems, system dynamics, interacting with systems). From these three aforementioned books, this is the one that follows a more pragmatic approach. The authors emphasize the importance of an iterative design process and rapid prototyping to test as quickly as possible if the adopted design solutions are aligned with the desirable gameplay experience.

Iterative game design is a process where the proposed game design is tested and the results are evaluated over and over again, through the development of the game, each time improving upon the gameplay or features until the gameplay experience meets the defined criteria (Fullerton et al., 2008). Iterative design is an open-ended process, thus having a clear view of the player experience helps structure the process (Salen & Zimmerman, 2005).

Having a well-established process to organize the game design activity is an essential aspect for the success in achieving the game experience goals defined for this activity. In this sense, Fullerton et al. (2008) describe an iterative process formed by four main stages (fig. 2.3). The first stage in which game ideas are generated and the gameplay experience goals are defined. In the next

phase, game ideas are formalized, that is, written or outlined in the sense of being communicated, or even prototyped in the sense of being tested. Once the ideas are formalized and prototyped, it is possible to rehearse with players to do playtesting and collect feedback. Finally, the results are evaluated to decide whether the process should be repeated, if the conclusions are not satisfactory, or if, on the contrary, the feedback is positive, concluding the process.
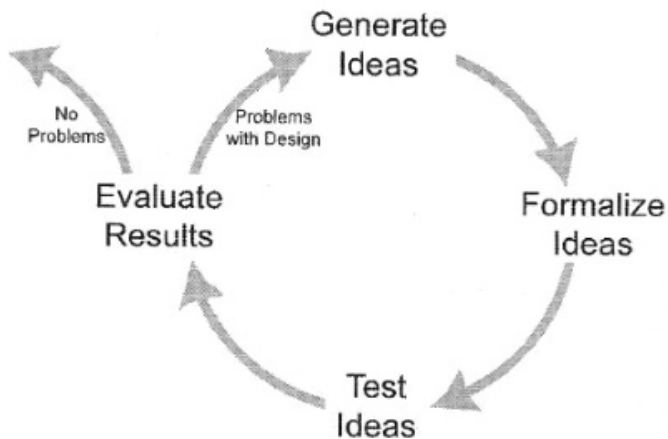
Figure 2.3 Iterative process diagram (Fullerton et al., 2008).

As in other fields of artistic expression, the generation of ideas can have different motives and inspirations. The analysis of the process of generation of ideas in the context of game design deserved the attention of authors such as Craveirinha and Roque (2011), Kultima (2010) and Hagen (2004). Craveirinha and Roque and Hagen highlight the negative impact on the creativity of the usual practice of recycling ideas within the realm of videogames, contributing to a normalization of their expression. Although the maturity of the videogame medium has evolved as a means of expression, we consider it pertinent to analyze how the design instruments can facilitate the process of systematization of generated ideas. Beyond the valorization of ideas themselves, we are interested in the role of design tools as contributions to a more effective process and, therefore, as a greater guarantee of success. A systematic review of game design instruments is carried out in the following section.

Achieving Coherence

A relevant aspect for coherence of a game design activity is the communication of the game's vision. As the game design activity is typically performed or developed by a team, communication is a key aspect in both exploring and

35

discussing design solutions, and keeping the design team on the same page in regards to any decisions. Hagen (2010) studies how game developers express the vision of the experience they want to promote through the game, and how they communicate the vision to the development team and other stakeholders. In this sense, the author summarizes a set of good practices used in these game developments, such as concise and expressive descriptions: to find words and phrases that capture the idea concisely, without using long and time-consuming descriptions; the one question: to turn the design vision into a question to use as a design decision tool; similes and exemplars: "The player experience should be similar to the experience you have when ..."; anti–exemplars: another way to characterize the player experience is to refer to something that is contrary to the experience you want.

The previous examples are verbal forms to express game design visions. As the complexity of the videogames increases and, consequently, so do the development teams, the greater becomes the necessity to use more formal ways to express game experience goals and game design decisions, which typically constitute a Game Design Document. The Game Design Document as a formal organization of game design information tends not to be used as much today (Sansone, 2014), with the game design documentation being more heterogeneous, organized according to the needs of the team and the size of the projects, in order to guarantee design consistency as a vision statement (Colby & Colby, 2019).

Prototyping and playtesting are two fundamental activities of an iterative game design process. Prototyping is the creation of a working model of the design concept that allows testing its feasibility and making improvements to it. And playtesting is defined as "something that the designer performs throughout the entire design process to gain an insight into whether or not the game is achieving your player experience goals" (Fullerton et al., 2008). Fullerton advocates the importance of prototyping through physical means. Physical prototyping saves time because it helps to focus and share a clear vision and understanding of the game being designed and also allows free experimentation.

Playtesting can be done using different techniques such as individual testing, group testing, feedback forms, interviews, and open discussions. Fullerton et al. suggest some practical questions to be used in a playtesting session: Overall, what were your thoughts about the game? What were your thoughts about the gameplay? Were you able to learn how to play quickly? What is the objective

of the game? How would you describe this game to someone who has never played it before? What would you tell them? Now that you have had a chance to play the game, is there any information that would have been useful to you before starting? Is there anything that you did not like about the game? If so, what? Was anything confusing? Please take me through what you found to be confusing.

Game User Research

Practical questions can help obtain a preliminary assessment of the gaming experience, collecting useful information to feed the design process. With the evolution of the game studies research field, several approaches have been developed to evaluate the gaming experience in greater depth. We can consider self-reporting, physiological data, and game-play metrics as the main approaches to assessing the gaming experience.

Self-reporting is one the most simple and accessible approaches to evaluate gameplay experience, and it works by directly asking players about their perception of the interaction with the videogame object (Tullis & Albert, 2008). Testimonies of players' perception can be collected through different methods such as, oral interviews, written questionnaires or electronic surveys (Isbister et al., 2006; Tullis & Albert, 2008). These methods are typically applied at different times, during the activity itself at key times to obtain information about specific tasks, or at the end of the game session (Tullis & Albert, 2008). One challenge in using the self-reporting approach is the dependency of subjects' " perception of the experience and its context and [...] ability to interpret and express their feelings "(Jenkins, Brown, & Rutterford, 2009), which can skew the accuracy of the results.

The possibility of analyzing the emotional response of players through physiological changes creates opportunities to evaluate the gaming experience through biological signals. Electromyography, skin conductance, cardiac activity, blood volume pulse are examples of biological signals used in the context of assessing gambling exercise (Isbister and Schaffer, 2008; Kivikangas et al., 2011). One of the main advantages of using physiological data for the evaluation of the gaming experience is the possibility of collecting different measurements in real time and automatically, without direct influence of the player. However, despite technological developments in this area, there are still challenges in using this approach in assessing the gaming experience in a more generalized way, as these are expensive techniques both in

equipment and in preparation time for tests, interpretation and analysis of the results.

The gameplay metrics approach makes use of automatic data collection to track player behavior. To track players, different types and sources of information can be collected, from logging of keystrokes, movements of game elements through the game world, meaningful game events, game progress metrics, etc. (Drachen & Canossa, 2009; Kim et al., 2008; Tychsen & Canossa, 2008).

Drachen and Canossa (2009) summarise the main advantages of this approach as follows: quantitative and highly detailed data on player behavior; objective way of visualizing and analyzing play-session data; detailed feedback on game design and mechanics; supplements existing methods for user experience testing and bug-tracking (data for both purposes can be collected simultaneously); assists the location of game problems (e.g. bugs and faulty patterns of play, and helps with evaluating fixes); progressive detail (gameplay metrics permit analysis from a top-down approach working towards progressively more detailed layers of analysis).

However, challenges in using the gameplay metrics approach for the evaluation of the gaming experience are also known, such as the lack of context in the interpretation of the players' behaviors, namely in the conclusion about the reason for these behaviors (Drachen & Canossa, 2009; Kim et al., 2008). Another challenge also concerns the difficulty of analyzing and sending a large amount of data in order to be useful to inform the design process (Wallner & Kriglstein, 2013). This last challenge gives rise to an opportunity to create data analysis and visualization tools that have been developed in the area of game studies (Wallner, 2013; Nguyen et al., 2015; Canossa et al., 2016; Agarwal et al. 2020).

In this section we highlighted the importance of an iterative process to organize a game design activity. Given the possible flexibility in the appropriation of a videogame by the players, it is important to have assessment tools that help inform the design activity in order to analyze whether the experience objectives initially established are being achieved. In the context of this work, we are interested in developing design tools that facilitate establishing a clear relationship between the activities of conception and analysis of the gaming experience.

2.5 Game Design Tools

The design of digital objects is mediated by different types of artifacts (Bertelsen, 2000). The game design activity is mediated by instruments that help make sense of the configuration of a game context (Roque, 2005) and conceptual models play a relevant role in informing design tools. Conceptual models are abstractions composed of concepts and relations that help us see, map, understand and analyze a domain, facilitate communication, ground design processes, and the evaluation of outcomes.

Speaking from practice, Costikyan (1994) states that "as game designers, we need a way to analyze games, to try to understand them, and understand what works and what makes them interesting", suggesting a critical language is needed. Since then, different types of game design tools have been systematized (Almeida & Silva, 2013), organizing design knowledge in diverse forms like conceptual models (Hunicke et al., 2004), design patterns (Björk & Holopainen, 2005), design guidelines (Fabricatore et al., 2002), ontologies (Zagal & Bruckman, 2008), and also in the form of tangible tools (Hornecker & Buur, 2006; Schell, 2008b; Lucero & Arrasvuori 2010; Alves & Roque, 2011).

Authors such as Neil (2012) or O'Shea and Freeman (2019) refer to the challenges in the comparative analysis of game design tools, due to methodological issues, their origins from different research fields, or even the different design intentions underlying these instruments' proposals. It is therefore difficult to assess how these qualify or rank among themselves without adequately framing them in terms of their purpose fit, field, etc.

In this section, we are interested in analyzing the game design artifacts that may support young designers in clarifying the possibilities of the game design space, especially through conceptual proposals. In this sense, we can consider the instruments already presented in the previous section to characterize the game experience as game design artifacts, such as models centered on the concept of immersion (Thon, 2008) or the typification of player behavior (Bartle, 2004; Nacke, Bateman, & Mandryk 2011; Nacke, Bateman, & Mandryk 2014).

Following we start the presentation of additional design models concerning gameplay experience.

Gameplay Experience Models

Sweetser and Wyeth (2005) developed a model, GameFlow, in an effort to evaluate player enjoyment in games based on Csikszentmihalyi's (1975) theory of flow. GameFlow is a concise model of enjoyment drawn from various previously defined heuristics, and is composed of eight elements of flow: Concentration, games should require concentration and the player must be able to focus on the game; Challenge, player's skill level must be in balance with the game challenges difficulty; Player Skills, games must support the player's learn and skill development process; Control, games need to provide players with the sense of control; Clear Goals, the goals of the game must be obvious and provided at appropriate times; Feedback, games must provide appropriate feedback at suitable times; Immersion, players should experience deep but effortless involvement in the game; and Social Interaction, games must establish opportunities for social interaction between players. Although this model was shown to be a useful tool for reviewing games and identifying issues in player enjoyment, authors state that some of the GameFlow criteria are challenging to be analyzed by an expert review, requiring player-testing to be evaluated.

Ermi and Mäyrä (2005) designed a model that aims to understand players and the experience provided by gameplay. The model consists of a heuristic representation of fundamental components that structure gameplay experience and immersion; said structure is organized in three dimensions of gameplay experience: sensory immersion, challenge-based immersion, and imaginative immersion. The first dimension, sensory immersion, is related to (...) the audiovisual execution of games. (...), i.e. how games use stereophonic and three-dimension worlds to involve the players. The second dimension, challenge-based immersion, is the feeling of satisfying balance between challenges and abilities, based on interaction. The third dimension, imaginative immersion, relates to that which enables the players to use their imagination, create connections with game characters, (...) or just enjoy the fantasy of the game. This gameplay model offers one version of a game-specific model that already considers the diversity of digital games, and which could be enhanced by evaluating gameplay experience with other components besides immersion.

Calleja (2007) proposes an analytical model for detailing players' moment of involvement in videogames, with the intent to provide ways to address issues of game involvement. The model designated Digital Game Involvement Model, constitutes six frames of involvement structured in two temporal

phases, macro-involvement which focuses the motivational game factors that influence constant engagement, and micro-involvement, focused on "(...) moment by moment involvement (...)" of the gameplay. Regarding the six frames of involvement these are tactical involvement (decision making), performative involvement (game controls), affective involvement (emotional), shared involvement (relation with others), narrative involvement (storytelling and interpretation), and spatial involvement (localization). Each of the frames presented describes a spectrum of player experience "(...) ranging from conscious attention to internalized knowledge.". With this model, the authors aim to better understand the concept of immersion and the relationship between players and digital games.

Takatalo et al. (2010) propose a psychological research framework to analyze multidimensional user experience in games. It is based on three concepts: Presence, for the perception, and attention given to the game; Involvement, for amount of player motivation; Flow, for evaluation of a cognitive-emotional engagement. Each concept includes subcomponents that are assessed by a questionnaire of 180 items (1-7 Likert-scale and semantic differentials) measuring different experiential aspects related to human-computer interaction. The framework can be included into different phases of the game development cycle, providing desired attributes for the UX, inspiration for new game designs, and tools to assess the UX alongside game usability.

These models/frameworks allow us to think about the game experience through a set of core concepts such as flow, immersion, involvement, presence, perception and attention. These concepts are centred on the player, being framed in the theoretical field of psychology, thus allowing them to contribute to a deeper reflection on the nature of the gaming experience supported by videogames. One of the common aspects of these proposals is their internal structure which is derived at a second level from concepts usually referred to as frames, dimensions or elements. The development from key concepts from other media categories or disciplines, to characterise the game experience, thus contributes a vocabulary to express and analyze the gameplay. However, it is not yet clear how these concepts once focused on the game experience can be related to the formal characteristics of the videogame object.

In the following we present instruments that can be considered as support to game design, which are characterized mainly by the enumeration and organization of concepts that may serve as vocabulary useful in the game design practice.

Game Design Models and Frameworks

The concept of Formal Abstract Design Tools (FADTs) was introduced by Church (1999) as a method of achieving a common design vocabulary. More precisely, FADT is a framework that consists of a number of tools, or FADTs, that enable the refinement of game design practice. Church presents three FADTs that were conceptualized by analyzing a range of games. The first tool is "intention", the process of assembling goals, learning about the world, making a plan, and then executing it. The second tool is "perceivable consequence", the way in which the game world responds to the player's action. The third and final tool is "story", the narrative thread that ties together the plot of the game and drives the player forward. By applying these tools it's possible to obtain a deeper insight into some aspects of videogames, and consequently improve their design.

The MDA (Mechanics, Dynamics, and Aesthetics) framework was provided by Hunicke et al. (2004) as a means to link game design, game development, game criticism, and technical game research. By separating concerns about games into Rules, System, and "Fun" and defining their design counterparts, Mechanics, Dynamics, and Aesthetics, this approach formalizes the way games are consumed. Mechanics are the actions, behaviors, and control mechanics the player is provided with while playing a game. Dynamics refers to how a system reacts to player inputs and each other's output based on its interactions over time. Aesthetics is defined as the desirable emotions evoked in a player when engaging with a game system. With these concepts, the framework considers both the game designer's perspective and the player's perspective. Regarding the former, the mechanics lead to dynamic system behavior that then provides opportunities for particular aesthetic experiences. Whereas the latter, aesthetics set the tone, which leads into observable gameplay dynamics and ultimately, into exploring operable mechanics. Furthermore, this framework offers eight concepts that describe Aesthetics: Sensation - the game as sense-pleasures; Fantasy - game as make-believe; Narrative - the game as drama; Challenge - game as obstacle course; Fellowship - game as social framework; Discovery - the game as uncharted territory; Expression - the game as self-discovery; and Submission - the game as a pastime. Overall, since its introduction, MDA has been able to aid the design and tuning process by conceptualizing the dynamic behavior of player-game systems.

According to Järvinen (2008), game mechanics are a means of guiding the player towards a specific behavior by limiting the possible paths to a goal. Further, it is

through game mechanics that players interact with all the components of a game, including rules and representations. Järvinen (2008) created a library that contains a list of 40 game mechanics categories, such as "building", "choosing", "controlling", "jumping", "moving", and "transforming". Each category is understood as a verb, since game mechanics are related to the actions that players perform while playing a game. With this approach it is possible to depict how players use mechanics and how to improve game systems to generate them. However, it is less useful, for example, in a sandbox style of gameplay due to the fact that this type of games might not have a predefined goal.

Games vary greatly in content, gameplay, and why they are played, so the study of games can be very challenging and complex. With that in mind, Björk and Holopainen (2005) developed a model that utilizes game design patterns to investigate and catalog game element patterns. The model consists of a structural framework that describes components of the game as design patterns that detail player interaction while playing. Regarding the former, it consists of game instance, game session and play session which delimit the activity of playing. The framework describes game elements in three categories: bounding, temporal, and objective. The bounding category comprises goals, rules, and game modes, i.e. describes the activities that are or not allowed in a game. The temporal category contains actions, events, end conditions, evaluation functions and closures, and details the temporal execution during gameplay. Lastly, the objective category represents physical game components and consists of players, interfaces, and game elements. Considering the latter, design patterns separate design knowledge into related elements as a method for describing game mechanics, i.e. design patterns describe design elements. Each game design pattern consists of a name, a description, consequences, usage, and relations with other patterns. By utilizing both of these concepts and combining multiple design patterns, it's possible to describe current games and extend the language with new game design patterns, to be used for analysis, comparison and design of games.

The Game Ontology Project (GOP) aims to provide a common vocabulary of game design concepts (Zagal et al., 2007; Zagal & Bruckman, 2008). The purpose of the GOP is to develop a framework that describes game elements, their relationships, organizing them hierarchically. The top level of the ontology is divided into five elements: Interface - relation between the player and the game, i.e, how the players interacts with the game and what feedback does the game gives to the player; Rules - what can or can't the player do in the game; Goals - objectives of the game; Entities - objects that the players interacts with

in the game; Entity manipulation - actions that can be done by the player and by game entities (Zagal et al., 2007). Each ontology entry contains a title/name, a description of the element, a parent element, one or more child elements, and examples of games that include the element. These examples are divided into two classes: "strong" example and "weak" example. The former consists of canonical examples of a particular entry, while the latter describe the cases where it's possible to reinforce the element to a certain extent. Zagal and Bruckman (2008) demonstrated that the use of GOP in the learning of game studies aided students to have a better understanding of videogame concepts. Despite that, the project has an issue with scalability since it is targeted toward more abstract concepts than actual videogame contents.

To aid the process of creating and designing playful interactive experiences, Costello and Edmonds (2007, 2009) developed a tool/framework based on six theories that characterize the pleasurable aspect of a play experience. More precisely, theories of philosophers Karl Gross and Roger Callois, psychologists Mihaly Csikszentmihalyi and Michael Apter, and game designers Pierre Garneau and Marc LeBlanc; these focus on defining a play experience, understanding play as a type of pleasurable experience, stimulation of play, and delineating types of pleasure in games, respectively. Based on these theories, thirteen pleasure categories within the play framework were defined: Creation - pleasure in creating something while interacting and in the capability of creativity expression; Exploration - pleasure in exploring a certain scenario; Discovery - pleasure in working something out; Difficulty - pleasure in making overcoming an obstacle; Competition - pleasure in achieve a defined goal; Danger - pleasure in taking risks and feeling scared on in danger; Captivation - pleasure in feeling mesmerized or spellbound by something or someone; Sensation - pleasure in physical action (vocalising, body movements, etc.); Sympathy - pleasure in sharing emotional and/or physical feeling; Simulation - pleasure in associating something with real life; Fantasy - pleasure in perceiving "(...) fantastical creation of the imagination."; Camaraderie - pleasure in the development of relationships; Subversion - pleasure in breaking the rules and twisting the meaning of something. Using these concepts, the framework can be used as a design or evaluation tool, to develop new concepts and aid the process of making design choices.

Korhonen et al. (2009) designed a framework of playful user experiences, based on the study conducted by Costello and Edmonds (2007, 2009), called PLEX. The PLEX framework adjusts and expands this study by taking into account previous work on pleasurable experiences, game experiences, emotions,

elements of play, and reasons why people play. As a result of this analysis, the overall focus of the framework changed from pleasures to experiences, since not all game experiences are pleasurable. With this intent, 19 playful experience categories were defined (table 2.1). Korhonen et al. (2009) assessed the framework with 13 players in 3 different games and, based on the evaluation, added new categories to the framework. Although the list of categories is not a scientific model of experience, this framework can be used as an aesthetics oriented tool to evaluate and improve the design of games.

Category	Description
Captivation	Experience of forgetting one's surroundings
Challenge	Experience of having to develop and exercise skills in a challenging situation
Competition	Experience of victory-oriented competition against oneself, opponent or system
Completion	Experience of completion, finishing and closure, in relation to an earlier task or tension
Control	Experience power, mastery, control or virtuosity
Discovery	Experience of discovering a new solution, place or property
Eroticism	Experience of sexual pleasure or arousal
Exploration	Experience of exploring or investigating a world, affordance, puzzle or situation
Expression	Experience of creating something or expressing oneself in a creative fashion
Fantasy	Experience of make-believe involving fantastical narratives, worlds or characters
Fellowship	Experience of friendship, fellowship, communality or intimacy
Nurture	Experience of nurturing, grooming or caretaking
Relaxation	Experience of unwinding, relaxation or stress relief. Calmness during play
Sadism	Experience of destruction and exerting power over others
Sensation	Meaningful sensory experience
Simulation	Experience of perceiving a representation of everyday life
Subversion	Experience of breaking social roles, rules and norms
Suffering	Experience of frustration, anger, boredom and disappointment typical to playing
Sympathy	Experience of sharing emotional feelings
Thrill	Experience of thrill derived from an actual or perceived danger or risk

Table 2.1 The PLEX framework (Korhonen, 2009).

The game design support models presented here have as a common characteristic the proposal of a vocabulary to express the game experience or the characteristics of the videogame object. These vocabulary proposals are typically obtained by synthesising previous proposals, organised into different conceptual structures, such as enumerations of concepts (Costello & Edmonds, 2009; Korhonen et al., 2009), design patterns (Björk & Holopainen, 2005) or game mechanics (Järvinen, 2008). Noteworthy for its pragmatic articulation of the concepts is still the MDA model (Hunicke et al., 2004) which places the

Aesthetics concepts proposed to describe the game experience framed together with the perspectives of Mechanics and Dynamics. Although it represents an effort to elaborate a more systemic framework, MDA still does not seem to fully explore the relations between the dimension of the game experience and the characteristics of the videogame object. This is a shared problem with the models presented in the previous section. Another aspect that does not seem particularly developed to us is how these models can be instantiated or operationalized in the practice of game design activities, that is, how to move from the proposed concepts to concrete game design decisions.

The next section presents instruments that support game design activity through physical devices.

Tangible Game Design Tools

Based on the PLEX framework, Lucero and Arrasvuori (2010) developed the PLEX cards, a design deck with the intention to clearly communicate the categories of the PLEX framework to enable designers to design playful experiences. In its final version, each card consists of a PLEX category, it's description, and two representative pictures, one depicting "human emotions" in black and white and the other showing an example from daily life. These cards were designed, evaluated and iterated four times until arriving at its final version. Regarding the usage of the cards, working in pairs, each participant draws a card and starts generating game ideas based on that PLEX category. Other alternative usages are the PLEX Brainstorming and the PLEX Scenario methods. In the former, a card is drawn from the deck for both players to see, then each participant can elaborate new ideas based on the categories of the three cards that they have in hand. In the latter, the participants have three cards each and have to create a scenario combining all of the categories. Furthermore, Lucero et al. (2013) made use of the PLEX cards to conduct three studies in which the goal was to evaluate playfulness in a game.

Verbs, Nouns and Adjectives (VNA) is an easy and fast method for creating high level game ideias, designed by Kultima et al. (2008). The VNA cards consist of three decks, where each deck contains verbs, nouns, and adjectives. In this turn-based game, the first player draws one verb card, shows it to the rest of the group, and describes the basic game mechanic based on that verb. The second player draws a noun card and elaborates the existing idea. The third player takes an adjective card and aims to complete the game idea by

combining all of the three elements. VNA enables the players to think outside of the box, thus resulting in new and creative game ideas.

The Card Brainstorming Game, a card game developed by Hornecker (2010), utilizes concepts from the Tangible Interaction Framework (Hornecker & Buur, 2006) to create provocative questions for a brainstorming exercise, i.e. creative thinking. These concepts are grouped in four themes: tangible manipulation, spatial interaction, embodied facilitation, and expressive representation. Moreover, each card shows the question, it's related concept, one or two representative images, and it's color-coded by theme. To play the game, taking turns each participant plays a card that they consider relevant or not, and explain their decision to the others. This generates a debate within the group to decide if the card is relevant or not, and then it is placed in its respective pile. Usually, at the end of the game, the cards are sorted in three piles: "relevant", "somewhat related", and "irrelevant". Overall these cards can be used as a tool to aid the game design process.

With the intent to aid the process of including sound design as a prime concern in game designs, Alves and Roque (2011) developed a sound design pattern language and design deck that map the content of those patterns. These patterns depict categories of sound usage that can be present in a game, for example, "Achievement", "Acoustic Ecology", "Stealth", "Footsteps", "Grunts", and "Contextual Music". The cards provide rich information on both front and back, such as the name of the concept, representative examples, a synopsis, and the relationships with other patterns. This tool aids both game designers and non-expert practitioners in the process of sound design in games, through the means of debate and combination of the various patterns, and with other game design tools.

Schell (2008b) describes perspectives on how to view games which are designated as lenses. The collection of 113 lenses includes a set of questions that the game designer should consider while designing a game. Thus, these lenses encourage designers to think about important aspects of the game to gain better understanding about its design. The lenses can be divided into five distinct categories: Designer, Process, Player, Game, and Experience. With this, Schell (2008) created a deck of ideation cards where each card details a specific lens. Each card consists of the title of the lens, it's description, an illustrative image, the set of questions, and an icon representative of the lens category.

The Exertion Cards are design cards created by Mueller et al. (2014) based on their Exertion framework (Mueller et al., 2011). The framework consists of

four lenses that offer different perspectives over exertion themes: uncertainty of exertion; awareness of exertion; expression of exertion; rhythm of exertion; risk of exertion; and understanding of exertion. The lenses are: the responding body, the moving body, the sensing body, and the relating body. Regarding the Exertion Cards, each card contains a provocative question that relates to the exertion themes with a "dimension", that varies from "a little" to "a lot", which highlights the interactive qualities of the theme. Furthermore, the cards include a short and descriptive title, and two pictures to represent either end of the "dimension" spectrum. The cards are used as a support to design exertion games. After the concept of the game is defined, it's possible to use the cards to study which exertion themes and lenses the game contains.

Wetzel et al. (2017) develop a deck of 93 ideation cards that aim to assist the process of design in Mixed Reality Games (MRG). The cards consist of three types that have a specific function in the ideation process: Opportunities, Questions, and Challenges. The first type, Opportunities, details a concept, mechanic, or element of a MRG. The second type, Questions, provides questions that the users can answer to further develop the game design idea. The third type, Challenges, describe common issues and obstacles that can affect MRG. The graphical layout of the cards denotes it's type, Opportunities, Questions and Challenges. Further, each card represents a specific category (audio, gameplay, locations, management, physical, players, sensors, technology, and time) which is color-coded and written next to the type. The principal content of the card is composed by a representative photo, a title and a three-line description. By combining cards, game designers are able to generate, develop, and document ideas for their MRG.

Based on their previous work (Bekker et al., 2014), Bekker et al. (2015) developed a design deck composed of a set of lenses of play. The lenses are: "open-ended play", "form of play", "playful experiences", "stage of play" and "emergence", and describe "(...) perspectives that designers can focus on when developing playful solutions". The first card set developed only contains the two core lenses of the research, "open-ended play" and "emergence". Each card consists of a title, a picture, a design consideration, a rationale, an example, and a label with the lens type, for example "Lenses of play : Open-ended play". The usage of the cards aids the design process in different phases, since they help to analyze initial concepts and ground design decisions.

The tangible game design tools presented here aim at facilitating the generative exploration of ideas in concrete game design activities. These tools typically

start from a specific conceptual basis that enables a directed exploration. Such an exploration may involve particular game types (Exergames, Mixed Reality Games, etc.) or specific game design elements (Sound Design). While the specificity of these tools is useful when they are aligned with the design goals, in this research we consider the possibility of proposing a more comprehensive design support tool. Instruments with a more generative character such as Plex Cards or A Deck of Lenses lead us to think about the appropriateness of the depth or detail of the themes presented versus the purpose of their use. In our case, we are focused on providing a conceptual model that is both comprehensive and synthetic, to facilitate the understanding and rationalization of the space of possibilities of the videogame medium.

2.6   Discussion

In this chapter we have presented an overview of the topics underlying the general problem of this research work, the conceptual support of game design activity. This chapter describes both the substantiation of the problem at hand and a survey of conceptual models and instruments that served as a basis for our own proposals.

In the first sections "Play and Games", "Videogames", "Gameplay Experience" we substantiate the challenges inherent to the development of game design instruments, due to both the subjectivity of the phenomena of play and experience, and the multiplicity of disciplines from which we can find useful, but partial, knowledge to characterize the videogame medium. In this way we will aim for the conceptual instruments proposed in this research to suggest a comprehensive view on the design possibilities supported by the videogame artifact. That is, that they do not simply highlight a particular perspective on a videogame or dimension of the game experience.

In the "Game Design Activity" section we highlighted the challenge underlying unpredictability of the appropriation of the videogame medium (due to its interactive nature): this reinforces the need for an iterative practice to evaluate if the result of the experience is aligned with designers' intentions. In this sense, with our research we intend to contribute with design tools that offer a comprehensive perspective on the possibilities of the game experience, allowing at the same time to facilitate the understanding of the relationship between the videogame object, the resulting game activity (or how players interact with

it), and the player experience (how players sense, perceive, and interpret their artifact and their time-bound relationship with it). In this sense, given the subject-specific variability of the game activity, we aim to propose instruments that may play a role in the convergence of this game activity, i.e. that they may support the focus of participation in the game activity according to design goals.

Taking into account the conceptual nature of this work, it was fundamental to analyze similar purpose instruments presented in the "Game Design Tools" section. The analysis of these tools was important in the construction of a conceptual vocabulary underlying our own proposal. As a differentiating characteristic from the models presented, we intend for the conceptual approach proposed in this work, besides a comprehensive vision, to have an operational character in the game design activity. In other words, the instantiation of these concepts in the game design activity should also be facilitated.

In summary, we aim that the game design support tools developed in the scope of this work differ from the current solutions by combining the following characteristics: they should empower the designer to develop a comprehensive view of the game experience and the design possibilities supported by a videogame; they should facilitate the operationalization of the proposed concepts in the game design practice; and they should assist the convergence of the game design activity by enabling the evaluation of the game experience according to the design objectives. In this way, based on the design problem in question and presenting the alternative proposals, the conditions are met to move on to the next phase of this research work, with the general conceptual proposal developed in this work, which will be presented in the next chapter.

3   PARTICIPATION-CENTERED GAME DESIGN MODEL

3.1   Introduction

In this chapter we propose a conceptual model intended on supporting the game design activity. This model is structured on the notion of participation, i.e. the way players take part in the gameplay activity and experience the game. Videogames are paradigmatically distinct from interactive computing systems that perform a more utilitarian role where the focus on interaction efficiency and functionality is salient. Essentially, videogames' purpose is to promote an experience (Fullerton et al., 2008). The videogame medium – by its very nature – is purposefully designed to enable players to actively participate in the meaningful activity from which the gameplay experience emerges. Without the player engagement or participation the play experience can not emerge. By its effort the player extracts or generates their reading from what has been classified as an ergodic form of literature (Arseth, 1997).

This model aims to contribute to an understanding of the videogame medium's design space by placing the concept of player participation at the forefront of the design practice. Currently, it seeks to structure design thought around six perspectives of player participation – Playfulness, Challenge, Embodiment, Sociability, Sensemaking and Sensoriality. These are intended to aid in: the creation of new design ideas, analysing, communicating, and discussing the videogame artifact, and providing guidance in the evaluation of the gameplay experience. In the remainder of this chapter, we describe the model construction, its perspectives and how they were inspired in the literature review, and we illustrate how the model could be used in the analysis of videogame artifacts, and the kinds of participation they promote.

3.2   A Participation-Centered Perspective

Participation is seen as a key feature of the videogame medium (Aarseth, 1997; Salen & Zimmerman, 2004; Raessens & Goldstein, 2005; Roque, 2005; Bogost,

2007). "Play is experienced through participation. When a player interacts with a game, the formal system is manifest through experiential effects." (Salen & Zimmerman 2004). The player takes part in interpreting and determining his/her engagement and contribution in the activity. The experience emerges through the de facto player participation, through the interpretation of the context of the game, and how the player acts in it.

The participatory aspect was previously put forward by Jenkins et al. (2006), as part of their characterization of participatory culture. In the context of digital media studies, Ian Bogost (2007) approaches the interactive quality of the videogames referring to one of Murray's four properties of the computing medium, its participatory nature. "Procedural environments are appealing to us not just because they exhibit rule-generated behavior, but because we can induce the behavior... the primary representational property of the computer is the codified rendering of responsive behaviors. This is what is most often meant when we say." (Murray, 1998). Later Murray developed the idea of user participation as a representational affordance of digital environments in her book Inventing the Medium (2012).

Concepts like participation and interactivity are some of the common concepts used to characterize the distinctive qualities of the videogame medium. However, both Raessens and Goldstein (2005) and Aarseth (1997) argue that the Participation concept is a more precise alternative than the Interactivity concept to characterize the specificity of videogames. Even before, Laurel already criticizes the interactive qualifier: "The search for a definition of interactivity diverts our attention from the real issue: How can people participate as agents within representational contexts" (Laurel, 1993).

The notion of participation can also be useful to conceptualize the game design activity. Salen and Zimmerman (2004) define the design activity as "the process by which a designer creates a context to be encountered by a participant, from which meaning emerges." Roque (2005) considers the design of a videogame as the creation of a special kind of socio-technical context consisting of a network of elements - inscriptions of programs of action - that promote or inhibit certain forms of participation, from which experience and meaning emerges. In order to design a videogame it is then necessary to consider how the elements configuring the game medium may be translated by the player, so as to support the intended forms of participation and, consequently, the emergence of a playing experience.

From the aforementioned literature, we find the concept of participation to be very influential in the ideation of the gameplay experience and, consequently, in the design of games as participatory media. It is therefore relevant to further research the design activity in terms of player participation and to develop indicators of participation as essential instruments towards a more informed design.

By proposing to think of the videogame as a participatory context, we are interested in understanding the nature of the elements that compose those contexts and promote different forms of participation. To frame the multi-mediating role of videogames in players' participation, we used Activity Theory (Engestrom, 2001; Leontiev, 1978; Vygotsky, 1978) as a source for reflection. Activity Theory has been introduced (Bødker, 1991) and used in HCI contexts to enable analysis of the user's interaction with artifacts, from cultural and historical perspectives (Rogers, 2012).

Activity Theory offers a conceptual framework to analyze the role of material or mental instruments mediating the relation between subjects and the object of the activity. The object of activity can be understood as the motive that gives meaning to the activity (Kaptelinin & Nardi 2009). As cited in Bødker and Klokmose (2011), Bødker (1991) argue that "instead of studying the relationship between the user and the computer as something that the user works on, or communicates with", "we may more usefully see the computer as something that the user acts through, on other objects or with other subjects — a mediator". Later, there was an increasing interest in the analysis of the multiplicity of mediators that structure an activity (Bertelsen & Bødker, 2002; Bødker & Andersen, 2005; Bødker & Klokmose, 2011). Bodker and Andersen (2005) observe that real life mediations are heterogeneous and consist of a "web of mediators" connected in chains (i.e. the object of one activity becomes the mediator of the next one) or organized in levels, depending on the purpose of the activity.

We argue that the notion of multi-mediation is a useful concept in the analysis of the role of the videogame object in the structuring of the gameplay activity. We can view the gameplay activity in the lens of Activity Theory, framing the videogame as a network of mediators of diverse nature. From the designer's point of view, what matters is the understanding of how the proposed game experience, as a result of the gameplay activity, is promoted by the multiple forms of mediation that compose the videogame and enable or configure the players' participation.

Let us imagine a game scenario where we propose to the player the role of a city manager with the goal of having the city with the best quality of life possible. Examples of mediators of this gameplay activity could be, among others: the role suggested to the players; the available resources; the game space as represented; the organized ways of acting in the game; the scores or various indicators of success; the characters and rules they follow in the game. Another game scenario example would be a game where players are invited to interact with other players through the performance of a dance. Examples of mediators of participation in this gameplay activity could be: the representation of the players' avatar and action repertoire; the model and valuation of each dance step; notions of appropriate social behavior within the game, the music; etc. These two scenarios exemplify mediators of participation in the videogame medium, that being of a diverse nature, instruments and signs, social norms and practices of organization towards the object of the activity, naturally promote distinct game experiences. The proposed model in this chapter suggests thinking about players' participation in diverse perspectives, precisely because that allows us diverse insights and rationalizations of what characterizes a videogame as medium.

3.3   Participation-Centered Gameplay Experience Model

In this section we present a proposal for a model to guide the activity of game design. The model is instrumental in our attempt to address the question of: how to reframe the design of a videogame from the perspective of players' participation? This model is intended to have a guiding role, assisting the designer in considering how the player takes part in the game. To achieve that, we will consider six perspectives on participation: Playfulness, Challenge, Embodiment, Sensemaking, Sociability and Sensoriality (fig. 3.1). These dimensions seek to assist the designer in thinking, in a comprehensive manner, about the range of possibilities at her disposal to define or give a certain character to a game. The proposed perspectives emerged as categories from readings in game studies considering the structure of the play activity, the focus of the gameplay experience, and the motivation and modes of engagement of the players.

Next we will present the references that support each perspective. The perspectives considered emerged from the criteria used in the conceptualization of the model. The number of perspectives was meant to strike a balance: as small as can be to ease model appropriation and rationalization in the design practice,
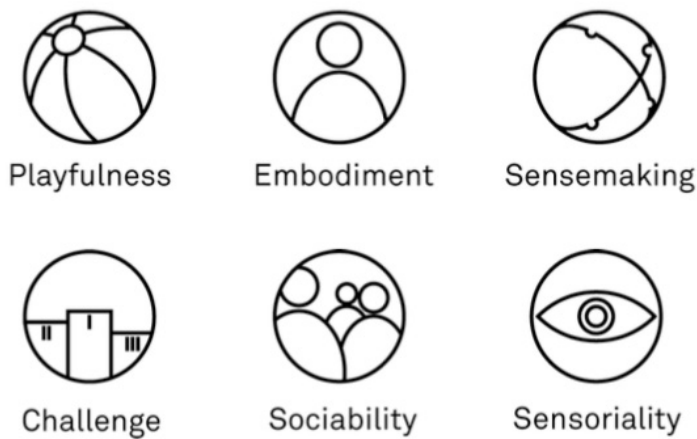
Figure 3.1 Six perspectives to rationalize player's participation.

while still large enough to frame the medium and be encompassing of the variety of gameplay experiences. In turn, we expect these six forms of participation can also be used to characterize and analyze gameplay activities, so as to confront actual player participation with designers' original intent. These lenses are mostly complementary, and when successfully integrated should provide a holistic perspective of the participation phenomenon. However, it can be quite complex to establish rigid boundaries between these views of interaction as, often, different forms of participation share common game elements when realized in a videogame artifact.

With the purpose of operationalising the model in the context of design activities, we identified three operative foci: a) defining design intentions, b) characterizing game artifacts, and c) analyzing player participation. Those three foci derive directly from the conceptual base that supports the participation-centered model: bearing in mind that the videogame artifact mediates players participation, from which the potentially intended experience emerges. In the following subsections we will describe the three foci along the six participation perspectives. In Table 3.1, we map the three analysis foci, and the six perspectives of the model.

3.3.1   Analysis Foci

Intention

The first operational level concerns Intention: What is the participation ideal that the videogame designer is suggesting? It is often from a design intent that

the conception of a gameplay experience emerges. As already noted, we assume that a design exercise departs from a proposed experience ideal. At the intent level of operation, we declare the proposed forms of participation and, implicitly, the kind of experiences to be enabled. This focus highlights the character or style of the proposed game as it is idealized, and generativelly, the perceived value of the game activity.

Artifact

The second operational level concerns the Artifact: How does the videogame artifact support the idealized forms of participation? At this level we envision an object as a complex mediator that enables an interaction context, calling for the intended forms of participation. In other words, we aim to align the features of the artifact with a model of player interaction supportive of the intended player participation. The artifact focus helps designers rationalize the videogame artifact as a network of mediators that supports an action repertoire compatible with the intended player participation. This also helps us to think about the nature of the mediating elements (representations, rules, goals, etc) configuring the artifact.

Participation

Finally, the third operational level concerns the Participation itself: What characteristics of actual player action are consistent with or revealing of the idealized participation? This level of operation is meant to focus observation, analysis and evaluation on actual player participation, in particular, to examine if the game activity meets the design intent, and to point towards indicators and metrics that we can define, and that would be revealing of progress towards that intent. This focus allows for characterizing player participation, measuring the level of alignment between the actual appropriation of the game artifact by the player and the idealized participation.

3.3.2   Six Perspectives on participation

Playfulness – The videogame as a context of free, informal, and unstructured participation.

This lens is based on the concept of "paidia" (free-form, spontaneous, child-like type of play) (Caillois, 2001). Think of the videogame as a toy with

	Intention	Artifact	Participation
Playfulness	exploring, discovering, recreating, customizing	the nature of a player's agency, the variety of interactive elements of the game (objects, characters, actions, etc.)	degree, variety and tendency of exploration
Challenge	overcoming a challenge, creating a strategy, defeating an opponent, mastering a skill	nature of challenges proposed, type of penalties and rewards, intensity and organization of challenges	control, pace, progress, efficiency in performing tasks
Embodiment	physical involvement, physical performance	representation of the physical game world, player's representation on the game world, interpretation of player's movement	control and rhythm of movement, aesthetics of the movement
Sensemaking	interpretation of a role, fantasy, self- expression	theme and underlying narratives, models and representations of phenomena, roles and motives, significant actions	alignment between actions and roles, understanding and or critique of the represented phenomenon
Sensoriality	contemplation, wonder	style, nature of the stimuli, visual and sonic compositions, synesthetic explorations	degree of exposure and responsiveness to stimuli, interaction or engagement with sources
Sociability	competition, cooperation, friendship, identification, recognition	diversity and nature of social interactions and relationships, models of social structures (team, hierarchy, etc)	the intensity and types of interactions between players, affective bonds

Table 3.1 Characterizing players' participation along the three foci of analysis

interpretative flexibility, allowing for player exploration and improvisation. Player participation in this perspective is based on intrinsically motivated interaction with the game, i.e. players determine what activities to pursue and how to pursue them based on their own preference and volition (and not motivated by outer sources of feedback and conditioning) (Skard & Bundy, 2008).

This perspective enables us to analyze a videogame as a context that enhances experiences like exploring, discovering, recreating, customizing, etc. Evidence for the plausibility of this lens is found in the literature in the context of player motivations – "Discovery", "Customization", "Escapism" (Yee, 2006), "Easy Fun" (Lazzaro, 2005); player profiles – "Explorers" (Bartle, 1996); and the characterization of the gameplay experience – "Creation", "Exploration", "Discovery" (Korhonen et al., 2009).

Mediators in this participation perspective shape the possible space of interaction, such as what actions avatars possess, the shape and affordances inherent

to the game world itself, its game resources (or lack of), etc. In this perspective the characterization of participation can be expressed by indicators such as degree, variety and tendency of exploration.

Challenge - The videogame as a context of structured participation, of a proposed challenge, or according to a formal goal.

This lens is based on formal perspectives of games, what Callois (2001) describes as "ludus" (rule-based, structured play) and "agôn" (competitive activities). This perspective enables us to analyze a videogame as a context that enhances experiences related to activities like overcoming a challenge, creating a strategy, defeating an opponent, mastering a skill.

Think of the videogame as a goal driven context, defined by rules. Player participation is assessed in terms of how relevant their performance is in overcoming the challenge, given the game's goal. Player performance is usually linked with the mastery of physical or mental abilities. Evidence for the plausibility of this lens are found in the literature in the context of player motivations – "Advancement", "Competition" (Yee, 2006), "Hard Fun" (Lazzaro, 2005); player profiles – "Achievers", "Killers" (Bartle, 1996); and the characterization of the gameplay experience – "Difficulty", "Competition" (Korhonen et al, 2009), and "challenge-based immersion" (Ermi & Mäyrä, 2005).

Types of mediators of participation in this perspective are for example the challenge proposed, the type of penalties and rewards, intensity and organization of challenges, etc. In this perspective the characterization of participation can be expressed by indicators such as control, pace, progress, efficiency in performing tasks.

Embodiment - The videogame as a context of physical participation, both virtual and actual.

This lens is related to "immersion in relation to the player's embodied interaction with screen-and- speaker world, partly by providing salient somatosensory and proprioceptive support for the feeling of embodiment presence in the game world." (Gregersen & Grodal, 2009). Think of the videogame as a context for physical performance. Player participation is based on the physical relationship established between the player and the videogame, whether that happens through the virtualization and representation of the player's body in the game itself, thereby projecting the player's body in the virtual physical space of the

game, or just by interpreting player body movement as an interface with the game (Nørgaard, 2012).

This perspective enables us to analyze a videogame as a context that enhances activities involving physical involvement and physical performance. Evidence of the plausibility of this lens can be found in the literature on player motivations – "Altered States" (Lazzaro, 2005); and the characterization of the gameplay experience – "Sensation" (Korhonen et al., 2009), "sensory immersion" (Ermi & Mäyrä, 2005).

Types of mediators of participation in this perspective are for example the representation of the physical game world, player's representation in the game world, the interpretation of player's movement, etc. In this perspective, the characterization of participation can be expressed by indicators such as control and rhythm of movement, and aesthetics of the movement.

Sociability – The videogame as a context of social participation, of establishing relationships between players.

This lens is based on the perspective of games as social systems (Klabbers, 2006). Think of the videogame as a context for legitimizing forms of interaction between players, of role configuration between them as active subjects in a shared activity. Player participation is based on establishing relationships, whether of competition or cooperation, or through any other type of direct or indirect, communication or player-to-player interaction. This perspective enables us to analyze a videogame as a context that enhances activities involving competition, cooperation, friendship, identification and recognition.

Evidence for the plausibility of this lens can be found in literature on the context of player motivations – "Socializing", "Relationship", "Teamwork" (Yee, 2006), "The People Factor" (Lazzaro, 2005); player profiles – "Socializers" (Bartle, 1996); and the characterization of the gameplay experience – "Camaraderie" (Korhonen et al., 2009).

Types of mediators of this sociability perspective are for example diversity and nature of social interactions and relationships, emerging patterns of social structures (team, hierarchy, etc). In this perspective, the characterization of participation can be expressed by indicators such as the intensity and types of interactions between players, affective bonds, recurring practices and organizational patterns, etc.

Sensemaking - The videogame as a context of significant participation, of creation of meaning.

This lens is related to the "significant function" of play phenomena (Huizinga, 1971). Think of the videogame as a means of expression. Player participation is based on interpreting and acting on the semantic space represented by the videogame. This perspective enables us to analyze a videogame as a context that enhances activities involving the interpretation of a role, fantasy or self-expression.

Evidence for the plausibility of this lens can be found in the literature in the context of player motivations – "Role-Playing" (Yee, 2006), "Easy Fun" (Lazzaro, 2005); and the characterization of the gameplay experience – "Simulation", "Fantasy" (Korhonen et al., 2009), as well as in "imaginative immersion" (Ermi & Mäyrä, 2005).

Types of mediators of participation along the sociability perspective are, for example, the theme and underlying narrative, models and representations of phenomena and characters, play roles and motives, significant actions, etc. In this perspective the characterization of participation can be expressed by indicators such as the alignment between actions and roles, understanding and or critique of the represented phenomenon.

Sensoriality – The videogame as a context of multisensory involvement.

This lens is grounded on the sensorial dimension of an experience (McCarthy & Wright, 2004) and is strongly related to Embodiment lens. We decided to include two related but different lenses because they put in perspective different characteristics of the artifact: space and movement (Embodiment), and style and atmosphere (Sensoriality).

Think of the videogame as a source of stimulation for the senses. Player participation is then based on engaging in perception, filtering, acceptance or reproduction of a stimulus. This perspective enables us to analyze a videogame as a context that enhances activities involving sensing, contemplation, reflecting, and wondering.

Evidence of the plausibility of this lens can be found in the literature on player motivations – "Altered States" (Lazzaro, 2005); and the characterization of the gameplay experience – "Sensation" (Korhonen et al., 2009), "sensory immersion" (Ermi & Mäyrä, 2005).

Types of mediators of participation in this perspective are, for example, the videogame's representational style, the nature of its stimuli, variety of visual and aural compositions experienced, the synesthetic explorations, etc. In this perspective, participation can be expressed by indicators such as the degree of exposure and responsiveness to stimuli, interaction or engagement with sources.

3.4   Participation-Centered Game Design Analysis

In this section, we present an analysis of six videogames in light of the participation perspectives. The selection of these six games was based on the videogames that are part of the permanent collection of the Museum of Modern Art, curated by Paola Antonelli[1]. By using this list as a starting point we intended to make the selection less subjective and to choose videogames that were socially recognised as being representative of the cultural value of the medium. Within this list, we had as a criterion to choose videogames that explored different perspectives as a proposition of their game experience.

Katamari Damacy

> *In a drunken stupor, an eccentric, god-like entity called the King of All Cosmos destroys all the stars, Earth's Moon and other such celestial bodies in the universe, save for Earth itself. Despite acknowledging his mistake, the King charges his 5-centimeter-tall son, the Prince, to go to Earth with a "katamari"—a magical ball that allows anything smaller than it to stick to it and make it grow—and collect enough material for him to recreate the stars and the Moon. The Prince is successful, and the universe is returned to normal.* (Wikipedia, 2021) [https://en.wikipedia.org/wiki/Katamari_Damacy]

Playfulness

- Players control a small boy who's pushing the katamari, a highly adhesive ball that glues itself to smaller objects. As the katamari

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1 - https://www.moma.org/explore/inside_out/2012/11/29/video-games-14-in-the-collection-for-starters (accessed 1/09/2021)

touches objects they glue themselves, and the more objects get glued, the more the katamari grows, and hence, the more capable it becomes of gluing itself to larger objects.

• Players can move the katamari forward and backward, left and right, by moving the PS2 dualshock's analog sticks with specific motions. For extra speed, players can dash the katamari by cycling each analog stick between the upward and downward positions, in alternated movement (so when the left analog moves up, the right moves down and vice-versa).

• The game world consists of levels of escalating scale (rooms, gardens, small towns, cities, continents). Each is a mundane scenario populated with a multitude of animate (animals, citizens, cars, ships) and inanimate objects (knick-knacks, houses, trees, mountains) that the katamari can glue to its surface. Animate objects have their own set of highly stylized animations, and react when the katamari glues itself to it.

• Each level is sufficiently open in spatial terms, and has a high enough variety of different objects, that the player can traverse it in many ways.

Challenge

• The main goal for the player is to restore several heavenly bodies (stars, constellations, the moon) that were destroyed. They can be rebuilt by taking the katamari and gathering enough objects on its surface so that it is as big as the missing star.

• In each game level, players must grow the katamari until it reaches that target size before a timer runs out. If the player loses, they must repeat the level.

• Game constraints include how animate and inanimate objects can collide with the katamari. If they are too large when compared with the katamari, players bump into them, wasting time. If they are of a relatively similar size, players can glue on to them and become bigger.

• Many levels have physical barriers that can only be hurdled once the katamari reaches a given size.

Embodiment

• The player controls the katamari by moving the dualshock's symmetrically placed joysticks. The manner in which the player

moves his thumbs is physically analogous to how the prince rolls and pushes the katamari with his hands, creating a sense of empathy with his physical movements' intensity and pace.

• Players see the action using a third-person perspective camera, nested on the back of the katamari, which provides some identification between player and their prince avatar's actions.

Sensoriality

• The world is represented using a kids' playground aesthetic. Objects and characters have been modelled using very basic, flat-colored shapes and polygons, like spheres, cubes, pyramids and tubes. There are some very rare instances of decorative elements applied to objects, using very low detail textures. The visual appearance suggests that every object has been crafted using either a play doh-like substance or children's blocks.

• The soundtrack is also child-like in its aesthetic. Extremely happy and upbeat electronic music accompanies the action, sometimes featuring instruments associated with children play (such as xylophones), and vocal tracks sing along (sometimes featuring child-like voices), and often including humorous dialogue segments.

• Sound effects are non-naturalistic, as if conjured by a child's imagination of what the real sounds should sound like, accentuating the game's zany tone.

Sociability

• The game features a split-screen multiplayer mode where 2 players compete to become the largest katamari in a given time-period. In this mode, players can bump into each other to halt their opponents progress, and even glue their adversary to their katamari.

Sensemaking

• Framing the action is a story about how the Prince's father, the King of All Cosmos, destroyed the missing heavenly bodies, and why the prince must recover them using the Katamari. As the prince goes about restoring them by rolling up ever increasing objects, the effect of his actions is also narrated from the perspective of a family of regular folk.

• The world, its objects and inhabitants have a very naïve and child-

like mode of representation, which accentuates the bizarre tone of the game's fairy tale-like story.
• There are several visual references to playgrounds and toys, which, alongside the lack of naturalistic physics, might suggest that we are meant to interpret the game world's chaotic and whimsical nature as a representation of how a child sees the world (lacking the rigidity, structure and rules of adult society). One might then derive (like in Pacman), that this establishes a form of social criticism, directed at a consumerist society that teaches young ones to consume everything in sight, irrespective of negative consequences.

Pong (Atari Arcade)

Pong is a two-dimensional sports game that simulates table tennis. The player controls an in-game paddle by moving it vertically across the left or right side of the screen. They can compete against another player controlling a second paddle on the opposing side. Players use the paddles to hit a ball back and forth. The goal is for each player to reach eleven points before the opponent; points are earned when one fails to return the ball to the other. (Wikipedia, 2021) [https://en.wikipedia.org/wiki/Pong]

Playfulness

• The game presents a simplified top-view of a table tennis game.
• Players control a paddle that can be moved upwards and downwards by turning a knob right and left.
• There are 2 paddles, one on the left and one on the right, each player controlling one of them.
• When a paddle hits the ball, it sends it in the opposite direction; the greater the speed the paddle has when it hits, the greater the speed the ball acquires.

Challenge

• A ball is served from the middle of the screen and players must stop it from crossing their line, as whenever it crosses the opponent gets one point.

- The main goal for the player is to get 11 points before their adversary. In the original version, each game cost 1-quarter. Game starts anew once 11 points are achieved.
- Game constraints are limited to two side walls that ricochet the ball and stop it from going off-field.

Embodiment

- The player controls the paddle by turning the knob. To lob the ball with speed you must move the paddle equally fast, and thus, turn the knob in similar fashion. This means there is a sense of physical connection between the players' movements and the in-game action, as better hits require strenuous and precise hand movements.
- The game is viewed from a top-down perspective, which distances players from the action.

Sensoriality

- The tennis table is drawn using thick, low-definition, white lines on a pure black background.
- Paddles are represented as short line segments, and the scoreboard is present on top of the screen in a squared font.

Sociability

- The arcade cabinet was built for 1 on 1 competition. Players play side by side trying to achieve the 11 point score.
- The close physical proximity enabled players to use their body in non-regular ways, like shoulder bumps, pushes and even turning the adversary's knob.
- As Pong cabinets were placed in social settings (bars, arcades), their competition could permeate the social fabric: drinking friends might challenge each other for a game, tournaments might emerge, local champions become famous, etc.

Sensemaking

- The only signs in the game (the field markings, scoreboard and paddles) refer to its nature as a simulation of a table tennis game.

Minecraft (PC, Survival Mode)

In Minecraft, players explore a blocky, procedurally-generated 3D world with virtually infinite terrain, and may discover and extract raw materials, craft tools and items, and build structures or earthworks. Depending on game mode, players can fight computer-controlled mobs, as well as cooperate with or compete against other players in the same world. Game modes include a survival mode, in which players must acquire resources to build the world and maintain health, and a creative mode, where players have unlimited resources and access to flight. Players can modify the game to create new gameplay mechanics, items, and assets. (Wikipedia, 2021) [https://en.wikipedia.org/wiki/Minecraft]

Playfulness

- The game presents players with an infinite world entirely built out of blocks, and each block is made of a material (wood, stone, etc).
- Players can pick up, carry and place blocks (to build walls, for instance), and also harvest materials to use them to make different materials or craft them into objects (food, weapons, tools, etc). This means the player can edit the gameworld extensively, destroying and building as he sees fit.
- Players also have basic actions available, for movement, jumping, sneaking and attacking. Also, they can trade items with human non-playable-characters.

Challenge

- The goal of the game is for the player to survive. During each of the game's nights, monsters come out and attack the player. Players must then collect resources (by mining, killing animals, etc) so as to build weapons and shelters and tools that improve survival.
- Inventory space is limited, so players must juggle which items to carry.
- Players lose life whenever they are attacked by enemies. While health regenerates naturally, there is also a hunger system at play. Hunger determines how regeneration occurs, so players must then feed themselves frequently to maintain their regeneration and consequently their health. If the hunger bar is completely depleted, the player starts losing life.

- When players die, they drop their items where they stand (and can for a time be recovered).
- Player characters gain experience by engaging in the game's many activities, and experience can be channeled into enchanting items to make them more efficient.
- Other goals include the raking of achievements, and a hidden ending and credits sequence that can be triggered by killing a dragon boss.

Embodiment

- The player controls the game using a standard keyboard and mouse, so there is little relationship between in and out-of-game actions.
- The game's first person (default) perspective strongly relates what players and their avatar can see of the game-world.

Sensoriality

- Most of the game's environment, objects and creatures were created out of textured cubes. This gives the game a very distinct look, as if the world was built out of lego blocks, which establishes the game's aesthetic as somewhat childlike. To maintain coherency with the presentation, animations and sounds are also very simple.
- The game settings include distinct natural environments, such as green hills, mountains, lava caverns, deserts, and snowfields.

Sociability

- The game features a multiplayer variant where players co-exist in the same world. Players can choose to cooperate or compete, either sharing resources and constructions or vying for their control.
- As the game allows for extensive creative control by the player in terms of what he builds in-game, this promotes player sharing of game recipes and designs for their creations.

Sensemaking

- While the game makes no attempts at providing an explicit story or any semantic framework for the action, there is one notable

exception concerning the credits sequence. In it, players can read a postmodern poem of sorts, where two divinities dialogue about the nature of the gameworld, the player, and his experience.

Passage

In form, Passage most resembles a primitive side-scroller in which players control a male avatar that can move from left to right as time progresses. There are no instructions. The environment is a two-dimensional maze with treasure chests scattered throughout, some in relatively hard to reach places. Points are earned for collecting these chests. After a short time, the player will encounter a female character who will marry the protagonist if touched; this choice, however, will increase the difficulty of navigating the maze, as the female will begin to accompany the player and restrict certain avenues of movement. (Wikipedia, 2021) [https://en.wikipedia.org/wiki/Passage_(video_game)]

Playfulness

- The game presents players with the control of a single male character that can move, up, down, left and right in the game-world. They can also open chests by bumping into them.

Challenge

- There is no stated or unstated goal for the game. Players simply move through the world, and after 5 minutes of gameplay, the experience inevitably ends.
- Whenever the player walks, they increment an in-game counter, however. Players can also join themselves with a female character, increasing the counter's growth, and they can collect gems hidden inside chests that increase the counter.
- If the player joins with the female character, the player in effect controls a pair of characters, so they have greater difficulty in navigating the in-game space to collect chest gems, as passages are surrounded by close walls.

Embodiment

- The player controls the game using a standard keyboard layout, so there is little relationship between in and out-of-game actions.
- Players are represented by a generic male figure.
- The game perspective mixes a side view (for characters and chests) with a top down view (for the passage and walls). The incorrect and distant perspective decreases players' physical connection with the in-game action.

Sensoriality

- The game only shows a narrow strip of screen, where characters walk from left to right.
- The game-world is bare, there are very few game elements, obstacles are represented abstractly (using simple geometric shapes), and characters, love, tombs, and chests are rendered using low-detail pixelated takes on iconic designs.

Sociability

- There are no in-game social elements. Given the game's thematic ambition and its somewhat cryptic nature (due to the lack of textual narrative elements), it is likely the author hoped players would discuss its meaning outside the game context.

Sensemaking

- The game seeks to depict the passage of time and its effect on a man, and potentially his beloved (hence the title).
- The in-game counter is likely intended to represent personal achievements (material in the form of gems, and spiritual in terms of the love of his companion) and the obstacles represent life adversities.
- Life inevitably ends at a set point, irrespective of score, for both the companion and the main character, thus signifying the inevitability of death.
- Joining up with the female character represents companionship, which increases the player's increments in score, implying that a life well lived involves love of some sort. The fact that the companion character also impedes movement in some areas, suggests that with the

companion come lost opportunities, and a new set of adversities that must be overcome.

• Life is filled with unknowns, so the game only shows you a narrow strip of the game-world. Past and Future are represented visually, as the spatial passage which extends before and after the characters; when they are young, the future space is vast and the past is small, and vice-versa when they age. Past and Future also blur as they extend well beyond the view of the characters, meaning both past and future are not known to the characters.

Myst

Myst's gameplay consists of a first-person journey through an interactive world. Players can interact with specific objects on some screens by clicking or dragging them. The player moves by clicking on locations shown on the screen; the scene then crossfades into another frame, and the player can explore the new area. Myst has an optional "Zip" feature to assist in rapidly crossing areas already explored; when a lightning bolt cursor appears, players can click and skip several frames to another location. While this provides a rapid method of travel, it can also cause players to miss important items and clues. Some items can be carried by the player and read, including journal pages which provide backstory. Players can only carry a single page at a time, and pages return to their original locations when dropped. (Wikipedia, 2021) [https://en.wikipedia.org/wiki/Myst]

Playfulness

• The game presents players with the control of a character that can move about the world, by clicking where they want to move.
• Players interact with machinery (pull levers, push buttons, etc), either by clicking elements or dragging them with the mouse.
• Players can also choose certain worlds they wish to travel to (called Ages), and (for the most part) the order in which to solve the game's puzzles.
• At a given point in the narrative, players choose who, out of two characters, they wish to save or not, in this impacting the game's narrative ending.

Challenge

- Each of the book-world's has a series of machine puzzles that the player must solve in order to unlock progress.
- Puzzles require hard logic to solve; based on a set of clues (notes, journals, diagrams), and experimentation with each machine's interface, players must be able to deduce the solution to each puzzle.
- Depending on players' choices (in respect to which character they wish to save), they can reach a good or bad ending.

Embodiment

- The player controls the game using a point and click interface, so no connection is established between body movements and in-game action.
- The game uses a first-person perspective of the action, allowing players to feel as if they were physically present in the game world.

Sensoriality

- The game uses a mix of science fiction and fantasy settings, drawing its worlds to feel otherworldly. Worlds typically feature steampunk technological artifacts and buildings surrounded by romantic natural scenarios (misty forests, remote islands, etc). Each world has a distinct identity in terms of setting.

Sociability

- There are no in-game social elements. The difficulty of the puzzles can propel players to share hints and solutions between them, and the narrative's twists might also be subject of watercooler discussion.

Sensemaking

- The game seeks to present players with a fantasy multiverse, where parallel worlds exist side by side, each with their own spaces and cultures. The player enacts a main character that discovers the Myst book, and opening it, is whisked away into its world (worlds can be entered through portal-books); this mirrors players own journey into the game, by playing it.

- To exit the game (the diegetic one), players must find an exit, by learning more about the world and its story.
- There is a great deal of backstory that the player can piece together from diegetic elements (diaries, notes, video-recordings, etc.)

EVE Online

Eve Online (stylised EVE Online) is a space-based, persistent world massively multiplayer online role-playing game (MMORPG) developed and published by CCP Games. Players of Eve Online can participate in a number of in-game professions and activities, including mining, piracy, manufacturing, trading, exploration, and combat (both player versus environment and player versus player). The game contains a total of 7,800 star systems that can be visited by players. (Wikipedia, 2021) [https://en.wikipedia.org/wiki/Eve_Online]

Playfulness

- The game affords players a multitude of systems they can use to act upon the gameworld, by selecting actions from a multi-tiered menu based system. These include the options to customize player character's race, appearance and origin, move about the world, shoot, steal, build bases and ships, travel in ships, engage in airship combat by issuing commands, raid pirate hideouts, craft, mine, buy, sell and barter items, ally with factions, engage in missions, etc.
- Players are free to explore these systems of their own accord and interest, adopting a wide array of different play styles, becoming explorers, pirates, warriors, captains of industry, etc.

Challenge

- Progress in terms of the main story and economical standing, requires players to participate in its litany of PVE and PVP challenges: completing missions, collecting and raiding resources, mining, trading, stealing and killing other players and NPCs, etc.
- Improving character skills requires investing real-life time into said skills, or using in-game currency. Skills serve as gates that lock off which actions players can enact in the world.

Embodiment

- The player has a systems-level perspective of the gameworld, both in terms of visual perspective and control; therefore, there is little physical engagement present.
- Players can, in specific instances, see their avatar's picture and body.

Sensoriality

- The game adopts a cinematic sci-fi aesthetic, with predominantly high contrast lighting and dark color palettes dominated by the black void of space. The game-world is as vast as deep space.

Sociability

- Most of the game's systems propose social interactions and structures to emerge. Players can converse with each other using text and voice chat, trade items and currency with each other, cooperate or compete with each other in battles, and vie for resources, etc.
- All players cohabit the same in-game universe simultaneously, there are no restrictions to player on player interaction, and every system is permeable to multiplayer interaction.
- The game's intricate and complex systems mean it is very hard to get a grasp to progress in the game without the aid and guidance from other players, both in and outside gameplay. Players are highly incentivized to join corporations and alliances, to tackle large scale PVP conflicts and endgame PVE content.

Sensemaking

- EVE's story takes place in a star cluster surrounding planet Earth, in the distant future. It details a new conflict between five empires that rule the cluster. It simulates how individuals and factions could work and live in a universe with faster than light travel.

With this analysis we aimed to demonstrate how model perspectives can be used to characterise the game design space explored in real videogames. That is, we have shown that perspectives can operate as lenses into the game

design space and thus help to discourse about specific characteristics of videogames. This analysis helped us think about the role of perspectives in a game design support tool, namely, different levels of intensity in the exploration of a perspective in each game, different possibilities of realization in the same perspective, and also the potential of intersection in between perspectives.

It is possible to recognize that the games illustrate diverse levels of exploration of each perspective. For instance, it is possible to recognize that Katamari Damacy more thoroughly explores and focuses its participation on the Playfulness perspective, while Pong focuses on Challenge. Yet, the analysis demonstrates that it remains relevant to consider the remaining perspectives in both these cases, as each design requires a holistic understanding.

With the presentation of different videogames it was also possible to demonstrate diverse possibilities of realization of the same perspective. This is a relevant aspect when we consider that we are interested in obtaining a design support tool that promotes diversity of play experiences.

Another aspect to also consider is the orthogonality vs potential for overlap between perspectives. For example, in the Katamari Damacy case, the experience of free exploration (playfulness) is encouraged through the avatar exploration of the game world (embodiment). On the one hand, an experience is a naturally fluid phenomenon that cannot be entirely dissected and separable, and design tools should propose a holistic view of the game experience. On the other hand, from a pedagogical perspective, the potential of intersection of perspectives should be taken into account as a risk of misunderstanding the proposed concepts.

However, it is not our intention to argue that the six perspectives have a universal character, enabling the analysis of the totality of videogame space. Nor do we intend to argue that the six perspectives allow us to analyze videogames in an exhaustive way in all their characteristics. We argue, however, that having been able to analyze diverse videogames from the six proposed perspectives of participation, it is then plausible to consider these concepts as the working basis of the game design support tools to be developed in the current research.

3.5   Discussion

In this chapter we present the constructs of a support model for game design and game experience evaluation activities centred on the concept of participation. We propose the adoption of participation as an aggregating concept for the conceptual approach under development. That is, by thinking of the videogame medium as a context of participation, we consider how to facilitate the rationalization of the space of possibilities that the videogame medium supports, as will be further discussed in the following chapters. Besides the rationale for the participatory nature of the videogame medium, presented in section 3.2, we argue for the pertinence of adopting the idea of participation because it is a sufficiently abstract concept, to potentiate a comprehensive view, while at the same time operable and a concrete influence on game design activities.

After presenting the Participation-Centered Game Design Model in section 3.3, which concretises the conceptual approach proposed in this chapter, we analyzed several videogames from the six perspectives of participation suggested in the model. As discussed, we argued the plausibility of these perspectives as a potential operationalization strategy to characterise the game design space.

However, while the analytical potential of participation perspectives to describe existing videogames has been demonstrated, it remains open how the proposed conceptual approach might play a generative role in the creation of new ideas in game design. This is the research question to which the next chapter is dedicated.

4   PARTICIPATION-CENTERED GAME DESIGN CANVAS

4.1   Introduction and Research Roadmap

In this chapter we describe the development and evaluation process of the Participation-Centered Game Design (PCGD) Canvas instrument. As the first version of the Participation-Centered Game Design Model was being formalized, there came the need to design an instrument that could operationalize its use in the game design activity, enabling and empowering designers to use the model; this is what led to the creation of the Canvas.

Essentially, the PCGD Canvas is a paper document where designers can record design ideas; these ideas are prompted by a series of questions (so called Game Design Questions), derived from the model, and structured around its six dimensions. These questions serve as a way to help guide design decisions according to the model. The canvas includes blank space for simple, fast and informal annotation of designers' answers and ideas, so as to foster group discussion during the design process.

Besides operationalizing the model in a way benefitting the design practice, this materialization into an object had, from a research point of view, the added advantage of providing a way to make the model's appropriation by users observable and auditable. Thanks to this, data could be gathered to evaluate and iteratively improve it.

Following this, we provide an overview of the development and evaluation roadmap that was used to iteratively review it.

The instruments herein proposed were employed and evaluated in a Game Study and Development discipline, part of the Informatics Engineering, Multimedia Design and EuroMACHS (European Master on Cultural Heritage and Media Studies) Masters courses of the University of Coimbra. We used a Design Science Research Methodology in the deployment and evaluation of these instruments (as described in section 1.3), throughout 3 cycles, along four academic years: Iteration 1 (2011/2012), Iteration 2 (2012/2013 and 2013/2014) and Iteration 3 (2014/2015).

The choice for this evaluation context, and respective participants, is justified by the following reasons:

- **Accessibility and Relevance**: the development of instruments arises from a concrete need identified in the context of the Game Study and Development discipline, taught in the same institution that houses this research. On a practical level, this afforded an accessible context, and on a research level, it afforded us a context that we had inside knowledge of, both in terms of the discipline's dynamics and of how this work could contribute to the teaching dynamics of the discipline.

- **Need**: considering that the majority of students in this discipline are confronted with a game design activity for the first time, the use of these design instruments gains special relevance. As participants, these are especially adequate given that they do not have an established game design process nor any pre-conditioning that might come from previous praxis, hence easing the introduction of new instruments (and scaffolding the activity). So, there are two benefits with this choice: one, the instrument is adequate to the context in which it will be applied; and two, the evaluation context was not created, artificially, to serve the instrument's evaluation.

- **Intervention protocol**: another factor refers to processes inherent to the evaluation context. The fact that the disciple is project based, structured around the conception and development of an original videogame demo, helps define and reinforce the role of the instrument that is to evaluated. The fact that the discipline has a new edition every year eased the revision of the instruments in a structurally coherent context.

Naturally, the option for a particular evaluation context, such as an academic discipline on the study and development of games, will always have consequences and condition interpretations in the reported evaluation activities. This will be taken into consideration when discussing results.

In each evaluation cycle, the discipline was lectured to students in different courses. The demographics in each evaluation cycle are shown in table 4.1 and described in increased detail in the appropriate sections.

Each of the evaluation cycles represent particular phases of the instruments development process:

- **Cycle 1**: the first evaluation cycle corresponds to the validation phase of the proposed instrument. This cycle corresponds to the evaluation of an initial proposal of the instrument, seeking to verify if the value of this instrument is recognized, on a general level. The first version of this instrument is composed of 30 questions aiming to support the game design activity. Besides this first appreciation, data on its understanding by users, and its perceived utility was collected, so as to iterate the instrument. In this cycle, self-reports, interviews and written design proposals were used as data sources.

- **Cycle 2**: The second evaluation cycle corresponds to a revision of the proposed instrument. After a global evaluation in Cycle 1 and its consequent revision, a more detailed analysis of each of the instrument's questions was carried out. Besides reevaluating the perception, understanding and utility of this instrument, in this cycle the quality of subject answers was evaluated. Self-reports and content analysis of design proposals were carried out. This cycle lasted two academic years (2013/2014 and 2014/2015) using the same instruments, so as to study a larger sample of subjects.

- **Cycle 3**: the third evaluation cycle corresponds to a consolidation phase of the proposed instrument. After validating the global value proposition in the first cycle and the in-depth evaluation of individual questions in the second cycle, this third cycle had the goal of confirming the overall results from previous cycles, while also evaluating the revisions that resulted from the second cycle. Once again, interviews were used as data source, so as to obtain subjects direct appreciation of the instrument, complemented with self-reports on the interpretation and usage of the instrument, and content analysis of the game design proposals.

Table 4.1 synthesizes the roadmap throughout the 3 cycles, including the academic year, courses in which the discipline was lectured, number of participants, number of work groups, participant's demographics, and the data sources that were employed.

	Iteration 1	Iteration 2	Iteration 3
Academic Year	2011/2012	2012/2013 2013/2014	2014/2015
Courses	Informatics Engineering and Euromachs	Informatics Engineering, Multimedia Design and Euromachs	Multimedia Design
Participant Numbers	60	66	11
Age	22 - 30	21 - 28	21-27
Gender	5% Female 95% Male	31% Female 69% Male	18% Female 82% Male
Number of Game Design Projects	15	14	4
Methods	Questionnaires Design notes Interviews	Questionnaires Design Notes	Questionnaires Design Notes Interviews
Instruments	30 Questions, No examples	18 Questions + Examples	18 Revised Questions Examples New Canvas

Table 4.1 Research iterations and participant demographics

4.2   Iteration 1

4.2.1   Canvas V1 Proposal

In this section is presented the first version of the Canvas instrument, with its set of questions and a note-taking space (see A.1).

Intended Qualities of Participation-Centered Game Design Questions

The PCGD canvas, and its set of questions, were developed based on the following considerations:

Operational Balancing

The main goal of this work is to support game design operationally, in a comprehensive and synthetic manner. On one hand, there was the intention to consider the game design space in a comprehensive manner, without limiting it to a specific typology or application context, hence the choice for a synthetic group of abstract questions. On the other, we aimed for these abstract perspectives to be anchored on practical cases, so as to more easily operationalize them. It is this role that the game design questions play in this work, complementing the conceptual model with an operational component. Each of the model's perspectives were synthesized into a group of questions that could add a practical dimension. The synthesizing process itself is discussed in the next section.

Formalization

The justification for the form of this instrument – a set of questions – comes from its goals of helping ponder game design possibilities and solutions, and of contributing to a rationalization of design decisions taken towards conveying a given play experience. In this sense, this support instrument's formalization into a set of questions, seems to us an adequate solution for this goal, prompting users to think and rationalize their own answers.

Design Problematization

This instrument contributes to a problematization of the game design activity. The game design activity is commonly understood as an exercise of finding a solution to a given problem. In this context, we can understand the game design problem as finding the right set of game artifact features that support players participation forms in line with the idealized play experience. By prompting users to question their decisions in respect to artifact features, framed in function of player participation, game design questions help designers' rationalization and problematization processes in the game design activity.

Design as Possibility

The design questions aim to offer design guidance, help consider design possibilities, while abstaining from normative and prescriptive considerations on how the videogame should be; instead opting for speculative notions of

how it could be. With design guidance, we do not intend to frame the design questions as design guidelines (in the sense of providing design best practices); it is not the goal from this proposal to contribute game design optimization solutions or formulae, nor provide a process that assures satisfactory results. Quite the contrary, we aim to stimulate exploration of different and varied alternatives in the game design space.

Intensity and ambiguity

Considering the suggestive character of the questions, it is natural that these might afford different levels of intensity in prospective answers, face the goal of providing the proposed play experience. Therefore, this suggestive character means users need not answer all questions. It is important to highlight that these instruments are not attempting to propose a theoretical, ontological definition of the play activity, but only to support the generation of design ideas and solutions prompted by these questions. In this sense, the ambiguity of certain questions is assumed as being beneficial to the design process.

Participation-Centered Game Design Questions V1

The definition of the questions presented was based on the fundamental theoretical concepts discussed in chapter 3, as well as on the concrete practical experience from the teaching praxis of the author. These questions were defined in order to explore the topics behind each participation lens, based on the literature, and with the aim of stimulating reflection with varying depth by participants in the design process. The choice for making the game design questions in an open-ended format is to promote creativity through active production and reasoning on possible answers.

We limited the construction of the instrument to the selected five questions per perspective with the intention of keeping it effective, yet simple enough to avoid overloading the design exercise. Questions were grouped in sections to preserve and explore the contextual perspective of each lens.

You can find the first set of draft questions on table 4.2, grouped by each of the model's perspectives.

Playfulness	PL1	What type of game characteristics incentive free participation?
	PL2	What kind of restriction constrains free participation of the players?
	PL3	Which interactive elements enhance free participation?
	PL4	To what extent players can express themselves through free participation?
	PL5	To what extent the game promotes improvisation by the players?
Challenge	CH1	What are the goals and how do they organize the participation of the players?
	CH2	What are the possible outcomes of the game?
	CH3	How does the game value the participation of the players?
	CH4	What type and level of skills are required by the game?
	CH5	What is the flexibility in the ways to achieve the proposed goals?
Embodiment	EM1	How to characterize the game space?
	EM2	What is the perspective of players regarding the game space?
	EM3	What is the representation of players in the game space?
	EM4	How do the players physically interact with the game?
	EM5	How to characterize possible movements in the game space?
Sensemaking	SM1	What is the theme of the game and its underlying messages?
	SM2	What is the role of players in the represented semantic context?
	SM3	How is the semantic context represented?
	SM4	What are the significant procedures in the game?
	SM5	How do each of the other perspectives help build that semantic context?
Sensoriality	SS1	What is the style and atmosphere that the game offers?
	SS2	What are the main feelings that the game is intended to invoke?
	SS3	What are the elements responsible for sensory stimuli?
	SS4	How do different stimuli relate to each other? (work together)
	SS5	To what extent the sensory environment results from participation of players?
Sociability	SO1	What is the social configuration proposed by the game?
	SO2	What kind of interactions between players are proposed by the game?
	SO3	What kind of roles are proposed by the game?
	SO4	How does the participation of a player influences the participation of others?
	SO5	What kind of perception players have of each other? (visibility)

Table 4.2 Participation-Centered Game Design Questions v1

In the following sections, we comment on the questions we defined for each participation perspective, as well as specific issues we encountered.

Playfulness

The questions proposed for the Playfulness lens seek to contextualize the videogame object as a space of free and informal participation. The idea of

playfulness that is herein attempted to stimulate is as rich as it is challenging in its operationalization.

Underlying the idea of playfulness is the notion of freedom and unbounded interaction; this was informed by Caillois (2001) as freedom is identified as one of the defining features of the play activity, and essential to the greek concept of paidia, i.e. a free-form, spontaneous, child-like type of play.

The challenge inherent to the definition of these questions arises from the difficulty of operationalizing the idea of freedom in the abstract. Thus, keeping in mind the commitment to contribute a wide-encompassing and non-specific instrument, we attempted to define a set of questions that could help think of videogame features in terms of the space of play possibilities they define or open. Designers who intend to explore this facet of the medium, will likely want to open up the space of play possibilities while avoiding normative impositions on the player (like penalties for certain actions, or rewards for others).

Questions PL1 ("What type of game characteristics incentive free participation?") and PL2 ("What kind of restriction constrains free participation of the players?") refer directly to features that enable or hinder players' free participation. PL3 ("Which interactive elements enhance free participation?") aims to operationalize this notion of free participation in light of the fundamental feature of the videogame medium, interactive elements. The idea here is to focus designers' questioning on structural elements of the game activity that can promote this kind of play.

By placing player expression and improvisation at the forefront of questions PL4 ("To what extent players can express themselves through free participation?") and PL5 ("To what extent the game promotes improvisation by the players?"), we attempt to add a different point of view, so that designers not only consider what a videogame allows players to do, but also how it may be diversely appropriated by them.

Challenge

The Challenge perspective question aims to help think of the videogame in the perspective of classic games' structure. That is, a game as a mediator of activities framed by formal rules and achievable goals. The proposed questions for this perspective are based on fundamental, historical concepts on the nature of

the play activity, like "ludus" (rule-based, structured play) and "agôn" (competitive activities) found in Caillois (2001). Authors like Callois (2001), Huizinga (1971), Avedon and Sutton-Smith (1979) are at the base of modern game definitions, such as Juul (2005), Salen and Zimmerman (2004) and Frasca (2007). The latter, through their reviews of classical works, have opted to identify these features - rules, challenges and reward/penalties - as fundamental in the definition of games. These features work as the basis for the game design questions herein proposed, and framed in the idea of videogames as configurations of a participation context (Roque, 2005).

Question CH1 ("What are the goals and how do they organize the participation of the players?") and CH2 ("What are the possible outcomes of the game?") aim to identify the formal features of a game. The game's goals, mentioned in CH1, are considered the drive of players participation and the organizers of the play activity. CH2 aims to identify probable end game scenarios, in terms of quantifiable/measurable outcomes and beyond (points, collectibles, achievements, etc).

CH3 ("How does the game value the participation of the players?") also concerns how the game offers feedback to players performance, though we opted to use the expression value to potentiate other, less strict, interpretations of feedback. By definition, when we speak of games, what is at stake is the idea of a conflict that must be overcome by employing particular skills, be they social, physical-motor, mental, etc. CH4 ("What type and level of skills are required by the game?") aims to assist in reflecting on the nature of the skills which the game's challenges demand of players (as one goes hand in hand with the other). Inside the formal structure that the Challenge perspective frames participation, there can be a certain level of flexibility to players' actions, allowing for different strategies to overcome challenges; CH5 ("What is the flexibility in the ways to achieve the proposed goals?") aims to help subjects consider these.

Embodiment

The questions proposed for the Embodiment perspective aim to conceptualize a videogame as a space of physical participation, in the possibilities of physical experience between players and videogame objects. The questions are related to concepts such as immersion (Gregersen & Grodal, 2009) and presence (Heeter, 1992) that before becoming widespread in the game studies field, originated in studies of virtual reality environments.

EM1 ("How to characterize the game space?") and EM2 ("What is the perspective of players regarding the game space?") ask designers to think of the physico-spatial dimensions of the game-environment, and how those are mediated to players. EM1 pertains to the description of the game space itself, and EM2 to the description of the spatial relationship between players and game environment.

EM3 ("What is the representation of players in the game space?") seeks to promote thinking of how players are projected into the game-world, by asking designers how they're represented within the game's environment, be it through character mediation or more abstract representations.

Question EM4 ("How do the players physically interact with the game?") directly approaches how players' bodies interact with the game, with a view to how such interactions allow players to control the action. Besides these functional questions, this perspective also seeks to consider videogames as contexts of free physical performance. Hence, question EM5 ("How to characterize possible movements in the game space?") aims to help designers consider what sort of player movement the game potentiates the player to enact and feel.

Sensemaking

Questions proposed for the Sensemaking perspective seek to help think of videogames as means of expression, mediators that create meaning. Huizinga (1971) referred to meaning making as the "significant function" of play phenomena, therefore inherent to any play activity (even if this might be considered a somewhat limited interpretation of the full phenomenon).

SM1 ("What is the theme of the game and its underlying messages?") aims to help designers think in a broad and encompassing manner, of the semantic meaning of the videogame, and SM2 (What is the role of players in the represented semantic context?) aims to identify the role that players play in that meaning making context. SM3 ("How is the semantic context represented?") and SM4 ("What are the significant procedures in the game?") questions concern the representation of the semantic context, either in respect to the form it takes within the game - SM3 - or in respect to any significant actions that players can perform in the game - SM4.

As mentioned above, the suggested participation perspectives aim to frame the game medium in as comprehensive a way as possible; therefore, the relationship between the perspectives should be taken into account. SM5 ("How do each of the other perspectives help build that semantic context?") is precisely intended to help practitioners think about how the remaining participation perspectives can help establish a videogame's meaning.

Sensoriality

Questions proposed for the Sensoriality perspective are intended to help think of videogames as a multisensory context, and are directly related to the sensory dimension of experiences mediated by videogames (McCarthy & Wright, 2004). Games are usually seen as a predominantly visual medium (Tavinor, 2009), but herein we seek to frame the videogame as a network of potential sources of stimuli of different nature and modalities (e.g. visual, aural, haptic, etc.).

SS1 ("What is the style and atmosphere that the game offers?") and SS2 ("What are the main feelings that the game is intended to invoke?") relate to what we can also call the mood that videogames enable: SS1 suggests thinking about the style and atmosphere that characterizes the videogame, and SS2 suggests thinking about the feelings that its style and atmosphere can potentiate. Together they seek to help rationalise the intended goal of a game's formal, or aesthetic, layers.

The SS3 ("What are the elements responsible for sensory stimuli?") question aims to help think of the in-world elements of the game that serve as sensory stimuli and SS4 ("How do different stimuli relate to each other? (work together)") how these stimuli relate to each other; together, these seek to help guide the creative process, in terms of how to select and harmonise aesthetic stimuli.

One key feature of the videogame medium is the active participation of players such that it influences the unfolding sequence of events; therefore, SS5 ("To what extent the sensory environment results from participation of players?") concerns the way the sensory environment is affected by players' active participation. This promotes designers to potentially think of the videogame aesthetics as a dynamic entity shaped by player participation, as opposed to a merely static snapshot (as expectable in non-interactive media).

Sociability

The questions proposed for the Sociability perspective aim to help to think of videogames as social participation contexts, establishing relationships between players. The idea underlying this perspective is that of the game as a social system (Klabbers, 2006). In this perspective we contemplate both play-defined roles and relationships, such as competition (player against player) and cooperation (player with player), as well as looser, freer social interactions, such as communication and collaborative creativity.

The SO1 question ("What is the social configuration proposed by the game?") concerns what sort of social relationship a game proposes for its intervenients:- for example the players compete directly against the game, among themselves, or in a team.

SO2 ("What kind of interactions between players are proposed by the game?") seeks to query what inter-player interactions the game supports. Interactions may rest on different types of roles (e.g. magician, explorer, assault trooper, red team member, Dungeon Master, etc), possibly with different goals, relationships, and so on; these are reflected in SO3 ("What kind of roles are proposed by the game?").

The SO4 question ("How does the participation of a player influence the participation of others?") is intended to refer to the possible systems of interdependence between players present in the game, from which a richer and more intense social activity can be developed in the game.

Finally, SO5 ("What kind of perception players have of each other? (visibility)") refers to how the game shapes what players perceive of themselves and others. This could be established through explicit avatar representations (a players' representation within the gameworld), the sharing of play spaces (a player's house in an MMO), in mutual access to performance indicators (i.e. leaderboards), or any other type of shareable player information.

In the following section is described the physical instrument intended to introduce these questions into the game design activity. It should be mentioned that this version of the instrument was the result of the suggestion stage of the first cycle of the Design Science Research (DSR) process and, therefore, was an openly, tentative, not-yet-validated solution, formulated via a process of abduction (only later would it be subjected to evaluation and revisions based on experimental data).

PCGD Canvas V1

The goals for the canvas were manifold:

- For design practitioners to be stimulated to design according to the PCGDM, all the while structuring the process according to its perspectives and foci
- For designers to write down their design intentions and ideas, in so doing foster rationalization and discussion within their group,
- To make the design process more auditable.

To fulfill these goals, we gave each design student group three A4 paper sheets with the guiding questions, as shown in figure 4.1. This printout had 6 areas, one for each participation model perspective, with an open space to be used as notebook to write design notes and ideas during design sessions.

We hoped this instrument would serve to:

- Collect and analyze students design ideas;
- Study which questions lead to the generation of which design ideas;
- Study how many design ideas each design question prompted;
- Study which questions lead to more developed and substantial design idea;

In figure 4.2 is described the structure of the canvas area for each of the six perspectives.

4.2.2   Evaluation of the Canvas

As stated above, the aim of this first evaluation cycle was the validation of the proposed instrument in terms of users' perception of value. To evaluate the design canvas globally, i.e. whether or not it is helpful in practice, we were interested in understanding if the proposed questions were effectively understood by users, and whether or not they were perceived as productive, i.e., if they help to generate meaningful contributions in the definition of a game design concept. Finally, we wanted to gather data that could help improve the design instrument, in terms of its effectiveness with the target user group.

Playfulness

The videogame as a context of free, informal, and unstructured participation.

Think of the videogame as a toy with interpretative flexibility, allowing for player exploration and improvisation. Player participation is based on interaction with the game led by an intrinsic motivation.

_____

Intention

exploring, discovering, recreating, customizing, choosing, lack of constraints, freedom

_____

Artifact

1. What type of game's characteristics incentive free participation?
2. What kind of restrictions constrains free participation of the players?
3. What are the interactive elements that enhance free participation?
4. To what extent players can express themselves through free participation?
5. To what extent the game enhances the improvisation of the players?

_____

Participation

degree, variety and tendency of exploration

Figure 4.1 Detail of perspective depicted in Participation-Centered Game Design Canvas

Each of the perspectives is represented on the canvas with the following structure:

1) Logo and name of the perspective;
2) Brief description of the perspective;
3) Longer, complementary description of the perspective;
4) Corresponding 'Intention' component according to the Participation-Centered Game Design Model;
5) Proposed game design questions for the perspective;
6) Space for canvas users to answer questions and take notes;
7) Corresponding 'Participation' component according to the Participation-Centered Game Design Model previously proposed;

Synthetically, canvas elements 1, 2 and 3 aim to help understand the perspective. Elements 4 and 7 help frame the perspective in the model. Elements 5 and 6 refer to the questions themselves.

Figure 4.2 First version of the Participation-Centered Game Design Canvas

Summarising, for the current research design we wanted to:

- Evaluate users' perception of understanding and productivity;
- Collect evidence regarding the productive character of the instrument;
- Collect relevant information that signaled problems or weaknesses in the instruments, for later revisions.

The canvas evaluation was carried out in the context of an elective course on Game Design and Development, part of a Masters in Informatics Engineering study program. In it, students are called upon to conceive and develop an original videogame demo in one semester, going through concept definition, detailed design, implementation, and experience evaluation. The participation centered game design model and instrument were presented during the concept definition phase, and the canvas questionnaire was used by students so as to support their initial concept design process.

In the presentation of the model, each perspective was exemplified by a videogame in which said perspective manifests itself in a relevant way. The employed videogames were: "Noby Noby Boy" (Takahashi, 2009) for Playfulness, "Pong" (Alcorn, 1972) for Challenge, "Wii Sports" (Nintendo, 2006) for Embodiment, "September 12th" (Frasca, 2003) for Sensemaking, "Flower" (Chen, 2009) for Sensoriality and "The Endless Forest" (Tale of Tales, 2006) for Sociability. These were selected by the course professor for being particularly expressive examples of exploration of their respective participation perspective.

The class in which the instrument was rehearsed was constituted by 60 game design students, divided in 15 teams, each between 3 to 6 members, ages ranging from 22 to 30, predominantly male (95%) and from an Informatics Engineering background (95%). All students had a solid understanding of English as a second language.

The starting point for each of the projects was a set of themes which were assigned to groups based on stated preferences and breadth of coverage of the themes. We offer 3 examples to illustrate the nature of the themes, shown in table 4.3.

Project briefs had purposely little detail on how the design should be developed. Theme proposals were intended to promote diversity in the projects' conceptual domain, so that, on one hand, we could provide opportunity to analyze and discuss different aspects of game design during course debates, and, on the other, to create opportunities for students to explore how the participation-Centered model of gameplay would be employed in a diversity of project domains, thus promoting exploration of the medium's multiple dimensions.

Data Collection Procedure

Once themes were attributed and the game design model and instruments were presented, there was a kickoff design session, where teams were asked to autonomously outline their concepts, to be materialized in the form of a 7 minute presentation. This assignment was due a week later. At that point, groups were asked to deliver their canvas for analysis. Figure 4.3 shows a canvas filled out by participants, containing the game design notes that would later be analyzed in terms of their consistency with the model dimensions.

After the aforementioned design exercise, we gave game design students an instrument questionnaire for them to rate each of the canvas' guiding questions, on a 5-point Likert scale ("Strongly Agree", "Agree", "Undecided", "Disagree" and "Strongly Disagree") regarding the understandability of each question ("read and understood the question"), and the productivity of each question towards their design process ("we can find answers in the design intention").

Name	Description	Goals
reCenter	A game where the player is located at the center of a game world, perceivable by using a mobile device as a virtual window	Take advantage of input devices capturing orientation and movement to create an experience that changes perspective, putting the player at the center of the game world
Frontiers	A social dynamics game about frontiers	Consider a multi-agent simulation that lets players explore what can go on across borders. Frontiers are semi-permeable membranes between societies and cultures. (...) Picture specific times and places where significant changes occurred due to contact between civilizations.
ARGit	An Alternate Reality Game to explore mobile technology	To explore mobile Augmented Reality techniques on smartphones to propose an alternate reality challenge to be played out in the open; Define a purpose for communicating with the game, get people to be aware of something, mobilize people for some common action, or simply create a fun social experiment.

Table 4.3 Examples of themes for project proposals
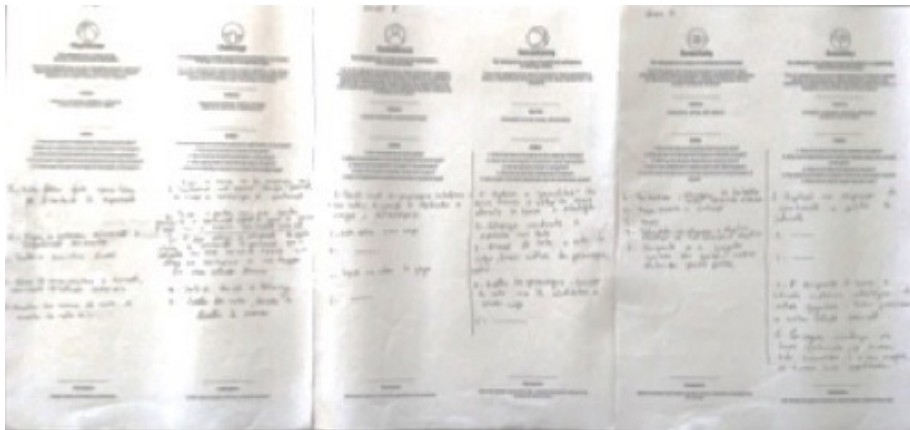
Figure 4.3 First version of the PCGD Canvas filled by a group of participants

At the end of the semester, during the final project presentation, each group of participants was interviewed in a focus group format, to collect testimonies regarding their use of the model and instruments. The following questions were used to guide the semi-structured interview with the students:

- Can you describe to me the moments in which you used the model?
- In which moment did the model show greater usefulness?
- What difficulties did you feel at each moment?

- Has the model helped you think about the design possibilities space?
- Has the model helped define the direction of the design at some point?
- Do you have any suggestions or critiques?

In the following section we present the results of this procedure.

Results of the First Game Design Exercises with the Canvas

In this section are presented the results of the first evaluation cycle, which come from 3 different data sources:

- The survey intended to evaluate participants' perception of the proposed questions, in terms of understandability and productivity;
- Groups concept proposal ensuing canvas notes;
- Interviews resulting in questioning the exercise teams.

Surveys

Herein are presented results from the survey on users' perceptions of understandability ("read and understood the question") and productivity ("we can find answers in the design intention") regarding the instruments. Figure 4.4 and figure 4.5 show graphs with relative frequency of Likert replies (from a total of 60 answers) for each of the canvas questions, for understandability and productivity, respectively. To evaluate the instrument, we aimed to identify the best and worst results in terms of each of the model's dimensions, besides assessing each questions' individually.

As a criteria of success both for understanding and productivity surveys we will consider the questions with at least 50% of positive replies (i.e. answers corresponding to "Agree" or "Strongly Agree"). In relation to the results on the understanding of the questions, it is possible to establish the following. Globally assessed, the Challenge, Embodiment, Sensoriality and Sociability perspectives present the best results, with all questions having more than 50% positive replies and a median of at least 4 (SS2 presents a median of 5). The Playfulness perspective has one question (PL4) with positive results lower than 50%, and the Sensemaking perspective has two questions with results lower than 50% (SM3 and SM5).
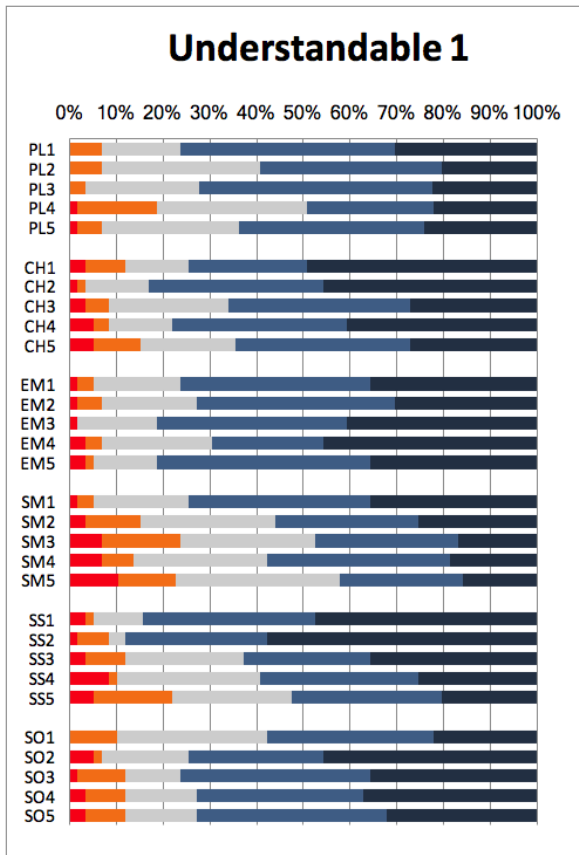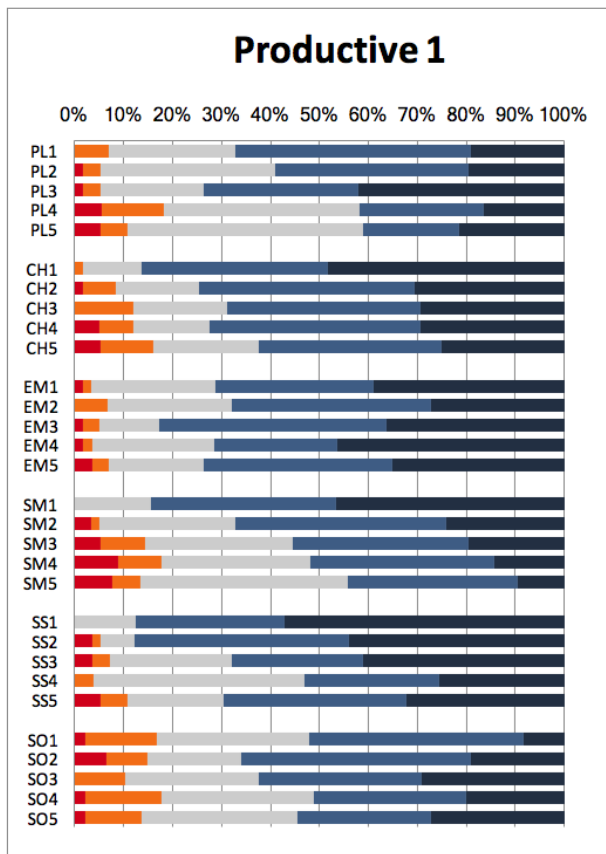
Figure 4.4 Likert agreement scale results for the statement "Read and Understood the Question", for each of the 5 questions in each Participation perspective. Red ("Strongly Disagree"), Orange ("Disagree"), Grey ("Undecided"), Blue ("Agree"), Black ("Strongly Agree")

Regarding individual questions, questions CH2, EM3, EM5 SS1 and SS2 stand out given their proportion of positive responses, exceeding 80%. Questions PL4, SM3 and SM5 stand out negatively, showing a lower number of positive replies, and a median of 3. SS5, despite the high median of 4, has negative responses in excess of 20%.

In terms of productivity, we found that the Challenge, Embodiment, Sensoriality and Sociability perspectives present the best global results. All the questions show positive replies superior to 50%, and have a median of at least 4 (question SS1 presents a median of 5). In the Sociability perspective, although all questions presented a median of 4 and a percentage of positive responses greater than 50%, all questions had a percentage of negative responses greater than 10%.

Regarding individual questions, CH1, EM3, SM1, SS1 and SS2 stand out for the percentage of positive responses, superior to 80%. PL4, PL5 and SM5 however, have a lower number of positive responses, and a median of 3.

Figure 4.5 Likert agreement scale results for the statement "We can find answers in the design intention", for each of the 5 questions in each Participation perspective. Red ("Strongly Disagree"), Orange ("Disagree"), Grey ("Undecided"), Blue ("Agree"), Black ("Strongly Agree").

Although all questions show negative results below 20%, questions PL4, CH5, SM4 deserve special attention with negative answers surrounding the 18% mark. The Embodiment perspective stands out for the reduced percentage of negative responses.

Overall, we concluded that results were positive for a first version of the instrument, as all questions had a majority of positive results. Still, it is possible to identify that the Playfulness and Sensemaking perspectives need reviewing, as well as individually problematic questions, based on negative answers:

- CH5: What is the flexibility in the ways to achieve the proposed goals?
- SS5: To what extent the sensory environment results from participation of players?
- SO1: What is the social configuration proposed by the game?

- SO4: How does the participation of a player influences the participation of others?

These results will be discussed in more detail in the discussion section, taken together with results of other data sources.

Game Design Notes

At this stage we were interested in assessing the productive character of the design notes produced by participants; therefore, a quantitative analysis was employed. The quality of the answers was only evaluated at a later stage of the research process, after several revisions of both canvas and model.

Productivity assessment was based on the number of answers that each participant group gave to the guiding questions, that was deemed a valid design idea, i.e. consistent with what was asked by questions. To establish this, the thesis author performed content coding of each answer using a top-down approach, which was later reviewed by a second researcher. In this phase, we were interested only in understanding which questions were generating responses, which perspectives of participation had more or less answers, and how reply numbers vary between different groups.

To highlight the criteria used by the researcher for coding answers as consistent with the model, a select set of examples from the game design notes are presented in table 4.4, annotated by group and response numbers when possible (the fact that it is not possible to classify all the answers will be discussed in the next section). Valid answers were considered thus, whenever they were a consistent answer to the question at issue, regardless of their design quality; so a brief response ("Through the mouse" EM4, G) or an abstract answer ("Limited by the area" EM5, J) were still deemed valid.

Figure 4.6 summarizes valid responses counts. The central table shows the number of responses organized by participation perspective, for each of the 15 groups that participated in the exercise, identified arbitrarily from A to O. The graph on the right shows boxplots for answer counts distribution for each group. The chart below shows boxplots for group answer counts across participation perspectives.

By analyzing the answers to each perspective, represented vertically, it is possible to verify that in every perspective valid and coherent design notes can be found.

	Examples of Games Design Notes
Playfulness	C: "Free routes that allow freedom of expression". P1 K: "The sounds in the game indicate different paths that the player can choose. the sounds can indicate objects or other characters with which you can interact if you want "PL3 G: "It is the player who draws elements that help him achieve the goal of the game" PL5 M: "Release stress by destroying objects on set" PL4 J: "Through the reproduced sounds, different scenarios are discovered" L: "Too many dancing rules; The context of art form. "PL2
Challenge	C: "Bring the largest number of memes to the sanctuary, in the shortest time possible, to maximize the score" CH1 C: "Decision Skills and Timing" CH4 K: "There's no score. The player joins pieces of the puzzle so the story makes sense." G: "Depending on what the player "draws" in the game, the game unfolds." CH5 E: "There are challenges that can be individual and pre-chosen by the player and also challenges in teams assigned by the system."
Embodiment	C: "Aerial view on a map." EM2 K: "Game in first person." EM3 G: "2D environment, in surrealist movement scenarios." EM1 G: "Through the mouse." EM4 L: "Limited by the area." EM5 M: "The perspective is free as long as it does not exceed the boundaries of the map, or it is attached to a vehicle / tower." EM2
Sensemaking	C: "Explore the 'personality' of various memes and use them as an element of humor and strategy" SM1 K: "Plant in players the idea that they are waking up blind and giving the idea that not everything is what it seems" SM1 G: "Each character or historically / culturally relevant object will also have information (ex: biography) associated". L: "Maybe the sociability perspective, the Portuguese dances, involves groups of people". SM5 M: "When we look at it from the perspective of the aggressors, we can see that there is one bad side and the other one good, and they can alternate between them." SM5
Sensoriality	C: "Fantasy; Battle atmosphere but fun and comical. "SS1 K: "Hope, fear, uncertainty, doubt, panic, discomfort, empathy" SS2 G: "Graphic adventure in a surreal world" SS1 J: "Exploration" guided by "sound interactions". M: "When interacting with the game, we get reactions that result in new stimuli" SS5 L: "Characters dancing on the screen and the music" SS3
Sociability	C: "Competition via score comparison and solution sharing" SO1 C: "Can view your scores if they have been submitted, and your maps, if they have been shared" SO5 G: "cooperation / competition" SO2 E: "In the mini-map appear avatars of the games and where they are" L: "You can play by yourself but folk dances are not meant to be danced by only one person, so it's best if you play with friends." SO1

Table 4.4 Examples of Games Design Notes

In all perspectives there is at least one group with a number of answers equal to or greater than the number of questions. The Playfulness, Embodiment and Sensemaking perspectives receive a greater number of responses, with a median of 3). Conversely, the Sociability perspective shows the lowest number of responses with a median of 1 response per group. However, if we remove groups that did not submit any answers to the canvas, 7 out of 9 reply with at
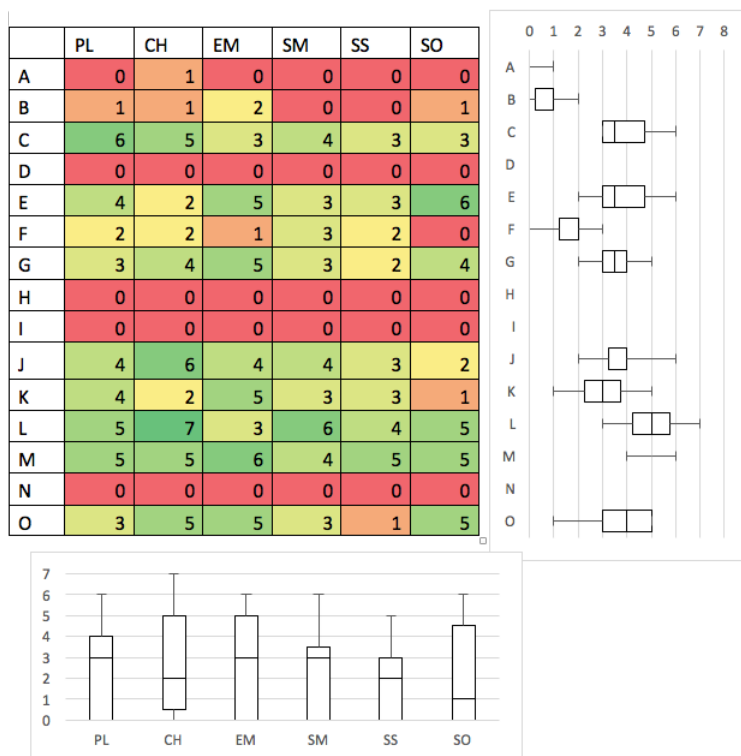
	PL	CH	EM	SM	SS	SO
A	0	1	0	0	0	0
B	1	1	2	0	0	1
C	6	5	3	4	3	3
D	0	0	0	0	0	0
E	4	2	5	3	3	6
F	2	2	1	3	2	0
G	3	4	5	3	2	4
H	0	0	0	0	0	0
I	0	0	0	0	0	0
J	4	6	4	4	3	2
K	4	2	5	3	3	1
L	5	7	3	6	4	5
M	5	5	6	4	5	5
N	0	0	0	0	0	0
O	3	5	5	3	1	5

Figure 4.6 Number of design ideas found in canvases. Columns are participation perspectives (PLayfulness, CHallenge, EMbodiment, SenseMaking, SenSoriality, SOciability) and rows show student groups.

least 3 responses. This particularity demonstrates the relevance of the horizontal analysis, depending on the groups.

When analyzing the answers group-wise, it becomes apparent that some groups (A, D, H, I) did not participate in the exercise, writing either none or a single note to the canvas. Though this finding will be the subject of discussion at a later section, it should be pointed out that having carried out this experiment in an academic context, it was bound to result in heterogeneity between groups, regarding their motivation and commitment, both to the elective course itself, the study and design of videogames, and the motivation to participate in this research. Another aspect that we find interesting to point out is a trend towards coherence in the number of responses for the various perspectives, noticeable in the concentrated interquartile range.

We can conclude that generally, all perspectives led to valid design notes, even though with arguable quality and frequency. One important finding is that there does not seem to be any critically unproductive perspective, i.e. no perspective showing a complete lack of, or even a small number of responses,

which seems an important indicator of potential relevance, at the first stage of the process.

Post Process Interviews

Interviews were conducted with each group using a focus group approach, seeking to collect qualitative discourse data on canvas use. We were interested in collecting evidence of participants' reasoning regarding the usefulness of the instrument, of potential difficulties or challenges that they encountered, as well as collecting suggestions. The fact that these evaluation objectives were defined a priori allows us to use a top-down coding approach to discourse content analysis. We began by categorizing excerpts from the interviews associated with high-level themes - utility, challenges and suggestions - and then we identified sub-themes that could help us in future revisions.

In order to facilitate the communication of this analysis, we describe the analysis according to the same top-down approach, where for each of the main themes we present excerpts from the interviews, followed by the respective comments. The excerpts presented here, although perhaps extensive, seem to us the adequate unit of discourse, in order to understand the context in which it arose. We begin by presenting the excerpts cataloged with the general topic of usefulness.

> *— **Interviewer: Do you remember using the model, answering those questions? Concerning that experience, can you remember any difficulties you had then, or if it felt useful to answer those questions?***
> *— Group B Participant 1: We managed to look inward and make a string of ideas we had.*
> *— GrB_P2: That's it. It was more the case of defining ideas because we were mixed on what we wanted.*
> *— GrB_P1: To clarify.*
> *— GrB_P2: To try and find an answer for it [canvas], we'd search for an idea, and that is what came about.*
> *— **I: It seems you were able to steer your project, right? And was it useful in that respect, of steering?…***
> *— GrB_P3: We had very scattered ideas, and then with the questions and trying to answer it. It wasn't really the ease of answering it. It was more finding things that could fit in it.*
> *— GrB_P2: Finding more game features*

> — *GrB_P1: That fit with the game.*
> — *GrB_P2: That by answering the questions we could have outcomes to the game.*

Regarding content classified with the perception of usefulness, it is interesting to analyze which expressions and vocabulary was used to describe how game design questions were used by the students in their exercise. In the above excerpt we find expressions like "make a string of ideas", "defining ideas", "to clarify", "'finding' more game features" or "to have more outcomes to the game". These expressions are in line with the goals set for the proposed game design instruments, in order to foster design decision rationalization, as well as to think about the space of possibilities for new game solutions. Even if it is a small excerpt, the employed expressions already indicate different instrument qualities perceived by participants. Namely, a more analytical perspective of helping think about game design ideas as they are generated ("make a string of ideas", "defining ideas", "to clarify"), and in a creative perspective, as helping generate new design ideas ("finding more game features", "more outcomes to the game").

In the following excerpt, we can find evidence of the influence of the instrument in the design process.

> — ***Interviewer: You've had the opportunity to use it at different moments in your project. Can you describe more or less what these moments were?***
> — *Group C Participant 1: In the beginning we were using it more like a looser guideline. Then we used it more like a way to guide us, not like a rule, you know? That is, we tried to cover more or less what was there, but we did not want to... stop trying to answer the questions exactly and we started trying ... that is, it is broader. This served as a help.*
> — *GrC_P2: It was a guide.*
> — *GrC_P1: It was a guide, exactly.*
> — *GrC_P2: But not as rigid.*
> — ***I: You were talking about the beginning.***
> — *GrC_P1: But there it is, I don't know how much it influenced, maybe, the game's design. Because we didn't change so much based on it [the canvas]. Remember? Then, when we were answering the questions, it was more like, "well, this is it" or "this is like this"; It is a way of perhaps analyzing it but not developing it.*

(It was one thing, but in the end. What I'm talking about is the feeling I got.) Because there was a discussion surrounding playfulness.
— GrC_P2: Yes.
— GrC_P3: (If our game... and it was triggered by the question-naire.) The discussion at the time was triggered by the questionnaire. Whether there was playfulness in our game or not.
*— **I: Okay. You did not use it to think about design possibilities, for example.***
— GrC_P3: No, it's like this: this has always been a fairly intuitive thing in which our elements in the last four weeks have undergone some substantial changes. And at that point we thought like this: okay, we have this idea, this concept. Let's answer the questionnaire to do the assignment. And that, replying to the questionnaire, we changed things.
— GrC_P1: By trying [...] from some things for others, ok… why did we not remember this before? Why didn't we do that? But it wasn't that much... What I'm trying to say is: it weren't two parallels; we'll discuss, well check this, let's check that; let's answer the questions. Doors were opened, others were closed. Let's discuss again. Let's answer the questions again. We were answering based on the questions. [...]
— GrC_P2: I think the model is like a crutch. Something you can lean on to try.
— GrC_P1: Basing on and following [the canvas]…

Participants use a revealing expression in this excerpt, when they state the questions are "a guide", a "looser guideline", a "way to guide us". Yet another valence attributed to the canvas instrument is as a promoter of discussion: "The discussion at the time was triggered by the questionnaire. Whether there was playfulness in our game or not." This valence is precisely what is sought as an intention to instrument, in the sense of being a facilitator of discussion and thinking about the ongoing design process.

Another interesting find concerns reflection on "how much [the instrument] influenced" the game's design, with considerations arising that the instrument worked more in the perspective of analysis, and not so much in helping "develop" the design. Despite this claim, in this excerpt we still find mentions to idea generation ("Why didn't we remember this? Why don't we do that?"). Yet another revealing expression is to describe the model as "a crutch" in its role as aid to the design activity. This notion is further developed in the following

excerpt, where we find reference to the questions being understood as "small seeds" that ultimately originated changes in the game's design:

> — ***Interviewer: At any point did you think the model helped you think about the direction you were giving to the game you were creating?***
> — *Group C Participant 1: What was cool was that quality: there would be a question and we'd think "to what elements does this answer to?" Ah, it is answering to those kind of elements in which we… so forth and so forth in the game, and then we thought: could this work on our own? And there were some you could entirely discard. No! I don't even like this. Don't like it in games. How could we insert this? And at times there would be radical changes in the game's design. [...] There were several moments where we almost avoided that. And it was sparked by a tiny thing. And there were in the questionnaire [canvas] little seeds planted there. Meaning, even if our process isn't, let's answer these questions and let's argue this about each of them, for a long time, or something like that. We were discussing, let's do this, this and this... resorting to the questionnaire. These new elements, by chance we could have a thing with two players, or a thing like this, or like a turn-based thing; (and any thing sparked social elements, and there were others that sparked more).*

These examples show explicit references to the instrument's utilitarian quality, or a rationalization of the canvas role in the design process, as a means for supporting analysis, discussion, and idea generation. The following excerpts are examples categorized with the issues theme, highlighting difficulties expressed by participants:

> — ***Interviewer: I can say that you have had the opportunity to look at the model and use it at different stages of the process. Can you identify those moments? Or to say in which parts you had most difficulties or in which you found it most useful?***
> — *Group I Participant 1: When we filled out that big sheet, that had those...*
> — *GrI_P2: Questions.*
> — *GrI_P1: Questions, yes. That helped us think on the subject. There were some things we had not thought about and had not approached.*
> — *GrI_P2: I think in some things it helped us. At the same time, that grid I… On the one hand: so many questions, at first it scared us a lot,*

it left us a bit… it looked like too much information for what we need-ed. But on the other, seeing so many questions made us think about what we had not even worried about and, at the same time, it made us realize what we needed to focus on. That is, from so much informa-tion, it was good to know so much information, or so many things that we could have to worry about.

The previous excerpt seems to us particularly interesting because it presents both evidence of utility and a potential challenge. At the same time that the students recognize usefulness in using the instrument for thinking about sub-jects that they had not thought about before, they share the concern that, ini-tially, the number of questions is overwhelming ("on one hand there were so many questions, at first it scared us a lot "). This perception is especially rele-vant given the instrument strives for synthesis (although, ideally, it should al-so be comprehensive). Therefore, the number of questions per perspective of participation, was to be reconsidered in future revisions, and will be the sub-ject of forthcoming discussion.

Another topic identified in speech relates to the stage of the design process when the model is to be used. The following excerpts discuss this idea from different perspectives:

— Interviewer: And on that part you found it useful?
— Group A Participant 1: Yes. If we wanted to focus on that subject, what could we do to …
— I: So you're saying it helped define the character of the game, isn't it? What particular features did you …
— GrA_P1: I'm not saying it was right at the start of it, but more in the middle of trying to figure out how we could place more [answers for] that question. At that point, it helped a bit. More than starting off.

— Interviewer: Anything you didn't quite understand?
— Group B Participant 1: At first we were a bit sixes and sevens. Especially considering when we made a proposal, it was early in the course. We made a proposal for the game we wanted to make; this proposal was accepted. And then right in the next session, when pro-posals were being presented, we had to answer a whole series of ques-tions, to define more what game it was that we guys wanted to make and, and how we wanted to make it. And we only had a simple ques-tion of what it is that we wanted to do. We were finding it a bit

strange: <u>we are here answering this when we already know what we</u>
<u>want to make</u>!

If, on the one hand, previous excerpts make clear the canvas usefulness in organizing and discussing ideas, in these excerpts we find a challenge in using the instrument at an early stage of the design process ("... It helped a bit. ";" At first we were a bit sixes and sevens"). On this subject, it is also interesting that group B calls into question the usefulness of the instrument when there is already an intention for the design of a game ("we are here answering this when we already know what we want to make "). While this idea is contradicted by previous testimonials, this group's perception is worthy of note, and signaled to us that the function and usefulness of the model and canvas, for creating and analyzing, needed to be better communicated.

Regarding other potential issues, the following excerpts show participants mixed some of the participation dimensions:

> *— Interviewer: Any critique? Any suggestions?*
> *— Group D Participant 1: There were times when we were perhaps mistaking a bit sensemaking with sensoriality. But I don't happen to have suggestions on how to make them more distinct. But it seemed to us that things were encompassed [by both] and that each was overlapping [the other] and we did not figure which question to write [the notes].*
>
> *— Interviewer: And why did you decide not to mention embodiment in your game? Did you think it didn't make sense?*
> *— Group I Participant 1: At the time no... the dimensions describe themselves, in the paper, they themselves say, in the embodiment or was it another...?*
> *— GrI_P2: Embodiment… sensoriality.*
> *— GrI_P1: Sensoriality, exactly! It is explicitly there; these two are similar but the line that separates them is the more physical side, the more inner side of the player [experience]. And so it led us to think that embodiment didn't make sense.*

These reports should be taken into account in the revision of the instrument, clarifying the distinction between perspectives, and better communicating the instruments. However, as previously mentioned, we find it acceptable to have some degree of ambiguity between participation perspectives, as it might help

support the speculative creation of new design ideas. From the point of view of design as a creative process, where there isn't a search for a single solution to a concrete problem, it seems to us even that ambiguity is a welcome feature (Gaver et al., 2003).

These final excerpts show suggestions left by students:

> *— Interviewer: Do you have any suggestions or critiques?*
> *— Group I Participant 3: In the assignment we added a new dimension, that of emotions.*
> *— GrI_P2: I think you need something there that contemplates the emotional side.*

> *— Interviewer: Do you have any suggestion, any critique in relation to the filling of the model?*
> *— Group A Participant 1: Perhaps we needed more examples. Concrete ones. Using really different types of games and… Concrete examples for us to depart from: "Ok, this example makes sense or not?"*
> *— GrA_P2: I think there were too few examples in that regard.*

> *— Interviewer: Do you have any suggestions or criticisms to make regarding those issues or those dimensions; something you did not understand?*
> *— Group X Participant 1: That would make sense, perhaps, divide questions a bit by phases. In the early stages, more abstract questions. That is to help people focus on what the game is going to be and then, later, more specific questions. I think that could be the biggest...*
> *— GrX_P2: At least those two [changes].*

In these excerpts are suggestions at different levels. First, at a fundamental level, in regards to perspectives that the instrument should contemplate, we find an explicit suggestion for an emotional dimension ("something that contemplates the emotional side"). Then suggestions of a more structural nature: the inclusion of examples, and of how questions should be organized ("split the questions a little by stages"), which echoes the issue of how many question there should be in the first place ("On the one hand, so many questions, at first it scared us a lot ").

4.2.3   Iteration 1 Conclusions

Having presented the results of the different data sources (surveys, design notes, and interviews) in the previous section, we are now in a position to reflect on goals of the first evaluation cycle, namely: a) evaluate user perceptions of utility and understandability; b) collect evidence on the productive character of the instrument; c) collect data on problems or weaknesses of the instruments for revision in the ensuing iteration.

Overall Assessment

Having analyzed all collected data, we conclude that the outcome is generally positive, confirming the instruments utility. Concerning the questions' understanding and their utility, we can verify from the survey data that a majority of questions present a high number of positive responses (> 50%). Interview testimonies also highlight the instruments' productive character, with several expressions of its usefulness ("make a string of ideas", "defining ideas", "to clarify", "to have features in the game", "to have more solutions in the game", "opened doors (...) closed others"). Even in model dimensions with less favorable self-report results - Playfulness and Sensemaking - we can find canvas replies from the game design exercise.

Sociability Dimension Revision

Concerning the Sociability dimension however, the percentage of negative responses (> 10%) is problematic, and it is also paired with the least number of game design notes given by students. There is one constraint to keep in mind: this being an exercise in an academic context, it is severely constrained in terms of design and development time. Multiplayer games tend to be more complex and costly to implement; therefore, exploration of this dimension might have been neglected for this reason. Still, the negative result leads us to conclude that there is a need for a revision of this dimension.

Timing

Just as we find in subjects' discourse different expressions of the instrument's usefulness, at different stages of the design process (serving as both medium for idea generation and consolidation), we also find evidence of groups struggling with the instrument, particularly regarding idea generation. Although it is a pertinent question for reflection, we consider that this aspect is related

more to the nature of the design activity that was studied, than with the instrument itself. Different groups were at different stages of the design process when the instrument was introduced, so we consider questions of timing to come about naturally. Compounding the matter are the different levels of engagement with the exercise from each group, as can be verified by the sheer number of design notes.

Dimension Clarification

Another issue found in subjects' discourse is uncertainty regarding the conceptual boundaries of different model's dimensions. Subjects of two groups noted difficulties in distinguishing sensoriality from embodiment, and sensoriality from sensemaking. Although we may consider ambiguity to be tolerable to some extent (as a way of fostering creativity), the intelligibility of the proposed perspectives is essential. As such, these dimensions should be reviewed in the instrument during the next iteration, so as to make their identification clearer.

Domain Clarification

In terms of subject proposals, an Emotion dimension emerged as a recurrent theme. While emotions were contemplated as a possibility for the model from the start, we chose not to explicitly contemplate an emotional dimension for two reasons. On the one hand, it is a scientific domain widely covered in videogame design literature, which means that any contribution from this model would be lacking in originality. On the other, we consider that an emotional dimension and the proposed perspectives stand on different conceptual levels.

We propose participation perspectives as a means for rationalizing game design and the player experience that emerges from it, not as an end in itself, i.e., not as a way to directly characterize players' experience. As such, we do not need to explicitly consider the more subjective emotional dimension. For this reason, we believe that the communication of this conceptual approach can be improved. In addition to the theme of emotions, no evidence was identified in the participants' discourse that would justify the consideration of alternative perspectives beyond the ones proposed.

Design Notes Facilitators

Subjects also suggested the possibility of including examples to illustrate each of the Instrument's questions, so as to help them understand what each

question entailed. Furthermore, to alleviate the burden of answering a large number of questions, subjects suggested questions should be organized into stages. These issues were considered in the review of the instrument for the next phase in two ways: a) rewriting some questions, to clarify and reduce the number; b) keeping the open order between dimensions and questions as a characteristic of the instrument to avoid conditioning the creative process, only suggesting that intent could be addressed first across all dimensions.

Evaluation Process

Finally, we must analyze the evaluation process itself. In this first evaluation cycle, the analysis of game design notes was below its potential. Using mixed-methods approaches, we could have analyzed answers not just the quantity of valid answers but also their quality. In this iteration, qualitative analysis was not feasible as there was no direct and explicit association between the proposed game design questions and subjects' responses. This was due to the design of the physical canvas itself, as it had a large text field for subjects to answer all their questions regarding a single perspective, thus preventing an association of each answer to a specific question. Thus, the design of the canvas should also be reviewed in order to enable a better qualitative audit of the design notes.

In short, we consider that this first version of the instruments was generally successful, allowing us to answer the posed research questions, namely in terms of the instruments' usefulness and the identification of features that need improvement in the next iteration. Based on these results, the next section will present a revision of the instruments and a new evaluation round.

4.3   Iteration 2

4.3.1   Canvas V2 Proposal

On the basis of the conclusions of the first evaluation cycle, in this section, we propose a review of the instruments and a new round of evaluation. This second cycle's main goal is to assess the quality of the design answers given by subjects.

We proposed a new version of the instruments. We revised the number and formulation of each question, the canvas layout, and now include examples with each question. The revision of the number of questions (3 per participation perspective), is intended to make the instrument more synthetic, and aims at alleviating any potential negative impacts of the instrument's first use. So as to enable answers' content analysis, we revised the canvas itself.

We have also chosen to include examples of answers for each question to improve their overall understandability, and clarifying the distinction between some of the dimensions. We assume the risk that these examples can exert in the contamination of the answers, by potentiating their direct transcription into the design notes.

Another key change refers to the communication of the instruments at the onset of the design process; during this stage we illustrated each of the model's perspectives with videogames that explore said perspectives, so as to make their definition clearer. Examples used were: "Noby Noby Boy" (Takahashi, 2009), "Minecraft" (Persson, 2009), and "Dear Esther" (The Chinese Room, 2008) for Playfulness, "Pong" (Alcron, 1972), "Angry Birds" (Rovio Entertainment, 2009), and "Starcraft" (Blizzard Entertainment, 1998) for Challenge, "Wii Sports" (Nintendo, 2006), "Dance Dance Revolution" (Konami, 1998), and "Sega Rally Championship" (Sega, 1994) for Embodiment, "September 12th" (Frasca, 2003), "The Graveyard" (Tale of Tales, 2008), and "Call of Duty Modern Warfare 2"'s "No Russian" (Infinity Ward, 2009) mission for Sensemaking, "Flower" (Chen, 2009), "Silent Hill" (Toyama, 1999), and "Monument Valley" (Ustwo Games, 2014) for Sensoriality and "The Endless Forest" (Tale of Tales, 2006), "World of Warcraft" (Pardo, 2004) and "Mario Kart Wii" (Nintendo, 2008) for Sociability.

In the following section, we present the second version of the Participation-Centered Game Design Canvas and respective questions.

Participation-Centered Game Design Questions V2

The Design questions of the second version of the instrument are presented in table 4.5. Questions were reformulated, synthesized, their vocabulary updated, and in some cases alternative formulations are presented. For each of the questions, a set of examples is presented, as mostly abstract answers to these questions, that seek to illustrate potential design options for each dimension.

Playfulness

The first version of the Playfulness perspective issues warranted revision, on smaller reported values for subjects' understanding and productivity. As already mentioned, we consider that this perspective is, since origin, potentially challenging to operationalize, given its level of abstraction. Thus, in this second version we chose to reformulate the associated questions, focusing on what in this context seems essential: to conceive of a videogame as a context for free exploration. For this, the new set of questions queries users to think about the kind of spaces of freedom that a videogame offers, of the elements that support the free activity of players, and to characterize these spaces of freedom.

Challenge

For the Challenge perspective we synthesized it into 3 questions and adjusted the vocabulary. We focused questions on the notions of goal, the nature of the challenge, and feedback. The question concerning Goals was maintained in relation to the first version, but was made concise. We have adjusted the skill question to question subjects on the nature of the challenge, thus making the question more far-reaching. Questions about player outcomes and its valorization were condensed into a question about feedback.

Embodiment

Embodiment perspective questions were also designed through a synthesis of the previous versions. We now suggest operationalizing this perspective using the ideas of player's presence, the game world, and interaction with the game world. The question about player's presence has been synthesized from previous questions on players' perspective of the game-space and their in-game representation. The remaining questions already existed in the previous version, with a minor adjustment in the change of game space to game world.

Sensemaking

In the Sensemaking perspective, 3 previous questions were considered relevant for operationalizing this dimension, with only minor adjustments of vocabulary. The question about the videogame's theme gave rise to a question on the phenomenon represented in the game, so as to be comprehensive. The other two questions are about the player's role in the game, and the nature of significant events presented in the game.

Participation-Centered Game Design Questions V2	
PL1	**What spaces of free exploration does the videogame support?** Physical or logical (open world exploration, interacting with mechanisms / Representational (characterizing or interpreting a character) / Aesthetic (dance, acrobatics, visual or audio expression, decoration, construction / Social (interacting with characters, dialog)
PL2	**What elements support player's free willing activities?** Physical (interactive components in the gameworld, vehicles) / Scenic (avatar, characters, wardrobes, props) / Expressive (movement and sound, music and dance, dialogs, drawing instruments)
PL3	**How do you characterize players' space of possibilities?** Gameworld dimension, granularity of game levels and arenas / Diversity of supported actions (characters, actions, dialogs) / Diversity of interactive elements(vehicles, weapons, items) / Diversity of elements that support player expression (number of music's do dance, variety of layable sounds, variety of drawing instruments, variety of construction blocks, etc)
CH1	**What goals does the videogame propose?** Solving a problem or puzzle / Winning a race, matching a performance / Chase or catch an adversary / Build a base or town
CH2	**What is the nature of the videogame's challenge?** Physical (coordination, dexterity, resistance) /Mental (memory, observation, problem solving) / Social (team-coordination, social skills)
CH3	**What feedback is awarded to players' performance?** Rewards (points, prolonged play, powers, resources, completion / Punishment (loss of points, shortened play setback, removal of powers)
SM1	**What phenomenon is represented in the game is meant to be interpreted by players?** Representations (character design, scenography, 2d/3d, animations, audio) / Type of Representations (abstract, realist, iconic) / Interpretation or reaction on the signi cance/ meaning of the experience
SM2	**What signi cant events are represented/elicited in the game?** To Fight, Shoot, Kill / To Communicate, Act / To Build, share, exchange / To Feel, Care
SM3	**What roles do players act out?** A military on a mission, a football coach / A father in search of a lost daughter / A healer in a fantasy universe
EM1	**How to you manifest players' presence in the game.world?** Avatar mediated representation / Direct interaction with the gameworld / Visual Perspective – (1st person, 3rd person, god view)
EM2	**How do you characterize the game world?** Dimensionality of its representation (projection, space, time, etc) / Spatial configuration (linear, grid, web, points in space, divided space) / Infinite, discreet/ continuous, physical/virtual or both
EM3	**How do players interact with the gameworld?** Keyboard and mouse, controller or other device / Touch, sound / Body movement
SS1	**What is the nature and intention of sensorial stimuli?** Types of stimuli (sounds, music, images, animations, special fx) / Style (joyous, sad, happy, gloomy, dark, dramatic, infantile, futurist / Relation of stimuli with intended experience
SS2	**What opportunities for contemplation does the game offer?** Environmental contemplation (visual and auditive) and cutscene watching / Places and speci c moments (level transitions, locale presence) / Sensorial stimuli as feedback for player action (achievement sound) / Induced Emotional responses
SS3	**What opportunities for aesthetic exploration does the player have available?** Players actions generate an audiovisual experience / Physical or virtual performance as aesthetic exploration (dance) / Playing a musical instrument (virtual, real) / To draw or compose

SO1	**What interpersonal relations does the game propose or promote?** Competition, confrontation, collaboration / Meeting, Dating, Sharing, Leading / Empathy and other affective relations
SO2	**What is the structure or topology the game promotes?** Player vs Game, Player vs Player / Multilateral competition, Unilateral competition / Team and Cooperative Play / Unstructured or Contingent Play
SO3	**What is the type of inter-player mediation?** Gamespace sharing / Resource Sharing / Sharing agency sources / Sharing results / Communication (voice, text,..)

Table 4.5 Participation-Centered Game Design Questions v2

Sensoriality

In this second version of the instrument we have chosen to reformulate the questions of the Sensoriality perspective. So we now suggest in this version to operationalize the Sensoriality perspective through the concepts of nature and intent of stimuli, opportunities for contemplation, and opportunities for aesthetic exploration that the videogame supports. The first question (SS1 V2) is synthesized from the first two questions (style and atmosphere, and main sentiment) and the third question, on aesthetic exploration, is a reformulation of the previous question with the same intention (SS5 V1).

Sociability

For the Sociability question we have also chosen to rephrase the questions for this second version of the instrument. We suggest to operationalize the Sociability perspective through the ideas of "interpersonal relations", "(social) structure or topology" and "inter-player mediation". Although we consider that the questions that represent these ideas may be too abstract, as in the Playfulness perspective, we also believe that the fact that there are now examples illustrating the issues may help your understanding.

Participation-Centered Game Design Canvas V2

In the second version of Participation-Centered Game Design Canvas (see A.2), shown in figure 4.7, we made some changes in order to minimize problems encountered in the previous evaluation cycle. The most relevant improvement resided in giving subjects a specific space for answering each design question. Additionally, for each question, we included examples.

Figure 4.7 Second version of the Participation-Centered Game Design Canvas

For practical and logistical reasons, the physical canvas space was expanded to A3 sheet-size, thus facilitating its printing, distribution, and ease of use during a design session. A new, blank column was added so subjects could have the opportunity to freely write any design notes not encompassed by the models' perspectives.

Structurally, each perspective is represented with the same elements as the previous version, though with the addition of examples and the removal of a second description of each perspective (removed for lack of space). Figure 4.8 shows these elements in their new configuration.

4.3.2   Application

In this second evaluation cycle, the same general procedure was used, namely: presentation and discussion of project themes, presentation of instruments (model and canvas), game design session, and data collection sessions. The second version of the instruments was tested during two academic years (2012/2013 and 2013/2014) in the same curricular unit as the previous cycle.

Figure 4.8 Detail of one of the Model's perspectives, in the Participation-Centered Game Design Canvas V2
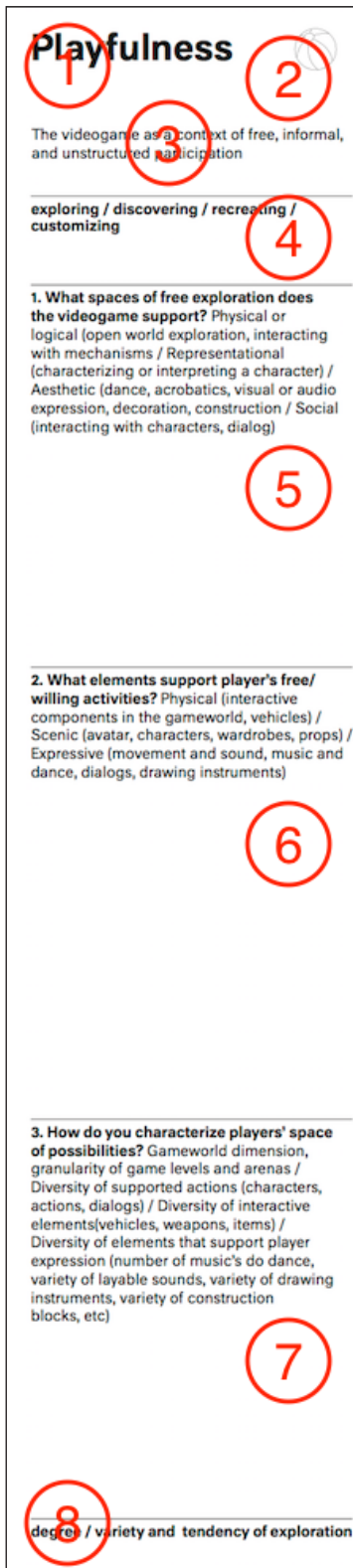
Each of the perspectives is represented in the second version of the canvas with the following structure:

1) Name of the perspective;
2) Perspective icon;
3) Brief description of the perspective;
4) 'Intention' component of the perspective according to the Participation-Centered Game Design Model
5), 6) and 7) Game design questions for each perspective, examples and space for design notes;
8) 'Participation' component of the perspective according to the Participation-Centered Game Design Model

Thus, canvas elements 1, 2 and 3 aim to help situate and communicate the perspective to users. Elements 4 and 8 help frame answers in terms of the model. Elements 5, 6 and 7 relate the questions themselves.

The class in which we rehearsed the use of the instrument is constituted by 66 game design students (42 12/13, 24 13/14), organized in 14 teams of 3 to 6 members, ages ranging from 22 to 30, predominantly male (95%) and coming from an Informatics Engineering (38), Design and Multimedia (3), or Euromachs background.

4.3.3   Evaluation

In this section we describe the evaluation procedure of the second version of the instruments. In the same way as in the previous cycle, we are interested in evaluating users perceptions of understanding and usefulness, collecting evidence regarding the productive character of the instruments, and finding potential issues in the use of the instruments. However, in this second cycle we are interested in carrying out a more detailed evaluation of answers' quality, through content analysis of the game design notes. We will begin by describing the procedure of this evaluation, followed by a presentation of results and respective conclusions.

Data Collection Procedure

Regarding the evaluation procedure, this cycle was carried out in a similar way to the previous cycle, using surveys and design notes as data sources. To evaluate the perception of understanding and productivity of the instruments we used the same method of the previous cycle, a questionnaire for rating the guiding questions, using Likert scale replies ("Strongly Agree", "Agree", "Undecided", "Disagree" and "Strongly Disagree") regarding understandability of each question ("read and understood the question"), and productivity of the question towards the design (can we find answers in the design intention). For practical reasons it was not possible to conduct interviews during the second evaluation cycle; this was one of the reasons for conducting the third evaluation cycle.

Figure 4.9 presents the second version of the canvas after being filled by students, containing the game design notes that were later analyzed in terms of quality. It is expected that the new format of the instrument will help in the process of classifying and analyzing the answers given by the students.
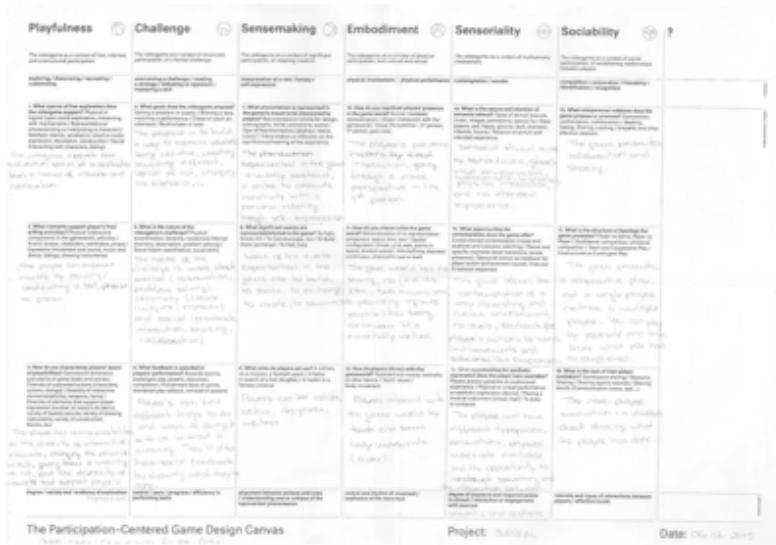
Figure 4.9 Participation-Centered Game Design Canvas v2 filled by the students

Results

In this section we present the results of the second evaluation cycle. These are divided in terms of the two data sources: a) the survey intended to evaluate the students' perception of the proposed questions, their understandability and usefulness; b) the analysis of the notes resulting from the 14 exercises of game concept definition.

Surveys

Figure 4.10 and 4.11 present survey results on users' perceptions of understanding ("read and understood the question") and utility ("we can find answers in the design intention").

We started by analyzing survey results to identify weaknesses in the instruments. Regarding questions understanding, we can consider the overall results positive, with all questions presenting at least 50% of positive responses. The questions on perspectives PL, CH, SM, MS present at least 70% positive responses. In terms of positive results, questions CH1 (> 80%), question SM9 (> 90%) and EM12 (> 90%) can be highlighted as exceedingly positive, likely on account of the use of very familiar language in their formulation. All questions have a median of 4, with the exception of CH2 (median of 4.5) and CH1, EM3 and SM3 (median of 5). The SS2 question has the least number of positive responses, approximately 50%. Question EM2 is the question with the greatest number of negative answers (approx 10%).
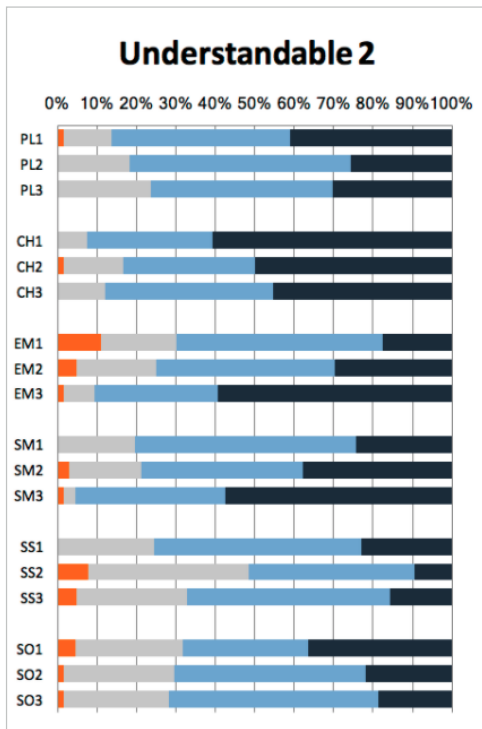
Figure 4.10 Likert agreement scale results for the statement "Read and Understood the Question", for each of the 3 questions in each Participation perspective;
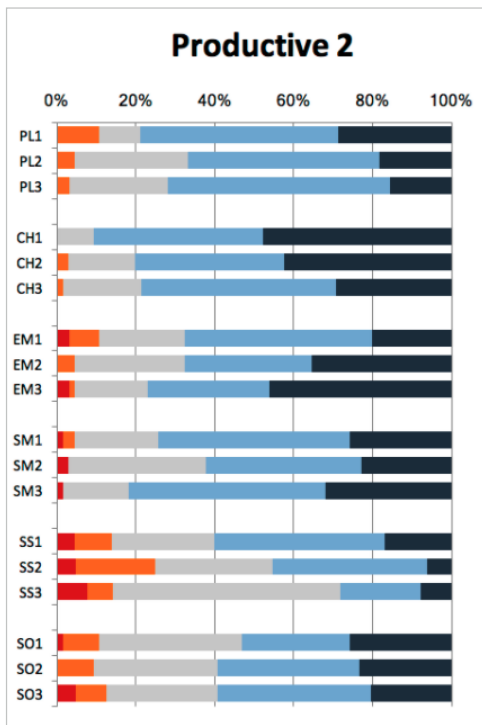

Figure 4.11 Likert agreement scale results for the statement "we can find answers in the design intention", for each of the 3 questions in each Participation perspective;

As to the perception of the usefulness, we also consider the results positive. The PL, CH, SM and EM perspectives present positive responses greater than or equal to 60%, especially the Challenge perspective, with all questions reaching approximately 80% positive responses. All questions have a median of 4, with the exception of questions SS2 and SS3, with median 3.

PL1, despite a high number of positive responses (80%), had a significant number of negative responses (10%), the same happening with the EM1 question. Negative results also warrant attention in terms of the SS2 question (> 20%). Looking at perspectives globally leads us to conclude that Sensoriality and Sociability have issues, as all questions have at least 10% negative responses.

Overall, it is possible to say usefulness and understanding results are consistent, which further highlights the need to revise questions with less positive results.

Game Design Notes

In this section we present analysis of game design notes written by subjects. We will follow a qualitative approach, with the objective of evaluating the quality of the answers suggested by the game design questions. More specifically, we are interested in analyzing, for example, whether all questions give rise to answers, if there are frequency patterns in respect to perspectives or groups, whether answers are fully developed design ideas or mere replication of the forwarded examples, frequency of blank answers, etc.

We use a top-down approach, by setting apriori analysis goals for the content analysis. Design notes were transcribed, question by question. As a unit of analysis we considered a single game design idea; typically this corresponds to a single sentence, as will be seen in the following examples. In some exceptional cases, we considered smaller units of analysis, on a word by word basis, particularly when dealing with enumerations of design elements.

In order to analyze the quality of elicited replies, a classification key was defined:

- B (blank) - lack of an answer, space was left blank.
- A - ambiguous, or incoherent replies.
- T - replies were transcriptions of the forwarded examples;
- N - (neutral) replies that are original (meaning, not directly

transcribed from the examples) but that appear isolated and not further developed.

- D - Developed design ideas that are original; developed means a design idea has some novelty and interconnection with other ideas, formulating some reasoning for being part of the set);
- R - responses that besides developed, are rationalized or justified in a way that makes their participation intention explicit.

In table 4.6, we illustrate each category with some classification examples.

Figure 4.12 shows results of the coding process. Table 1 shows the number of answers per question per group, classified with the coding key (using color). Blank is white, Ambiguous red, Transcribed grey, Neutral is baby blue, Developed is blue, Rationalized dark blue. Table 2 shows the total numbers of each type of answer for all questions, and Table 3 presents the same information in a stacked bar chart. In table 4 are the total numbers of each type of answer for all groups, and 5 presents this information through a stacked bar chart. Tables 2 and 3 aim to facilitate reading results from the point of view of questions, and 4 and 5 from the perspective of the groups.

Key	Examples
A	"Players seek to evolve their village through resources they will have to find." (EM12 G3) "The game is fantasy, surrealistic and magical." (SM7 G12)
T	"Interacting with Mechanisms (Experiments with the exhibition objects)" (PL1 G1 "Keyboard." (EM12 G7)
N	"O jogo suporta espaços de construção para cada família." (PL1 G3) "Viajar por vários locais específicos." (SS14 G5)
D	"O jogo terá foco no espiríto livre e artístico do jogador, espiríto esse possivelmente condicionado a uma música que estará a tocar durante a sessão, tendo uma tela virtual e algumas ferramentas à sua disposição para usar livremente." (PL1 G6) "The player's objective is to solve a series of puzzles that consist in navigating through somewhat unknown paths in a certain location that lead to other different locations." (CH4 G10)
R	"A estimulação sensorial através dos diferentes tipos de sons e músicas, poderá levar os utilizadores, construir diferentes pensamentos, levando ao desenho de coisas completamente diferentes do seu estilo, da sua maneira de ser e da sua maneira de pensar." (SS13 G6) "As the maps are a series of puzzles, we can say the player is not totally free to roam through the game, but rather able to explore their current location with no path restrictions." (PL1 G10)

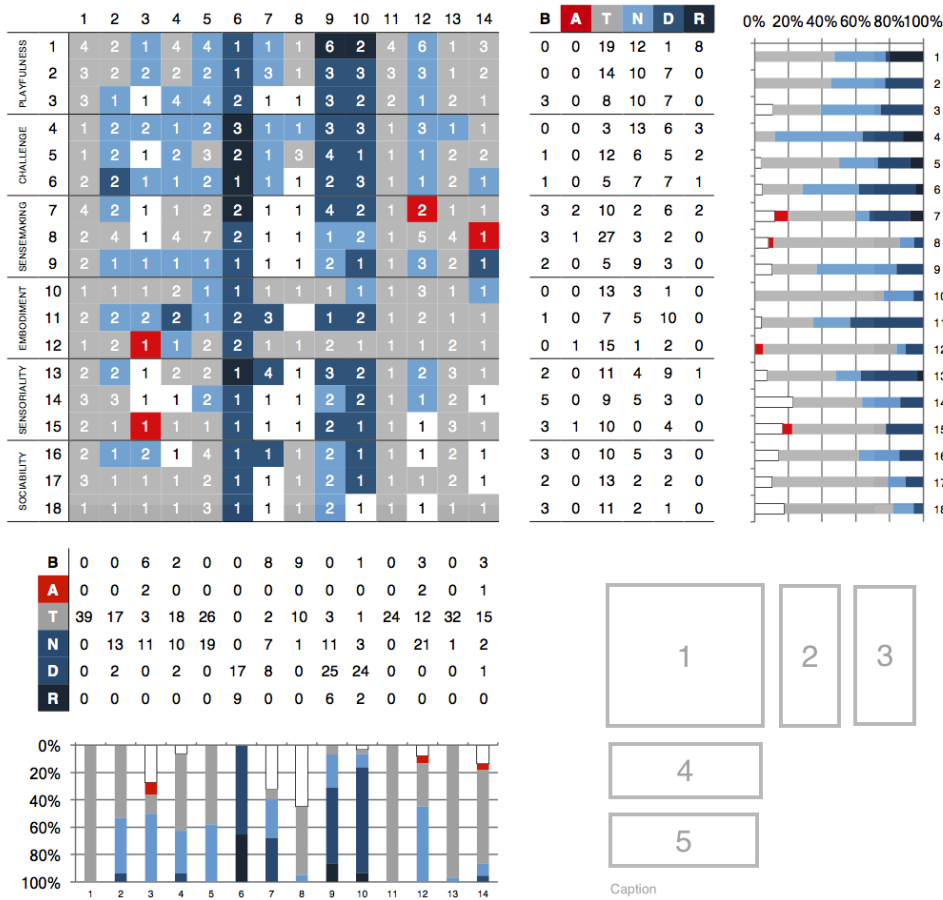Table 4.6 Examples of game design notes according to quality classification

Figure 4.12 Number and quality of ideas found in canvases. Rows show participation perspective questions (3 per perspective) and columns show student groups.

In view of the objective of analysis through game design notes, we will start by highlighting the results regarding the number of more developed answers, first in an overview of each perspective and then for any questions that stand out. In terms of each perspective, it is in the Playfulness and Challenge perspectives that we find more satisfactory answers, meaning, original and developed ideas. Here are some examples:

The main goal is to get to the hidden treasure by solving puzzles. Another option for a two-player mode: winning a race against the rival player. (CH1, Group D)

"Objectively, we intend to create a joint image, in a cooperative way, resulting from the creativity of each player, in order to arrive at a unique, original and interesting set, derived from the contribution of all players. This creativity can be conditioned or not, through random

sounds / music that will influence the player as he build his drawing. In this way, the final image will be an "amalgam" formed by fragments representative of the mind and imagination of several players. A kind of Frankenstein." (CH1, Group F)

Physical / Expressive: All the options that the player takes on the globe and the speed with which it moves, which depends on the types of transportation. Scenic: the representation of virtual animals, representation of the player through his photo / avatar.(PL2, Group E)

"Explore the real world with your fingers, create your own puppet, give players the background and they customize their own puppet, or Chinese/Portuguese dresses. The emphasis is on easy. Create your own puppet, use colour paintings, colour the puppet, every puppet is saved and we have gallery and implement also email function. After their creation, you can play with your own puppet." (PL1, Group I)

The player's objective is to solve a series of puzzles that consist in navigating through somewhat unknown paths in a certain location that lead to other di erent locations. The goal itself is to solve all the puzzles, meaning the player completed the game. In a storyline driven manner, the player must be able to leave the house they are locked in, and so when such a thing happens, it would be considered the nal level. (CH1, Group J)

There is no score, just an indicator that moves according to the player's options. (CH3, Group N)

In addition to more developed responses found in the Challenge and Playfulness perspectives, it is worth highlighting positive answers found in Sensemaking (SM3) and Embodiment (EM2) perspectives, which may be justified by the familiarity of the concepts used in their formulation, roles and game world, respectively.

A virtual animal hunter in which the player is the character itself. (SM3, Group E)

The player assumes the role of an artist, a painter, who, after expressing his idea on the screen through the drawing, forms an image that once

complete gives a perspective of all the minds of the various artists that compose it. (SM3, Group F)

The world is infinite, continuously scrolling until the player loses. The pace gets faster and faster the longer the player survives. The world is divided in two spaces, the surface and the underground. Inês can run in both and can freely switch between them. (EM2, Group G)

The world is a nite, grid-like environment apparently set in what is the contemporary real world. Aside from the surreal elements that will play out as the game progresses, the setting would be similar to the real world, discarding any canonical fantasy, sci- and other themes. (EM2, Group J)

Analyzing the qualitatively less positive answers, overall, it is in the Sociability perspective that the least number of original and developed responses are found. Concerning ambiguous answers, the following notes were classified and will be discussed in the next section:

The game is fantasy, surrealist and magical. We made it in abstract and 2D. (SM1, Group L)

The senses are emotion and communication. (SM2, Group N)

Through the performance and construction of the village it is possible to observe its evolution. (SS3, Group C)

Players seek to evolve their village through resources they will have to arrange. (EM2, Group C)

Also on account of the number of transcribed answers, questions SM2, EM1, EM3, SS3, SO2, SO3 stand out negatively. In questions SM2, EM1 and EM3 the persistence of the transcribed responses among the various groups stands out. Given the positive results of the surveys, this outcome may be associated with the closed-ended nature of the questions and/or their examples.

"Fight, communicate, represent, share, exchange, feel, care." (SM2, Group E)

"The game is played in a 3rd person view." (EM1, Group G)

"Keyboard and mouse" (EM3, Group A).

Despite the less positive results for questions SS3, SO2, SO3, SM1 and SS2, we can find satisfactory answers to each of these questions.

> *"The game aesthetics focus directly on the way puzzles are created, be it by prop placement or changes occurring in the environment through the game. Aside from that, the player is limited to puzzle-solving."* (SS3, Group J)

> *"The player plays by itself and faces no adversaries."* (SO2, Group I)

> *"Players will only have small visible margins of other players' space, so as to allow them, as per item 11, to create a work with a certain level of aesthetic continuity."* (SO3, Group F)

> *"VOYAGE TO MACAU in 2D or EXCHANGE OF KNOWLEDGE INTRO IN THE GAME; Little animation at first, where you see the voyage from Portugal to Macau, you see where you came from and where you are and now you exchange knowledge in Macau..."* (SM1, Group I)

> *"Being a surreal theme, the player has several oddities/easter eggs that may or may not be part of the storyline that, in either case, are a point for contemplation and taking their own conclusions regarding what is or may be happening. Cutscenes are also a part of these stimuli, as well as level changing and map changing."* (SS2, Group J)

Still, the number of transcribed and blank answers to these questions marks them as candidates for review. It should be noted that the favorable answers to these last questions are centralized in 3 groups of subjects. A vertical analysis of the results from the perspective of comparing between groups allows us to discern different levels of participation, as in the previous cycle; this analysis will be developed in the next section.

4.3.4   Iteration 2 Conclusions

The second evaluation cycle of the proposed instruments described in this section aims to analyze the quality of responses in greater depth. One of the positive aspects the results show is that all questions gave rise to original or developed answers. On

the other hand, the number of design notes that are transcribed from the examples is alarming. Thus, this second evaluation confirms both a positive evolution of the instruments and a new set of issues introduced by previous changes.

Regarding the comparison of the results obtained from the two data sources, the game design notes confirm the more positive survey results of Playfulness and Challenge perspectives. It is possible to find the same level of coherence between the two sources of data regarding the less positive responses found in the Sensoriality and Sociability perspectives. Considering Playfulness and Challenge are the first dimensions present in the canvas, one possible explanation is that the order of the perspectives in the canvas is affecting attention given to each perspective, leading to an unequal distribution of effort in the outlining of answers. The fact that the Canvas is materialized in a single sheet of paper, suggests a specific order to the questions (left to right) as well as a tendency for it to be filled by a single person. Another possibility is that subjects have a bias (perhaps on account of backgrounds in computer engineering) that leads them to be more comprehensive in regards to perspectives closely related to interaction and gameplay.

In regards to the Sociability perspective, once again we think the design context is not conducive to the development of projects that explore this dimension (as that would make them more complex to develop).

Related to the results of the Sensoriality perspective, though not exclusive to it, one aspect that may deserve attention is the vocabulary used in the questions. A posteriori, we conclude that the used vocabulary may be overly theoretical and abstract for these users, and this may have contributed to their difficulty in interpreting the questions. The formulation of these questions ("represented phenomenon", "aesthetic exploration", "opportunities of contemplation", "inter-player mediation", etc.), was originally intended to move the design vocabulary from its roots in traditional games, to a more expressive language associated with the arts and design. However, it seems its complexity is now at odds with its intended goal, so a simplification might be in order, considering its current audience.

As mentioned previously, another aspect that should be emphasized is the high number of responses transcribed from the examples. This was a risk from the get go, and we were aware that the introduction of examples was likely to have this undesirable effect, which is why we did not include them in the first place. However, we consider that the examples are important both for a better understanding of the questions, and to fulfill a pedagogical function. Still, careful review of the more problematic examples should be considered.

As in the previous cycle, considering the academic context, it was expectable, for us to find different levels of participation in the exercise. The data clearly reveals different levels of appropriation of the instrument, which may help to understand the transcribed and blank answers on most questions by groups A, H, K, M and N. There is also the opposite situation in groups F, I and J. In the remaining groups, B, C, D, E, G and L, we find an intermediate outcome. The diversity of engagement profiles should be considered in future revision of the instruments.

Concerning the visual design of the canvas, one of the revisions in this second iteration concerned the graphic configuration in a single A3 sheet. After analyzing the collected data regarding the quality of the answers, we consider that the space reserved for writing design notes, especially after the introduction of the examples, may be too small, and thus not be inviting for more developed answers. Hence, to check this assumption, the canvas space destined for annotations should be expanded in a further revision. Another aspect to be reconsidered in a third evaluation is the time devoted to the design exercise: a practical class plus one week of autonomous work may not be enough for learning the conceptual dimension and then using the instrument.

We should also reflect on the evaluation process itself. Although game design notes coding was extremely useful, it could be further elaborated upon if complemented by interviews as in the first iteration. Direct testimony of the users of the instruments is bound to help us propose more evidence-based understandings on why certain issues arose. As this was not possible within the period of this second evaluation cycle, we chose to carry out a third evaluation cycle, aimed at adjusting and or confirming these results.

4.4 Iteration 3

4.4.1 Canvas V3 Proposal

Throughout the Design Science Research process described in this chapter, we have attempted to reconcile a critical perspective both with the results we obtained from the evaluation of the instruments as well as with the evaluation process itself. Thus, this third and final iteration of the DSR process

aims to review and improve the proposed instruments, but also to consolidate the evaluation process. For this iteration, we used a mixed-methods approach, combining surveys, content analysis of the design notes, and interviews with subjects. Review of issues and canvas is described in the following sections.

Participation-Centered Game Design Questions V3

Table 4.7 shows questions and examples reviewed in this third iteration. Revisions were focused mainly on vocabulary adjustments of questions' formulation, without changing their core semantics. In the Playfulness perspective, despite the satisfactory results, it was decided to simplify questions PL2 and PL3, for the purpose of presenting the questions in a more accessible way at an initial contact with the instrument. In the Challenge perspective there were no changes. All questions of the Sensemaking and Embodiment perspectives were adjusted, as shown in the table below. Both in the Sensoriality and Sociability perspectives, questions SS1, SS3, SO2 and SO3 were adjusted in order to simplify the vocabulary presenting more familiar expressions. Although SS2 was a candidate for reformulation, given the number of blank responses, we decided to retain its previous form because we consider an important issue in the reflection on the expressiveness of the videogame medium. Examples from questions SM2, SM3, EM2, EM3, SO2 and SO3 were also reviewed in order to stimulate different response possibilities, trying to minimise the transcriptions as happened in iteration 2.

Participation-Centered Game Design Canvas V3

In this third cycle the canvas review was focused on a new visual configuration. As illustrated in figure 4.13, each perspective now becomes individually represented on an A5 sheet of paper. This had a dual purpose, on the one hand, increasing the space available for annotations for each question, on the other hand, allow multiple people to handle the canvas simultaneously, avoiding one person to concentrate control over the instruments reading and annotation (see A.3).

Participation-Centered Game Design Questions	
PL1	What spaces of free exploration does the videogame support? Physical or logical (open world exploration, interacting with mechanisms / Representational (characterizing or interpreting a character) / Aesthetic (dance, acrobatics, visual or audio expression, decoration, construction / Social (interacting with characters, dialog)
PL2	What elements support player's expression and wilful actions? Physical (interactive components in the gameworld, vehicles) / Scenic (avatar, characters, wardrobes, props) / Expressive (movement and sound, music and dance, dialogs, drawing)
PL3	What is the space of players' possible actions? Gameworld dimension, granularity of game levels and arenas / Diversity of supported actions (characters, actions, dialogs) / Diversity of interactive elements(vehicles, weapons, items) / Diversity of elements that support player expression (number of music's do dance, variety of playable sounds, variety of drawing instruments, variety of construction blocks, etc)
CH1	What goals does the videogame propose? Solving a problem or puzzle / Winning a race, matching a performance / Chase or catch an adversary / Build a base or town
CH2	What is the nature of the videogame's challenge? Physical (coordination, dexterity, resistance) / Mental (memory, observation, problem solving) / Social (team-coordination, social skills)
CH3	What feedback is awarded to players' performance? Rewards (points, prolonged play, powers, resources) / Punishment (loss of points, shortened play setback, removal of powers)
SM1	What ideas or contexts are represented in the game? Representations (character design, scenography, 2d/3d, animations, audio) / Type of Representations (abstract, realist, iconic) / Interpretation or reflection on the significance/meaning of the experience
SM2	What meaningful events are represented and enacted in the game? Does the player enact a narrative, a story, or according to metaphors and tropes and ideas derived from fictional genres? What is the significance and symbolism of enacted actions for the game's agenda? What emotions are players expected to feel and how do they empower the games' meaning? How do actions and events and their representation cohere with the game's meaning?
SM3	What roles do players play? What part is reserved for the player in the game? Is he a hero or power-character? A spectator or observer? An actor in a grander play? A god capable of deciding the fate of all? What about outside the game - what is players' role post-experience? Is he meant to reflect on some theme? Question the nature of the gameplay or represented events? Question a hidden plot-aspect or message or theme?
EM1	How would you spatially characterize the game world? Dimensionality of its representation (projection, space, time, etc) / Spatial configuration (linear, grid, web, points in space, divided space) / Infinite/finite, discrete / continuous, physical/virtual or both
EM2	How are players present in the game world? What does the player control? An avatar, several avatars or an abstract device (like mouse pointers in a desktop environment)? Is the avatar anthropomorphic? Is it pre-established or can players chose and/or configure their virtual manifestation? How do you perceive the game world (first person, second-person, third-person, bird's eye view, isometric perspective)?
EM3	How do players move or perform? How do players physical control devices relate with avatar's movement? Which metaphors govern the relationship between the two? What physical movements and actions must players enact in the real world that can have expressive impact (think bodily movements while using wii-motes and kinect, and the intensity, rhythm and difficulty involved in inputting commands through controllers)
SS1	What are the modalities, style or mood of stimuli? Types of stimuli (sounds, music, images, animations, special fx) / Style (joyous, sad, happy, gloomy, dark, dramatic, infantile, futurist / Relation of stimuli with intended experience
SS2	What opportunities for contemplation does the game offer? Environmental contemplation (visual and auditory) and cutscene watching / Places and specific moments (level transitions, locale presence) / Sensorial stimuli as feedback for player action (achievement sound) / Induced Emotional responses

SS3	What will be the opportunities for aesthetic expression in gameplay? Players actions generate an audiovisual experience / Physical or virtual performance as aesthetic exploration (dance) / Playing a musical instrument (virtual, real) / To draw or compose
SO1	What interpersonal relations does the game propose or promote? Competition, confrontation, collaboration / Meeting, Dating, Sharing, Leading / Empathy and other affective relations
SO2	What forms of social organization does the game promote? How does the game structure players' relationship? There are roles in the game with different actions and powers? Leaderboards, ranking, guilds, teams, experience points, diversity of social roles
SO3	How do players interact with each other? Outside the game experience – are players meant to communicate secrets to each other, search online (in forums and chat and websites) for strategies to certain challenges, share experiences and interpretations, gloat in achievements, tell stories about events, what events promote streaming? Local play – are players meant to play in the same physical space? What sorts of interactions are expected to occur in the world? Fiero? Shadenfreude? Naches? Other competitive emotions? Are player meant to share information? Inside the game – How do players communicate? How they see each other? Chat, voice-chat emoting, multiplayer game mechanics (inter-player dialogs, co-operative and chaining move sets),

Table 4.7   Participation-Centered Game Design Questions v3

Figure 4.13 Third version of the Participation-Centered Game Design Canvas

Figure 4.14 illustrates one of the perspectives with the new arrangement (though it is similar to the previous versions).

For space optimization, the element corresponding to the 'Intention' component of the model was integrated into the perspective description (element 3) and the 'Participation' component of the model was removed from this version of the canvas. Each of the perspectives is represented with the following structure: 1) perspective name; 2) perspective icon; 3) brief description of the perspective; 4) 5) and 6) game design questions proposed for each perspective, with their examples and space for annotations.

Playfulness

The videogame as a context of free, informal, and unstructured participation. Think about participation as free play, expl... experimenting discovering, recreating, customization, etc.

What spaces of free exploration does the videogame support?
Physical or logical (world exploration, interacting with mechanisms, experimenting different actions and systems) / Representational (characterizing or interpreting a character) / Aesthetic (dance, acrobatics, visual or audio expression, decoration, construction) / Social (interacting with characters)

What elements support player's expression and wilful actions?
Physical (interactive components in the gameworld, vehicles) Scenic (avatar, characters, wardrobes, props) / Expressive (interactions, movement and sound, music and dance, dialogs, drawing instruments)

What is the space of players' possible actions?
Gameworld dimension and degree of openness, granularity of game levels and arenas / Diversity of supported actions (characters, actions, dialogs) / Diversity of interactive elements (vehicles, weapons, items) / Diversity of elements that support player expression (number of music's to dance, variety of playable sounds, variety of drawing instruments, variety of construction blocks, etc) / How neutral/negotiable/inconsequential are player actions (do they have permanent effects?

Figure 4.14 Detail of the Playfulness perspective in the third iteration's Canvas.

130

4.4.2   Application

The third version of the instruments was evaluated following similar procedures as in previous cycles, namely, presentation of the instruments (model and canvas), followed by a game design session and data collection. The third version of the instruments was tested during the academic year 2014/2015 in the same curricular unit as the previous cycles. Differing conditions from the previous two applications were:

- The class in which we rehearsed the use of the instrument is constituted by 11 game design students (2 female and 9 male), organized in 4 teams of 2 to 4 members, ages ranging from 20 to 25, coming from Design and Multimedia background.
- The students were free to determine the theme of their projects.
- The canvas configuration was changed to six separate worksheets, allowing several participants to make annotations concurrently.
- Another change was in the time available to rehearse this version of the instruments. In addition to the one-week presentation of the instruments and their use in autonomous fashion, students had an additional two-hour class to complete the annotations of ongoing game design decisions. In total, students had the opportunity to write down their ideas during two face-to-face classes and one week between them.

4.4.3   Evaluation

In this section we present the results of the third and final evaluation cycle. Once again, we are interested in evaluating users' perception of questions' understanding and usefulness, and collecting evidence regarding the productive character of the revised instruments. In this last cycle we are interested in understanding if the design process was constrained by time and space resources, opportunity to make contributions, and especially in triangulating the qualitative results of the game design notes analysis with subjects' perceptions through interviews. Next we begin by describing the procedure of this evaluation activity, followed by the presentation of the results and respective conclusions.

Data Collection Procedure

The data collection procedure was carried out in a similar way to previous cycles, contemplating surveys, game design notes and interviews when the design was concluded. At the end of the project, the canvases of the various groups were registered photographically, and the surveys, following the same format as before, were filled out by the students. Figure 4.15 illustrates a canvas filled by one of the groups.

As during the first evaluation cycle, at the end of the project, interviews were conducted with students using a focus group format, one with each work group. The purpose was to collect testimony of their experience using the instrument in their game design process. The semi-structured collective interview had the following questions:

- How do you evaluate the use of this instrument in the case of your game?
- Did you experience any kind of difficulty? In what way? In understanding the questions? Or finding the answers?
- Which perspectives do you consider more relevant to your project?
- Did you find any idea or concept for your game that was not covered by the questions?
- Since you first used the instrument, has the design of the game evolved? In what way?
- Do you have any suggestions or comments for an upcoming version of this instrument?
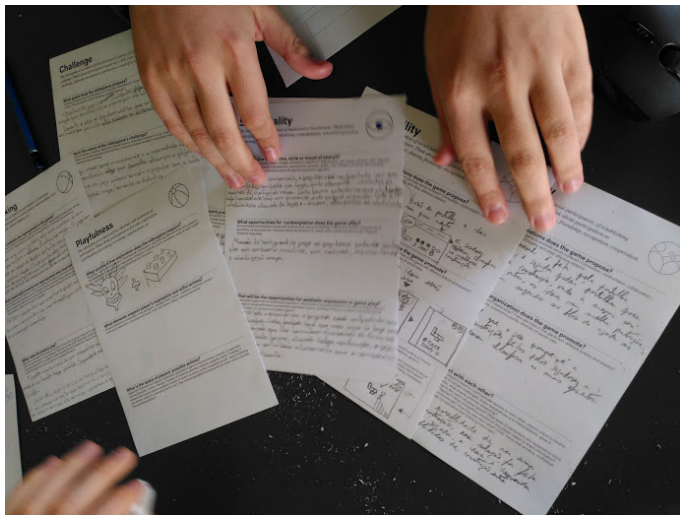
Figure 4.15 Third version of the Participation-centered Game Design Canvas spread over separate sheets of paper.

Specific questions were also prepared for each group, in order to clarify specific answers they gave in the game design notes:

- You described the game world through the ideas of levels and challenges: "*The game has several levels, each level unfolding in a different Portuguese city. At the end of each level there is a key combination challenge that has to be done within the time.*" Can you explain a little better how this idea characterizes the game world? (Group A)
- You wrote in the comments "*Some of the categories are hard to establish at such an early stage of the design process*". Can you explain this idea a little better? (Group B)
- You wrote "*Feedback dialogue given according to performance*" in the Playfulness dimension. Can you better explain how this idea relates to players' expression and freedom? (Group C)
- Although your game supports a very structured and formal type of activity, you present an enlightened idea about the type of freedom that the game supports. How did you come up with this idea? (Group D)

Results follow in the next section.

Results

In this section, we present the third cycle results, whose general objective was to consolidate previous cycles' findings. Despite a smaller number of students in this third cycle, we chose to continue the use of the surveys to maintain methodological coherence with previous cycles. Results obtained from each of the data sources are presented below.

Surveys

In this section we present the results obtained from the surveys using the same format as the previous cycles. The graphs on Fig. 4.16 and Fig. 4.17 represent the results of the guiding questions concerning their understanding and productivity, respectively. Due to the smaller number of participants (11) in this cycle, we chose to present the data analysis in a discrete and absolute way.
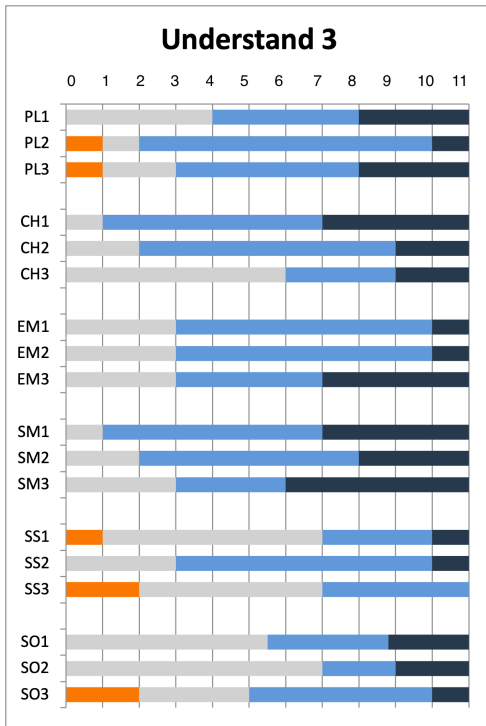
Figure 4.16 Likert agreement scale results for the statement "Read and Understood the Question", for each of the 3 questions in each Participation perspective;
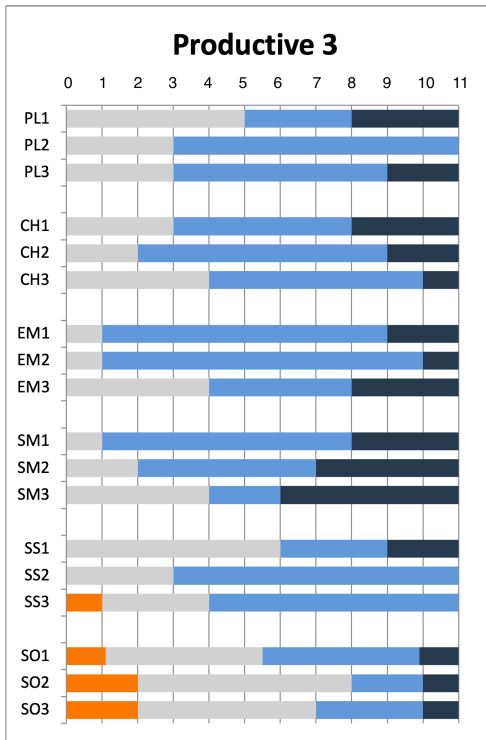
Figure 4.17 Likert agreement scale results for the statement "we can find answers in the design intention", for each of the 3 questions in each Participation perspective;

As to the understanding of the questions, globally, the Playfulness, Embodiment and Sensemaking perspectives have the greatest number of positive answers, with all issues with having a median of 4. Regarding individual responses, the best results in terms of positive responses are PL2 (9/11), CH1 (10/11), CH2 (9/11), SM1 (9/11), SM2 (9/11) and MS (7/11). On the other hand, the issues with the least positive responses are CH3 (5/11), SS1 (4/11), SS3 (4/11), and SO2 (4/11). Globally, Sensoriality and Sociability present the answers with the least positive results.

Regarding subjects' perception of usefulness towards productivity, the Playfulness, Challenge, Embodiment and Sensemaking perspectives, all have questions with a response median of 4. Individually, questions with the greatest number of positive answers are CH2 (9 out of a possible 11), EM1 (10/11), EM2 (10/11), SM1 (10/11) and SM2 (9/11). It should be noted that the Playfulness, Challenge, Embodiment and Sensemaking perspectives did not receive negative agreements in any of their questions. Least positive results came from questions SS1 (5/11), SO1 (5/11), SO2 (3/11) and SO3 (4/11). Overall, it is the sociability perspective that had fewer positive responses.

Game Design Notes

In this section we present the analysis of the game design notes written by subjects in this third cycle, following the same approach as previously. As before, we used the ensuing classification key for qualitative answers: B (blank) - lack of an answer, A - ambiguous, or incoherent replies, T - transcriptions of the forwarded examples; N - replies that are original but are not further developed, D - Developed design ideas that are original and part of an interconnected set, R - responses that are developed and rationalized in terms of participation intention (table 4.8).

Following the same presentation approach, after classifying the responses, we synthesize the results in figure 4.18, which allows us to visualize the frequency and type of response, in relation to the group of students and their canvas questions.

In analyzing figure 4.18, one of the main results that needs highlighting is that in all questions we find complete and developed answers. For the vast majority of questions, Developed answers are repeatedly found in one or more groups of students. In order to illustrate these results, we present the following examples of answers that are classified as Developed in each perspective.

Key	Example
A	"No, the game always follows a certain plot and will be relatively easy to play. The game will always develop in the same space." SO3, Group A "At the end of each level there is a key combination challenge that has to be done within the time-limit." EM1, Group A "Choices, decisions, results and consequences." SM1, Group C
T	"The player controls an anthropomorphic character in the third person." EM2, Group A "The game unfolds from an orthographic (sic) perspective." EM2, Group A "3rd person. 2D. Platform Perspective" EM2, Group C
N	"Mental, when you have to make the key combination." CH2, A "The freedom and possibility of choice given to the player is limited to their choices when facing decisions that need to be taken before various placed stages". PL3, C "The game fits into a virtual and closed environment. "EM1, C
D	"In the middle of the game there are several obstacles, like crossing a valley. To complete the objective the player will have to create a bridge, with a group of pieces, that give him the freedom to assemble the bridge as he wishes. "PL1, D "A hybrid blend of social and narrative challenges as they compel players to make decisions about their academic lives, mirroring our priorities, consciousness, responsibilities, and influencing the course of the game." CH2, C "The game has the possibility to see (sic) a construction solution, this solution was made by another player, the idea is to unveil all possibilities of construction between players." SO3, D
R	"Apropos of collecting and attacking with specific objects, (this) represents the origins of the character, while avoiding the tunos (singers) and the wine they shoot represents both academic experiences, as the hating of wine." SM2, A "When you encounter a challenge that can consist of tasks as simple objects, the layout / movement of elements present on the map, among others, the player will have to realize which of their possibilities is more appropriate. PL2, D "In this way it is intended that the user be transported to a universe where he can express all creativity through the Legos and thus overcome obstacles." SS1 D

Table 4.8 Examples of classified game designs notes

	A		B	C		D	
PL1	3		1	2		2	
PL2	2		1	1		3	1
PL3	3		1	1		2	
CH1	2		1	3		2	
CH2	2		1	1	1	2	
CH3	2		1	1		3	
SM1	1	4	4	3	1	2	1
SM2	2	1	1	1	1	1	
SM3	1		3	2		2	
EM1	1	1	1	1	1	1	1
EM2	2		1	2	2	1	1
EM3	2		1	1		1	1
SS1	1		3	2		1	1
SS2	3	4	4	1	1	4	
SS3	1		3	2		1	1
SO1	1		1	1		2	
SO2	1		1	2		1	
SO3	1		1	1		1	

■ rationalized ■ developed ■ neutral ■ transcribed ■ ambiguous
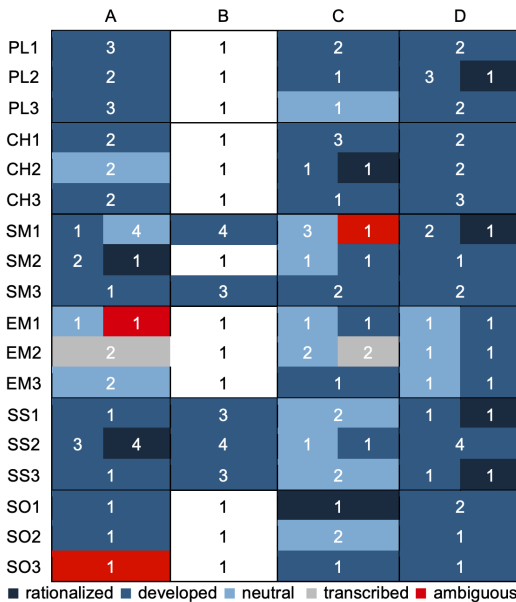
Figure 4.18 Number and quality of design ideas found in canvas
Rows are participation perspective questions (3 per perspective)
and columns show student groups.

The exploration space will exist mainly when the player chooses where to spend his time, in studies, friendships, etc. Allowing you to create different endings in the game, I may end up as an excellent student, or very social student or a student who does not stand out at all. PL1, Group C

In order to justify / support the actions of the player, the game will have several challenges that will have to be overcome. Allied to the entire visual environment, composed of legos, the player will be invited to use his creativity and thus create several objects that will achieve the objectives. Thus the player will have to control his character and get him to advance along the map. When you encounter a challenge that can consist of tasks as simple objects, the layout / movement of elements present on the map, among others, the player will have to realize which of their possibilities is more appropriate. PL2, Group D

The goal of the game is to find artifacts (glyphs) and assemble them into a puzzle to decode the message in the story. During the game players will have to be able to build a way to overcome obstacles. CH1, Group D

A hybrid blend of social and narrative challenges as it compels players to make decisions about their academic lives, mirroring our priorities, awareness, and responsibilities, influencing the course of the game. In this way it can be considered as an interpretive experience of a student's life. CH2, Group C

The look of the game will be converted to 2D format, and will be given the illusion of 3D. The archaeologist will, in principle, be the only character to appear to be playable. EM2, Group D

Intermediate dexterity games are controlled by timely and intelligent button combinations (arrows) as well as all decision actions that would be made via keystrokes or mouse clicks at key moments. EM3, Group C

The game will promote debate on a serious of surveillance methods. The employment of autonomous drones as facilitators of surveillance. Urban development centered around the principals of a panopticon. Use of the multi-touch screen paradigm as a promoter of desensitization. Exploration of the malleability of digital based information. SM1, Group B

The player frames a narrative in which the protagonist travels through the city with the purpose of reaching a performance at an important Coimbra (the University's town) stage. The purpose of collecting and attacking with specific objects represents the origins of the character, while avoiding the tunos (singers) and the wine that they throw represent both academic experiences and the hating of wine. These elements, besides being forms of action and mechanics, pretend to represent and make known the history / person that inspired the concept. SM2, Group A

In sensory terms, the player will be confronted with a 2D environment, composed of legos, where the ruins of the Mayan civilization will be recreated. In this way it is intended that the user be transported to a universe where he can express all the creativity through Legos and, thus, overcome the obstacles. SS1, Group D

Environmental: environmental aesthetics, ambient sounds and music, unique and disturbing locations, focus on intricate level design. Induce paranoia via gaze of Big Brother posters that follow you.
Feedback: predominantly visual feedback, absence of text or explicit narrative, suggest action through level design. Dynamic responses to actions; up immediate challenge, induce tension via sound, ambience, vibration (haptic output) Induce bewilderment by silently changing messages in game (enforce media manipulation). SS2, Group B

The interpersonal relationship is made by sharing constructions, the player can share his construction with the site, where it will be classified by others, the ideas with the best score are those that are suggested by the game's agenda notebook. SO1, Group D

Players can, in real life, talk about their stats in the game, their strategies, prizes and ranks. SO3, Group C

Regarding the frequency of developed responses, it is in the perspective of Playfulness, Challenge, Sensemaking and Sensoriality that the greatest number of responses are found. And it is in the Embodiment and Sociability perspectives that the smallest number of developed answers are found, albeit with different typology of responses.

In the Embodiment perspective, lacking in developed answers, we present examples of transcribed and neutral answers:

> *The player controls an anthropomorphic character in the third person. The game is played from an ortographic (sic) view.* EM2, Group A

> *The player is present as a DEI (faculty department) student. Gender can be chosen, your name. 3rd person. 2D. Platformer perspective.* EM2, Group C

These denote a very pragmatic approach to answering the canvas questions, limited in length and scope, and possibly influenced by the forwarded examples, or the developing projects tendency to emulate existing genres, like that of a "platformer". Regarding answers found in the Sociability perspective, we confirm students' tendency for conceiving single-player videogames, made explicit in answers such as:

> *The game will be single player, though the protagonist character would create empathy for the person in which the game is based on. The Tunos (singers) would be the antagonists.* SO1, Group A

> *The game is for 1 Player only, without communication with other players. There is a ranking and leaderboard table.* SO2, Group C

Despite the lower number of developed responses in the Embodiment and Sociability perspectives, it is still possible to find satisfactory answers that could be part of a design, as previously exemplified. Globally, we find a marked decrease in the number of transcribed responses. Answer quality varies in a way that does not appear related to specific questions. As an example, we can also find ambiguous answers in response to questions where other groups put forth developed answers.

One result that has manifested itself in previous cycles, and which manifests itself once more, is the varying response frequency on a group by group basis. In this third cycle, in terms of number of design notes, there is a notable difference in the participation of group B versus the others.

Finally, another interesting result, absent from previous cycles, concerns visual and graphical annotations made by students to help clarify possible design solutions. Figure 4.19 illustrates this aspect with visual representations from group D to depict interactions and collaborations in the sociability perspective.
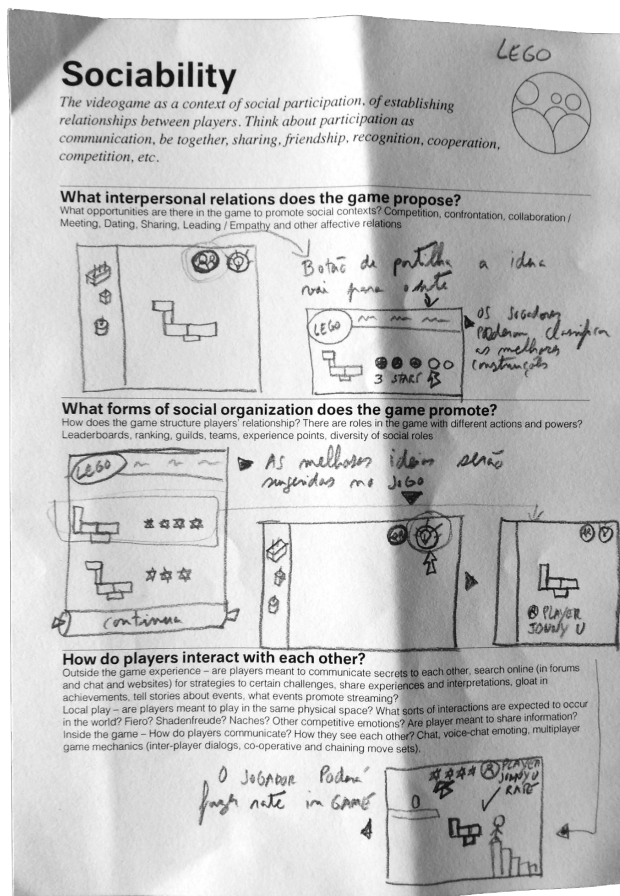
Figure 4.19   An illustration of emerging visual annotations in the sociability dimension.

We consider this a relevant result for reflection, especially when considering the current material qualities of the canvas, and future opportunities for exploring alternative design annotation formats.

Interview Analysis

In this section we present results from the group interviews. As in the first cycle, these interviews were aimed at gathering evidence on the usefulness of the instrument, on potential difficulties or challenges that have been encountered, as well as any suggestions for improvement. The same methodological approach already described in the first cycle was used. Taking into account these goals, we present interview excerpts in three broad categories: rationalization of the usefulness of the use of the instruments, manifestation of challenges, and suggestions. As also referred to in the first cycle, we chose to present the excerpts extensively in order to benefit their interpretation in context.

— Interviewer: How do you evaluate the use of this instrument?
— Group A Participant 1: things that we had not thought about very deeply about, the themes that we were asked about, and things that we did not even have the notion that we needed think about, and in that aspect it helped us to think about things that we were not going to think about [had we not been given the canvas]
— I: As for example?
— GrA_P1: What was [the] game [like], how it worked - we knew what we wanted. But in terms of sense making and sensortiality (sic) I think it made us think more. Because... what was the meaning of events, and how they were represented, that left us thinking more about what we wanted. Because our game is about life in DEI [faculty department], a semester in DEI, we could see how we could represent this for other people. Because for us it's very obvious how it is, but since the game is for different people, it [canvas] made us think how it [game] is perceived by the other side…

— I: But do you think it helped in any way to answer those questions?
— GrB_P1: Yes, but I can also only speak from the perspective of the two [dimensions] that I filled out, which was (sic) sensemaking and sensory. But yes, I think in the field of the sensorial (sic), answering these questions directed out thinking in a way that created a more consistent thing.

— I: Yes, and for those dimensions, you think it helped you to get new ideas or was it more systematizing ideas you already had?
— GrB_P2: No, I happen to think that because the topics are not very specific in terms of what you can do with them, that is, there is a space for creativity. And I thought that to think about these topics, as they are subscribed (sic), helps to try, for example ... yeah, we return to the idea of having a concrete concept. But from the moment we have this concrete concept, I think that, for example, thinking about these topics helps to think of ideas at times, it helps in a way to fit ideas that maybe you would not remember that idea could fit here. Helps you to think that way.
— I: Can you give examples of this fitting?
— GrB_P2: For example, here in sensemaking you have the question of ideas and contexts in the game. And I happened to propose here, since we are working with the concept of 1984, that is a totalitarian

regime, this forced me to think that ideas, or what contexts, or what paradigms would result from this type of world. Then I remembered, for example, at first glance it may not be related, for example, the use of autonomous drones of war or surveillance. I thought it was a good idea to include it here. [...] I thought that maybe that would contribute, in a way, to a "desensitization" of the people, and from there maybe it fits into a game. And this is thanks to thinking, for example, of ideas and contexts.

— I: Okay. And you think that answering these questions helped you in any way?
— GrC_P1: On the one hand I think so, it helped us to have to think about the various components of the game.
— GrC_P2: Yes, since we did not have anything very concrete at the time, there were also things that we had not thought about, and maybe with the questions that were here, we began to think that maybe there were important factors that we had not yet considered in our game.

— I: And I would begin by asking how do you evaluate the use of this instrument? In your project, in your game. Did you feel any kind of difficulty? In what sense? In understanding the questions or was it more about finding answers?
— GrD_P2: To a certain extent I found it complex. I found it complex because we also had not structured well what we intended, and this turns out to be interesting because it was complex but at the same time it has helped us a lot to have a closer idea of what it is we wanted to do. What's more, there is a lot that happened to us that we would ignore, that is, that we might not have come so quickly to the idea of the game and raising these questions and us thinking about the solution, we were able to more quickly get to the bottom of what was intended for our game.

— Interviewer: Can you give some examples of these ideas that emerged during this process, and that were not previously defined?
— GrD_P2: The Social [dimension]!
— GrD_P1: The social [dimension], for example, is an excellent example. The social [aspect], we had not thought of anything social. And that question was "okay then we have to think, basically in our

game, so how can we make the game social?" These are issues that we had not even thought about and we even came up with a super interesting solution. So if we wanted our game to be more complete, we would add the social [element]. It was something that was completely apart, we did not even dream about the idea.

— Interviewer: And you think it also helped promote dialogue between you? Promoted the discussion between, when we speak ...
— GrD_P1: Unbelievable teacher, I could not respond without speaking [first]. I at least felt it, I did not have the courage to write without [saying["Dude, I think this question answers that, what do you guys think?" Then the rest of the guys would read it, then we would exchange ideas of "Okay, that really does answer [the question] but that's not enough, we have this more". We seemed to be a single brain, R- said one thing, J- said another, we then supplemented the answer, and adapted, to synthesize the answer to the question.

Through previous excerpts we can find in all 4 groups' discourse evidence of the instrument's usefulness. As it was possible to verify in the first cycle interviews, we encountered different expressions to describe the role of the instrument in the design process, either as a means for generating new ideas (e.g. "things we did not even have a notion of", " in a way, to fit ideas that you might not think of"), or in a perspective of rationalizing the process in progress (e.g.," to direct thought "," it has helped us a lot to have a closer idea of what it is which we intended to do ").

One aspect that we consider important to highlight is that different groups expressed relationships between participation perspectives (e.g. sociability, sensemaking, sensoriality) and their design process, revealing unmistakable awareness of the influence the instrument had in their game design activity. Below we present quotes classified as issues.

— Interviewer: I would start by asking how do you evaluate the use of this instrument? In your case, more than... did you experience any kind of difficulties?
— Group B Participant 1: I see this is a useful tool once you have that initial concept. Once you have that initial concept, then you fill the empty spaces, this is a very logical and very functional path, in that aspect. I also think that drawing without having ideas, and getting here, and filling it is a bit ... if there is not an idea, a concept that can unify

everything, is a bit complicated. But I think that yes, from the moment we have the concept, yes.

— I: And was that the difficulty you felt? Because you still had not a minimal concept?

— GrB_P1: Yes, yes, because we do not have a concept yet. Yes, because we have no idea where to group it all. I felt a lot of difficulty considering they [questions] are very specific. And, if I have some ideas as I describe here [the canvas] in terms of environments, a little sensorial, but since I do not have such a unique concept, I walk about "zigzaging".

— I: I would begin by asking you how you evaluated the use of this instrument in your experience? For example, did you feel any kind of difficulty in understanding the questions? Or to find answers to the questions? How would you define your experience?

— GrC_P1: At first, I was a bit sixes and sevens, not exactly due to the questions, but I did not know exactly what ... the situation was new, there you go! The situation was new, we still did not have well consolidated ideas, there were parts here that even reading the description, and that later I saw were pieces of subject matter [from classes] that we had not covered yet, and at the time we did not know exactly how we should respond.

— I: But did you think it was difficult to define this guiding line?

— GrC_P2: Partly yes because as there are some things that relate to each other, and we could not see a line "ok, we have to move from here to there", we ended up jumping about. And then when there was only one or two missing [answers] here or there, we no longer knew exactly what we were could to relate between each other, and what could be missing.

— I: So, for example, would you think it would be useful to have this suggestion of a specific order to respond?

— GrC_P2: Yes because, for example, when we are going to design a game we have a theme that is something, what it is that we needed first to develop this, and to have these questions, and then to go deeper even if we go into other branches, go deeper, go by stages, to organize it in your head. I at least feel that I have the need to systematize things, and that I was walking a bit ...

When it comes to issues using the canvas, we find two different strands of answers. One recurring theme refers to the design stage when the instrument is

used, (e.g. "the way I see it is a useful tool is once I have that initial concept"). Rather than a question about the design of the canvas and respective questions, we consider this point to be more related to the strategy of using the instrument in the context of a game design activity. As already mentioned in interaction 1, the recognition of the right timing for the use of this instrument could be one of the factors in the perceived value of its influence.

The other theme is a perceived lack of orientation as to the sequence of questions or perspectives (e.g. "I think I was a bit confusing initially, not due to the actual questions, but I did not know exactly what ... the situation was new"; "... there are some things that relate and we did not see a line 'ok, we have to go from here to there', we ended up jumping about."). This issue may be directly related with the new canvas configuration (with 6 individual sheets), which does not easily afford a specific path through the participation perspectives and questions. This was a risk we were aware of, and we stand by this option, as despite any drawbacks, this process openness enabled better overall results, especially regarding the higher number of developed design notes that resulted in this iteration.

The following are extracts classified as suggestions:

> *— Interviewer: Okay, I will not bother you any more, I would only ask if you have any suggestions? Or any further comment for the next versions of the instrument, of these guidelines?*
> *— GrB_P1: I think that, for example, a concrete example of a game seen through these categories, picking up a game and deconstructing it in these categories, I think it would help a lot to understand what each category is for.*
>
> *— Interviewer: And did you find any other idea or design topic that you thought would be interesting to specify on its own?*
> *— GrD_P1:That we had thought of it like this, no teacher.*
> *— GrD_P2: But for example here when talking about the environment, the style, the visual, how colors will influence the user's choice, the perception of space, the world, I think these topics are important.*
> *— Interviewer: But do you think it would be better to specify them apart?*
> *— GrD_P2: Perhaps yes.*
> *— Interviewer: Perhaps using other media, more visual?!*
> *— GrD_P2: Yes, because, there it is, when one talks about design first*

a person has the vision, and its inside the person. It is very difficult to convey on paper [writing]. It's easier to show.

4.4.4   Iteration 3 Conclusions

Across the three iterations, we find two recurrent suggestions. One suggestion is the presentation of illustrative games, analyzed through each participation lens, so as to afford greater pedagogical character to the canvas. Another suggestion mentions other types of representation for use in design notes, namely visual, which may serve to describe design choices, in line with what was demonstrated in figure 4.19.

In terms of global results, we find evidence that attest to the improvement of the instruments, and demonstrate the fulfillment of the goals for which they were assigned: to help think of and rationalize about videogame design, in a synthetic and comprehensive manner. We find this in the canvas answers, which were, globally, developed, and in participants' discourse, where the role the canvas played in their design process is explicit and conscious. Even in the participation perspectives with the least number of positive responses in self-reports, we can find developed, satisfactory answers from some users.

4.5   Discussion

In this chapter, we presented the development of an instrument - the Participation-Centered Game Design Canvas - to operationalise the PCGD model presented in the previous chapter. Over three DSR iterations, we had the opportunity to develop a design proposal for this instrument and test its use in a real context, in the teaching practice of a game design discipline. Throughout these three iterations, we had the opportunity to review the formal characteristics of the instrument, namely, the number and formulation of the proposed design questions, the examples accompanying the questions, and the physical configuration of the instrument, according to the results obtained.

As criteria for evaluating the instrument we analyzed the perceived understanding and usefulness of the proposed design questions, the analysis of the design notes created with the help of the canvas and the direct discourse of the

users of the canvas through interviews. The possibility of triangulating data sources (design notes and group interviews) allowed for a detailed reflection on several aspects of the design of the canvas itself, namely, leading to: a) the reduction of the number of questions to make the instrument more intelligible; b) the reformulation of the vocabulary to adjust it to the target audience; c) the inclusion of examples to facilitate the interpretation of the questions; and also d) the visual reconfiguration of the canvas to facilitate the recording of ideas with more space and in a collaborative way.

The collection of evidence in the form of game design development notes and direct testimony about the usefulness of the canvas lead us to consider that the adjustments made during the three iterations point to the alignment of this instrument as a solution to the research question at hand: how to operationalization of the model in the practice of game design activity?

However, this process also enabled us to identify aspects that may be developed in future iterations of this research, such as: a) what may lead to different levels of appropriation of the instrument; b) how to avoid the transcription of the examples as answers to the proposed questions; c) the reconfiguration of the canvas in order to allow for the recording of other types of media; d) and also the further study of the communication and instruction strategy as preparation for the use of the canvas.

We consider that the evidence gathered, both of the understandability and usefulness of the canvas, works as a proof of concept for an instrument and methodological approach that answers the research question. Even so, we believe that there are also opportunities for improvement, such as increasing the variety of the design cases and data collection methods, the diversity of the testing contexts, possibly with professionals in the field.

5   PARTICIPATION-CENTERED GAMEPLAY EVALUATION

5.1   Introduction

In this chapter we present the application of the Participation-Centered Game Design Model (PCGDM) as a guide for the game activity evaluation process. The model proposed in ch. 3 aims to support the game design activity in a systematic way, that is, by understanding the evaluation process as inherent to the design activity. In this sense, the model should help to understand the alignment of the resulting game activity with the goals defined for the gameplay experience. Thus, the proposed perspectives of participation, which conceptually constitute the model, should help guide the evaluation process, through the identification of analytical goals and indicators based the perspectives.

We proposed to adopt the Goal-Question-Metric (GQM) approach (Basili et al., 1994) to support the definition of gameplay metrics for the analysis of players' participation. The GQM approach is a goal-oriented measurement framework to define/select metrics for specific contexts and motivations. Goal, Questions and Metrics are the basic concepts of this approach and are organized in a hierarchical structure with three levels. Goals sit at the conceptual level where intents are synthesized as goals to be achieved in a context, and from the perspective of stakeholders. Questions sit at the operational level, which establishes the questions to be answered in order to enable decision-making towards the proposed goals. Metrics, when collected, enable the processing of quantitative indicators, from which to elaborate responses to the proposed questions. A GQM approach can thus be used for conceiving of a measurement plan for assessing the participation of players, alongside a conceptualization of the videogame medium as a context of participation. This allowed us to rationalize the gameplay activity along specific forms of participation and thus guide the assessment of player behavior in a quantifiable manner, with a clear frame of interpretation.

The following are three cases of game design where the PCGDM was used to guide the evaluation of the game activity. The three cases presented emerged in three different contexts and moments. The first case is a videogame about

a religious phenomenon and was designed prior to the proposed PCGDM. In this case the application of the model concerns only the evaluation of the players' participation. The second case is an audio-only videogame conceived in the context of the Game Study and Development elective course, that resulted from the first cycle of PCGDM evaluation, presented in the previous chapter. The third case is an electronic poetry videogame experiment based on the work Livro do Desassossego, by the Portuguese poet Fernando Pessoa. We believe that the diversity of game design contexts presented will benefit the demonstration of the PCGDM as a support tool for gameplay evaluation, both to highlight its potential and to identify its weaknesses.

5.2   The Fátima Game Case

In this case we report on the game design and evaluation process of a religious themed videogame: Fátima, available at http://playfatima.net. Fátima is a videogame that places the sightings of Our Lady of Fátima (Portugal, 1917) in a playful context. The overarching aim was to enable a play experience around the Fátima phenomenon by confronting players with a dilemma between a materialistic dimension (herding sheep) and a spiritual one (praying to the Virgin Mary). The player takes the role of a young shepherdess (Sister Lúcia) represented by an avatar that moves around discreetly in the game world, represented by a green meadow. At the start of the game there are six sheep in the meadow; they move randomly and may leave the game scenario altogether. By moving the avatar, the player is able to influence the movement of the sheep, herding them within the game scenario. In line with the original accounts of the phenomenon, there are a total of six sightings throughout the game. These sightings come up approximately every minute. In each appearance it is possible to pray to the Virgin Mary for 10 seconds. In addition to the reporting of the game design process, we describe the evaluation of the gameplay experience. This evaluation is based on gameplay metrics and allows us to analyze how players acted facing the meaningful possibilities existing in the videogame.

5.2.1   The Fátima Game Design process

The idea of designing a game about the phenomenon of the 'Our Lady of Fatima' apparitions had interested us for almost as long as had research and

exploration of the videogame medium. Our interest mainly lied in exploring a subject matter - religious phenomena - that has proved marginal to what is traditionally represented in videogame territory, thus allowing it to reflect on the very nature of the medium, thinking about its borders in terms of expressive power and fruition. Apart from questions intrinsic to the medium itself, we were attracted to the potential of exploring such a theme because it remains a phenomenon that is culturally rooted in contemporary Portuguese society, and hence symbolically very rich.

For quite some time we came to consider different perspectives on how to tackle this religious subject matter. Initially we pondered addressing pilgrimage and oath keeping (two aspects very closely related to Fatima), and in so treating Fatima as a direct way of questioning faith and religious beliefs. However, such explorations never lead us to practicable game concepts that were worthy of developing based on these ideas.

We ended up following an agenda that came to us inspired by popular visual representations of the Miracle of Fatima – containing Our Lady and the three little shepherds (see fig. 5.1).

In a way, we were interested in the iconic power of this image, and how it became so significantly popular and a symbol of the phenomenon itself. So in a first instance, our design served as a transmediation of this image, gathering all its symbolic figures into the videogame medium. Following that line of thought, the theme of the game evolved naturally to the contrasting dilemma between the material and the spiritual, where one of the little shepherds was confronted with the possibility of either praying to the Virgin Mary or tending to his flock. In so doing, we proposed to explore sensemaking around a dichotomous reflection on the valorization of a contemplative attitude (solemn praying to a divine spirit), as opposed to a pragmatic, earthly nature (tending to possessions).

Once the basic concept was established, it was followed by a strategy for its concretization. One fundamental aspect of this project was that it was motivated solely by intrinsic desires, having no ulterior purpose. Therefore, it was made resorting to a small circle of friends, from which a workgroup with different skills and competences was established. It was composed of Joana Sobral, Mafalda Maia, Mafalda Nobre, Pedro Santa, Tiago Alves and Luís Pereira; once the team was gathered, preparation phase ensued. Even though all members of the team had some relation to the phenomenon, at the very least, due to its

Figure 5.1 A popular representation of the Fátima Miracle religious event, e.g. as depicted in postcards.

cultural ubiquity and weight, we opted to carry out some bibliographical research. It was not so much in our interest to find more or less scientific arguments on events' veracity or lack of, rather to investigate on crucial aspects of how a narrative was constructed based on the experience of the phenomenon. Towards that end, it was essential to read the book "Memórias da Irmã Lúcia" (Kondor, 2007) ("Memories of Sister Lucia", the youngest of the three shepherds) , and that came about to become the basis of some of the details in the game; for example: the textual discourse was based on actual speech that is attributed to sister Lucy and the Virgin Mary, and some scenic element, such as the ray of lightning that precedes each of the 6 apparitions.

This being a "pet project", a minimalist approach was carried out in terms of development, trying to focus all the effort in prototyping. Considering the simplicity of the chosen dualist concept, the gameplay was made equally simple: The player takes the role of a young shepherdess (after Sister Lúcia) represented by an avatar that moves around discreetly in the game's world, represented by a green meadow. At the start of the game there are six sheep in the meadow; they move randomly and may leave the game scenario altogether. By moving the avatar, the player is able to influence the movement of the sheep, herding them within the game scenario. In the playing field there is a holly oak tree representing the site where the Virgin Mary sightings took place. In line with the original accounts of the phenomenon, there are a total of six sightings throughout the game. These sightings come up approximately every minute. In each appearance it is possible to "pray" to the Virgin Mary for 10 seconds; to do so the avatar must be moved to kneel on a marked location, near Virgin

Mary's image. While the avatar is praying, a progress bar comes up on top of it indicating the accumulated praying time up to that point. While praying there is a possibility that some sheep will exit the playing field - here lies the game's dilemma which opposes praying to the idea of caring for or guarding the flock of sheep.

One of the questions that was initially discussed was what role to give to the player, and consequently how to establish his identification with the game and its characters. We considered giving him the means to choose which of the little shepherds he wished to personify. This possibility seemed interesting on a symbolic level, since according to reports of the aforementioned book, each of the shepherds had his own distinct relationship with the Virgin Mary as the apparitions occurred. However, an issue of effort rationalization eventually led us to opt to only represent Lucia, given her pivotal role in the events.

Representation would become one of the most interesting challenges in this project. The initial motto was to create an environment with a minimalist and cartoony aesthetic. This choice was backed by the intention of referencing the very videogame medium, so as to formalize the crossing of these two different territories: videogames and religion. The significant game elements then were the Virgin Mary and the holly oak tree, the little shepherd and the sheep she tended to. The scenario also included some rocks that served as obstacles for the generation of different spatial movement dynamics. Figure 5.2 shows some of the sketches that trace the graphical evolution of the elements.

Following criteria of technological familiarity and for its adequacy for web distribution, at the time we opted to implement the game in Flash, employing an isometric background perspective and vector graphics (figure 5.3).
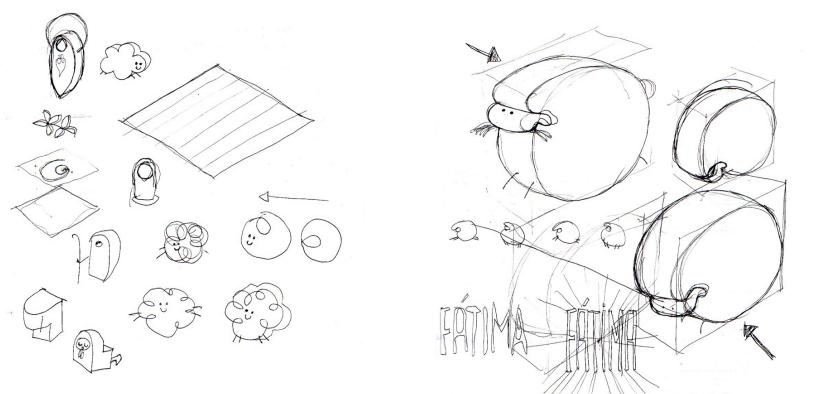
Figure 5.2 Initial sketches from Play Fatima concept art
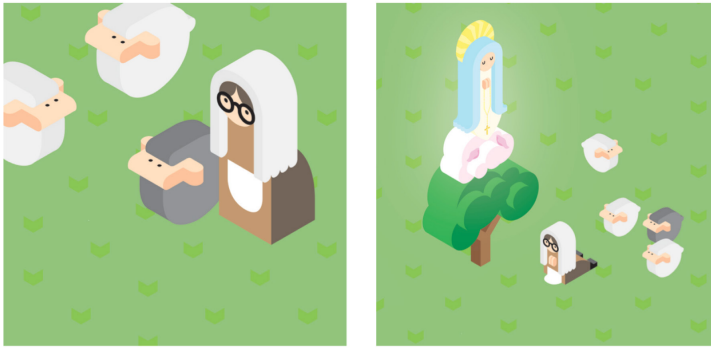
Figure 5.3 Final game design characters.

In regards to sound, we risked interpreting and recording our very own soundtrack. One of our team members (Tiago Alves) had musical skills, which gave us confidence to adapt the themes that were selected for the game. So, it was possible to synchronize with precision the dynamics of gameplay with all sound elements. The music compositions' low fidelity 8 bit aesthetic was once again, a reference to 80's videogame tropes.

One of the aspects that was more seriously reflected and discussed during development, and the one which took more time before a decision was made, was how to incorporate formal game elements ('ludus') (Caillois, 2001) that characterize videogames, namely: the objective, the nature of the challenge and conflict, winning and losing conditions, etc. At design time it was important for us that these features were part of the object we were designing (further development of this topic is in the reflection section). In order to enhance the conflict between these two dimensions, the group determined that the winning condition would be to get to the end of the game (after the six sightings) with at least one sheep. Despite this requirement, the player is afforded the flexibility in choosing whether to care for the flock or pray. We chose not to explicitly communicate to the player what to do, to allow for greater interpretative flexibility of the object.

To create a privileged context for publicizing the game, the group aligned the release and media communications with key dates of the phenomenon, namely, commemorative dates of the apparitions – the thirteenth of each month from May to October. Hence, on the 13th of May we launched a teaser to announce it; on the 13th of June, we launched the game and on the 13th of July we updated it with a method for posting scores on Facebook, so as to provide a social dimension to the experience. Score tallies consisted of a communication of the number of kept sheep and the total time spent praying.

Figure 5.4 A Fátima videogame screenshot during gameplay.

In the following section we analyze player participation in the game in response to the design solution that we described in this section.

5.2.2   Characterizing Players' Participation

After presenting the game's aim, as well as examining its main features, in this section we analyze participation in this videogame. Bearing in mind the culturally-seated interpretation of the videogame Fátima, we have defined the goals of our analysis to be the characterization along the following perspectives – "Sensemaking" and "Challenge" - as these were considered the most pronounced forms of participation in this particular design case. In order to characterize the participation along the perspectives outlined, we have defined guiding questions such as:

- Do the players try to look out for the sheep?
- Do the players try to pray?
- Do the players pray in a persistent way?
- Do the players try to keep all of the sheep?
- How many games are won, lost or incomplete?
- How can we characterize the games based on the results (sheep vs. praying time)?
- What is the duration of the "lost games"?

Collected data

In order to characterize participation on the videogame Fátima we have logged the player's most significant actions. The data presented in this section refers to game playing instances that took place between May 2010 and May 2011. During this period, 23933 games were logged for analysis. Next we describe the main findings according to the metrics previously defined. Out of the 23933 games played, 9316 were incomplete, 13964 were lost and 653 were won.

Figure 5.5 illustrates the number of lost games according to the game's duration. We can see that most of the lost games are over in the first two minutes, indicating a rough start. Figure 5.6 illustrates games won according to the outcome. There was 1 instance where no praying was done and the six sheep were kept, while in 102 other games praying was done for more than 50 seconds and only one sheep was kept. We can see here that for the majority of games that were won one sheep was kept and praying time was maximized.

Figures 5.7 and 5.8 show the players' involvement in the praying action. In figure 5.7 is shown the distribution of the number of games according to praying time. We can see that for the majority of the games there is an attempt to maximize praying time: in nearly 87% of them the praying time is over 30 seconds (out of 60 available).
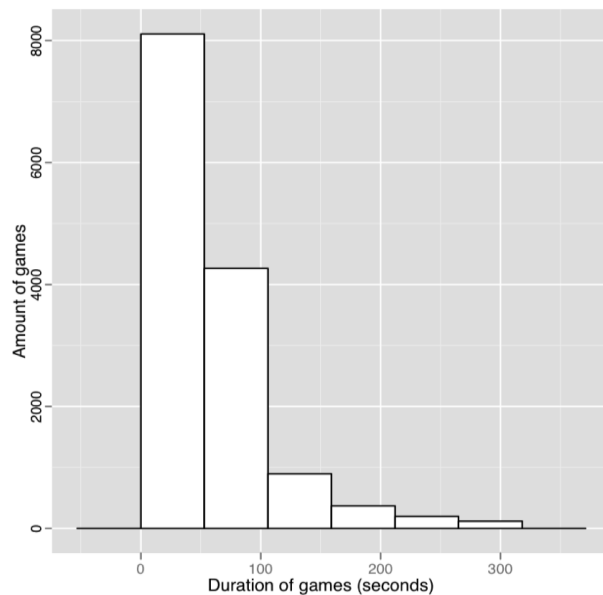
Figure 5.5 Duration distribution of lost games.
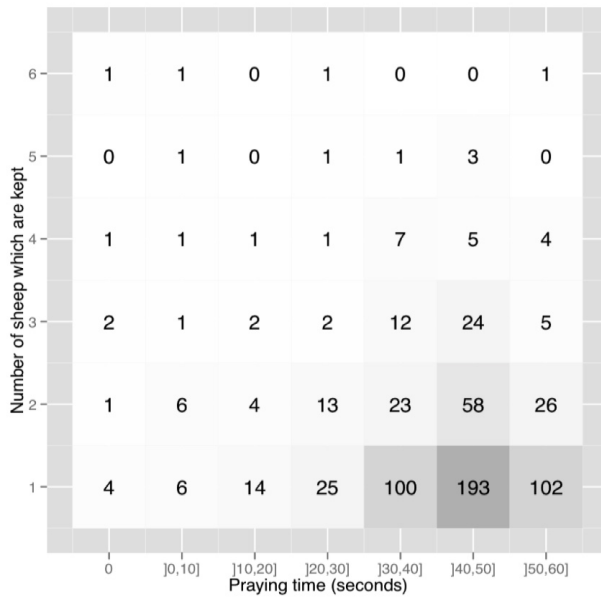
Figure 5.6 Number of games according to result (amount of sheep kept vs. praying time).
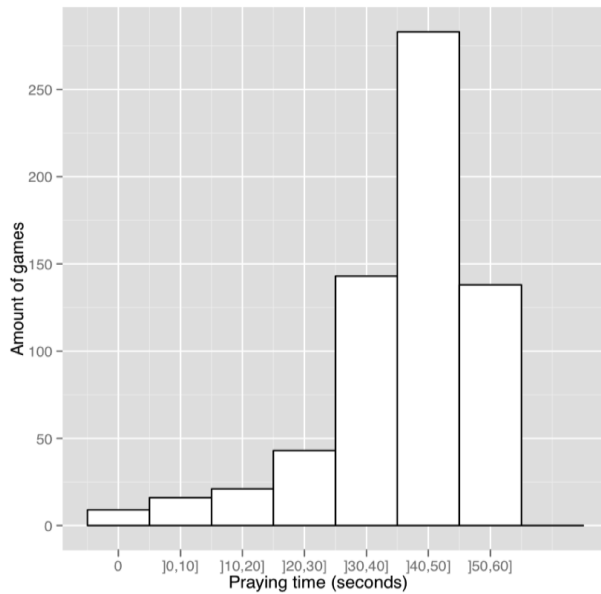
Figure 5.7 Praying time in successful games.

Figure 5.8 measures the persistence of the praying action which is shown by the number of times that the players performs said action; players can choose to pray a total of 6 times per match (once for each sighting). In the vast majority of games players (nearly 81%) chose to pray whenever that was possible (6 times).
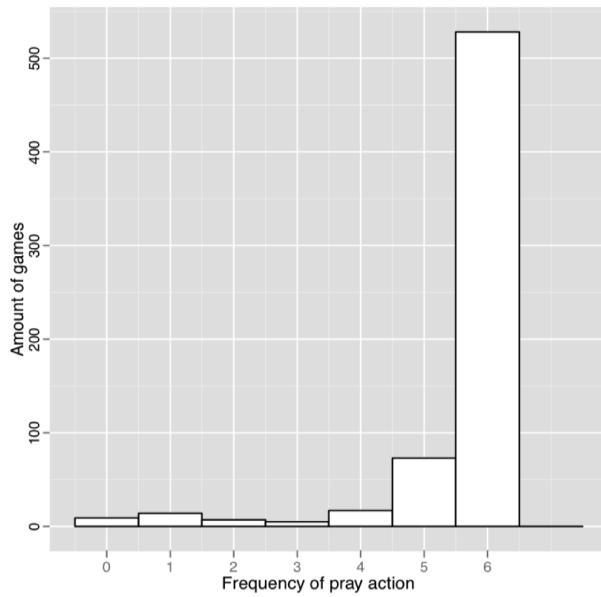
Figure 5.8 Amount of times that praying was performed in successful game sessions.

Data Analysis

Drawing on the results described above we would like to highlight two aspects from the point of view of participation, which concern the kind of results obtained (sheep vs. praying) and the challenge suggested by the game.

If we look at the number of games won vis-à-vis the total number of games, we can see that only approximately 3% of the games end with a "victory". This finding, along with the duration of the games, in minutes, illustrates the difficulty of staying in the game. Even though the game was designed to generate a sharp conflict with the ultimate goal of keeping all the sheep within the playing field, findings suggest that this particular feature may need to be re-examined. With regards to the results of the games themselves (in terms of number of sheep which are looked after and praying times), taken as metrics of the "Sensemaking" dimension of participation, we find that there is a clear fall in the number of sheep which are kept. Indeed, results show that in most cases only one sheep is kept while praying time is longer. This trend is visible in the data related to praying time and persistence in praying. Therefore, considering that the game was originally designed with a view to enhancing the players' dilemma between two courses of action (praying or shepherding), it is questionable whether the design solution thus developed is indeed satisfactory, insofar as it mostly induces behavior associated with only one of these courses, whereas the ideal solution would be to have a more diverse distribution of

results across the two action programs. Having thus analyzed the response to the challenge dimension, we are now in an informed position that allows us to consider in greater detail the extent to which the game design solution was found to successfully meet its intended game experience ideal. In the particular case of Fátima we may now rethink the game design along the following directions: How can we lessen the challenge component in order to increase the number of games played till the end? (Challenge); How can we adjust the game's elements in order to facilitate a greater variety of gameplay approaches? (Sensemaking).

Reflection

Possibly this is too obvious, but a first aspect we think is still worth reflecting about, is that we were able to make the videogame we envisioned. Maybe the process itself has been the most significant reward of this project, what we learned and the sense of community and sharing around a common will. Bringing together a team was essential not only for the sharing of expertise and effort but also for the sake of compromise that enabled the project to be finished ahead of time. The sense of accomplishment is reinforced by the fact that it was the first game design experiment that this team participated in.

If on one hand the fact this group was able to realize the design intent contributes to a sense of achievement, on the other hand we got the feeling that we spend too much attention in the creation of the videogame itself. That is, all the energy of the project focused on the implementation of the videogame was accompanied by a planned strategy to promote and disseminate. Because of the effort involved in the project has been considerably higher and also for recognized naivety, the project ended when the videogame's implementation finished. Taking into account our intention to promote reflection would have been interesting to get to know in loco reactions to the game. In some specific contexts, especially where there was some kind of religious sensibility, we expected to promote discussion. However, our solution was the simple dissemination through the social network Facebook, and to interpret reactions based on written comments. In the comments there was a player who manifested itself displeased with the game considering it an insult. The comment was as follows:

> *Player: I personally do not like the idea. A religion should be seen as something serious. I think the videogame ridicules the Fátima Apparitions. So, why the game creator does not make another*

videogame but this time with Muhammad. I suspect that I already know the answer ...

Game Designers: Thanks for the comment. To what extent (or in what way) do you think the videogame ridicules the Fátima Apparitions?

Player: As the use of terminology related to religious belief, such as pilgrimage, praying, appearance without justification because it is just a game. 1 - a pilgrimage (from Latin per agros, ie, through the fields) it is a journey undertaken by a devotee of a particular religion to a place considered sacred by the same religion. 2 - According to Catholic belief, to pray, or simply "talking with God", is a gift of the grace of "God who comes to meet man" and allows the establishment of a "personal and living relationship of the children of God with their Father who is infinitely good, with his Son Jesus Christ, and with the Holy Spirit who dwells in their hearts". But to distort the Fatima Apparitions we already have a lot of traders around the sanctuary trying to make money at the expense of religion. Thank you for your attention.

Without wanting to overstate a single comment, we think this expression contributes to illustrate that, regardless of the design solution found, our initial intention is not devoid of meaning, in the sense that the use of a particular medium to represent a religious phenomenon is judged as an insult.

A third aspect, perhaps the most important one in terms of legacy, is a reflection on how the preconception of the videogame medium influenced the resulting object. At the time of the design phase we felt it to be important to include ludic elements, to consider the videogame as a game, setting objective and quantifiable results, restricted time to play, great emphasis on the challenge, and so on. Today, we believe those decisions may have been artificial (facing our intention for the gameplay experience) and corresponding to a certain kind of preconceived ideal of what a videogame should be. There is an ample space of expression in the videogame medium beyond the dimensions of challenge and use of ludic elements. Inscriptions such as the praying time progress bar, while not directly related to the evaluated victory condition, seemed to have had much more strength than we anticipated. Today, in hindsight, perhaps we would try to design a videogame less structured, mediating a participation program more open and possibly more ambiguous (Sutton-Smith, 2001), with a greater interpretive flexibility. As an

example, maybe the notion of victory itself could have been avoided and left for the player to interpret in face of the simulated results being represented, with a possibly more philosophical and less functional ending and player relation to the gameplay.

5.2.3   Conclusion

In this section we reported on the game design and evaluation process of a religiously inspired videogame: Play Fátima – a videogame that places the sightings of Our Lady of Fátima (Portugal, 1917) in a playful context. Through the rationalization of player's participation in different perspectives, it was possible to analyze this game design case, from the initially established gameplay experience intention, through the artifact's constitutive analysis, all the way to the analysis of players' behaviors mediated by this game. In this way, it was possible to evaluate the game design having in mind the intended game experience, objectively pointing out which were the artifact characteristics and participation metrics at issue in this design case.

5.3   The Blindfold Design Case

The main challenge of the Blindfold project was to design an audio-only game as soundscape that would allow the players to experience a rich emotional and introspective trip. The game artifact would have to be able to evoke diverse emotions on the player through a soundscape composition. This choice of design theme was initially motivated by the scarce research available on game design for audio-only games.

In this case we report on a game design exercise that focused on the sensoriality and sensemaking dimensions for conceiving and evaluating gameplay experience design, by framing design intentions, artifact characteristics and user participation. Through this exercise we were able to build understandings of user participation in the soundscape constituting the gameplay scenario. By employing a goal-question-metric approach we demonstrated the viability of using the participation-centric gameplay model dimensions as a basis for the synthesis of gameplay participation indicators and metrics, and their analysis in the context of interactions with a game as soundscape.

5.3.1   The Design Proposal

The main motive behind the Blindfold project was to design a game as soundscape that would allow players a rich, emotional and introspective experience. While considering the challenges of an audio-only game, authors wanted to elicit specific forms of player participation, though an emotional soundscape composition. In embracing the design challenge the authors (initially a team of game design students) wanted to contribute to a better understanding of the roles sound can play in games and, considering the participation model of gameplay, focused on sensoriality and sensemaking as dominant perspectives in design.

Sensoriality would be a natural focus since sight deprivation would heighten attention and contribute to focus on perception through hearing. The main idea behind the Blindfold concept was to make an audio-only game, rich in soundscapes and ambiance that would put players' emotions to the test. Game design had three premises: first, to build a game with the potential to provide sighted players an intense experience of sight deprivation, second to provide a game blind people can play and last, to build a game that would level interaction among sighted and blind people in a multiplayer scenario.

Sensemaking would mostly be explored through a narrative backdrop that, while not explicit (since for simplicity of interaction there would be no dialog or narration) it would help structure the design of specific sonic vicinities as soundscape components. The narrative would start with a traffic accident experienced in the first person perspective, followed by a period of blindness and disorientation where the player is challenged to interpret what just happened and try to decode possibilities for interaction as she moves around the soundscape.

Blindfold is also a game of free movement and exploration of a virtual space that allows simple interaction with key elements and assets, which ends up being quite a challenge. The game simulates a realistic sound setting, allowing players to make sense of the sound driven experience. A player will interact with cursor keys plus one action key, while equipped with headphones and a blindfold. The use of the blindfold and headphones provide a more intense experience as the player gets more isolated from the outside world while playing the game.

The Soundscape Interactive Scenes

In order to implement the conceptual game scenario mentioned before, we developed and staged six main scenes that compose the game challenges, named "the dog scene", "the mother scene", "the baby scene", "the mad man scene", "the house scene" and the "radio scene". Implemented as sensory and interaction areas, partly overlapping, on a continuous urban landscape, they offer the player the opportunity to meander among them.

The dog scene: is a challenge scene where the player will try to release a frightened dog from his chains. The dog will then follow the player in this blind adventure. Precedence: The house scene where the player must find the keys to release the dog. Purpose: Invite the player to feel sorry for the dog in the first moment and after, induce a sense of achievement and relieve the players' sense of loneliness by providing him some company and protection.

The mother scene: deliver a lost baby to his desperate mother. Narrative purpose: Make the player feel heroic. Precedence: The baby scene - find the lost baby, outdoors.

The baby scene: find and carry a lost baby in the wild. Narrative purpose: give the player a feeling of hope.

The mad man scene: fight back an attack from a delusional man. Narrative purpose: build tension, feelings of fear and insecurity.

The house scene: enter an abandoned house. Here there are two interaction opportunities: to find the keys that release the dog and to interact with a malfunctioning TV that gives some clues about what might have happened in the initial game scene. Narrative purpose: provide a familiar place (home) where he could feel sheltered and safe.

The radio scene: interact with a lost Radio that gives some clues about what might have happened. Initially the radio is playing a nostalgic, depressing or sad song. Narrative purpose: Create a nostalgic/depressing effect using music, in the case it is playing Bobby Vinton's "Lonely".

Regarding the Radio and TV scenes it is important to point out that the given clues are never too definitive, this is an intentional and very important feature, as it leaves the necessary room for free interpretation and imagination.

Figure 5.9 Map of the Virtual Game Space showing the interactive sound scenes composing the soundscape.

Along with the previous described interactive scenes there are two additional audio cinematic scenes. Specifically, the introductory scene and an ending scene.

The initial scene: a trailer style car accident staging where the player wakes up from, start kicking the action. Narrative purpose: This scene creates the necessary ground for the upcoming action. It introduces the game by creating a doubtful motive for waking up blind and disoriented.

The ending scene: the ending scene tries to create another doubtful ending for all the confusion that the player had just experienced while playing the game. The scene resembles a rescue mission where ambulances, fire trucks and their loud sirens create the main background along with some military vehicle and speech sounds. Narrative purpose: Somehow to close the gap between the initial scene and a possible outcome while not being obvious about a true and meaningful ending, leaving room for interpretation.

5.3.2   Experimental Evaluation via Playtesting

In order to make an experimental evaluation of Blindfold, 17 users with different profiles were chosen, which allowed us to obtain feedback generated from different perspectives. The experience included users with great experience in action games, game designers and users without any game experience at all. Thus, we tried to exploit the advantages and disadvantages from the perspective of each user.

In order to ensure that the testers would have a genuine game experience, we did not reveal any details. They were only told that the arrow keys were used to walk on a 3D first person perspective, the left shift key to run and the spacebar to interact in some game situations. We also told users that they could play as long as they liked, stressing the freedom to end the game experience whenever they wanted. Additionally, all testers played with headphones and blindfolded, to maximize the immersion in the game.

The characterization of the players' participation during gameplay was an important goal of our playtesting process. To ensure that we didn't miss some important (re)actions, we recorded the monitor video feed of the gameplay, and we also observed the players and took notes (as the players were blindfolded, this procedure did not influence the game experience). During the game, all attempts to interact were recorded in a log file. Finally, we did a short interview and questionnaire to capture different interpretations of the gameplay experience. The answers from the interviews and the questionnaires showed us that most of the players had a considerable degree of engagement and players reported experiencing diverse emotions, such as: fear, confusion, frustration and empathy, congruent with design intentions.

Following user playtesting evaluation with data collection in the form of usage logs, we processed indicators for analysis along the participation model dimensions, as relevant for the discussion in the next section. The model's role in this process was to provide lenses to support translation of design intentions to design proposals and an actual artifact. In supporting translation of intentions to an evaluation model of participation experience we adopt a Goal-Question-Metric approach.

5.3.3   Discussion of Results

The analysis of the interpretative support given by the indicators and metrics for understanding the way players participated in the game is presented next. For each model dimension considered, here interpreted simply as representing a participation goal we posed questions leading to assess that goal in the design case. Answers are drawn from the indicators calculated in table 5.1.

Sensemaking

Being Blindfold an audio-only game, it is understandable that it leaves a great margin for the player to imagine the world and its semantic context only through the soundscape. Still, some interactions in the game world – locked elements - have as pre- conditions the completion of other actions. There are two chains of interaction: A mother that asks for her son, and a dog that is locked and can only be released after finding a key somewhere in the game world. In this scenario, and regarding the sensemaking goal, we considered the following questions.

Do players understand the dependencies among interactions? The number of elements unlocked is the definitive indicator of an understanding of the dependencies as they signal that a player understood the challenge and solved it. The number of locked elements that the players encountered gives us an insight of the amount of players that didn't find the locked elements, which implies less conditions for understanding dependencies. The number of pre-conditions met gives another perspective on this issue, because without finding the pre-conditions, players don't have all the elements necessary to make sense of the dependencies.

The relative frequency (RF) values of the indicators are enlightening. The RF values of the number of elements unlocked show that almost half of the player's didn't unlock any element. The RF values of the number of locked elements encountered show that only about half of the players found both locked elements, which can explain the difficulties they had understanding the dependencies. The RF values of the number of pre-conditions met reinforce this idea, because only about a third of the players met both pre-conditions. This lead us to conclude that the game and the context in which it was played don't make it easy for the player to make sense of the dependencies. Sight privation associated with game world architecture, reduces the chances of the player relating and making sense of these elements, instead, mainly discovering locked elements or pre-conditions by chance. To summarize, the way that the search for the goals is mediated by the game shows evidence of not being essential to the game experience.

What are the evidences of a correct interpretation of the sound queues by the player? The ratio between the number of non- neutral interactions (interactions made inside areas where the player has elements to interact with) and the number of neutral interactions (without target) could help us get a glimpse

of the effectiveness of the sound cue that signaled entering an interaction zone. The results show that only 6 out of 17 players have more non-neutral interactions than neutral ones. One possible conclusion is that the chosen sound cue was not the best option to assume the semantic role assigned to. This design led players to become less assertive and to try to interact inside and outside the interaction zones, even when no sound cue was given to them, a bit like using a blind person's cane. The effectiveness of the sound cues that signaled the success of a non-neutral interaction is easily perceived by the player because besides the sound cue itself, there is always feedback as a consequence for the interaction, while with the sound cue that signaled the failure of a non-neutral interaction the same doesn't occur. So, the failure sound cue is also important and vital to help the sensemaking dimension of the player's experience.

However, the mean and the standard deviation values of the number of invalid interactions was respectively 33 and 41. Due to this amplitude of results, we calculated the quartiles (Q1 = 11; Q2 = 16; Q3 = 32; Q4 = 147). From these results we can infer that 75% of the players had no more than 32 invalid interactions. This value, although not very high, is still more than what the designers wished, which is caused by the sound cue chosen to represent an invalid interaction. We think that if the players had associated the sound with the desired semantic meaning, they wouldn't have insisted so much in trying repeatedly an interaction which was being signaled as invalid by the sound cue.

Did the player incarnate the role of being blind? This is probably the most important question for the sensemaking dimension. Blindfold puts the player in an uncomfortable and strange position to most players. Losing sight and having to guide themselves only by sound was expected to be quite a challenge, and many indicators show that the players really incarnated and felt the results of a sudden blindness. The answers to the previous questions can be seen already as indicators for this one. The general trend for having difficulty on relating elements and on perceiving sound cues, added to the fact that all players showed signs of frustration and that most of them (12 out of 17) gave up before the end of the game, indicates that players felt much of what was defined in the game design process as expected reactions caused by a sudden state of blindness.

Another indicator of this successful incarnation is the number of neutral interactions. The quartiles (Q1 = 28; Q2 = 62; Q3 = 118; Q4 = 303) show us that half of the players made between 62 and 303 neutral interactions, which is a very high value. Although it is understandable that at the beginning players should

Participation Indicators	Avg	Std	RF==0	RF==1	RF==2	Q1	Q2	Q3	Q4
Number of elements unlocked	0.71	0.77	0.47	0.35	0.18	0	1	1	2
Number of locked elements encountered	1.35	0.79	0.18	0.29	0.53	1	2	2	2
Number of pre-conditions met	1	0.87	0.35	0.29	0.35	0	1	2	2
# non-neutral interactions / # neutral interacts	2.09	4.53	NA	NA	NA	0.57	0.63	1.18	19
Number of invalid interactions	32.53	40.85	NA	NA	NA	11	16	32	147
Number of neutral interactions	82.71	78.22	NA	NA	NA	28	62	118	303
Average duration periods between elements	230.12	145.52	NA	NA	NA	135	188	243	645
Interactions rhythm (interactions per minute)	9.60	6.89	NA	NA	NA	5.06	8.8	10.89	30.55
Number of different stimuli	3.82	2.16	NA	NA	NA	2	5	6	6
Total number of stimuli	5.94	3.70	NA	NA	NA	3	6	8	14
Average duration of interaction periods	39.18	55.12	NA	NA	NA	13	21	27	230
Number of non-neutral interactions	50.29	44.33	NA	NA	NA	21	33	74	152
Total number of interactions	183.29	107.74	NA	NA	NA				
Duration of gameplay experience (minutes)	20	11				11	20	34	37

Table 5.1 Participation indicators based on the 17 playtests

show this behavior because the mechanics of the game are not explained to them before the experience, we expected that as soon as players started to encounter stimuli throughout the world, they would learn with the sound cues and stop interacting outside the interaction zones. This tells us that, as a recently blind person uses a cane with a lot of intensity, the players, deprived from their sight, relied on the interaction button to desperately make sense of the world in which they were.

Sensoriality

Many factors of the design proposal focused on providing a deep and varied audio stimulation for the player. Regarding the sensoriality goal the following questions can give insight on the players' sensorial participation, namely exposure and reaction to stimuli.

To which diversity of stimuli was the player exposed? The indicator that could give an answer to this question is the number of different stimuli to which the player was exposed. The mean of this value for all the players is approximately 3.8 (with a standard deviation of 2) of 7 stimulus compositions associated with opportunities for interaction in the game world. This data doesn't allow us to conclude much, but if we take a look at the quartiles (Q1 = 2; Q2 = 5; Q3 = 6; Q4 = 6), we can verify that half of the players interact with at least 5 different stimuli.

Again, as this is a game that relies solely on audio, which produces an extreme difficulty for the player's movement, this value can be seen as an indicator that, besides all the challenges the game posed to players, they still managed to explore the game world and interact with a good variety of stimuli. This high level of player persistence demonstrates that, in spite of the negative feelings associated with blindness, players still felt motivated to explore the world, even if they didn't completely understand the stimuli and dependencies. This successful exploration is very positive from a designer's perspective because it contributes greatly to the desirable sense of ambiance and immersion.

What was the quantity and duration of stimuli to which the player was exposed? Other values that can add to the perspective on the sensorial dimension of player participation are the quantity and the duration of the stimuli to which the player was exposed. This is important because, as mentioned before, some players can focus their attention on a short number of stimuli simply because it is their wish, and the stimulus diversity value can induce us to think that the player could have been incapable of discovering or making sense of the other stimuli. The quantity and duration of stimuli are evidence of the player's degree of involvement with the game world. Due to the nature of the experience, it is hard to look at the values and to measure accurately what can be considered a high level for quantity of stimuli, and what is a low level (some elements can only be interacted with once, some have pre- conditions and others are supposed to allow constant and repeated interactions). Similarly, while some elements have interactions that last only a few seconds, some are designed to allow the player to enjoy them for how much he desires to.

Still, an intuitive look at the metric's values from a designer's point of view shows that players experienced a good amount of stimuli, and experienced them for an amount of time that allowed for their interpretation. The average number of stimuli to which the player was exposed is approximately 6 and the standard deviation is approximately 4 (which doesn't tell us much). However,

looking at the quartiles (Q1=3;Q2=6;Q3=8;Q4=16) we can see that half of the players interacted with at least 6 elements. Having in mind that the movement in this game took a lot of time, this value is considered positive from a designer's viewpoint. The average duration of the interaction periods is approximately 39 seconds, and the standard deviation is 55. Once again, it is hard to infer something from these results, but the quartiles (Q1 = 13; Q2 = 21; Q3 = 27; Q4 = 230) indicate that most of the players had an average duration of interactions sufficient to allow for interpretation of an aural stimulus.

What is the evidence of reactions to the stimuli? Players experiencing Blindfold might take a more contemplative approach, or a more reactive one. Either way, the designer intended for the player to understand and make sense of the different stimuli and the sound cues created to help in this task. So, the goal was to minimize the number of interaction attempts out of the interaction zones (neutral), while trying to elicit engagement in more exploratory interactions (like the radio and the TV), and to make sense of elements that had pre-conditions (the mother and the dog). From this, we can say that the designer's intention was to maximize the number of valid interactions, while keeping invalid ones as rare as possible.

The average value for the number of non-neutral interactions do not tell us much because the standard deviation is almost as big. Looking at the quartiles (Q1 = 21; Q2 = 33; Q3 = 74; Q4 = 152) we can see that at least half of the players have at least 33 interactions, which is a considerable amount for the number of different stimuli (7). These values can be seen as evidence that the players truly reacted to the stimuli. Sometimes players tried to interact as soon as they begin to hear the stimuli, but because they were still outside the interaction area, those interactions were counted as neutral. The high values also resulted from misinterpretations or unawareness of dependencies on locked elements, which sometimes led the players to insist on a locked element. In any case, the player was being stimulated and corresponding when he tried to interact, so, we can conclude that there is strong evidence for players reacting to the soundscape stimuli.

5.3.4 Conclusion

We concluded for the valuable support given by the participation - centered model of gameplay in framing design through envisioning participation goals.

The model also helped to frame the synthesis of questions, indicators and metrics for interpreting player behavior from gameplay logs. Gameplay metrics can help interpret log data but can also have limitations in assessing and building interpretations of gameplay experience, only accessible from direct player interviewing. Specifically, in this case we were able to develop usable indicators for sensoriality, sensemaking and challenge but had difficulties with ambiguous interpretations for embodiment and playfulness. Removing ambiguity depended on being able to develop concurrent indicators that could be used to test possible interpretations.

5.4   The Machines of Disquiet Design Case

The work Machines of Disquiet [http://mofd.dei.uc.pt] (Pereira et al., 2018) has been developed in the context of an research project whose goal is to create a dynamic digital archive of the Book of Disquiet [Livro do Desassossego — LdoD], an unfinished work written by Fernando Pessoa between 1913 and 1935. Machines of Disquiet is the name chosen for a number of experimental web-based applications that aim to provide aesthetic reading experiences based on the text of the Book of Disquiet. Every software application is an attempt to find a new setting for experiencing the Book of Disquiet as sensitive matter (i.e. matter experienced in different modalities — text, drawing, sound, image, motion). The use of the word "machine" to name this series of experimental applications is intended as a reference to the machinic mediation that defines the creation, coding and enjoyment of digital objects. In a more poetic phrasing, we have allowed ourselves to think of these experimental applications as "feeling machines," "sense-making machines" and "imagining machines" — in sum, as tools for enabling an aesthetic experience and for opening up the virtuality of Pessoa's text at the level of writing .

5.4.1   From textual experience to gameplay experience

An aspect that seems relevant to address in this project is the relation between literary experience and gameplay experience — in particular, the relation between the acts of reading, editing and writing underlying the literary process associated with the Book of Disquiet, and the design process focused on the experimentation with digital artifacts, considering videogames,

created from, or inspired by this text. We think that the combined analysis of literary experience with gameplay experience can originate novel conceptual and theoretical insights, relevant both for the reflection on digitally mediated literary processes, and for creative and poetic approaches to digital artifacts in general.

From a perspective of the material qualities of the digital artifact, we understand the Machines of Disquiet to figure as videogames, and as such we propose to design the interactive experience they potentiate. In this context, we understand videogames in a broader sense, not confined to the idea of a formal ludic system of goals, rules and constraints. Instead we think of videogames as an expressive medium whose digital objects are open to aesthetic forms of fruition.

In the case of Machines of Disquiet [MofD], we aim to explore how diverse textual configurations coupled with ways of reading (i.e., of perceiving and interacting with the text) can enable diverse forms of participation and, consequently, new experiences, through forms of relating to the text. In the following section, we describe nine examples with accompanying contextualization which illustrate the range of designed interactions.

5.4.2   Participation-Centered Game Design Analysis

In this section we present the different digital artifacts that constitute the Machines of Disquiet (MofD) framing them through the perspectives of participation and the typology of mediation explored, organized in typography, text, sound and image. Taking into account that the material base of the MofD are sentences from Fernando Pessoa's Livro do Desassossego, and that the intention is to create experiences that allow us to explore the mediated text in new material configurations, we consider that the most evident participation perspectives are Playfulness and Sensemaking. Nevertheless, we will demonstrate how the different MofD fits into the remaining perspectives.

MofD TP01-TP09 as well as MP01 are characterised by allowing text to be explored through typographic manipulations.

TP01 proposes an experience based on the challenge of reading a sentence that is reconfigured to be encountered in the form of a puzzle as shown in figure 5.10.
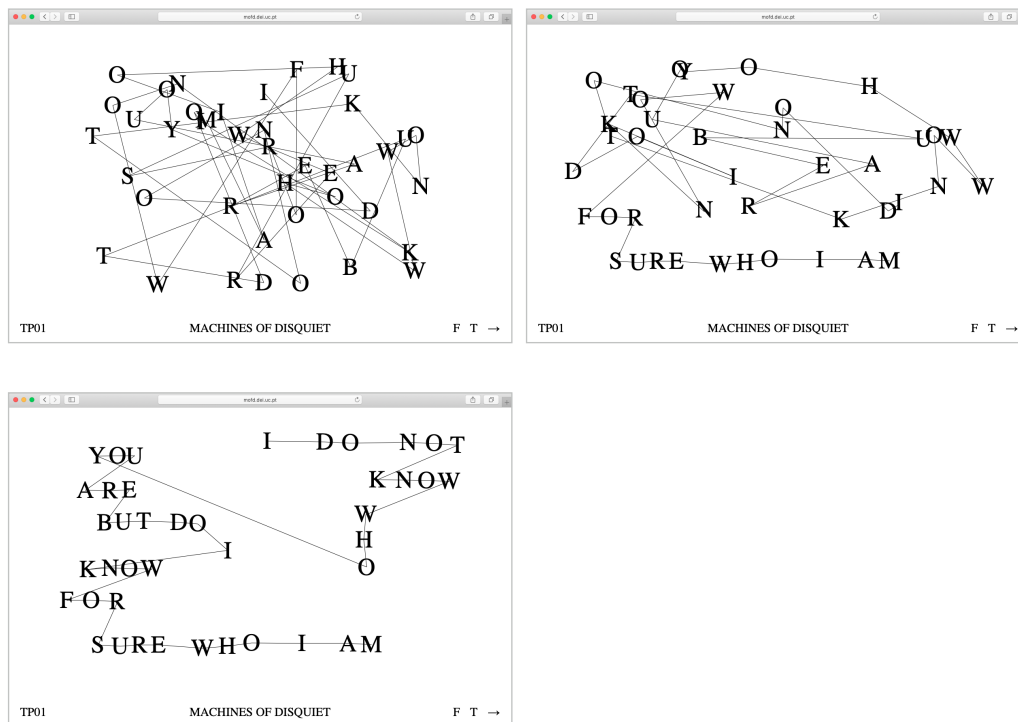
Figure 5.10 MofD screenshots (TP01)

This experience aims to slow down reading to reflect on the challenge of the reading act as a complex cognitive process. Since the presentation of the sentence is connected by a network of superimposed lines, omitting spaces, the challenge is presented both in the ordering of the letters and in the identification of the words. Ordering the letters through direct manipulation on the screen performs the resolution of the puzzle.

Mofd TP02 - TP09 provides an experience centered on physical manipulations of typographical configurations to create different types of visual compositions (figure 5.11). These experiments aim to explore the embodied dimension of reading and sensorial contemplation, based on mouse movement or motion sensors in mobile devices. For that purpose, interactive visual compositions based on the text are proposed at different levels, i.e. based only on the letters (TP02) of the most significant words, based on words (TP03, TP04, TP09) or sentences (TP05, TP06 and TP08). For each of the experiences a relation is defined between the possibility of visual reconfiguration and the interaction movement performed by the user. Besides the contemplative opportunities originated by the visual configurations, there are different degrees of challenge regarding the interpretation and creation of meaning of the original form that serves as the basis of each experience.
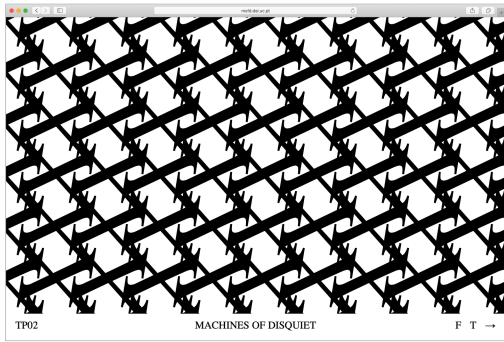
TP02
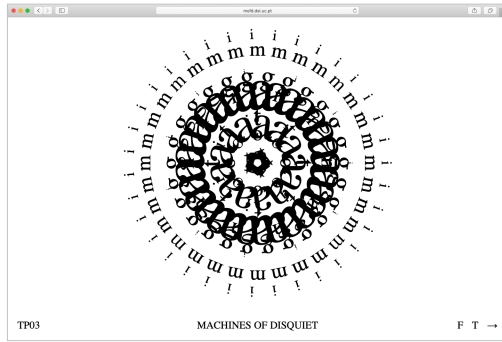
TP03
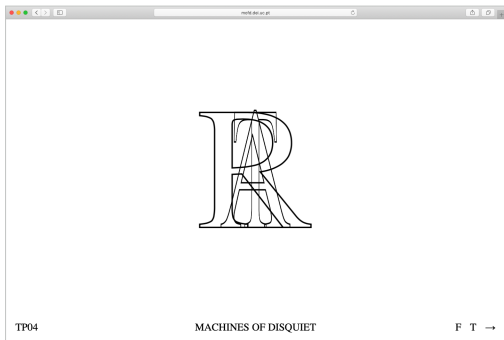
TP04
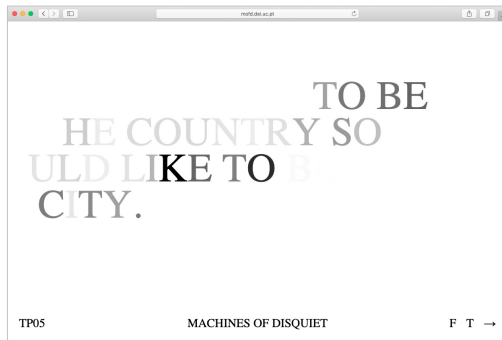
TP05
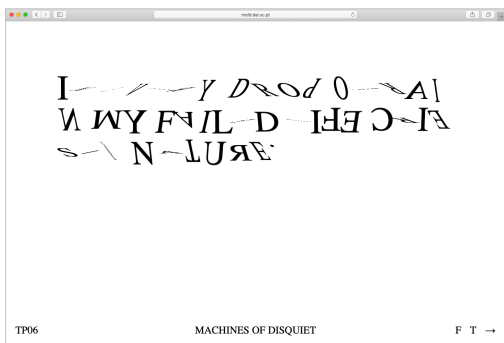
TP06
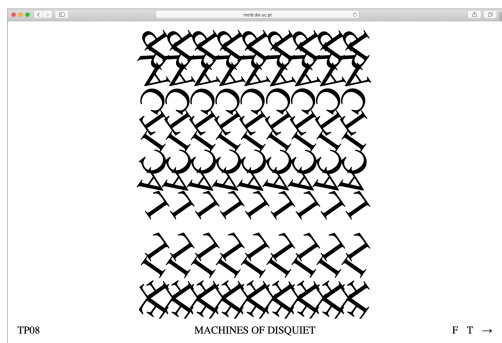
TP08
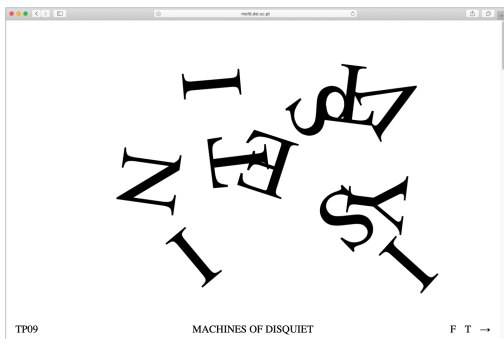
TP09

Figure 5.11 MofD screenshots (TP02-08)
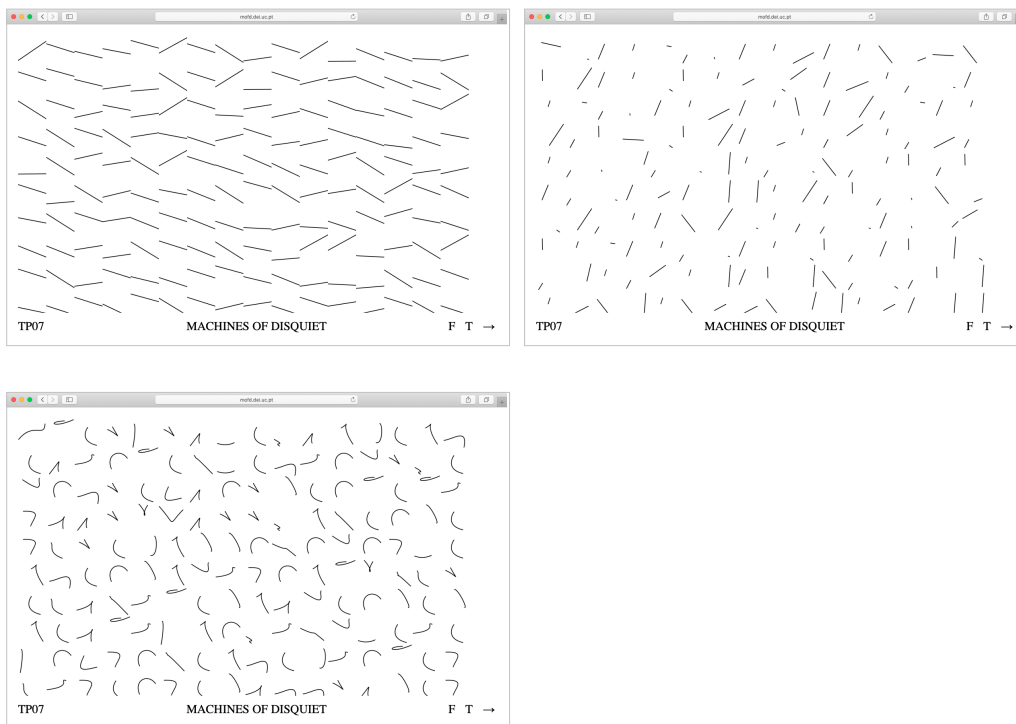
Figure 5.12 MofD screenshots (TP07)

MofD TP07 provides an experience centered on the design of typography. This experiment is based on the idea of writing as a drawing act and on reading as an interpretation and fruition of the drawing or decoding a symbolic system. For this purpose, several sets of automatically generated forms for letters which vary in form and expressiveness are presented (figure 5.12). The aim is to enable an experience that oscillates between making sense of the letter (and subsequent word) and the purely sensorial and aesthetic pleasure of perceiving its drawing as an abstract form. The user is given the possibility of discovering the shape of each letter through the use of tooltips.

MP01 adds a social dimension by allowing a free exploration of textual composition between multiple players. Actually, all the performed text manipulations are reflected on all connected devices. This experiment aims to reflect on the collaborative dimension of the writing process and the potential semiotic and semantic flexibility of the same body of text. By allowing a free exploration of textual composition, there is the additional possibility of social dynamics, according to variable patterns of both cooperation and competition. The occurrence of different social dynamics is enhanced by the fact that there is no other form of communication, except the actual textual reconfiguration (figure 5.13).
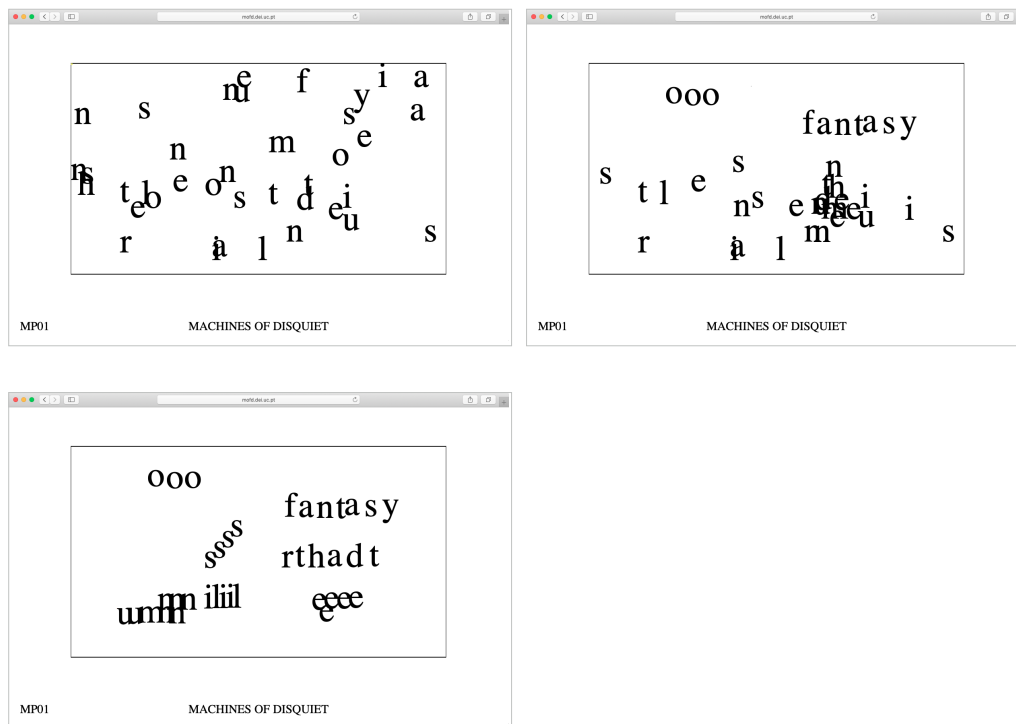
Figure 5.13 MofD screenshots (MP01)

The MofD TX01-TP0X07 are characterised by allowing the text to be explored through the manipulation and reconfiguration of the text itself, creating new reading possibilities.

MOFD TX01 - TX05 lets the player explore the text of LdoD in different experiences (figure 5.14). TX01 and TX02 allows a random reading of fragments, expanding the idea of an unordered book. TX03 and TX04 allow the player to read blocks of randomly generated text from different fragments of the Book of Disquiet. With this experiment we intend to explore the combination of thematic clusters in the Book of Disquiet in order to enable a recontextualized reading of sub-fragments. TX05 supports the combinatorial generation of text line by line. Both TX02 and TX04 provide the experience of reading text blocks that are randomly generated word by word (from the Book of Disquiet) without any grammatical constraint. Here the intention is to generate a chaotic writing that challenges conventional reading, allowing new phrases to emerge based on words from the Book of Disquiet, which can be more or less interpretable. Overall, these experiences support a playful reading experience, exploring the combinatorial generation of text at different scales — fragment, sub-fragment, and word. The user is given the possibility of generating a new text block, making it impossible to access any previously generated text block.

Only art is useful.

TX01   MACHINES OF DISQUIET   F T →

TX01

is of nature failed my to absolute.
soul be other. only they.

TX02   MACHINES OF DISQUIET   F T →

TX02

art is to dodge acting, or living. in every drop of rain my failed life cries in nature. to narrate is to create, for to live is only to be lived. ... this episode of the imagination we call reality. i pity more those who dream the probable, the legitimate and the near, than those who daydream about the distant and the strange. things are only valid in their interpretation. let us

TX03   MACHINES OF DISQUIET   F T →

TX03

imperfect i destiny. of i house. but dodge is is others only valid inner a i not me myself? is of learned myself? brag is what my actor, life me. existence elegance, retired once my other. travellers. will turned yellow, that do describes learned not unjustly is be. learned have to describes of the truly confounds for only liberation. in. if is me; never we meaning

TX04   MACHINES OF DISQUIET   F T →

TX04

the more we advance in life, the myself? only my own sensation. we more we become convinced of two can die if we only just loved. truths that nonetheless contradict dreaming, what for? to influence is to each other. things derive from me; leave the house.

TX05   MACHINES OF DISQUIET   F T →

TX05.a

myself? only my own sensation. we more we become convinced of two can die if we only just loved. truths that nonetheless contradict dreaming, what for? to influence is to each other. things derive from me; leave the house.

TX05   MACHINES OF DISQUIET   F T →

TX05.b

more we become convinced of two myself? only my own sensation. we

truths that nonetheless contradict can die if we only just loved.

each other. things derive from me; dreaming, what for? to influence is to

the whole nature is the firstborn of leave the house.

TX05   MACHINES OF DISQUIET   F T →
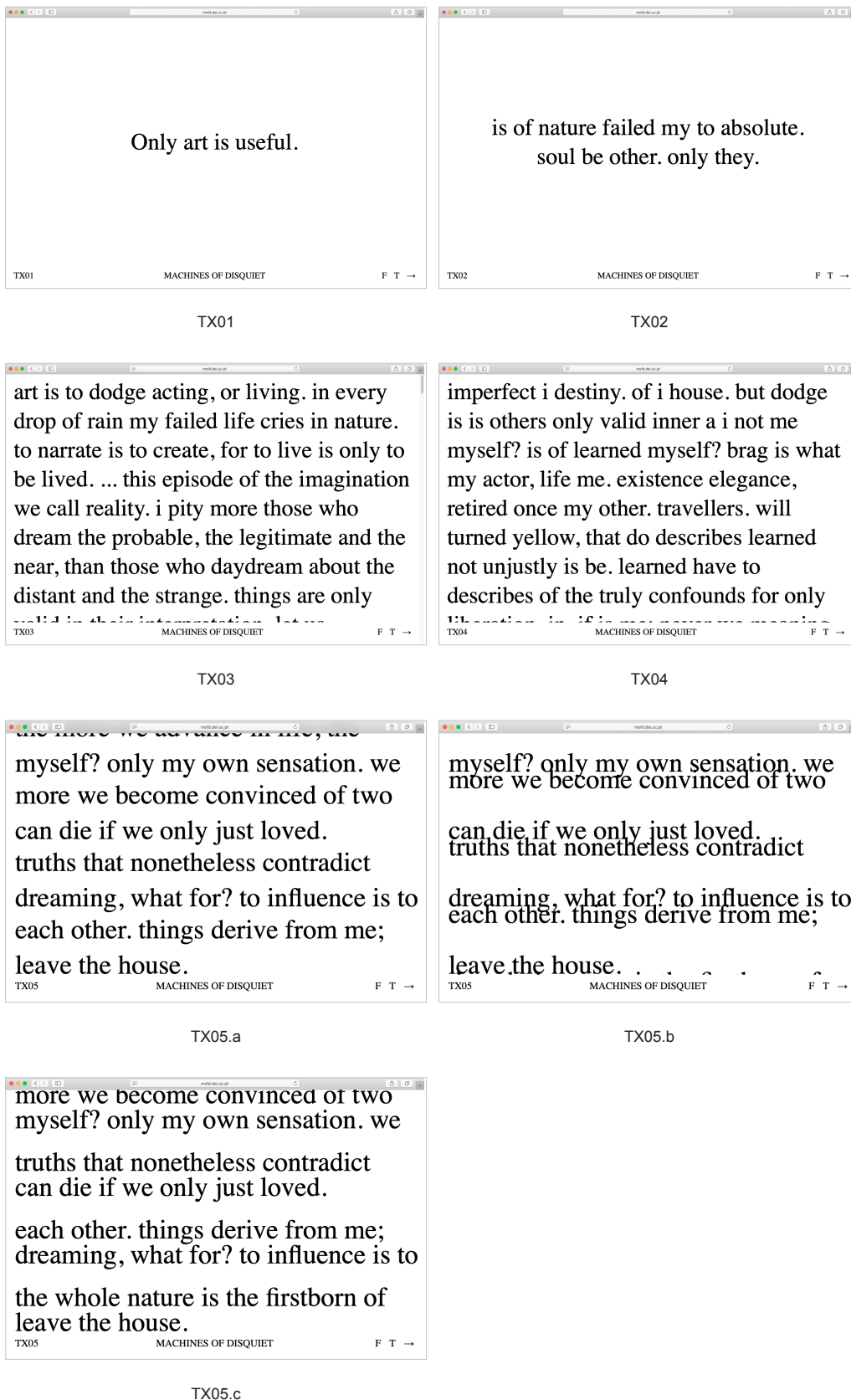
TX05.c

Figure 5.14 MofD screenshots (TX01-05)

| TX06 | TX07 |

Figure 5.15 MofD screenshots (TX06-TX07)

MofD TX06 and TX07 provides an experience based on the free exploration of textual composition creating new sensemaking opportunities. This experience aims to allow playing with words, repositioning them in different places, exploring possible interpretations within a closed set of words (figure 5.15). By allowing the replacement of each word, this experience re-enacts the recursive process involved in the act of writing, whether at a more literal level, exploring a specific sequence of words, or in terms of visual form, exploring the graphic dimension of words. The reconfiguration of words, from which new possibilities of interpretation and enjoyment emerge, is realized through direct manipulation on the screen.

MofD SO01 - SO03 provides an experience based on the sound captured from an automated computer reading (using google translate) of text from Book of Disquiet (figure 5.16).

The basic idea for this experiment is the sound enjoyment of the text. The fact that it consists of a machine reading reinforces the idea of technological mediation. SO01 acts as a box of randomly selected sounds taken from pre-recorded sentences. In each interface (in which the position of elements is also random) it is possible to reproduce three different sounds resulting from an automated reading of the text and three other synthetically generated sounds, allowing the recombination of sounds of distinct nature. SO02 provides an experience based on the free configuration of textual composition that generates a corresponding sound loop and SO03 allows the player to play the sound of each word individually. The ability to repeatedly reproduce sounds in a loop enables the user (who assumes the role of performer) to operate a sound space that may vary from the concrete to the abstract.
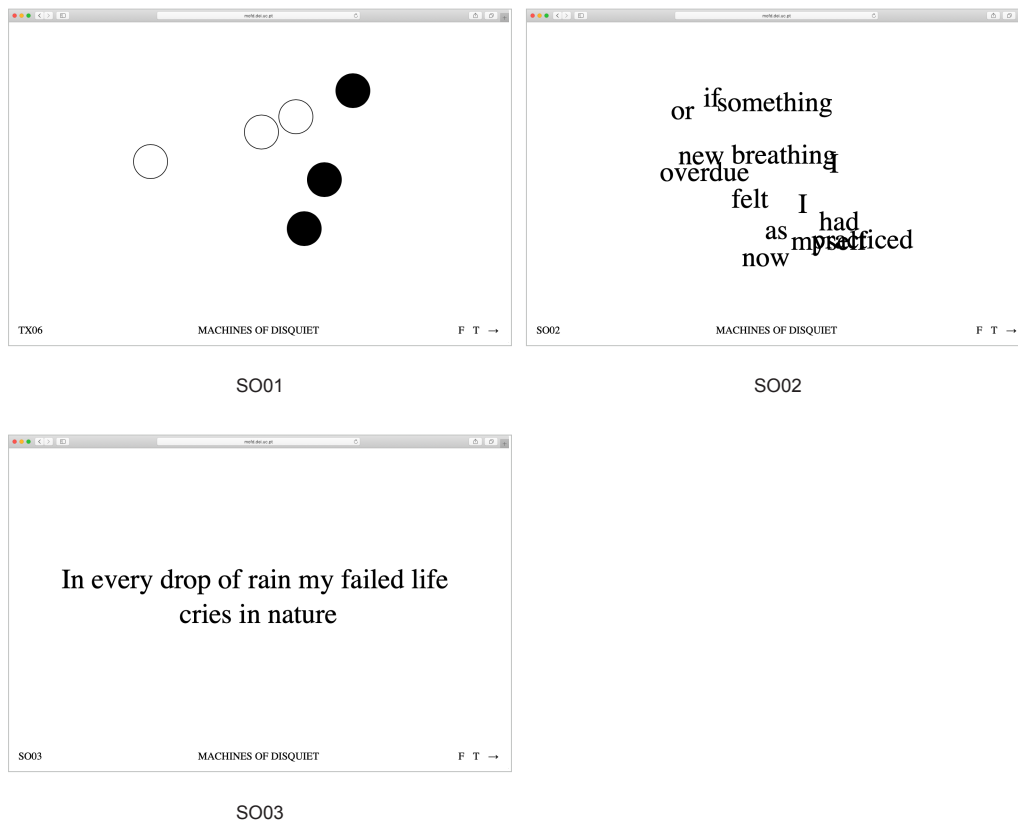
Figure 5.16 MofD screenshots (SO01, SO02 and SO03)

MofD IM01 is characterised by allowing the text to be explored through its relationship with the photographic image.

MOFD IM01 provides an experience based on the combination of text and photographic image. The idea for this experiment is to explore contextualization in sense making and in sensorial enjoyment, playing with the effect that text has on the photographic image, and with the effect that photographic image has on the text (figure 5.17). Each of the elements, text and image, can be randomly changed by the user, enhancing a new reading of the text-image instantiation.

In table 5.2 we identify the perspectives considered essential to describe the experience designed for each of the artifacts that compose the Machines of Disquiet. As mentioned, besides the Playfulness and Sensemaking perspectives, more directly associated with the exploration and reconfiguration of textual elements, it was also possible to describe the Machines of Disquiet through the perspectives Challenge, Embodiment, Sensoriality and Sociability.

IM01.a

IM01.b

IM01.c
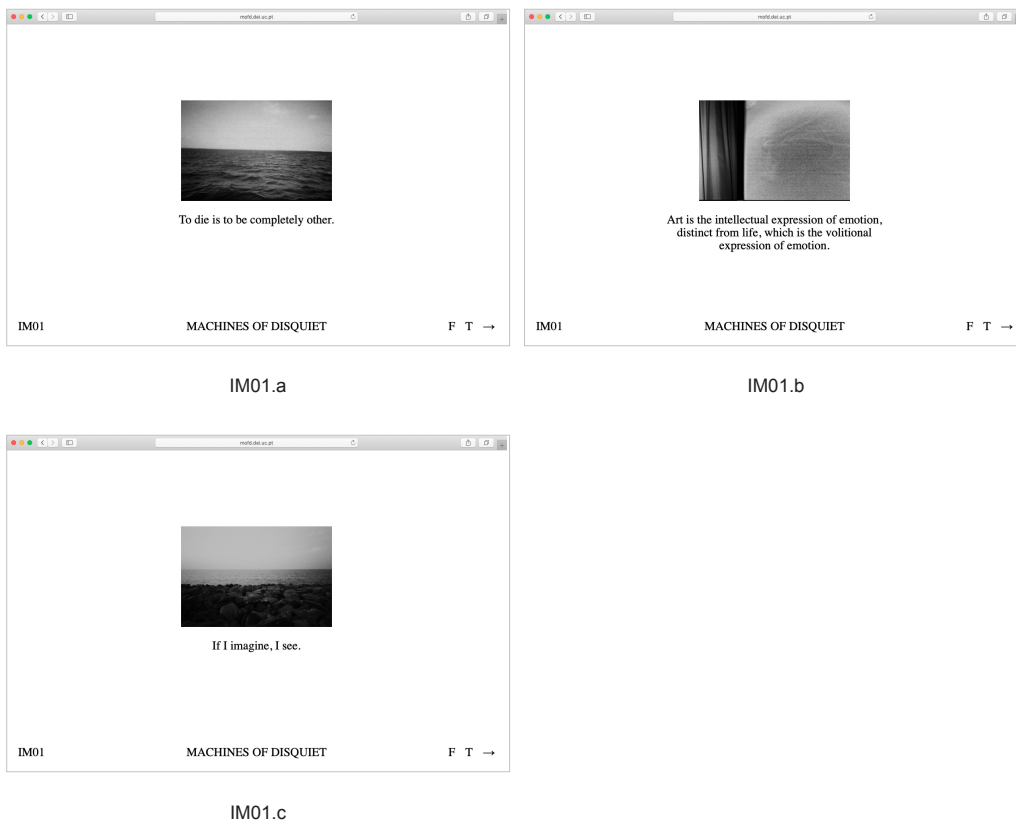
Figure 5.17 MofD screenshots (IM01)

MOFD	PL	CH	EM	SM	SS	SO
TP01	X	X		X		
TP02	X		X	X	X	
TP03	X		X	X	X	
TP04	X		X	X	X	
TP05			X	X	X	
TP06		X	X	X		
TP07		X		X		
TP08			X	X	X	
TP09	X		X	X	X	
TX01	X			X		
TX02	X			X		
TX03	X			X		
TX04	X			X		
TX05	X		X	X		
TX06	X		X	X		
TX07	X		X	X		
SO01	X		X	X	X	
SO02	X	X		X	X	
SO03	X		X	X	X	
IM01	X			X	X	
MP01	X			X		X

Table 5.2 Machines of Disquiet classification based on related perspectives of participation

5.4.3 Characterizing Players' Participation

In this section we present the analysis of the game activity carried out in the context of the Machines of Disquiet (MofD), consisting of 20 different experiences, from the perspectives of participation herein proposed. We will illustrate how the perspectives of participation may have a guiding role in the process of analyzing player participation, more specifically in the identification of analysis questions and indicators, as well as in the interpretation of the results. We will reinforce the illustrative objective in the presentation of this case, not seeking an exhaustive presentation of indicators for each perspective or for each case presented.

For the context of this analysis, game events were recorded between the period 11 September 2018 to 23 February 2019. The main events recorded were the start and end of gameplay and data resulting from mouse interaction, such as interaction with game elements and mouse movement. During this event recording period, 3602 unique games (from the various machines), referring to 404 different devices (151 mobile and 253 desktop) were recorded. However, for the analysis presented in this section, the games with duration time longer than 10 seconds were selected, in order to guarantee a minimum engagement index by the players. This selection resulted in 1222 games referring to 294 unique devices (103 mobile and 192 desktop). As a curiosity, the total number of games selected for analysis corresponds to approximately 13 hours and 45 minutes of gameplay.

The following graph, figure 5.18, presents the number of games played with each Machine with a duration longer than 10 seconds. The purpose of this graph is to inform about the data set under analysis, and not to conclude about players' interest between experiences, since players' participation emerged organically through sharing on social networks (Facebook, Twitter and Instagram), and therefore is not a controlled evaluation context but a convenience sample. Through a demonstration video and direct link, the three experiences TP01, TP03 and SO02 were specifically disseminated.

The analysis of participation was centred on each of the perspectives, and is presented below, starting from the experiences in which the respective perspective is more revealing, and listing examples of questions guiding the analysis. For each question we will present the results of the suggested indicators in detail (mean, standard deviation and quartiles) referring to the machines that are considered relevant examples in the context of the question or perspective under analysis, as well as the machines presented individually (TP01, TP03 and SO02), for contextualisation.
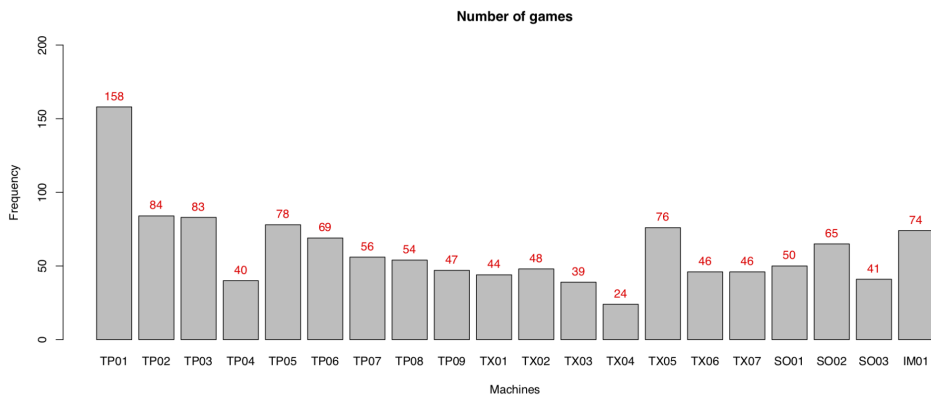
Figure 5.18 Number of game instances according to each MofD.

Whenever it makes sense, for global contextualisation purposes, the global results of the various machines will be presented through graphs.

The Playfulness Goal

The main purpose of the MofD is to create opportunities for exploration and recreation based on textual elements from Fernando's Livro do Desassossego. The Playfulness perspective helps us think about the MofD as a space of possibilities for free experimentation with the text in different modalities. More specifically, and as an example of experiences where the Playfulness character is more evident, we highlight experiences TP03, SO02 and IM01.

Experiment TP03 allows visual compositions with typography to be reconfigured through mouse movement. Experience SO02, by repositioning words on the screen, allows exploring new sound compositions. Experiment IM01 allows combining photos and phrases from LdoD in a random way suggesting new image-text relations. From the point of view of analyzing participation in the light of this perspective, we are interested in characterising how these machines were explored by players. The following questions are suggested to help guide the analysis exercises in the perspectives of Playfulness.

How can players' playful engagement be characterised?

In the analysis of players' involvement, the singular character of the experiences of the machines should be taken into account, both for the specific interest of the theme, not being a mass interest, and for the minimalist aspect of the

individual experiences. Therefore, the aim is not to find an absolute and global indicator of success but rather to find evidence of the alignment between the exploration of the machines and the proposed experiences.

With this question we then intend to model a general appreciation of players' engagament that could be translated by player attention. To answer this question we suggest considering indicators such as the **duration of game sessions** (in table 5.3) and the **number of interactions performed in a game session** (number of clicks, in table 5.4), with distributions per Machine in box plot graphs in figure 5.19 and 5.20, respectively. Taking into account the objective of the analysis and quality of the results, due to their dispersion, we tend to prefer choosing quartiles to describe the results.

	N	Avg	Std	Q1	Q2	Q3	MAX
TP01	158	96.84	140.76	13	31	113	738
TP03	83	34.95	43.72	11	21	32	312
SO02	65	42.32	47.39	14	28	50	278
IM01	74	31.49	39.92	11	21	31	211

Table 5.3 Game duration in seconds
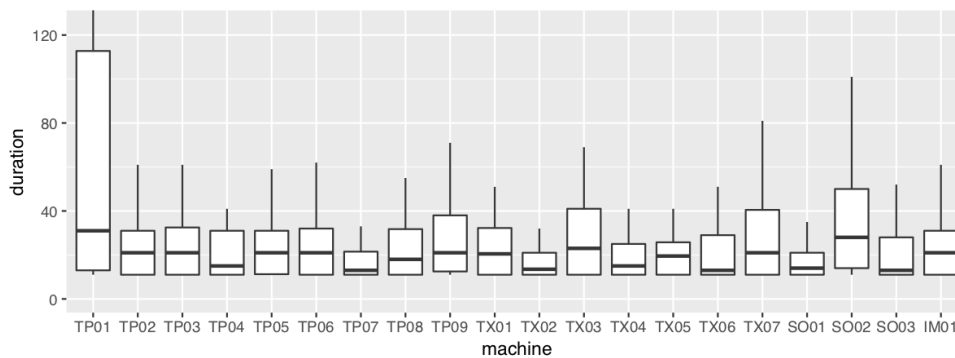
Figure 5.19 Boxplot presenting the duration of play for all machines.

As the presented results show, the TP01 experiment stands out both by the **number of games** and the duration of the respective games, 25% of which having a duration of at least 113 seconds. For the remaining highlighted machines (TP03, SO02 and IM01), 25% of the games last at least 31 seconds. With a shorter game duration we can find machines TP04, TP07, TX02, TX05, TX06, SO01 and SO3, in which 50% of the games last less than15 seconds.

	N	Avg	Std	Q1	Q2	Q3	MAX
TP01	158	26.21	37.57	2	7	35	178
TP03	83	3.39	5.80	0	1	4	27
SO02	65	12.60	13.74	2	8	18	77
IM01	74	4.27	5.51	0	3	6	38

Table 5.4 Total number of interactions indicator

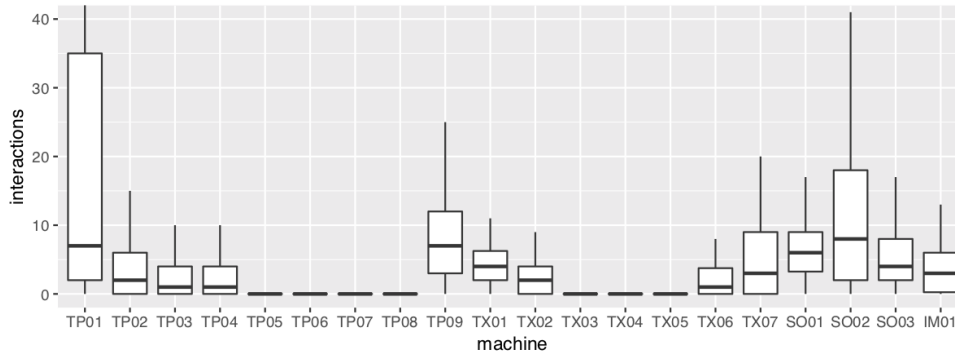Figure 5.20 Boxplot graph of the total number of interactions per gameplay instance indicator

The results on the number of total interactions are not comparable between machines due to differences in the amount of interaction their design demands, but could be useful to complement play duration. The higher number of interactions per game in machines TP01 (Q3 = 35) and SO02 (Q3 = 18) show that the existing space of possibilities in these machines was further explored by this sample of players. This suggests the playfulness participation dimension is likely further developed in those specific machines.

The TP03 experience will be analyzed in more detail in the following questions since its exploration does not necessarily depend on the number of interactions. As for the IM01 machine, results show that in 75% of the games no more than 6 interactions were performed, which seems to us a small value in face of the available exploration possibilities; so any playful participation existing in that machine did not arise from interactions (as they are practically non-existent).

Results lead us to conclude that there is a varied level of playful involvement, with TP01 standing out from other machines, which is probably due to the fact that it was the first to be shared publicly. Therefore, we can interpret this data to mean that a significant number of players explored the first machine more thoroughly due to its novelty and then less actively (if at all) explored the

remaining machines (hence the systematically lower number of total interactions per instance of said machines).

Besides the issue of disclosure, from the design point of view, this question may be interesting to reflect on the value proposition of the idealized experience and the effective involvement of players. Although it is not feasible to compare the involvement of the different machines, due to the fact that access to each one of them was not controlled but organic, and that different machines offered different potential levels of interaction, overall the average number of interactions across all machines (except, potentially, TP01) is so small that it effectively precludes any possibility that players did in fact explore its affordances in a playful manner.

What evidence can be found for the exploration of the machines?

This question aims to characterize players' participation from the perspective of player exploration; we understand exploration as the manipulation of reconfigurable elements in each machine. Exploration analysis therefore depends on the nature of the intended experience and its intended form of participation; for example, the typographic explorations through mouse movement available in machines (TP02-TP06). To measure the level of playfulness exploration through mouse movement we suggest a **total mouse movement distance** metric, normalized in the unit of screen width, present in the following table and graphics (the underlying rationale being that if players move the mouse more, then it is more likely they are exploring the mouse interaction possibility space).

	N	Avg	Std	Q1	Q2	Q3	MAX
TP02	84	4.88	5.63	2	4	6	34
TP03	83	6.69	8.90	0	5	10	54
TP04	40	6.03	5.38	2	6	8	25
TP05	78	9.81	10.80	2	7	14	63
TP06	69	7.90	6.03	3	6	13	24

Table 5.5 Total mouse movement measured in relation to screen width (e.g. a value of 3.5 would mean the player moved a total distance of 3 and a half times their screen width)

The values presented in table 5.5 allow us to conclude that players' total mouse movement when engaging with the machines was significant, with almost all machines having an average mouse movement of more than a screen's width;

in at least half of the games we found an average of 4 or above in total mouse movement. Considering that, with the exception of TP01, machine affordances were all of an exploratory unguided nature, players moving the mouse considerably likely betrays exploratory behavior of the machine's interaction. This then means players must have engaged with the machine's playfulness dimension (as intended). This indicator (figure 5.21) can also characterize physical exploration of the machines, which suggests expiration along the Embodiment participation perspective.
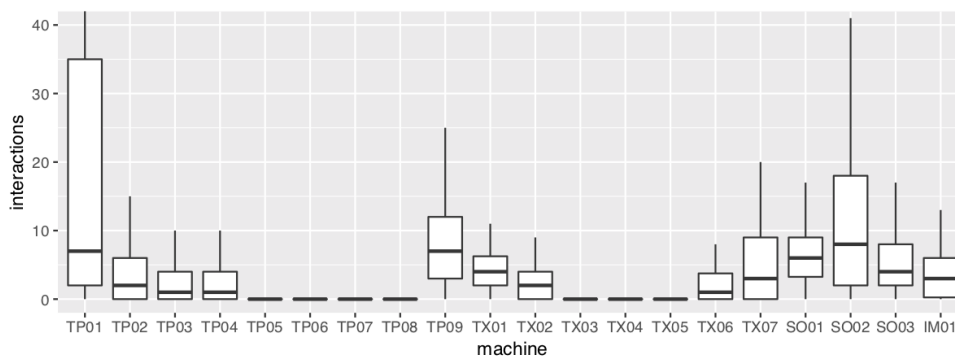

Figure 5.21 Boxplot graph of the indicator total distance of mouse movement.

Despite the favourable results obtained through this indicator, we consider that for a more detailed analysis of the exploration of the machines it would also be necessary to look at the quality of this exploration, in the sense of whether there is evidence of intentionality or alignment with the idea of participation proposed. As an example, we present in figure 5.22 examples of mouse movement path tracing in 12 cases of games of the TP03 machine. With this visual indicator it is possible to verify that the mouse movement path tracing in each game moves in different quadrants of the screen which, in this particular case, indicates variety of exploration of the different possible typographic compositions, thus strengthening the evidence interpretation towards the fulfillment of the machine's intent to promote exploration.

Although quantitative indicators may not be enough, in of themselves, to characterise explorative forms of participation (particularly considering the open-ended interpretative character of the machines), we posit the percentage of exploration of the total solution space might be a good indicator for the playfulness dimension. For example, the IM01 machine proposes the exploration of the relationship of an image with a sentence, giving players

the possibility to recombine these two elements. The possibility space is defined as all possible combinations of 40 images and 94 sentences. From the total number of interactions, we know that 75% of the games did not go beyond 6 interactions, so we can conclude that this machine is being explored substantially below the machine's full potential.
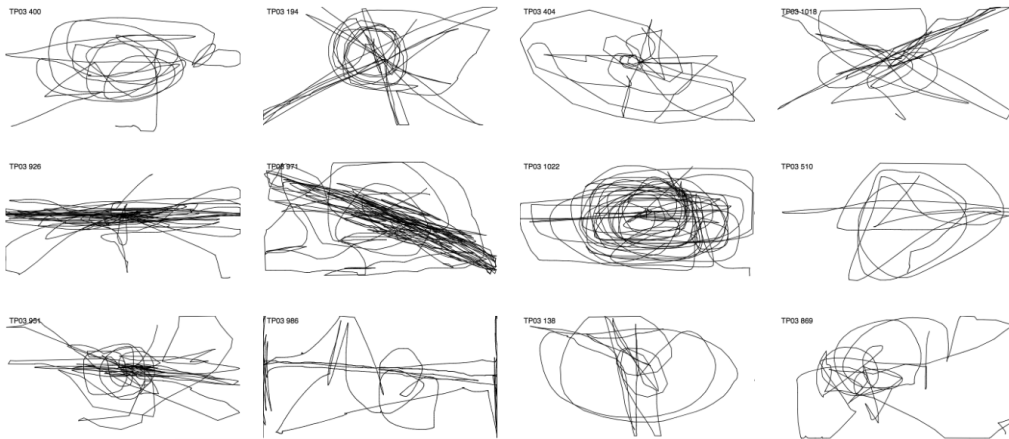
Figure 5.22   Examples of the variety of path tracings of mouse movement in 12 gameplays with the TP03 machine.

How is player's participation characterised with regards to games replayed and the variety of machines explored?

From a global analysis point of view of machine exploration, we can characterise player exploration and interest by the **number of games repeated by the same player** and by the **number of different machines played per player** indicators.

Figure 5.23   Number of replayed games by the same player.

From the graph in figure 5.23, one can conclude that players did not repeatedly experience games with the same machine. Although there are cases of repeat games in many machines, these are outlier cases and do not represent a trend in the data.
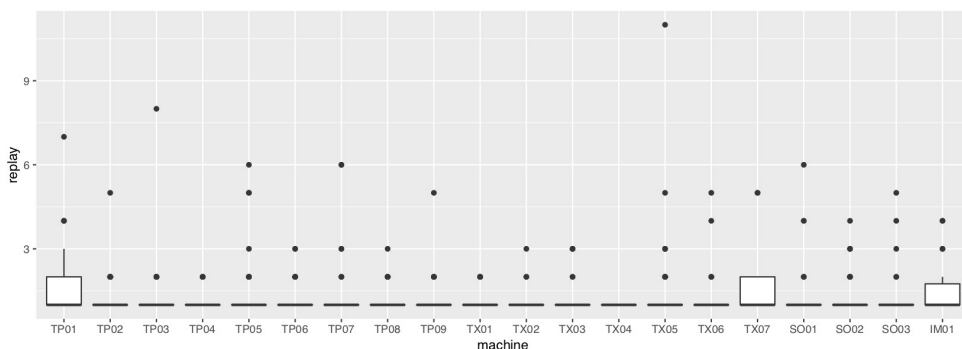
Regarding the number of different machines played per player, presented in the following graph, figure 5.24, we can conclude that about 90% of players (266 in 294) do not explore more than 6 different machines, from the available 20 machines.

As it was not expected that the players' attention would be equally distributed among the different machines, it will be interesting to reflect on design aspects that may influence these results. For example, the choice of a minimalist and enigmatic graphical interface may not make the connection with the other machines obvious.
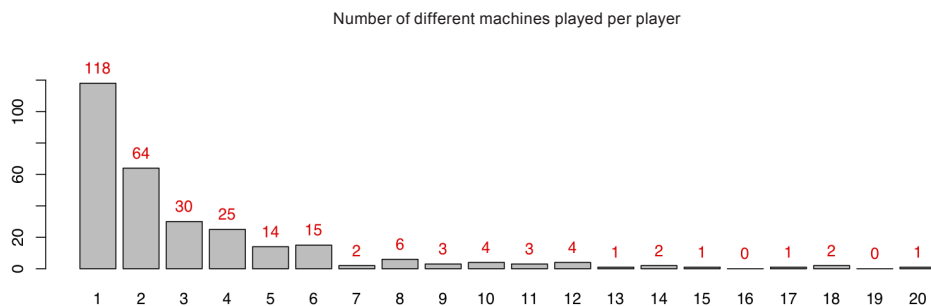
Figure 5.24 Number of different machines played per player.

The Challenge Goal

Among the twenty MofD machines, the Challenge perspective is perhaps the least explored in their design intent across the set. However, we consider it the dominant perspective in the design of the TP01 machine, where players are invited to unravel to read a phrase from LdoD that is randomly arranged on the screen, letter by letter. In addition to the challenge explicitly proposed in the TP01 experiment, it is also relevant to consider the challenge potentially to emerge in the player's exploration of the remaining machines.

From the standpoint of analyzing participation in light of the challenge perspective, we are interested in finding how players adhere to the proposed challenges, particularly in TP01. The following questions are suggested to

help guide the exercise of analyzing participation centered on the Challenge perspective.

In the TP01 machine, what evidence suggests players of adherence to the proposed challenge?

In this machine players are invited to unravel a sentence that is randomly arranged on the screen letter by letter connected by a line, thus creating intersections. We understand the level of challenge here as being proportional to the number of initial intersections a player can unravel. However, we suggest that adherence to challenge can be approached by the number of players who complete the challenge,or alternatively by the **number of players who reach a reduced number of intersections**. Of the 159 TP01 game sessions, 43 (27%) reached the end with less than 6 intersections, which seems to be indicative of the interpretation and engagement of the proposed challenge by this subgroup of players.

To complement the quantitative information given by the number of players completing the challenge, in the following image we present a visual indicator the **final configurations of the games** that ended with a reduced number of intersections (less than 6). The number and diversity of configurations illustrated in figure 5.25 gives us more confidence to conclude that these players interpreted and followed the proposed game objective, according to how the challenge had been designed into this experience.

On the TP01 machine, how can we track player progression?

This question aims to help analyze gameplay progression, in the sense of being able to assess how players' resolved the proposed challenge through time. For the TP01 machine we measure progression as the number of intersections players have undone over play time; the following chart illustrates this indicator.

In the analysis of the players' progression, the figure 5.26 illustrates different behaviors. It is possible to identify for example a set of players that, despite manipulating game elements and changing the number of intersections, do not follow the anticipated goal of minimizing them. The chart or intersections set against time also clarifies the different levels of initial challenge (measured in the total number of intersections), and could be used to study how that initial challenge can impact player effort, rhythm and engagement to solve the challenge. What evidence of challenge can be found across different machines?
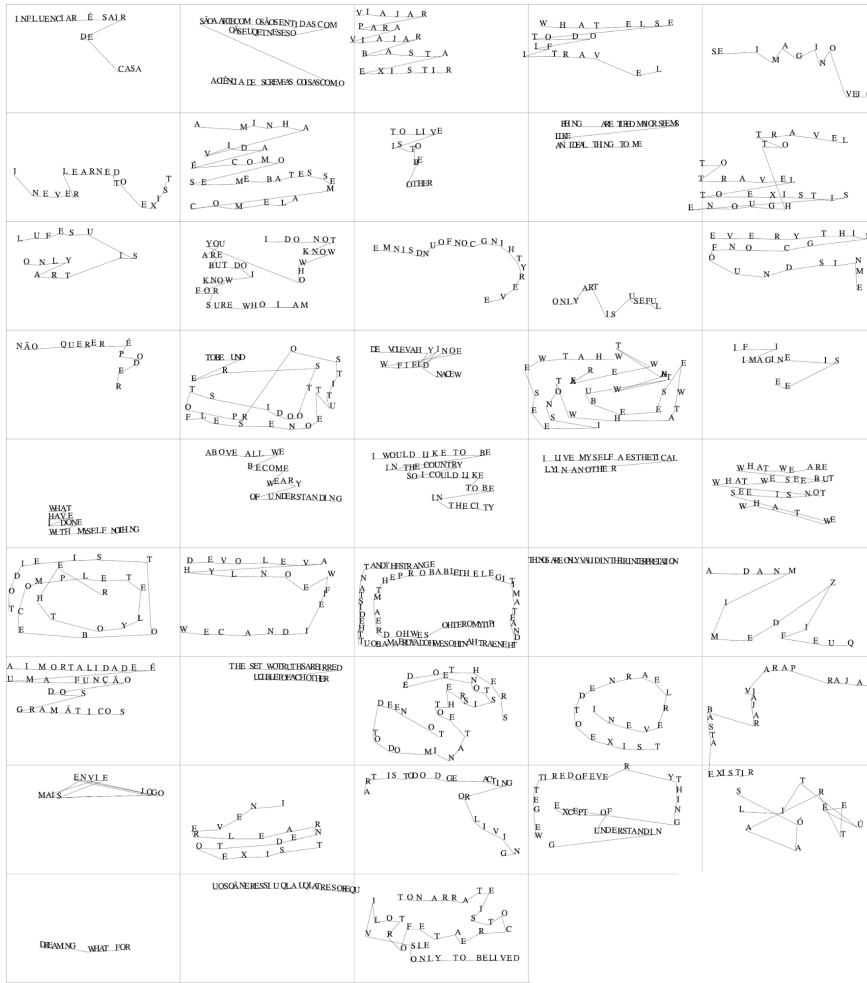
Figure 5.25 Final configuration examples of the TP01 machine games that ended with a number of intersections less than 6.
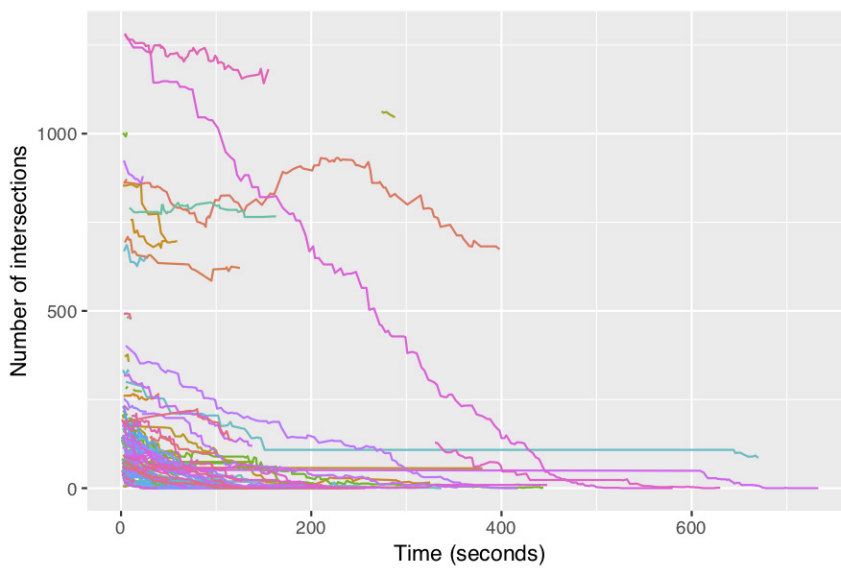

Figure 5.26 Player progression, represented by the number of undone intersections over playtime.

Apart from the TX01 machine, where challenge is an assumed design goal, it would be interesting to collect evidence of challenge present in the remaining experiences. We are mainly interested in the challenge inherent to the interpretation of the available interaction opportunities, which might negatively affect players' participation. We suggest analyzing a dropout rate, calculated for example by the percentage of games where no mouse click interaction occurs, when this type of interaction is part of the way this machine is used. The following chart, figure 5.27, shows this dropout index in the various machines.
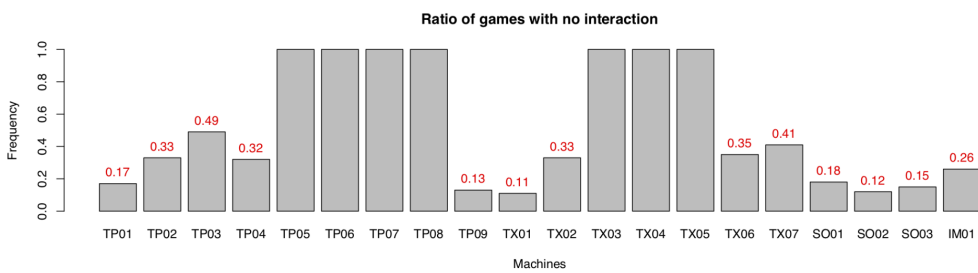
Figure 5.27 Ratio of games started without interaction

In the cases where the dropout index appears at 100% it means that this type of event was not collected, since interaction with the mouse is not part of the experiences of these machines. Although this index is high in machines TP02, TP03 and TP04 (33%, 49% and 32% respectively) we do not consider it worrisome, since the main interaction is performed through mouse movement. In machines TX02, TX06, TX07 and IM01 (33%, 35%, 41% and 26%) these values deserve attention, since they reveal a likelihood that players do not recognize the possibilities of interaction.

The Embodiment Goal

The physical experience proposed in the context of MofDs is naturally constrained to the spatiality of the "game world" – a 2D world composed of typographic and pictorial elements displayed on a web browser – and how players interact with it – by moving and clicking the mouse or tapping and tap-holding mobile touch-screens.. Despite this limitation, we consider it potentially revealing to analyze players' participation in the context of this perspective, with respect to the characterization of movement and interaction.

The experiences from TP02 to TP06 are examples where the embodiment perspective takes on more preponderance, since the decoding and reconfiguration of textual elements is more dependent on the movement of the mouse. From the Embodiment perspective, we are interested in characterizing players' physical relationship with the proposed machines, either through mouse movement or direct interaction with the game elements. In addition to the indicators already used in previous questions, such as the number of interactions and distance and path of mouse movement, the following questions are suggested to help guide the exercise of participation analysis focused on the Embodiment perspective.

How to characterize the movement of the mouse performed by players?

This question has already been partially addressed in the Playfulness perspective, where mouse movement also plays a role. Here we intend to illustrate a complementary analysis, suggesting to visually represent mouse movement of all game sessions, grouped by machine; figure 5.28 presents this visualization. Through this kind of **heatmap** we can notice the involvement and how players' attention stands out in the TP01 machine, allowing an overview of the general movement and **attention distribution** across the several machines. We present this visualization also as insight to the opportunities it may offer to develop future explorations, particularly in learning to interpret specific **patterns of player movement** and the areas where they occur.
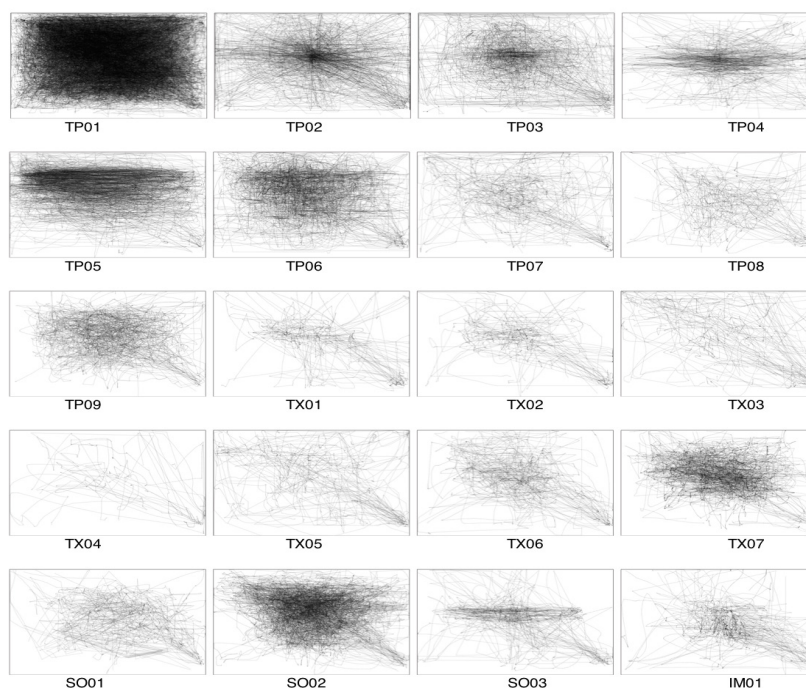

Figure 5.28 Visualization of total mouse movement

To complement mouse movement analysis, we present the visualization of the **individual movement over each game**. Figure 5.29 shows the example of 12 games of experiment TP06, where the horizontal inclination of movements is particularly noticeable. In this way, the alignment of the mouse movement with the proposed experiment is confirmed, since this movement is necessary to unravel the sentences in this machine.
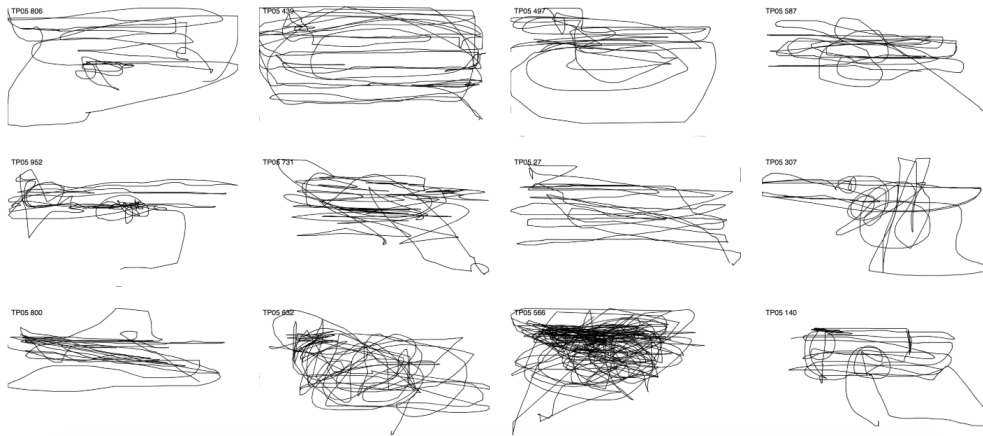
Figure 5.29 Examples of the representation of mouse movement in 12 games of the TP06 machine revealing a consistent horizontal movement pattern aligned with sentence unraveling.

What evidence of player participation can we collect that reveals bodily expressiveness in interactions?

With this question we suggest thinking about indicators that can offer evidence of physical **rhythm and intensity in player interactions**. As an example, we suggest analyzing indicators like pace of interaction (number of interactions / game time) and speed of mouse movement (total distance of movement / game time), presented in the following graphics (figure 5.30 and figure 5.31).

From the point of view of the proposed experience these indicators show which machines invite more intense physical activity, such as the SO01 experience that simulates a sound box and therefore has a higher rate of interactions. In relation to the speed of mouse movement it is possible to identify higher values in the typographic experiences (TP04, TP05 and TP06) that depend on movement to be explored.

We also consider these indicators can be used as descriptors of the intended experience during design exercises; e.g. starting with a design intent of players

engaging with the game at a given intensity level, like X amount of interactions of a given type per time interval, and then validating if their participation matches that design intent; this specification and validation loop is intended to be developed in future research work.
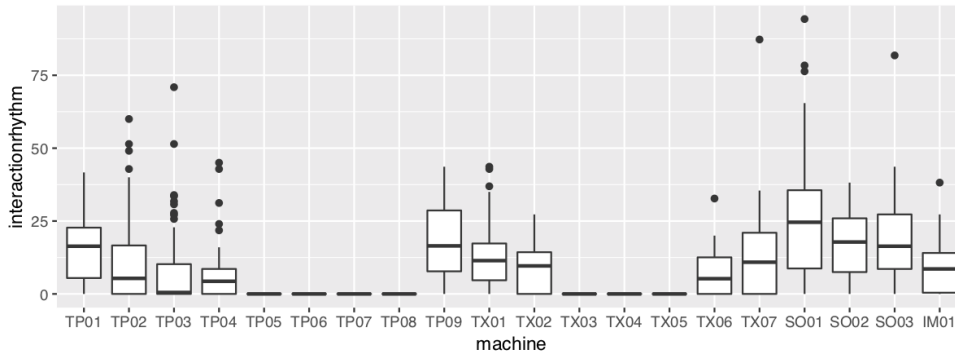
Figure 5.30 Game interaction rhythm or play pace (number of interactions / total game time)
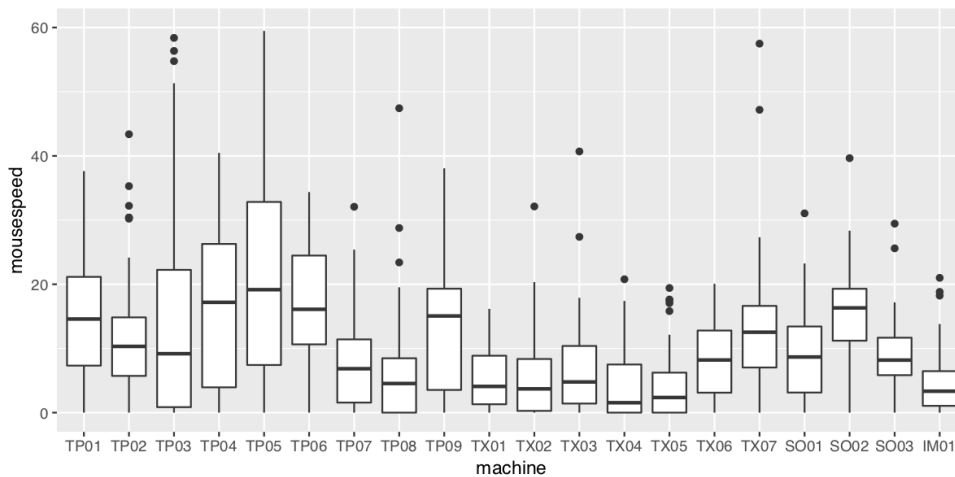
Figure 5.31 Average speed of mouse movement per play instance (total mouse distance / total playing time)

The Sensemaking Goal

Being LdoD fragments the base matter of the MofDs, the Sensemaking perspective assumes a transversal role in the design of the various experiences. Different opportunities were proposed to support meaningful participation, from the more direct interpretation of fragments (TX01 and TX02), to the recombination of words offering new opportunities for meaning creation (TX06 and TX07), to the generation of text through permutation (TX05) or randomness strategies (TX02 and TX05). From a Sensemaking

perspective, while analyzing participation we became interested in finding evidence of player interpretation and the forms of participation in meaning-making opportunities presented by each machine. The following questions are suggested as guides to participation analysis centered on Sensemaking.

What is the evidence of problems interpreting the machines' interactions?

We are interested in identifying potential problems that may occur in the interpretation of machines' behavior, and thus call into question the nature of their exploration by players. His reversal strategy was already employed with the Challenge perspective, in the analysis of challenge by questioning the rate of non-interacting players. Reversing the question helps us focus attention and appreciate when and how interesting behavior occurs, beyond a flat inexpressive number.

Cases worthy of attention were identified in which this indicator presents high values of games with no interaction, for example in machines TX02, TX06, TX07 and IM01 (33%, 35%, 41% and 26%). From the point of view of designing machines' experience, it seems relevant to consider how ambiguity factors in interpreting the proposed experiences associated with the question of challenge (particularly in design cases such as Machines of Disquiet, that propose an discovery experience and make use of minimalist interfaces, and are not always explicit in the ways they allow for interaction).

How can we characterize interactions that betray meaning-making processes?

Here we are interested in illustrating evidence of manipulation that can be directly related to meaning making. In figure 5.32 we illustrate the SO02 manipulations, where players could rearrange words dispersed randomly on screen, and thus originate new configurations of meaning (and of an aural expression, as in this experiment they are read automatically according to the order they are found on the screen). In these illustrations, in gray we can see the initial word configuration, and in black the final. This visual indicator suggests rearrangements, leading us to believe that this machine worked as intended, creating opportunities for the exploration of new meanings by rearranging the suggested sentences.
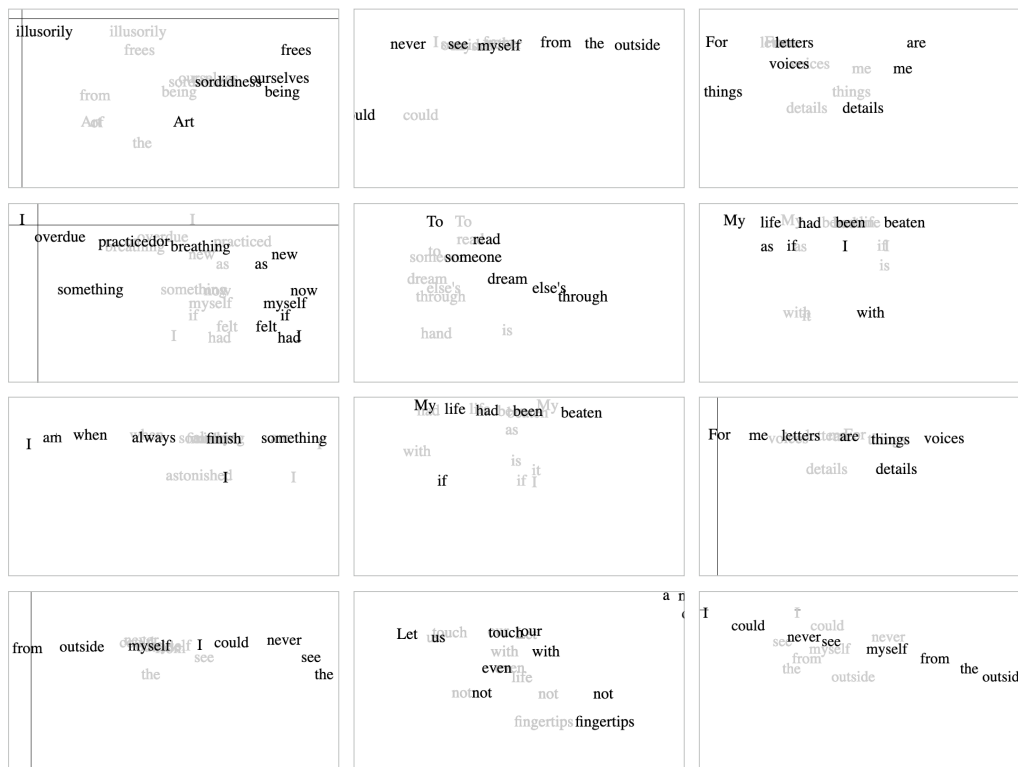
Figure 5.32 Example of rearranging manipulation, a visual indicator built based on interactions with the SO02 machine (in gray the original arrangement of words; in black the final configuration after player exploration)

The Sensoriality Goal

The sensoriality design perspective helped think about opportunities for visual and aural explorations of the text in the base fragments. In this sense, visual explorations from typographic reconfigurations were proposed, as is the case of visual experiences TP02, TP03, TP04 and TP05, but also of sound explorations, as in the case of experiences SO01, SO02 and SO03. We can also consider the IM01 experience as an opportunity for contemplation, in this case of the resonance between photographic records and the text. From the Sensoriality perspective, we are interested in collecting evidence of player exposure and interaction with sensory stimuli. The following questions exemplify how to guide participation analysis focused on the Sensoriality perspective.

How to characterize the evidence of exposure to, and exploration of, sensual elements?

Throughout the analysis of previous participation perspectives, indicators and visualizations have already been suggested that allow us to draw insights or conclusions regarding other questions. Here we highlight how a few examples can also help clarify players' exposure to diverse sensorial stimuli. In the experiments on typographic visual exploration (TP02-TP06), the indicator of traveled distance of the mouse, complemented with movement path visualisation, allows us to conclude that the players were exposed and indeed engaged with diverse sensory elements. In IM01, through interaction rhythm and mouse movement speed indicators, we verified a less intense game activity, which may suggest a more contemplative attitude from the players, as was intended, even if we might recognize the reduced number of total interactions as a potentially undesired result.

How to characterize the evidence of an expressive attitude on the part of the players?

With this question we suggest analyzing evidence that may be revealing of an expressive attitude on the part of the players, that is, that they manipulate the game elements in a way that conveys personal views, intents and actions. In the TP01 experiment, besides the possibility to represent the final configurations, to analyze games in which intersections were unveiled, it is also possible to identify different typologies of final configurations. Figure 5.33 illustrates the final configurations of experiment TP01 and how they present different typologies. Hence, this suggests that this machine can support an expressive attitude on the part of the players.
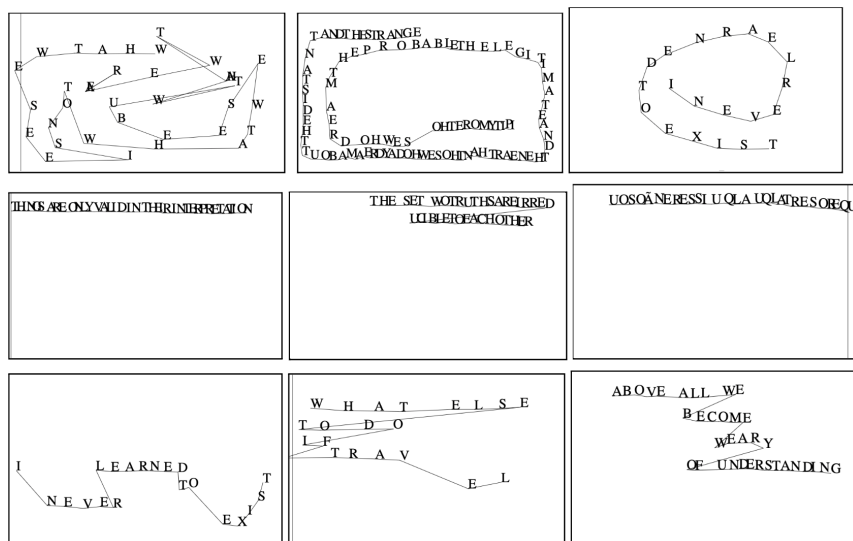

Figure 5.33 Examples of final configurations of TP01 experiments organized in different typologies.

Sociability

Due to time constraints inherent to developing, populating and testing multiplayer games, this perspective was not fully explored in the 20 experiments initially proposed. However, a 21st experiment was designed and developed in order to demonstrate a possible exploration centered on this perspective. The MO01 experiment allows the creation of textual compositions by multiple online users. All users share the same typographic configuration and the manipulation of the letters is carried out in a distributed manner in real time. Thus, by allowing the position of each letter to be configured in a distributed manner, this machine offers a collaborative text creation experience in real time. In this case, we would be interested in collecting evidence of, for example, collaborative creation of sentences or visual compositions, or evidence of competition for disputes over textual elements.

The remaining machines were adjusted to allow multi-user interaction on multitouch devices, to be explored as public installations. Participation in exhibitions (such as the Criatek event in Aveiro) demonstrated opportunities to explore the sociability perspective in this particular context. Evaluating the sociability perspective in a face-to-face context would require methods focused mainly on direct observation, in addition to the recording of events, however this remains to be explored as future work. Initial explorations during installations reveal evidence of social participation in which players explored the machines collaboratively (see fig. 5.34).

Figure 5.34 Users exploring MofD TP01 collaboratively

5.4.4   Conclusion on MofD Design Case

In this section we showed how participation perspectives helped guide the synthesis of indicators for evaluating participation in the context of Machines of Disquiet. The fact that the MofD's interactive textual experiences are open-ended (allowing players to freely reconfigure game elements) made this participation analysis more challenging (as there was no formal game structure in place to guide measurement of players' performance as progress towards game goals).

We consider this open-ended exploration further highlights the role of participation perspectives in guiding the evaluation of game activity. This chapter thus illustrates how player interaction with an artifact can be evaluated in reference to its design intent. We demonstrated how this could be achieved by using the model's perspectives as participation goals, and as a basis for formulating participation-centered questions, and then synthesizing indicators, which can then be used for experience characterization and assessment.

5.5   Discussion

In this chapter we demonstrated the instantiation of the Participation-Centered Game Design Model as support for game activity analysis and experience evaluation. Through the analysis of the player experience in three game design cases, we have demonstrated how the model can play a guiding role in the definition of game design strategies.

The nature of the guidance is materialized in the use of the model in the definition of evaluation objectives, elaboration of analysis questions and identification of the respective indicators and metrics, following the GQM approach. If, on the one hand, from a design perspective, the perspectives may serve to map the space of game design possibilities, from an activity analysis perspective, the perspectives can serve to map player behavior inside the possibilities supported by the designed artifact. Thus, for each game under analysis, we could identify relevant questions and try to answer them based on interaction data.

It seems natural, and even favourable, to note the evolution of depth of analysis over the three cases. Play Fatima represented the starting point of the exploration of the model in the context of the analysis of player activity, focusing only on fundamental questions about the game, in this case on the potential

for interpreting the phenomenon at hand (sensemaking). In the second videogame, Blindfold, it was already possible to deepen the analysis through several questions formulated from the model, contextualizing them within the design of the game. In this case, the limitation in the exclusive use of metrics as a source of data for the analysis of player participation became evident. In the third case, Machines of Disquiet, it was possible to comprehensively analyze from the clarification of the experience proposed in each machine, to the confrontation with specific metrics from players participation. In this case, we also explored complementary strategies to the analysis of the indicators, namely through visual indicators that bring to evidence player manipulations.

The evolution of the maturity and detail of the game activity analysis reached throughout the three cases of game design allows us to demonstrate the potential of the PCGD Model as a guide for the game experience evaluation activity. In addition, the diverse nature of the game design cases under analysis contributes to demonstrate the comprehensiveness and plasticity of the PCGD Model also in the context of the game experience evaluation.

It became clear that limitations may surface in an analysis that focuses exclusively on gameplay metrics, and it remains to be seen if the model will be useful for the interpretation of data from sources other than gameplay metrics.

In the next chapter we present the critical discussion of the contribution of this work, where the potentials and limitations of the results found will be further analyzed.

6   CONCLUSIONS

6.1   Research Contributions

This research aimed to contribute conceptual design tools to support the activity of game design and game experience evaluation. With this intent, a review of design concepts and models available at the startup was elaborated. Key concepts were selected based on their potential generativity to compose a proposal for a gameplay design model centered on participation. This proposal was drafted and first tested based on its analytical power to discuss a diverse set of game works.

With the proposed model, a design canvas was developed to invoke creativity through a set of design questions. The influence of this canvas design in learning contexts was tested through three iterations with 33 groups of game design students. The canvas was successfully appropriated by design students in learning and developing a varied set of original game designs that could be implemented. Through post-process interviews, it was possible to collect evidence of students' recognition of the usefulness of the canvas.

From the evidence collected and discussed throughout the last two chapters – namely, students' appropriation of the model in their many design processes, and the use of the PCGD Model in 3 game experience evaluation processes, we can conclude that the model can serve as an orienting instrument of the design process, within the constraints indicated in section 6.3.

As previously mentioned (see section 1.2), this work has led to several contributions in the fields of Human-computer interaction, Game Studies, Interacting with Sound and Digital Humanities. This highlights the intensely interdisciplinary character of this work and underlines how impactful game design and game design support tools can be to seemingly unrelated communities and fields.

Besides the merit of the participation-centered gameplay design model and canvas contributions, we should also highlight how the Design Science

Research methodology allowed not only to discuss the potentialities and weaknesses of the proposed instruments, but also identify issues and insights that open doors for future work. To be discussed next.

6.2   Research Questions, Answers, and Limitations

How can we facilitate the exploration of the design space supported by videogames in a comprehensive way that includes supporting the evaluation of the resulting gameplay activity?

In this research work, we proposed a conceptual instrument to support game design activity and demonstrated its operationalization both in the creation of novel game designs(chapter 4) and in the evaluation of game activity (chapter 5). Through different research methods (case analysis, surveys, interviews, content analysis, design cases) it was possible to collect evidence about the potential usefulness and weaknesses of the proposed instruments. This was demonstrated both through the analysis of feedback on instrument use and through the content analysis of the canvases produced in the learning context.

Ideally, the Participation Centered model should also have been exposed and assessed by other audiences beyond game design students, namely active game designers and developers, so as to obtain feedback on its potential utility, rationality, comprehensibility and adequacy to their praxis. So, the interpretation of the inductive and empowering results presented in this work should be circumscribed to the context where the instruments were evaluated.

In each of the following sub-questions, we detail the answers found in this research work.

How can we conceptually frame the videogame medium to encourage exploration of the design space in a broad and diverse way?

In order to conceptually frame the videogame medium in a comprehensive and diverse way we selected the idea of participation as the organizing concept to support the activities of game design and game experience evaluation. We suggest the concept of participation as an organizing concept because it is a fundamental characteristic of the videogame medium, sufficiently abstract

and comprehensive, but at the same time, leading to identifiable and operable dimensions in design and evaluation. We proposed six initial perspectives to help think of the gameplay design space in a comprehensive way, and three analysis foci to offer an overview of how design intent, artifact and participation interact.

The preliminary analysis of existing games (section 3.3) demonstrated the plausibility of the conceptual proposal's in the comprehensiveness, as well as its potential use as an analytical tool for describing intent, artifact, participation and implicitly, gameplay experience. The fact that no additional perspectives were suggested by design student practitioners when using the model (see sections 4.2.2, 4.4.3) when requested, further reinforces the merits of the six dimensions selected for composing this initial conceptual proposal.

However, professional designers and game criticism may differ, possibly leading to new insights and needed revisions of the model. The lack of an explicit reference to the emotional dimension of the experience was questioned (see 4.2.2), and while it can still be framed within the model, this suggests a possible limitation of the current work. Some doubts in students' interpretation and ambiguities in the differentiation of the perspectives were identified, and served to refine and improve the communication of the perspectives and their operationalization, but with room for further improvement.

The fact that the perspectives were systematically appropriated as new design vocabulary by participants served as a basis for operationalization in design activities, allows us to consider this question transiently answered.

While we did not encounter significant evidence of the need for extra participation dimensions throughout this research, the completeness and thoroughness of the six dimensions was not systematically pursued as a research problem, and as such, further investigation of its comprehensiveness would be needed. This could be done by applying the model to describe further design cases (analogous to the exercise in section 3.3, but with a larger, more representative sample of games that cover as wide specter of the medium as conceivable), or applying the model to generate full design and development cycles, while collecting data that could surface evidence from either practitioners feeling the need for extra dimensions to fulfill their intent, or from the designed games including any elements that do not fit neatly into the original dimensions.

How to operationalize the conceptual proposal into an instrument that supports the game design activity, promoting its rationalization and collaborative discussion between practitioners?

To operationalize the model, the PCGD Canvas was proposed, a visual canvas and physical instrument, practitioners can use to generate, collaborate on, and document game ideas. On its third design iteration, three game design questions are included for each perspective, to elicit and organize game ideas, and each question is illustrated with a set of examples.

We collected evidence of the perceived understandability and usefulness of the questions, both through observation, participants' discourse in interviews, and the analysis of the notes that resulted from the game design activity. Throughout three iterations of Design Science Research, it was possible to improve the instrument, both in terms of the number of questions, in order to make it more synthetic, and the vocabulary itself, to make it more accessible to the audience in question.

It was possible to detect diverse levels of appropriation, which allows us to reflect on the motivation to use an instrument of this nature, as well as the timing of its use. We verified a challenge to use it when there was no point of departure, such as a design brief, a specific theme or challenge for the design project to meet. This can led towards exploring possible combinations with other tools that focus on generating startup points such as the VNA. Opportunities for improvement were also identified so as to enable multimodal forms or documenting ideas and studying creative team collaborations.

How to support player experience evaluation using the proposed conceptual proposal?

We demonstrated the role of the perspectives in the structuring of the analysis strategy of 3 different game designs. They were effectively used to identify goals, questions, and indicators of gameplay activity, and together allowed a GQM approach to be implemented so as to assess said designs. The fact that we report on three different cases, demonstrates the potential comprehensiveness and plasticity of the conceptual proposal.

It would also have benefitted this research if the model, canvas, and the GQM approach to gameplay analysis had been appropriated in recurrent cycles of

game design and development, so as to obtain further evidence of their utility in orienting the development process and how the game design activity, as a whole, would be impacted by introducing these instruments.

6.3   Future Work

Having presented the results obtained in this research and its limitations, we now point out the following lines as potential future work.

Study of the use of the instruments proposed by different types of audiences. (e.g. Practitioners, Game Design Teachers, New media artists, etc.) Encouraging the use of the tools in a complete game design and development lifecycle including multiple generation and evaluation iterations.

Given how this research so far only studied design processes with practitioners in training, our understanding of its usefulness and limitations is constrained to that subset of its potential audiences. It is therefore critical to expanding its study into the practitioners at large, to collect data on how its use is appropriated in those contexts. Game designers and developers working in the Industry, New Media artists, or other Game Design Teachers might draw positive impacts from the introduction of the model. Since these groups have different design goals and practices, it might lead to different ways of appropriating the tool, with different degrees of usefulness and new requirements.

How to use the tools in a complementary way to other game design tools?

Another outstanding research question has to do with how the model and canvas might be complemented and potentiated by other design tools (whether of a conceptual or material nature). Although comprehensiveness is at the core of the motivation for the game design tool developed in this work, there was never any question of considering that it could be self-sufficient in a game design activity. Thus, it would be interesting to understand which tools are best suited to complement the value offered by the Participation-Centered Game Design Model and Canvas.

What is the opportunity to complement evaluation tools with other sources? New visualizations and qualitative characterization or gameplay experience?

In the context of how the model aids and supports the evaluation of game artifacts, our research only explored the use of gameplay indicators for a small subset of games. Further case studies must be carried out, ideally using game candidates in distinct genres and production contexts, to better represent the ecological diversity that characterizes this medium, and which this project aimed to assist in as much of its breadth as possible.

The other limitation relates to the methods and data sources used to inspect the resulting participation. Gameplay metrics are but one single strategy for that goal; a more complete picture of player participation can come from the complement of biometrics and subjective data sources, such as surveys and interviews. The latter is of particular noteworthiness thanks to their qualitative nature, which can further expand our understanding of the psychological qualities subjects attribute to their participation in these game experiences (needs being met, thoughts, feelings, value judgments, etc).

A.1 PCGD CANVAS V1

Playfulness

The videogame as a context of free, informal, and unstructured participation.

Think of the videogame as a toy with interpretative flexibility, allowing for player exploration and improvisation. Player participation is based on interaction with the game led by an intrinsic motivation.

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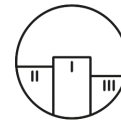**Intention**

exploring, discovering, recreating, customizing, choosing, lack of constraints, freedom

_____

Artifact

1. What type of game's characteristics incentive free participation?

2. What kind of restrictions constrains free participation of the players?

3. What are the interactive elements that enhance free participation?

4. To what extent players can express themselves through free participation?

5. To what extent the game enhances the improvisation of the players?

_____

Participation

degree, variety and tendency of exploration

Challenge

The videogame as a context of structured participation, of a formal challenge, or according to a proposed target.

Think of the videogame as a goal driven context, defined by rules. Player participation is assessed in terms of how relevant his performance is in overcoming the challenge, given the purpose of the game.

_____

Intention

overcoming a challenge, creating a strategy, defeating an opponent, mastering a skill

_____

Artifact

1. What are the goals and how they organize the participation of the players?

2. What are the possible outcomes of the game?

3. How the game values the participation of the players?

4. What type and level of skills are required by the game?

5. What is the flexibility in the form to achieve the proposed goals?

_____

Participation

control, pace, progress, efficiency in performing tasks
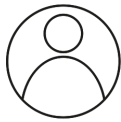
Embodiment

The videogame as a context of physical participation, both virtual and actual.

Think of the videogame as a performance. Player participation is based on the physical relationship established between the player and the videogame, whether that happens through the virtualization and representation of the player's body in the game itself, thereby projecting the player's body in the virtual physical space of the game, or by interpreting the player movement as an interface with the game.

_____

Intention

physical involvement, physical performance

_____

Artifact

1. How to characterize the game space?

2. What is the perspective of the players regarding the game space?

3. What is the representation of players in the game space?

4. How do the players physically interact with the game?

5. How to characterize the possible movements in the game space?

_____

Participation

control and rhythm of movement, aesthetics of the movement
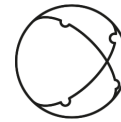
Sensemaking

The videogame as a context of significant participation, of meaning creation.

Think of the videogame as a means of expression. Player participation is based on interpreting and acting on the semantic space represented in the videogame.

_____

Intention

interpretation of a role, fantasy, self-expression

_____

Artifact

1. What is the theme of the game and the underlying messages?

2. What is the role of players in the semantic context represented?

3. How the semantic context is represented?

4. What are the significant procedures of the game?

5. How do each of the other perspectives help build that semantic context?

_____

Participation

alignment between actions and roles, understanding and or critique of the represented phenomenon
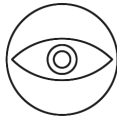
Sensoriality

The videogame as a context of multisensory involvement.

Think of the game as a source of stimulation for the senses. Player participation is then based on perception, filtering, acceptance or reproduction of a stimulus prior to rationalization. In general, this approach aims to consider the aesthetic dimension.

———————————————

Intention

contemplation, wonder, awe, reflection

———————————————

Artifact

1. What is the style and atmosphere that the game offers?

2. What are the main feelings that the game is intended to provoke?

3. What are the elements responsible for sensory stimuli?

4. How is that different stimuli relate to each other? (Work together)

5. To what extent the sensory environment resulting from the participation of players?

———————————————

Participation

degree of exposure and responsiveness to stimuli, interaction or engagement with sources

Sociability

The videogame as a context of social participation, of establishing relationships between players.

Think of videogame as a forum for legitimizing forms of interaction between players, of role configuration. Player participation is based on the establishment of relationships between themselves, whether competition or cooperation, or any another type of communication.

———————————————

Intention

competition, cooperation, friendship, identification, recognition, communication

———————————————

Artifact

1. What is the social configuration proposed by the game?

2. What kind of relationships and interactions between players are proposed by the game?

3. What kind of roles ara proposed by the game?

4. How does the participation of players influence the participation of others?

5. What kind of "visibilty" players have each other?

———————————————

Participation

the intensity and types of interactions between players, affectiveness bonds

A.2 PCGD CANVAS V2

Playfulness

The videogame as a context of free, informal, and unstructured participation

exploring / discovering / recreating / customizing

1. What spaces of free exploration does the videogame support? Physical or logical (open world exploration, interacting with mechanisms / Representational (characterizing or interpreting a character) / Aesthetic (dance, acrobatics, visual or audio expression, decoration, construction / Social (interacting with characters, dialog)

2. What elements support player's free/ willing activities? Physical (interactive components in the gameworld, vehicles) / Scenic (avatar, characters, wardrobes, props) / Expressive (movement and sound, music and dance, dialogs, drawing instruments)

3. How do you characterize players' space of possibilities? Gameworld dimension, granularity of game levels and arenas / Diversity of supported actions (characters, actions, dialogs) / Diversity of interactive elements(vehicles, weapons, items) / Diversity of elements that support player expression (number of music's do dance, variety of layable sounds, variety of drawing instruments, variety of construction blocks, etc)

degree / variety and tendency of exploration

Challenge

The videogame as a context of structured participation, of a formal challenge.

overcoming a challenge / creating a strategy / defeating an opponent / mastering a skill

4. What goals does the videogame propose? Solving a problem or puzzle / Winning a race, matching a performance / Chase or catch an adversary / Build a base or town

5. What is the nature of the videogame's challenge? Physical (coordination, dexterity, resistance) /Mental (memory, observation, problem solving) / Social (team-coordination, social skills)

6. What feedback is awarded to players' performance? Rewards (points, prolonged play, powers, resources, completion / Punishment (loss of points, shortened play setback, removal of powers)

control / pace / progress / efficiency in performing tasks

Sensemaking

The videogame as a context of significant participation, of meaning creation.

interpretation of a role / fantasy / self-expression

7. What phenomenon is represented in the game/is meant to be interpreted by players? Representations (character design, scenography, 2d/3d, animations, audio) / Type of Representations (abstract, realist, iconic) / Interpretation or reflection on the significance/meaning of the experience

8. What significant events are represented/elicited in the game? To Fight, Shoot, Kill / To Communicate, Act / To Build, share, exchange / To Feel, Care

9. What roles do players act out? A military on a mission, a football coach / A father in search of a lost daughter / A healer in a fantasy universe

alignment between actions and roles / understanding and or critique of the represented phenomenon

Embodiment

The videogame as a context of physical participation, both virtual and actual.

physical involvement / physical performance

10. How do you manifest players' presence in the game world? Avatar mediated representation / Direct interaction with the gameworld / Visual Perspective – (1st person, 3rd person, god view)

11. How do you characterize the game world? Dimensionality of its representation (projection, space, time, etc) / Spatial configuration (linear, grid, web, points in space, divided space) / Infinite/finite, discreet/ continuous, physical/virtual or both

12. How do players interact with the gameworld? Keyboard and mouse, controller or other device / Touch, sound / Body movement

control and rhythm of movement / aesthetics of the movement

Sensoriality

The videogame as a context of multisensory involvement.

contemplation / wonder

13. What is the nature and intention of sensorial stimuli? Types of stimuli (sounds, music, images, animations, special fx) / Style (joyous, sad, happy, gloomy, dark, dramatic, infantile, futurist / Relation of stimuli with intended experience

14. What opportunities for contemplation does the game offer? Environmental contemplation (visual and auditive) and cutscene watching / Places and specific moments (level transitions, locale presence) / Sensorial stimuli as feedback for player action (achievement sound) / Induced Emotional responses

15. What opportunities for aesthetic exploration does the player have available? Players actions generate an audiovisual experience / Physical or virtual performance as aesthetic exploration (dance) / Playing a musical instrument (virtual, real) / To draw or compose

degree of exposure and responsiveness to stimuli / interaction or engagement with sources

Sociability

The videogame as a context of social participation, of establishing relationships between players.

competition / cooperation / friendship / identification / recognition

16. What interpersonal relations does the game propose or promote? Competition, confrontation, collaboration / Meeting, Dating, Sharing, Leading / Empathy and other affective relations

17. What is the structure or topology the game promotes? Player vs Game, Player vs Player / Multilateral competition, Unilateral competition / Team and Cooperative Play / Unstructured or Contingent Play

18. What is the type of inter-player mediation? Gamespace sharing / Resource Sharing / Sharing agency sources / Sharing results /Communication (voice, text, …)`

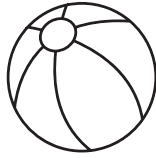**intensity and types of interactions between players / affective bonds**

?

The Participation-Centered Game Design Canvas

Project:

Date:

A.3 PCGD CANVAS V3

Playfulness

The videogame as a context of free, informal, and unstructured participation. Think about participation as free play, exploration, experimenting discovering, recreating, customization, etc.

What spaces of free exploration does the videogame support?

Physical or logical (world exploration, interacting with mechanisms, experimenting different actions and systems) / Representational (characterizing or interpreting a character) / Aesthetic (dance, acrobatics, visual or audio expression, decoration, construction) / Social (interacting with characters)

## What elements support player's expression and wilful actions?

Physical (interactive components in the gameworld, vehicles) Scenic (avatar, characters, wardrobes, props) / Expressive (interactions, movement and sound, music and dance, dialogs, drawing instruments)

What is the space of players' possible actions?

Gameworld dimension and degree of openness, granularity of game levels and arenas / Diversity of supported actions (characters, actions, dialogs) / Diversity of interactive elements (vehicles, weapons, items) / Diversity of elements that support player expression (number of music's to dance, variety of playable sounds, variety of drawing instruments, variety of construction blocks, etc) / How neutral/negotiable/inconsequential are player actions (do they have permanent effects?

Challenge

The videogame as a context of structured participation, of a formal challenge. Think about participation mastering a skill, overcoming a challenge, defeating an opponent, optimization, creating a strategy, etc.
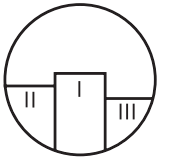
What goals does the videogame propose?

Solving a problem or puzzle / Winning a race, matching a performance / Chase or catch an adversary / Build a base or town / Piecing together a plot? Decoding a hidden-meaning?

What is the nature of the videogame's challenge?

Physical (coordination, dexterity, resistance) / Mental (memory, observation, problem solving) / Social (team-coordination, social skills) Narrative (understanding a character's hidden motivation or plot-twist), Interpretative (understanding hidden meaning)

What feedback is awarded to players' performance?

Rewards (points, prolonged play, unlocking powers and mechanics and levels, resources, badges and achievements, completion, rank, moral sense of achievement – "you win" expressions, story elements) / Punishment (loss of points, shortened play, play setback, removal of powers, moral sense of defeat – "you lose" expressions)

Sensemaking

The videogame as a context of significant participation, of meaning creation. Think about participation as interpretation, understanding, role-playing, self-expression, critical-thinking, etc.

What ideas or contexts are represented in the game?
Representations (character design, scenography, 2d/3d, animations, audio) / representational relationship with the world (abstract, realist, iconic) / interpretation or reflection on the significance / meaning of the experience

What meaningful events are represented and enacted in the game?
Does the player enact a narrative, a story, or according to metaphors and tropes and ideas derived from fictional genres? What is the significance and symbolism of enacted actions for the game's agenda? What emotions are players expected to feel and how do they empower the games' meaning? How do actions and events and their representation cohere with the game's meaning?

What roles do players play?
What part is reserved for the player in the game? Is he a hero or power-character? A spectator or observer? An actor in a grander play? A god capable of deciding the fate of all? What about outside the game - what is players' role post-experience? Is he meant to reflect on some theme? Question the nature of the gameplay or represented events? Question a hidden plot-aspect or message or theme?

Embodiment

The videogame as a context of physical participation, both virtual and actual. Think about participation as physical performance, physical involvement, physical coordination, movement, dancing, etc.
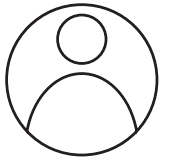
How would you spatially characterize the game world?
Dimensionality of its representation (projection, space, time, etc) / Spatial configuration (linear, grid, web, points in space, divided space) / Infinite/finite, discreet / continuous, physical/virtual or both

How are players present in the game world?
What does the player control? An avatar, several avatars or an abstract device (like mousepointers in a desktop environment)? Is the avatar anthropomorphic? Is it pre-established or can players chose and/or configure their virtual manifestation? How do you perceive the game world (first person, second-person, third-person, bird's eye view, isometric perspective)?

How do players move or perform?
How do players physical control devices relate with avatar's movement? Which metaphors govern the relationship between the two? What physical movements and actions must players enact in the real world that can have expressive impact (think bodily movements while using wii-motes and kinect, and the intensity, rhythm and difficulty involved in inputting commands through controllers)

Sensoriality

The videogame as a context of multisensory involvement. Think about participation as feeling, perceiving, contemplation, sensorial expression wondering, etc.
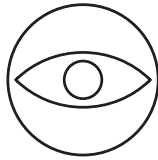
What are the modalities, style or mood of stimuli?

Types of stimuli (sounds, music, images, animations, special fx) / Style (joyous, sad, happy, gloomy, dark, dramatic, infantile, futurist, baroque, impressionist, expressionist, romantic, gothic, noir) / Relation of stimuli with intended experience (how does the stimuli serve the game's expressive agenda?)

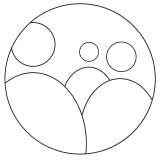### What opportunities for contemplation does the game offer?

Environmental contemplation (visual and auditive) and cutscene watching / Places and specific moments (level transitions, locale presence) / Sensorial stimuli as feedback for player action (achievement sound) / Induced Emotional responses

What will be the opportunities for aesthetic expression in game play?

Players actions generate an audiovisual experience / What kinds of sensorial feedback are there to player actions? / Physical or virtual performance as aesthetic exploration (dance, emoting) / Playing a musical instrument (virtual, real) / To draw or compose via in-game objects.

Sociability

The videogame as a context of social participation, of establishing relationships between players. Think about participation as communication, be together, sharing, friendship, recognition, cooperation, competition, etc.

What interpersonal relations does the game propose?

What opportunities are there in the game to promote social contexts? Competition, confrontation, collaboration / Meeting, Dating, Sharing, Leading / Empathy and other affective relations

What forms of social organization does the game promote?

How does the game structure players' relationship? There are roles in the game with different actions and powers? Leaderboards, ranking, guilds, teams, experience points, diversity of social roles

How do players interact with each other?

Outside the game experience – are players meant to communicate secrets to each other, search online (in forums and chat and websites) for strategies to certain challenges, share experiences and interpretations, gloat in achievements, tell stories about events, what events promote streaming?
Local play – are players meant to play in the same physical space? What sorts of interactions are expected to occur in the world? Fiero? Shadenfreude? Naches? Other competitive emotions? Are player meant to share information?
Inside the game – How do players communicate? How they see each other? Chat, voice-chat emoting, multiplayer game mechanics (inter-player dialogs, co-operative and chaining move sets),

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