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Julian Alvarez, Damien Djaouti

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# An introduction to Serious game

## Definitions and concepts

Julian Alvarez (1) ; Damien Djaouti (2)

(1) Trigone CIREL - Université de Lille 1, Supinfocom Group, LudoScience

(2) IRIT – Université Toulouse 3, LudoScience

Email : (1) [julian@ludoscience.com](mailto:julian@ludoscience.com) (2) [damien@ludoscience.com](mailto:damien@ludoscience.com)

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### Abstract

This article proposes a definition of the object “Serious Game” and an approach dedicated to classify its various occurrences.

### 1. Introduction

Serious Game application fields are related nowadays to many sectors such as health, defence, education, policy, training and ecology, and keep on expanding. Serious Game therefore addresses a set of markets. This positioning is thus accompanied of a very rich typology to refer to the object: *Educational games, Simulation, Alternative Purpose games, Edutainment, Digital Game-Based Learning, Immersive Learning Simulations, Social Impact Games, Persuasive Games, Games for Good, Synthetic Learning Environments, Games with an Agenda...* This census reflects the numerous actors with an interest in the Serious Game and the diversity of their approaches.

Despite this diversity of names, several contemporary definitions of Serious Game are proposed. The more general seems to be that the game designers Sande Chen & David Michael: "games whose first purpose was not mere entertainment." At the same time, Professor Michael Zyda, currently Director of the USC GamePipe Los Angeles laboratory, proposed a more specific definition: "A mental contest, played with a computer in accordance with specific rules, that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives."

In these definitions, we find a common base with the vision of the Serious Game put forward by Benjamin Sawyer: "[...] developers, researchers and industrial people, who are looking at ways to use video games and video games technologies outside entertainment ». As a

consultant, Sawyer is one of the important figures of this sector in the United States. He notably founded in 2002 "The Serious Game Initiative", an independent institution to develop Serious Game and its industry. However, some actors do not proceed as well. For example, in the sector of vocational training, some are based on role games or board games rather than video games. Kevin Corti perfectly illustrated through a very critical article that calls for the expansion of the usual definitions of Serious Game. He also recalled that some of the actors, sometimes quoted to illustrate the Serious Game, do not recognize it in this term, and prefer other names such as Game-Based Learning and Simulation. This claim refers us to the "Serious Game" of Clark Abt's book published in 1970. In his writings, this researcher sees the games support allowing to enrich the school curriculum by reducing the border between "school learning" and "informal learning". He supports his thesis by many practical examples of teaching by the game for topics ranging from physics to human sciences, through the policy. Although that inspired by the first computer simulations, Abt offers at the time a definition of the term "Serious Game" which is not restricted to the only video game (computer game). In the 1970s, a "Serious Game" could be a computer game, a game, a role-playing game or even a game of outdoor.

Today, this link with computer support appears to be a constant in the Serious Game industry. Nevertheless, professionals do not unite around a same definition of the object.

### 2. A proposal for a definition

Aware that there are a multitude of different approaches to the Serious Game, we know that to register in one of them implies limits. However, to move forward in our words, we must position us. Thus, in this article, we choose to relate us to the definition of the Serious Game, developed during our previous work: "computer application, for which the original intention is to combine with consistency, both serious (Serious) aspects such as non-exhaustive and non-exclusive, teaching, learning, communication, or the information, with playful springs from the video game (Game)." Such an

*association, which operates by implementing an utility script, which, in computer terms is to implement a package (sound and graphics), a history and the same rules, is therefore intended to depart from the simple entertainment."*

This definition can be summarized by implementing the following relationship:

**Serious Game = Utilitarian function(s)  
+ Video Game**

3. Difference between Serious game and video game: notion of Serious Gaming

Nothing prevents to play a video game originally dedicated to the only entertainment in adopting a posture of "serious". Many examples can be identified in the education sector as we are including Gee (2003) or Schaffer (2006). In France, the Pedagame collective performs field experiments on the use of video games from entertainment to educational purposes. For example, the set of karaoke Singstar PS3 (SCE London Studio, 2008) is used as support of course to work the pronunciation of the English to college students. In another register, the "question-answer" game Buzz! Quiz TV (Relentless Software, 2008) was hijacked by teachers of history and geography to current discussed concepts. They rely, to do this, on the possibility of create custom questions proposed by this title. Ludus network brings together teachers using the set (video or not) for educational purposes, highlights also the use of Sim City (Maxis, 1989) Lords of the Realms II (Impressions Games, 1996) for the history and geography.

Nevertheless, a fundamental difference persists between this type of approach and the Serious Game as defined above. If the result appears similar (a game used for serious purposes), only the Serious Game was explicitly designed for this use. This approach is thus distinguished from the idea to take a commercial video game to assign it a new function posteriori. This argument is logically put forward by the Serious game industry to enhance their expertise. This tends to exclude the approaches of diversion from the Serious games field. If this issue remains controversial, an interesting concept was suggested by Henry Jenkins through the term "Serious Gaming". Thus, in considering the difference in design between the titles "diverted" and the other process, we propose to reserve the term "Serious Game" for games that have explicitly intended for purposes other than simple entertainment by their designer. "Diversion video game" approaches, which allow a game to serve serious purposes not anticipated by their designer, are included in the term "Serious Gaming". This term includes then any use of a game for purposes other than simple

entertainment, whatever is the original intention of its designer.

#### 4. Classify Serious games

Facing the very rich typology of Serious Games identified : News Games, Advergimes, Military Games, Exergames, Edugames, Datagames, etc..., it seems relevant to clarify this aspect, by putting in place a classificatory system. In our work, we have retained the three following criteria:

- **G: Gameplay**, based on the gameplay of the "Serious Game". This test provides information on the playful dimension by providing information on the type of playful structure used.
- **P: Purpose**, based on the purpose of the "Serious Game". This test provides information on the functions beyond the "simple entertainment" desired by the designer.
- **S: Sector**, based on the areas of applications covered by the "Serious Game". This test informs on the type of public market (market, age...) that the designer seeks to achieve.

These three criteria form the "G/P/S model". This is a guide that allows to classify the "Serious Games" at the time by their playful dimension (Gameplay), and their serious dimension (allows of & sector). It is implemented effectively on the website:

<http://serious.gameclassification.com>

##### 4.1 "Gameplay" criterion

Introduced by Caillois in 1958, and then updated by Frasca in 2003, the concept of "paidia" and "ludus" refers to two distinct playful forms. Their difference is on the construction of the playful structure. For example, Sim City (Maxis, 1989) appears to take the "paidia", because it proposes no objectives explicit to allow the player to "win". According to the definitions proposed by Salen & Zimmerman, Sim City is indeed a game devoid of "quantifiable outcome", a final State terminating part while offering an assessment of the performance of the player. This means that Sim City is a video toy. Conversely, a game like Pac - man (Namco, 1980) "ludus" defines explicit goals (eat all the dots while avoiding the ghosts) that are used to assess the performance of the player, a positive return (points score gain) or negative (loss of a life). We have, in this case, to a video game.

To illustrate, by analogy, the difference between "video toy" and "video game", take a doll Barbie (Ruth Handler,

1959) and the Monopoly game (Charles Darrow, 1935). The Barbie doll is a toy because no record is provided in the box to tell us what rules to follow and how to win. It's here to play, therefore, *paidia*. A video toy offers a similar approach. In the case of the Monopoly, there are rules to follow to win. This is underlying objective: destroy all of his opponents. It is here *ludus*. This is exactly what underlies a video game.

Note that the difference between "*paidia*" and "*ludus*" is equivalent to that found between "play" and "game" in the English language. The "play" is close to the idea of fun (Barbie) then that the "game" behind the notion of rules of game (Monopoly).

Based on this principle, we refer to "Serious Play", serious games are based on a structure "*paidia*" (toy video) and "Serious Game" those that are based on a structure "*ludus*" (video game).

#### 4.2 "Purpose" criterion

The assessment of the objectives that a designer wants to aim through the realization of a "Serious Game" is far from simple. Usually, different designations such as Advergames, Edugames, Exergames, Datagames, News games, Edumarket games, Health games, Military games, etc. are used to distinguish the "service categories" of the Serious Game. In our opinion, the use of these categories is not necessarily more relevant because the criteria are devoid of formal criteria. We have therefore tried to establish a more synthetic list of categories.

Among the categories generally used to describe the purpose of a Serious Game, we find "Edugames" (and its equivalents "Games for Education" and "Learning Games") or "Advergames" (and its equivalent "Advert Games"). In a simple manner, a "Edugame" allows an educational message. An "advergame" to promote a product or service, that can be interpreted as a deliberately positive message about transmission of said product or service. Somehow, although their intention is different (commercial or educational), these two categories of Serious Games appear to have the purpose of a "message". A similar observation can be conducted on other usual categories: the "Newsgames" broadcast an informative message, the "Political Games" a political message, etc....

In the end, the different categories of "purpose" generally used are apparently used to differentiate the nature of the message broadcast by the "Serious Games". By classifying messages by their nature, then we identify them as follows:

-The informative message, to broadcast a neutral point of view.

-The educational message, to transmit knowledge or education.

-The persuasive message, to influence.

-The subjective message, to broadcast an opinion.

However, all Serious games do not have the purpose of a message. Indeed, we have games belonging to the categories "Training and Simulation Games" or "Games for Health" aimed another purpose: provide training.

For example, Pulse! is used to train emergency physicians to handle crisis situations, while MoSBE (Breakaway, 2007) allows to prepare soldiers for military operations. The concept of training here results in the development of physical or cognitive skills on the practice of the game.

A third and less common purpose seems also interesting to identify to classify the "Serious Games" to us: games designed to facilitate the exchange of data. In this registry, we have for example Google Image Labeler (Google, 2007). This Serious Game was developed by the company Google in order to improve the relevance of its image search engine. Each played match is thus a means to enrich its database, collect statistical data to refine the links between certain images and lists of words associated with... This type of application, called "Datagame", is still relatively little widespread to this day.

In summary, we therefore propose to classify the purposes according to three main categories:

-Broadcasting a message: the Serious Game is designed to deliver one or more messages. They can be of four different natures: educational (ex: Edugames), informative (ex: Newsgames), persuasive (ex: Advergames) and subjective (ex: activist games, Art games). A same game can combine several types of message.

-Providing training: the Serious Game is designed to improve cognitive or physical Player capabilities (ex: Exergames)

-Promoting the sharing of data: the Serious Game intends to facilitate the exchange of data (ex: Datagames) between players, or the Publisher of the game and players.

#### 4.3 "Sector" criterion

This criterion offers two levels of information.

First of all, information on the application domain within the Serious Game. This list of areas of application must regularly be updated to reflect the emergence of new sectors. It has, today, the following areas: State & Government, Military, Health, Education, business, Religion, Art & Culture, Ecology, Politics, Humanitarian & charitable, Media, Advertising, Scientific Research.

Other information concerning the target audience which is transcribed by age as well as by type: Public, Professionals, Students. For example, for the field of Health, practitioners will be considered as "Professionals", medical students as "Students", and patients as "General Public". This information can, of course, be more detailed as required, for example in seeking to identify the age, sex, nationality, etc. of the target public.

## 5. Synthesis

### 5.1 Definitions

This article has led us to define the 3 following concepts:

-A Serious Game is characterized by two main points:

- (1) It combines video game and one or several utility functions: broadcasting a message, providing training, facilitating the exchange of data.
- (2) It targets a market other than the only entertainment: defence, training, education, health, commerce, communication...

-A Serious Play is part of an approach similar to the Serious Game but relies on the video toy instead of the video game: it thus does suggest explicit playful objectives to do in order to "win" or "lose".

-The Serious Gaming is characterized by two main points:

- (1) The action "to associate", without computer programming, and posterior with a videogame objective one or several utility functions: broadcasting a message, providing training, facilitating the exchange of data.
- (2) This action is then within a context of use which departs from the only entertainment: defense, training, education, health, commerce, communication...

## 5.2 Classification

To understand the diversity of the Serious Game, it is important to classify both by its playful dimension and its utility dimension. For this, we propose a classification system called the "G/P/S":

- "G", as "Gameplay", determines if the Serious Game is based on a video Game or a video Toy. A Video Game sets rules that evaluate the performance of the player unlike Toy that fits more in the idea of a sandpit where is fun and where the notion of "win" does not exist. In the case of a "Toy" type, we speak of "Serious Play" instead of "Serious Game".

- "P", as « Purpose », put in place the main function of the Serious Game. This test indicates if Serious Game is used to broadcast a message, provide training, collect data, or more of these functions at a time.

- "S", as "Sector", identifies the Serious Game markets. Thus such applications may apply to defense, education, health...

These three combined criteria allow to reflect the "Playful" dimension (Gameplay) and the "Serious" dimension (Purpose + Sector) by the designer of a "Serious Game". However, players can use a video game in a way that has not necessarily provided by its designer. It is then "hijacking a use", which allows for example to use for Serious purposes a game basically designed for the entertainment. These two approaches, original design and use hijacking, constitute the whole of the "Serious Gaming".

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