

# Chapter 30

## DICE: A Generic Model for the Design Process of Serious Games

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### ABSTRACT

*This article deals with serious game design methods. More specifically, it focuses on the following question: is there any universal series of steps to design a serious game? Or is the availability of several different design methods unavoidable? To try to answer this question, we will study a corpus of ten design methods suited to Serious Games. Most of these theoretical tools are coming from or aimed to industry professionals. This literary review will allow us to perform a comparative analysis over the various steps used by these methods, in order to build a generic model for the design process of Serious Games: the Design / Imagine / Create / Evaluate (D.I.C.E.) model.*

### 1. INTRODUCTION

Serious Games have a formal definition (Michael & Chen, 2005) and are currently seen as a specific type of video game. Thus, per Alvarez (2007), Serious Games are no different from entertainment video games in formal terms; their difference is purely cultural and pragmatic.

Do these particularities imply that specific design methods should be used for Serious Games? Work in the field tends to suggest so: several publications put forward tailor-made process models for Serious Games (Cheruet, 2009; Lhuillier, 2011; Marfisi-Schottman et al., 2010; McMahon, 2009; Sauvé, 2010; St-Pierre, 2006). But are these various methods, which are aimed at creating one and the same object, really different? More precisely, this article intends to explore the following problem: is there a universal series of steps for designing a Serious Game? Or do several design methods need to be used concomitantly?

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To attempt to address this question, we propose to study a corpus of methods devoted to designing Serious Games, via a literature review. The majority of these theoretical tools are designed by or intended for industry professionals. Initially, we will present a design method that we have experienced personally as part of a project to design a driving simulation Serious Game. We will then review other design methods for Serious Games proposed by scientific and industrial literature on the subject. This literature review will thus allow us to carry out a comparative analysis of the different steps proposed as part of these methodologies, in order to attempt to delineate a generic design process model suitable for Serious Games.

## 2. LITERATURE REVIEW: DESIGN METHODS FOR SERIOUS GAMES

There are several documented process models for designing Serious Games. In order to carry out a literature review, we assembled a corpus of texts using the keywords “serious game”, “design”, “methodology” and “method”, in English and in French, via the Google Scholar search engine. We choose to use only Google Scholar to perform our literature review as it allowed us to easily search for academic works written in either English or French language, and also because it’s currently the largest academic database available (Gusenbauer, 2019). To confine the scope of our study, we selected only texts that were published from 2002 onwards, because the 2002 year marked the start of the current wave of Serious Games (Djaouti, 2014). Among the works identified through this online search, we focused on the ones clearly stating a series of steps to design a Serious Game. This focus was required to later compare the design methods. But it also introduces a scope limitation in our study. Therefore, the current study does not aim to provide an exhaustive view. Instead, our goal is to compare a sample of the available Serious Game design methods to try to devise a generic design process model.

Taking those limitations into account, our literature review enables us to identify nine methods used for designing Serious Games. Those nine methods are mainly taken from academic publications (books, dissertations and articles), although some of them are the fruit of collaborations between companies and universities.

### 2.1. The GEDRIVER Design Process

We propose to begin this study of design methods for Serious Games with an example coming from a project we personally worked on. While working at OKTAL, a private company designing training simulations, we were involved with a Serious Game project aimed at raising awareness of eco-driving among motorists. This project, baptised GEDRIVER (Green & Efficient Driver), united a consortium of five partners: the car manufacturer Renault, Key Driving Competences (KDC), the LEAD and ARTS laboratories at the University of Burgundy, and OKTAL. By combining realistic interfaces (steering wheel, pedals and gearstick from a real vehicle) and a technical tool for creating automobile simulations, SCANeR (Djaouti, 2011), the aim was to devise a simulator that will allow the general public as well as professionals to learn the principles of eco-driving. These principles are aimed at reducing the CO2 emissions of a vehicle by changing the habits of its driver (Figure 1).

The design process of this Serious Game was divided in four steps:

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