

Chapter 7

Decoupling Aspects in Board Game Modeling

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ABSTRACT

Existing research on computer enhanced board games is mainly focused on user interaction issues and look-and-feel, however, this overlooks the flexibility of traditional board games when it comes to game rule handling. In this respect, the authors argue that successful game designs need to exploit the advantages of the digital world as well as retaining such flexibility. To achieve this goal, both the rules of the game and the graphical representation should be simple to define at the design stage, and easy to change before or even during a game session. For that reason, the authors propose a framework allowing the implementation of all aspects of a board game in a fully flexible and decoupled way. This paper will describe the FLEXIBLERULES approach, which combines both a model driven and an aspect oriented design of computer enhanced board games. The benefits of this approach are discussed and illustrated in the case of three different board games.

INTRODUCTION

Recent research in the domain of multi-user interaction, such as multi-touch interactive tables (Loenen et al., 2007; Mazalek, Reynolds, & Davenport, 2007), opened a broad range of new

possibilities redefining the concept of human computer interaction. Noteworthy applications of these devices are computer enhanced games, which take advantage of both the physical and the digital worlds in order to improve the user experience. Our research is focused on computer enhanced board games, aiming at improving user experience by mixing the full flexibility of traditional board

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games played around a table with computational functionalities from the digital world.

Games benefit from the features offered by digital environments, such as the high degree of dynamicity that can be introduced by means of advanced visual and audio effects. These further promote improvements in the immersive experience (Amory & Adams, 1999), and the interactivity of the game-play (Malone, 1981). It is evident that a significant amount of benefit can be gained by transferring the concepts and the games themselves from the physical to the digital world. Advanced visualization capabilities spur the development of innovative and sophisticated representations of game graphics and computer support can also help ease complex game tasks or situations, for instance by calculating intricate winning conditions, or by performing mundane tasks such as card shuffling or point distribution. However, the rules that guide the game-play are typically handled by the game software and are tightly intertwined with it, with their implementation hidden and inaccessible during game-play.

While the porting of physical board games to their computer-enhanced counterparts has been to a large extent successful, there exist certain aspects of traditional game-play that are not inherently supported to date. These deficits diminish the merits of computer-enhanced board games and lead to players registering a smaller degree of game satisfaction. As pointed out in (DeKoven, 1978; Salen & Zimmerman, 2003), the ability to modify the rules should not be considered just as an additional feature of the game, but as a central aspect of it that should not be neglected. It empowers the players by giving them overall control of the game and its features, while at the same time enabling them to modify the level of difficulty of the game or even its winning conditions. One additional advantage of being able to dynamically update the game rules and logic is the ability to extend the game-play and incorporate or update specific options and parameters that are usually hard-coded

in the game software. Unfortunately, traditional approaches to game software development fail to support this vision, and represent a high barrier for both casual and experienced players without any programming skills, wanting to modify some rule of the game. Furthermore, depending on how the game is implemented, it could be difficult even for a programmer to add a certain rule without having to modify large portions of the code. In contrast, physical games allow the redefinition of rules by means of social agreement between players at any time during game-play.

In this paper we propose an extensible and efficient framework called `FLEXIBLERULES` that aims at taking advantage of both approaches (i.e., physical and digital), by allowing the implementation of board games in a fully flexible and decoupled way. The `FLEXIBLERULES` framework is comprised of both a conceptual model to design board games and a set of tools, including a domain-specific language and a dedicated compiler, to realize the aforementioned design. The different aspects of the game, such as the logical behavior of the different game objects, their representation, and the outcome of each action are modeled separately and can be freely modified during game-play. The main goal is to promote modularity and clarity: the user should be able to quickly identify what is to be modified and where, in order to change something in the game. Another requirement that was taken into consideration was simplicity of use, as it is not to be expected that all users will be skilled developers. To this end, the `FLEXIBLERULES` framework employs a user-friendly, Lisp-inspired language to implement its functionality. Another important aspect is providing the user with full control of the degree of automation: game rules can either be enforced by the system, or left to a human referee. Additionally, the framework aims at providing game designers with tools to support the modeling of a game and allowing the creation of prototypes that can be tested and fine tuned.

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