

SERIOUS GAMES
AN INTRODUCTION

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FOREWORD

The status of video games is evolving within society. The video game practices of children and young people, and more and more, that of adults or seniors can be a cause for concern for us all, as parents, educators, professionals, or researchers. Many books written by specialists (doctors, psychologists, teachers, journalists) call for caution in using video games. However, these same games have the capacity to fascinate us and have become part of our cultural universe.¹ Books are made into video games, video games become movies, stories migrate from one universe to another to the point of being completely entangled – it is a true multimedia environment. This convergence of content, and the versatility of screens and technology all support the process.

The French government has supported the establishment of competitive clusters focused on video games, local governments seeing this industry as a means of restructuring and developing their economic base. As such, video games are much more than technical objects; they permeate our society and both their conception and use must be examined as drivers of behavioral changes. This inquiry should extend from the creation process to gaming situations, requiring a variety of disciplinary approaches: from engineering science to sociology, from public policy analysis to aesthetics.

1. See *Médiamorphoses* no 22, February 2008.

This book helps us in understanding the current issues that surround video games, viewed through the prism of Serious Games, video games “with serious intent”, recognized as one of the key elements of this new digital culture. It has no intention of building a new video game theory, or defining the process of creating a Serious Game. It simply offers to help us decode the fervor that currently exists around Serious Games. In recent months, Serious Games have been the subject of much attention from political and economic parties, as demonstrated by the following initiatives:

- Creation or reorientation of competitive clusters to focus on Serious Games
- Emergence of initiatives promoted by local authorities to discuss Serious Games
- Call for projects under the French Government’s Stimulus Plan with financial aid totaling 20 million euros
- Organization of design contests by large industrial groups
- Organization of events and trade shows dedicated to Serious Games
- Development of websites dedicated to Serious Games and emergence of lengthy explanations of the object in collaborative encyclopedias
- Publication of numerous books in English
- Organization of scientific conferences

The results of their experiences as players, their professional activities and countless interviews, *Serious Game: an Introduction*, put forward by Julian Alvarez and Damien Djaouti, is a documented step in understanding these new applications. Five years of interviews at their disposal and with a critical look at fifteen years of experience gained in the field with companies and partners such as the French National Center for Scientific Research (CNRS), the Toulouse District School Board, the French Civil Aviation University, Orange Labs, Dupuis publishers, Bayard & Milan publishers, Publicis Group advertising and communications company, TF1 television network, the Cité de l’Espace theme park, give this book the objectivity needed to understand the

many different ways in which Serious Games are used. Whether one is a player, a learner, decision maker or game developer, the diversity of viewpoints and testimonials presented and the multitude of Serious Games discussed allow each person to form an initial opinion on these video games with serious intentions.

Moreover, this intention – or rather these intentions – political, economic, educational – are too “serious” to not subject them to analysis. The point is not to praise Serious Games or to view the introduction of a playful dimension in education or communication as automatic progress. We will keep in mind that this is an innovation that opens up new perspectives. Serious Games aim to offer new ways of transmitting knowledge and know-how.

Of course, this book offers us is but an introduction, and calls for expansions of the subject matter at a level to match the current effervescence of productions and studies.

Olivier Rampoux

INTRODUCTION

In the early 1980's, video games underwent their first economic boom and generated almost twice the earnings of the American film industry. Despite periodic crises, the video game market continues to grow globally. Thus, from 2003 to 2012 the video game industry has grown from revenue of \$18 billion¹ to \$69 billion². In May 2008 there were an estimated 281 million game consoles in existence worldwide and there are currently somewhere between 600 million and 1 billion potential players around the globe according to IDATE³.

Now we find ourselves at the beginning of the 21st century and it's difficult to consider video games as a mere fad, as some companies predicted at the onset of the 1980's. Today's under-30 generation⁴ was born with video games. Their consumption of gaming objects is as natural to them as watching television or listening to the radio was to previous generations. Yet, this practice is not confined to young people. People in their thirties and forties cultivate the nostalgia of video games through "retro gaming", returning to the games of the 80's and 90's. Older generations engage in virtual card games, such as *FreeCell*, and the like. Grandparents see video games as a way to create

1. Alvarez & Michaud, *Serious Games: Advergaming, Edugaming, Training...*, IDATE, 2008, <http://ja.games.free.fr/ludoscience/PDF/EtudeIDATE08_VF.pdf>.

2. IDEF Cannes 2011, <<http://bit.ly/jiKoXv>>.

3. *Ibid.*

4. Sometimes referred to as "Generation Y", grouping together persons born between the late 1970's and the mid 1990's.

ties with their grandchildren. Video games can even be found in certain retirement homes –the Nintendo Wii coming to mind – to stimulate the memory and motor skills of retirees¹. Gaming objects are multigenerational and have become part of our culture as is apparent by the many household objects: clothes², jewelry³, furniture⁴, etc. which make reference to *Pac Man*, *Mario Bros*, *Space Invaders*, etc.

It is within this context that Serious Games arrive, with the first significant game being *America's Army*, released in 2002⁵. This type of computer application is based on video games, both technically and culturally, but attempts to distance itself from the field of pure entertainment. Serious Games or “games with a utilitarian purpose” have as their main objective to teach, inform, train, and allow one to experiment, all while playing.

To date, Serious Games have been applied in many sectors, including health, defense, education, politics, training, and ecology, and the list is continually expanding. Serious Games therefore group together a wide variety of different markets. Since 2007, a range of between 1.5 and over 10 billion dollars⁶ is regularly cited. This discrepancy can be explained by the variety of definitions and approaches currently presented by the different parties associated with this emerging industry. This uncertainty is also fuelled by the fact that Serious Games mark a major transitional phase in the video game industry. The industry now addresses itself more clearly to all generations, improves itself and matures. This leads to new developmental prospects in the B2B and B2C⁷ sectors for all parties concerned. These prospects were promoted in May 2009 by Nathalie Kosciusko-Morizet, French Secretary of State for Forward Planning and Development

1. Alvarez & Michaud, *Serious Games...*, *op. cit.*

2. <http://blog.schtunks.info/post/2009/10/11/Une-cravate-Space-Invaders>

3. <http://www.tribords.com/?bagues-pac-man>

4. <http://leblogecolovie.free.fr/?p=206>

5. http://www.usatoday.com/tech/gaming/2006-05-19-serious-games_x.htm

6. Alvarez & Michaud, *Serious Games...*, *op. cit.*

7. Acronyms designating trade between two businesses (*Business 2 Business*) and trade between a business and private individuals (*Business 2 Customer*).

of the Digital Economy, who launched the first call for Serious Game projects¹ in France.

We open this introduction to Serious Games with a discussion on definition, classification and the variety of approaches. Then we discuss the primary market sectors that currently use this gaming object. Lastly, we give voice to the various parties involved in this field (industry, consultants, designers, teachers, researchers). This provides the reader with other viewpoints, as a complement and counterpoint to the choices and analyses expressed by the authors in previous chapters.

1. http://www.lexpress.fr/actualite/high-tech/le-coup-de-pouce-de-nkm-aux-serious-games_786966.html

CHAPTER I

DEFINITIONS AND CONCEPTS

This chapter proposes a definition of “Serious Games” and an approach dedicated to classify its various occurrences.

1. INTRODUCTION

Serious Game application fields are related nowadays to many sectors such as health, defense, 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 chapter, 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* (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* (2008) was hijacked by teachers of history and geography to



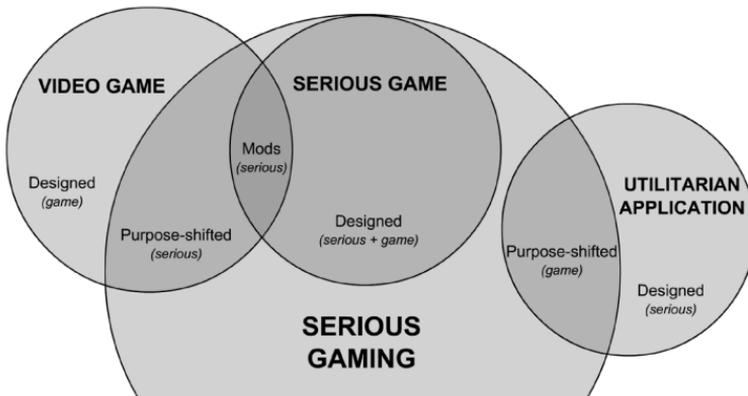
Buzz! Quiz TV



Lords of the Realm II

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 *SimCity* (1989) *Lords of the Realm II* (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, Advergames, 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: Scope**, 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 (Purpose & Scope). 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, *SimCity* (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, *SimCity* 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 *SimCity* is a video toy.

Conversely, a “ludus” game like *Pac Man* (1980) 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*” (video toy) 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



Pac Man



SimCity

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 “Advergaming” (and its equivalent “Advert Games”). In a simple manner, a “Edugame” allows an educational message. An “Advergaming” 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* 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* (2007). This Serious Game was

developed by 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.

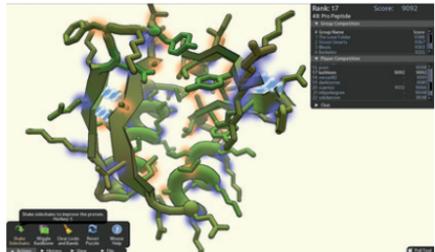
4.3 SCOPE CRITERION

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,



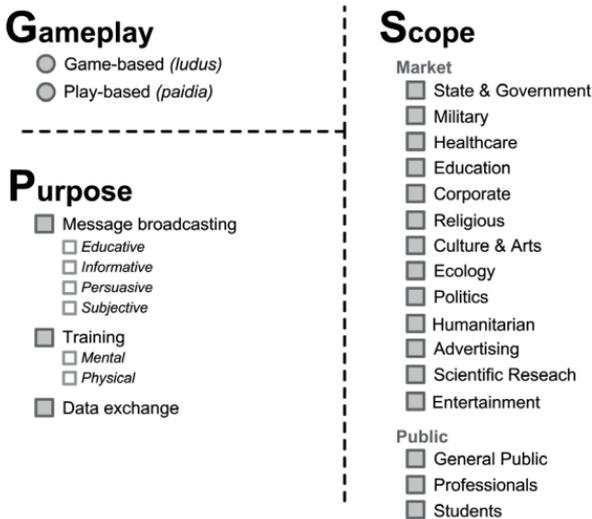
Google Image Labeler



Foldit

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 chapter 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: defense, 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 “**Scope**”, 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 + Scope) 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».