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# Game Development Guidelines: Practices To Avoid Conflicts Between Software and Design

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## Abstract

The game process is guided traditionally by the Game Design Document, a document which contains all the necessary info to support the team through the game development process. The Game Design Document contents is insufficient, starting a conflict between game designers and programmers. This work aims to study the game development process and recommend guidelines to reduce the conflicts between the Design and the Software development phases.

**Keywords:** digital entertainment, electronic games, process and software development methodologies, game design

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## 1. Introduction

The game development process involves three main phases: game design, where the main concepts of the game are defined; game production (including both programming and sound and graphic art); and game test and refinement. The design phase generates the Game Design Document (GDD), the most important asset to the production phase.

At the beginning of the game industry, the development process was rather experimental and ad-hoc. As the consumer market became more exigent and time-to-market harder, it was necessary to improve development process. Various processes have been proposed to the code programming [Bakie R.T., 2005], and some processes for the game design [Schell 2008] and art creation [Fullerton et al. 2007]. However, to our knowledge the literature has not yet discussed in depth the

relationship between the design and the production phases.

The lack of processes, or at least, good practices, in-between design and production is an issue indeed. Nowadays, if the same GDD is sent to N different production teams, it is highly probable that one will get N different games. In fact, the task of extracting information of the Game Design Document to support the software implementation is still very time-consuming and generate conflicts, due to misinterpretations and ambiguities of the GDD.

This study aims to get a better understanding on the cooperation between game designers and programmers, including the conflicting views, as well as, to suggest some guidelines to improve productivity.

The rest of the paper is organized as follows. Section 2 discusses related works, sections 3 presents the methodology, section 4 explains the guidelines obtained as results of this work. Finally, section 5 concludes the paper.

## 2. Related Work

Some efforts have been made in order to facilitate the information flow of the design and software phases, Souza and colleagues [Souza L. et al. 2009] work exclusively in identify incoherencies in the GDD, suggesting an extra effort in the development and evaluation of techniques which can describe the GDD content in a better way.

Other researchers [Calele et al. 2005] focused in investigating the difficulty of collecting requirements for games through the available information in the GDD. The author mentions that depending on who is responsible for the activity of analyzing the document, the requirements can result in different games. The study took as basis a session dedicated to dealing with problems in the development of the Game Developer Magazine [Game Developer Magazine 2009]. One of the alternatives

proposed to reduce such problems is greater investment in pre-production to create resources like prototypes and game architectures to help in the task of identify the game requirements. Later the author publish a complementary work, focused in maps the user response face to Non-Functional Requirements [Calele et al. 2006].

As in the gaming industry, the film industry also has its processes governed by a document: the screenplay [Bergan 2007]. The passage of the information described in the screenplay for what is seen on screen occurs with a higher investment in a stage of pre-production, advocated as necessary in developing games [Calele et al. 2005]. In this stage several resources are generated such as storyboards and art concepts that enable the movie director and production crew evaluating the best ways to record each of the scenes contained in the screenplay.

Another study [Alves et al. 2007] addresses the challenges of creating the GDD and its implications for the Requirements Engineering. Throughout the study, a game was used as example to discuss the difficulties to generate a coherent GDD. The GDD can be compared to a requirements document. However, it has many creative elements as part of its content that create conflicts when these info need to be turned in software code. Another problem is that the GDD is not as standardized as the requirements document or the screenplays [Bergan 2007], what implies in more conflicts because it increases the number of different interpretations.

The results of these works suggest that there are a great interdependence between game design and software implementation. But we can observe that authors preferred to concentrate the analyze in the GDD content or in the Requirements stage. The originality of our approach is to focus on the design-software conflicts.

### 3. Methodology

The methodology of the study was divided into the following phases.

#### 3.1 Literature Study and Semi Structured Interview

This phase involved research of studies related to game development in the areas of Software Engineering and Design Methodologies. Based on the studies we defined a small set of issues for a number of semi-structured informal interviews. The objective was to extract opinions regarding how the research's subjects consider that could be good alternatives to solve conflicts of the GDD Vs Software Game implementation. This study was conducted in three game companies of Porto Digital [Porto Digital 2010] and through a UFPE group of game development [UFPE 2010]. The result was the generation

of a survey based entirely on knowledge acquired with the interviews and the literature study.

#### 3.2 Survey

The survey was generated to reach a greater number of participants. We collected quantitative data related to conflicts in the game development process of the national or international game industry and of the members of the research centers.

#### 3.3 Analysis Methods

For our data analysis, was used a mixed methodology: based on both qualitative and quantitative methods. This principle of analysis has been well accepted in generating alternatives for production software [Sedig et al 2001]. The qualitative analysis was generated entirely from the views provided by participants in the survey. We used the assistance of NVivo software [NVIVO 2009] to facilitate the catalog of the qualitative data provided by the research participants of the semi structured interview. We opted to follow the free node coding technique discussed in the literature [Flick 2004] to define the quotations characteristics based on the patterns between the created nodes. The quantitative analysis was based on the entire sample and the data auxiliary sample groups (national industry, international industry, university).

#### 3.4 Characteristics and Experience of Participants

38 people participated in the quantitative study, all involved in some way with the production of electronic games, whether in academia or industry. The vast majority of participants [Table 1] focus on activities related to Design (26%) and Programming (34%).

**Table 1:** The quantitative data related to the role of participants

Role	N	%
<i>Game Designer</i>	10	26
<i>Producer</i>	5	13
<i>Programmer</i>	13	34
<i>Artist</i>	4	11
<i>Software Engineer</i>	3	8
<i>Other</i>	3	8

#### 3.5 Profile of Participants

As for the experiment, the vast majority of participants has between 3 and five years of experience (32%) or less than one year (29%). Almost half of that percentage are the more experienced members of our research, with more

than 5 years of experience in the game industry (13%). The other 26% of participants has between 1 and 3 years of experience.

## 4 Guidelines

The results of the study are presented in the form of a set of guidelines [Sommerville and Sawyer 1997]. Guidelines are widely used in the gaming industry to solve Design problems. An example of the efficiency of use of guidelines in game design is the study developed to guide designers in developing games for Augmented Reality (AR) [Wetzell et al. 2008]. The use of guidelines in Software Engineering is also very extensive and active in almost all areas. In the book Requirements Engineering - A Good Practice Guide [Sommerville and Sawyer 1997]. The authors describe a several guidelines to improve the requirements practice in software companies..

### 4.1 Guidelines Presentation

The guidelines will be presented according to an adaptation of the structure showed by [Sommerville and Sawyer 1997]. It also includes techniques presented in the Disney Creativity Strategies [Mycoted 2010] related to content media creation.

### 4.2 Guidelines List

This section presents the guidelines to minimize the conflicts between the design and development phase.

#### #1.Game Designer Participation during all the Process.

One of the most recurrent replies from participants was related to the importance of having the Game Designer's presence during all the phases of the development process. Approximately 82% of all the participants agreed that designer's presence is vital to ensure the success of the project as reveals the following quotations:

*"Yes, there are critical moments... Preparation of prototypes (evaluation of prototypes and what you aim with it) for example..."*

*"the presence of game designer is fully necessary in the beginning (to evaluate planning) and in the end (to evaluate fine adjustments, balancing ...)"*

#### #2. Game Overview

From the elements that compose a GDD [Schell 2008] the overview of the game was considered the most important artifact in the early stages of developing the game.

Approximately 97% of participants of the survey defined the game overview as the most significant item [Table 2] to start the game development.

*"... If this view is not clear, problems will surely come later on ... "*

*"Game Designer (or those responsible for Game Design) should act proactively to ensure that the overview of the concept becomes increasingly clear and uniform in the minds of everyone involved in the project life cycle..."*

**Table 2:** Focus on Overview (High Concept) of the Game as the most important item for the beginning of development process

Game High Concept	97%
Characters	55%
Items	30%
Level Design	30%
Game Flow	82%
Game Controls (Commands)	85%
Art Line	30%
Screens (menu, game title, game over, etc.)	30%
Soundtrack	3%
Sound Effects	6%
Game Rules	88%
Score Rules	61%
Competitors Study	21%
References (books, movies, etc.)	48%
Theme (Philosophical Idea)	27%
Genre (Puzzle, Action, RPG)	73%
Another	12%

Global sample = 38 participants

#### # 3. Create Direct Communication Channel With The Game Designer

Although all the details contained in a GDD and all care in subsequent revisions of the text that compose it is common in many situations that the programming team has doubts about implementing some specific functionality of the game. Many of the survey's participants (approx. 87% of the global sample) indicated that the best way to solve those doubts is headed directly to the Game Designer. Many claim that the search for him occurs through the normal tools of communication like instant messenger softwares, emails and VoIP.

*".. It would be interesting to have a system to manage the requests / changes to the GDD. Hence the G. Designer works on the basis of requests from developers..."*

#### #4. Preplanning for Conflict Resolution

The production of the game software as well as the production of other types of software is permeated by conflicts. For the technical part, these conflicts often arise because of insufficient technology to treat any particular requirement, or by failures of implementation the same or incomplete documentation. A key problem indeed, according to participants of the survey concerns the experience that the game design is proposed to offer. To reduce this kind of conflict, the participants pointed two ways: focus on production or focus on design.

*Focus on production* - this approach makes all the decisions of conflict based on issues relating to meeting deadlines and verification of the stakeholders.

*"Normally it follows the GD. But who decides is the producer because he is ... who controls the planning and priorities of the team."*

*Focus on Design* - this approach makes decisions based on the experiences which the game intends to offer to the player.

*"The document is constantly adjusted because of reasons such as cost and scope, but the power of decision is always of the Game Designer. The Game Designer is in charge of deciding what is best for the game."*

#### 5. Conclusion

In general, considering the data obtained from the study, the practices to reduce conflicts between software and design must receive a higher investment in preliminary game process phases, particularly to align all the team view related to the game project. The presence of Game Designer during all the process is encouraged as the investment in methodologies which focus on associate game design contents with game software components. Further, an effort in the creation or adoption of tools that increases the communication among the team is also necessary, to maintain designers and programmers working in a strong collaborative way.

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