

Revisiting the Serious Game Classification and Definition

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Abstract: In the field of heritage mediation, games are increasingly explored as tools to communicate knowledge, engage audiences, and support learning about cultural heritage. Before exploring their potential in this field, it is worth analysing them and their possibilities. In fact, they have always been used to share knowledge, develop skills, etc. However, it is only recently that we really started talking about them and understood their true potential, whether in schools, museums, or elsewhere. These games can be called Serious Games (SG), although this term is controversial. Indeed, this term implies that games are not 'serious' by nature, but rather 'playful'. Thus, in this paper, we aim to situate SG within the theoretical framework of gaming/playing (what is a game or a play, and what impact these definitions can have on SG?). We then seek to understand their meaning (what makes them a SG?); origins (how did they appear and what kind of medium were they associated with?); variations (how can we classify the sub-genre of SG?); objectives; target audiences; and areas of application. New concepts linked to SG have also emerged (ludification, gamification and ludicisation). We establish whether or not the term SG become obsolete compared to these other concepts. Then, we highlight the contributions and limitations that SG can bring compared to 'traditional' tools used to achieve the same objectives (e.g. ex cathedra courses, traditional physical training, and so on). This analyse of effectiveness focuses solely on motivation (one of the most important factors), even though many other components can contribute to it. Thus, without imposing a definition of SG, we will provide an overview of the existing literature, adding our own comments and observations. Finally, this allows us to refine a previous model designed to classify SG by adding the period, the medium used and the type of motivation.

Keywords: Serious game, Classification of serious game, Definition of serious game, Motivation, Heritage mediation

1. Introduction

Games were already used throughout antiquity to teach soldiers the art of war. Today, a specific term has been adopted for these games with a utilitarian purpose: Serious Game. It is therefore necessary to situate this term in the framework of games and plays. Moreover, research written in French or English uses several identical terms to refer to different concepts linked to this field of study. We therefore aim to link them by providing an overview of the theoretical frameworks surrounding game, play and SG, through a narrative review in English with an international reach.

This paper summarises a chapter from a thesis currently being written. The following sections cover how to define game/play and SG (is it a game?; what are their different types?; and is the concept still relevant today?); their contexts of use (how to classify them and how they have evolved); their effectiveness (with a focus on motivation); a proposition for a new SG's classification; and concluding remarks with research perspectives.

2. Serious Game Theory

2.1 What is a Game or a Play?

To begin, the terms game and play have the same translation in French: 'jeu'. Here, in English, *game* refers to the artefact such as the object with which one plays, its materials and its rules, while *play* refers to the activity (the players' actions with and in the game, their attitudes, etc.). Most of the early researchers who studied games were French-speaking (such as Brougère, 2012; Caillois, 1958; and Henriot, 1989/2023) and have therefore mostly defined the object and the activity without distinguishing them.

Huizinga (1938/1951) and Caillois (1958) both agree that play is a *free activity*, in which the player has not been forced to participate (otherwise the game ceases to be a game); *separate* (a pre-defined time and space); *unproductive* which differentiate it from work or art; that *uses defined rules* (creating a contrast with 'ordinary laws' and only applicable during the activity); a *fictional aspect* (marking a boundary with everyday life); and *uncertainty* (the outcome of the activity cannot be predicted in advance). However, Caillois (1958) does not agree with Huizinga (1938/1951) when he states that game/play involves *mystery and disguise*. For him, this relates to theatre and can be found in the game/play but not on a recurring basis. Brougère (2012) agrees only with the fictional aspect (which he calls non-literality) and the uncertainty. In addition, he prefers to talk about *decision* rather than freedom (a notion too difficult to handle); he adds the *system of decision* which varies according to two limits: constraint (the absence of possible choices) and anything (everything is possible); and the *lack* (or *minimisation*) of consequence.

Henriot (1989/2023) argues that these criteria are too descriptive, and the definition of play is subjective. For him, the very principle of freedom attests that players are free to play, or not, whatever they want and to stop playing whenever they want. However, Henriot (1989/2023) explains that a human being can be free, but does not have the tools to know it. The same can be said of play. Are we really playing? 'Play is at first the thought of play [translation by author]' (Henriot, 1989/2023) and this thought can vary depending on the time and place in which someone lives. The idea of play for one is different from another but this idea also varies for the same person over the course of her/his life; the game is determined by the player. Henriot (1989/2023) therefore points out that his definition of play is not absolute or universal.

Moreover, if a person does not consider the activity to be play, then it is not play from her/his point of view (Brougère, 2012; Henriot, 1989/2023) – e.g. *Sudoku* (Garns, 1979) which is considered play by some, while others consider it a chore, an activity that does not bring pleasure. A person's perception of whether an activity is play or not refers to the action itself, to her/his experience of playing. The game (object) remains a game. *Sudoku*, for those who enjoy doing it and those who do not, remains a game. However, the activity of solving a *Sudoku* may not be considered play by those who do not enjoy it.

According to Henriot (1989/2023), this subjective view contradicts the observations of Caillois (1958) and Huizinga (1938/1951) that the opposition between play and work forms the basis of the traditional idea of play. In fact, Huizinga (1938/1951) argues that play can be serious, just as certain elements of life are 'non-serious' without necessarily being games (such as laughter). Even when we regard play as inconsequential (purely for fun), we still think of it seriously. Furthermore, play itself can be played seriously, like gambling or a professional athlete who plays a match seriously.

There are two broad forms of play: *ludus* (game-based) and *paidia* (play-based). The term *ludus* is used to describe play that is governed by rules and offer a win/loss system (Alvarez, Djaouti and Rampnoux, 2012; Caillois, 1958; Henriot, 1989/2023). This term can also be applied to games that are based on the same criteria as play. If a game has rules, the player will follow them (if s/he plays in a 'traditional way', with no cheating, speed run, etc.). Game and play are therefore intrinsically linked and both subject to the *ludus* form.

This also applies to *paidia* which refers to a freer form of play where there are no main rules to guide the player, only secondary ones resulting from the player's choices (Alvarez, Djaouti and Rampnoux, 2012; Caillois, 1958). We can add that these rules can also come from the game by offering the player a secondary quest that s/he can choose to ignore without altering the end of the game.

As Henriot (1989/2023) explains, there is no definition of game/play accepted by everyone. If we try to choose one, it will be contested by some researchers, because no one agrees on what game and play really are. However, we have taken a position for this research and determined that play is above all a personal definition: everyone is free to decide whether an activity is play or not (based on Henriot's definition). Furthermore, we consider that if an object has been designed as a game, it remains a game, regardless of the player's opinion (e.g. *Sudoku*).

2.2 Definition of Serious Game

2.2.1 Is it still a game?

Abt (1970/1987) provided the initial basis for the term SG by explaining that it is a combination of a utilitarian objective with a ludic act (such as using a game to teach a new subject or to train someone) on any medium. However, no researcher has been able to agree on a fixed definition. For most researchers, the medium of SG is strictly digital, while for others there is no restriction on its form. In fact, Alvarez (2024) writes that the focus on the digital form can be explained by the numerous writings in English which have highlighted some videogame titles as being SG like *America's Army* (US Army, 2002). This focus on the digital medium includes Michael and Chen (2006), even though they explained that SG applies to any form of 'codified play'. Nevertheless, they cite several video game titles to support their argument. We can therefore infer that readers conflated the two by focusing only on what appeared most prominently and thus, concluded that *serious games are a type of video game*.

The assumption that a game can have a 'serious' purpose conflicts with the majority of Caillois' (1958) criteria. According to Lavigne (2016), the playful part disappears and, again, we can say that it depends on the player's point of view; on how the game was made, or played, as it is necessary to 'balance' each part so that the utilitarian part does not take precedence over the game and vice versa (de Grandmont, 1997); and on the situation in which the play takes place.

The other opinion about SG is that it is just a game and cannot be used in a ‘work’ context; its only utility remains entertainment. In a stricter sense, we can say that this oxymoron assumes that games are, by their very nature, ‘not serious’; that there are ‘playful games’. This assumption is absurd for Brougère (2012) and leads to the conclusion that the term SG is not the most appropriate. Nevertheless, since this term is so widely used and everyone refers to it in their research, we will continue to employ it (while keeping in mind its inaccuracy).

2.2.2 Types of serious games

SG can take various forms, which is why we use the G/P/S (Gameplay/Purpose/Sector) system of Alvarez, Djaoiti and Rampnoux (2012) to classify them. Therefore, the model presented below (figure 1) is an adaptation to clarify the terms used and to add a new category.

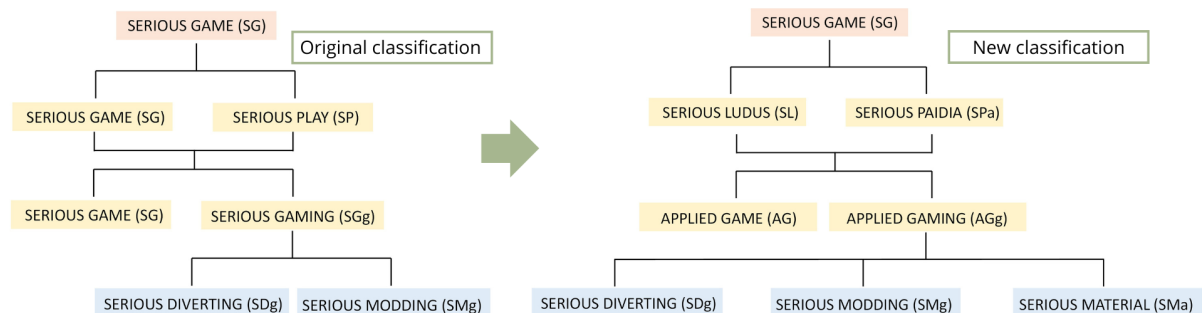


Figure 1: Representation and adaptation of the SG's classification of Alvarez, Djaoiti and Rampnoux (2012)

First, the *gameplay* refers to SL (Serious ludus) and SPa (Serious paidia). These two categories can be split into Applied Games (AG) and Applied Gaming (AGg). AG correspond to games made for a utilitarian purpose, whereas AGg refers, in the French literature, to games originally made for entertainment which are used for a utilitarian purpose. AGg can be divided into *Serious Diverting* (SDg), *Serious Modding* (SMg), and *Serious Material* (SMa).

SDg refers to games where only the purpose is modified (how the game is used) and where the game itself remains the same (Alvarez, Dajouti and Rampnoux, 2016). *SMg*, however, is used when the game is modified to give it a utilitarian purpose. These modifications can impact the game design, its functionality, its objective, the game mechanics, etc. (Alvarez, Djaoiti and Rampnoux, 2016). These mods are generally made for entertainment purposes, but modding can also be used to turn an entertainment game into a SG. They can be made by players, such as *MinecraftEdu* (TeacherGaming, 2011) which was originally developed by players and subsequently taken over by Mojang Studios, or by the game studio itself, like the *Discovery Tour of Assassin's Creed* (Ubisoft, 2018) made directly by the studio in response to a demand from the players. The form of the game can also be modified by transforming a digital game into a physical or a phygital one (in both the physical and digital realms). Finally, *SMa* covers certain elements which were not originally intended for playful or ‘serious’ use but are used as a SG. This category includes not only objects, but also buildings, series or books.

2.2.3 Is this concept still relevant nowadays?

The classification above is based on the concept of SG, but new ones have emerged since the 2010s to define games used for similar purposes: *ludification*, *gamification*, and *ludicisation*.

The *ludification* is described as a socio-cultural trend where games are becoming increasingly important in our society (Deterding et al., 2011; Bonenfant and Philippette, 2018). This concept can be divided into three categories: *extending games*, *using games*, and *playful interactions* according to Deterding et al. (2011). The figure below is an adaptation of their concept with our modifications (figure 2).

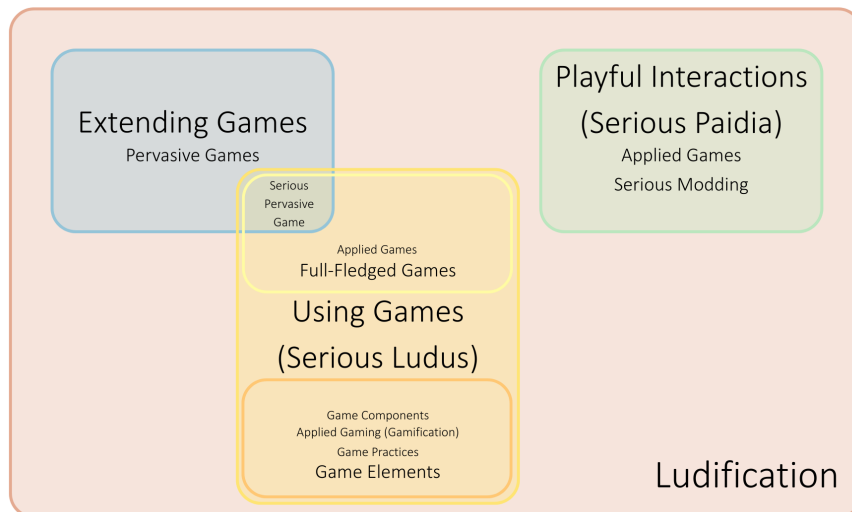


Figure 2: Adaptation of the schema of Ludification of Deterding et al. (2011)

The *extending games* are composed of Pervasive Games (often in phygital medium). These games blur the boundary between players' real lives and play, transforming the way players see their cities with ludic lens (Stenros, Waern and Montola, 2012). Between extending games and using games, we can find Serious Pervasive Games.

Using games corresponds to the use of games in non-game contexts. It is divided into two sub-sections: *Full-Fledged Games* and *Game Elements*. The first one considers released games (it therefore refers to AG). The second one refers to 'characteristics to games – elements that are found in most (but not necessarily all) games, readily associated with games, and found to play a significant role in gameplay' (Deterding et al., 2011). It can be divided into *game components* (components used to create a game like the game engine, the hardware, etc.); *game design* (also known as Gamification), which will be described below; and *game practices* which refers to the English definition of Serious Gaming (what we called AGg): any element related to games that is used for a utilitarian activity. Thus, as we based our definition of AGg on the French one, AGg does not correspond to game practices and needs to be placed under full-fledged games (like AG). Only the term game practices will be used for this category to not make any confusion.

The last category is the *playful interactions*, divided into *playful design* and *Serious Toys*. The first one is a 'part of play' (figure 3) according to the playing/gaming dimension diagram of Deterding et al. (2011). It corresponds to distinct components taken from games and applied in another context. It needs to be distinguished from gamification. While playfulness (playful design) refers to playful behaviours and mindset (paidia), the gamification (game design) refers to the qualities of the game (ludus). They both then correspond to AGg (and SMg more precisely). If the playful design refers to paidia, it also refers to SPa and then shows that the Serious Toys is a 'whole play' (a complete experience), which corresponds to an AG in SPa (figure 3).

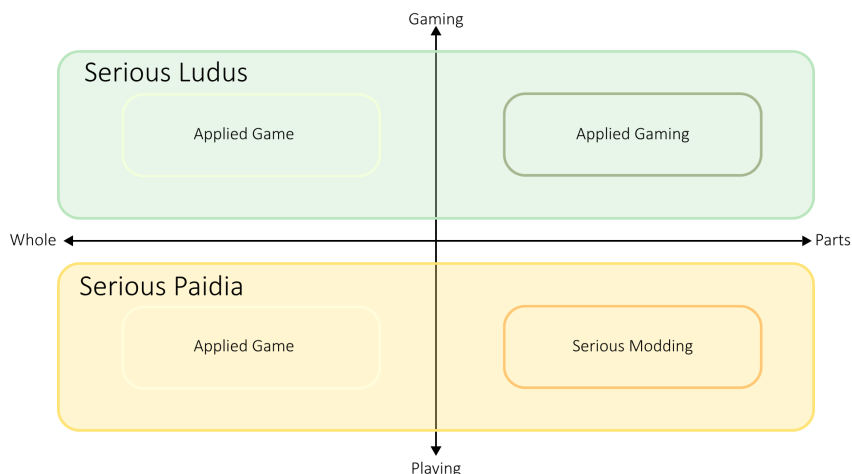


Figure 3: Adaptation of the diagram of playing/gaming dimension from Deterding et al. (2011)

The second concept is the *Gamification*, which some studies translate it in French by ludification (Bonenfant, et Philippette, 2018). Nonetheless, they are two separate concepts where gamification is a type of ludification.

This concept refers to the ‘use of game design elements in non-game contexts’ (Bonenfant and Philippette, 2018; Detering et al., 2011) to motivate, encourage problem-solving, and engage players (Deterding et al., 2011). With this definition, we can assume that gamification is a type of Applied Gaming (as we saw before) and is under the Serious Ludus type (figure 3). This term, like SG, is contested especially by researchers in game studies and the gaming industry. The criticism of gamified applications relates to their focus on goal-oriented play – ludus, and their lack of exploratory and free-form of play – paidia (Deterding et al., 2011). This also stems from the blurred line between the game and the object with game elements. Moreover, Henriot (1989/2023) writes about the ‘playful attitude’ (which is central to game studies) as an anthropological constant (behaviour found in all cultures, despite their differences). In contrast, the game can evolve through time and space. In response to this constant evolution of the game, Genvo (2013) suggests using the concept of *Ludicisation*.

It refers to an object, with originally no entertainment purpose, which becomes perceived as a game. This concept comes from the game’s transformation through time and space, defined as the process of ludicisation. We can then link this to the Serious Material category proposed above. Thus, gamification can trigger the ludicisation.

We can see that these new concepts are all linked to the SG concept, which appears to be divided into two categories of ludification. The gamification and the ludicisation are related to the categories presented in section 2.2.2., which we retain, while continuing to take the categories beneath and around it into account. To complete the SG classification, we need to specify their context of use.

2.3 Context of use

2.3.1 Classification

The context of use refers largely to the *Purpose* and the *Sector* of the G/P/S model that we have not yet addressed. The *Purpose* designates four SG objectives: *broadcasting a message* (educative, informative, marketing/communicational, or subjective); *providing training* (physical, mental, or cognitive); *promoting the exchange of data* (between players or creator-players); and *gamifying a task* (such as chores). We added the last one because the original objectives do not consider the players’ opinion.

The *Sector* is used to classify the *market* and the *public* chosen to create the SG. The *market* refers to the domain for which the game is used (such as education, healthcare, politics, etc.). The *public* corresponds to the type of player the game is aimed at. We keep only the general public, the professionals, and the students presented in the original G/P/S model.

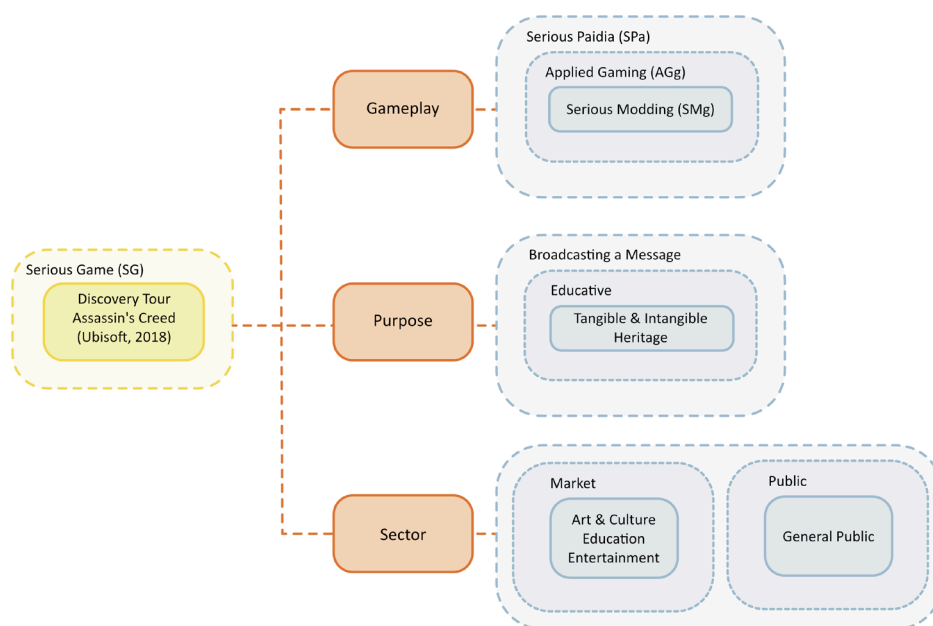


Figure 4: Analysis of the Discovery Tour (Ubisoft, 2018) using the adapted G/P/S model

The original model thus facilitates the clarification of existing or new SG objectives and can help teachers to find suitable SG for their lessons. The adaptations that we add allow it to consider not only the game, but also the player's subjectivity, in line with our game/play definition, and to develop certain categories in greater depth (figure 4). Moreover, the original model is limited since it only considers digital games and not their period of creation (even though its authors point out elsewhere that there are two periods).

2.3.2 Evolution

According to Alvarez, Djaouti and Rampnoux (2012) the term *Serious Game* began to be used in 2002 with the paper of Sawyer and Rejeski (2002). Nevertheless, several video games corresponding to this designation were created before 2002, so Alvarez, Djaouti and Rampnoux (2012) decided to call them *Retro Serious Games* (RSG). This category includes all digital games created between 1972 and 2002. We can see that only digital applications have been considered, and we have not seen any change to this categorisation in their more recent publications. Moreover, RSG is, in our view, a period. Consequently, all the sub-categories of SG we have seen before can also be applied here, without changing their name. We also add a new period named Ancient Serious Game (ASG), which corresponds to the oldest one (figure 5).

Alvarez, Djaouti and Rampnoux (2012) explain that the RSG phase begins with the release of *Pong* (Alcorn, 1972) which is considered by most players as the first videogame because it was the first to be commercially successful. They add that the first videogames were born in computer research laboratories and were made for a utilitarian purpose. Videogames made for entertainment thus appeared only after digital SG. The very first videogame (*Chess program*) was developed by Prinz (1951) on the first commercially available computer. This game was very limited because it could only play endgames. It is considered a SG because it was created to advance research in computer science (and artificial intelligence). We assume that Alvarez, Djaouti and Rampnoux (2012) decided to start the RSG 'period' in 1972 because it was in the 1970s that serious video games emerged. We therefore decided to change the starting point of the RSG period to 1951, the date of the first digital game with a utilitarian purpose, which seems more representative.

The ASG era includes all analogue games made before RSG. The advent of computing created a separation between 'SG' made with a digital medium and those made with a physical medium. It therefore seemed important to keep the RSG phase as it marks a transition in the world of play. We now have three periods, highlighted in the figure 5. Contrary to the original scope of these categorisations, we will also consider physical and phygital media in each category (keeping in mind that before 1951 there were only physical games).

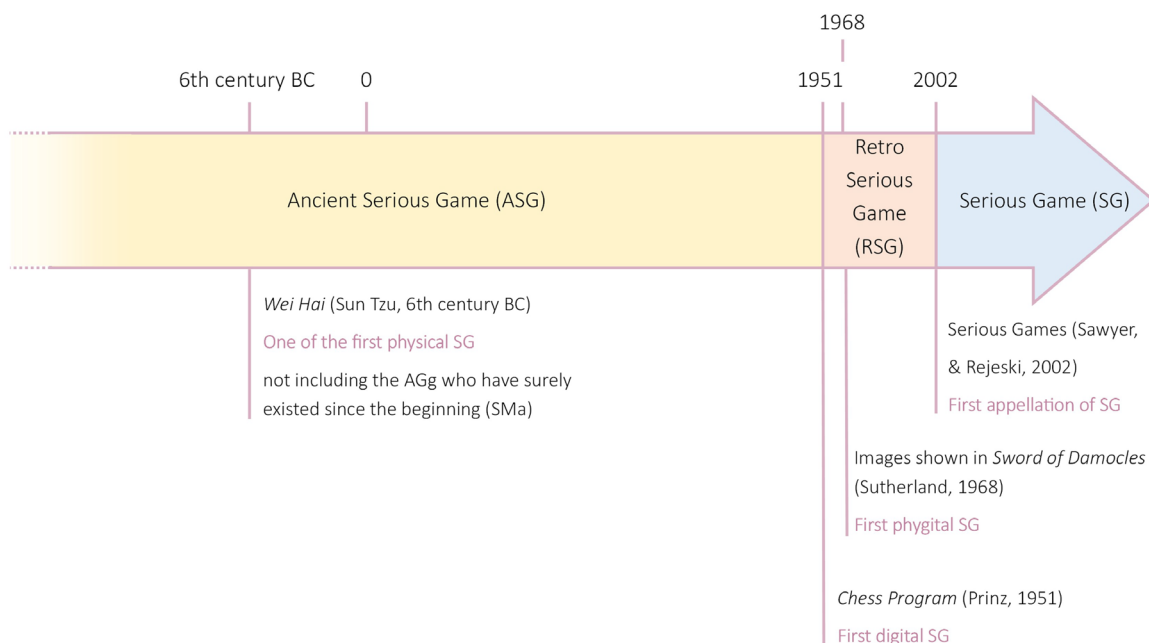


Figure 5: SG periods and important dates in their history

We can consider that the first phygital SG was made by Sutherland (1968) with the images shown by his invention: a *HMD* (head-mounted display), also known as *Sword of Damocles*. It is the first functional AR

tracking system, and it is also considered the first VR headset. Its invention marked the switch from observing to interacting (Abes et al., 2025).

We do not have the tools to know which was the first physical AG. However, one of the oldest AG known is *Wei Hai* (Sun Tzu, 6th century BC). It was made with a military purpose, to teach concepts of war strategy and tactics to students (Michael and Chen, 2006). We might also add that the first AG was probably a SMA made of pebbles or pieces of wood used to represent pawns, soldiers, etc.

2.4 Effectiveness

Several factors can have an impact on the ‘serious’ part of the game. Here we discuss only about the motivation, one of the most important factors, since it is linked to almost all the others.

Three types of motivation can lead players to start, continue, and finish playing (Yee, 2006): the *achievement*, the *social*, and the *immersion*.

The *achievement* encompasses advancement (a desire to progress in the game, to level up); the analysis of the mechanics to optimise performance; and the competition (desire to be ‘stronger’ than the others). The *social* encompasses socialising (such as helping others, making friends); the relationship with a willingness to forge long-term relationships; and the teamwork with the ‘satisfaction from being part of a group effort’ (Yee, 2006). Finally, the *immersion* includes the discovery (lore, exploration); the role-playing (creation of an avatar with a background story, etc.); customisation (avatar, accessories); and escapism with the use of ‘the online environment to avoid thinking about real life problems’ (Yee, 2006). These motivations are specific to each player.

In addition, there is the way in which the game motivates players, based on its game mechanics. We use the two categories given by Nicholson (2015): *BLAP* (Badges, Levels/Leaderboards, Achievement, and Points) and *RECIPE* (Reflection, Exposition, Choice, Information, Play, Engagement).

BLAP, or behavioural ludification for Bonenfant (2023), uses short-term extrinsic motivation to bring about a change in the players’ behaviour. To that end, these games use positive or negative rewards such as earning points, levels, badges, etc. (Bonenfant, 2023; Bonenfant and Philippette, 2018). This can be linked to the achievement component of motivation explained by Yee (2006). The reward principle is the most widely used system in SG, but this system works ‘as long as the rewards keep coming’ (Nicholson, 2015). Moreover, students are so used to obtaining grades for their work that most of them do not want to engage in activities where they would not receive any.

The second category is *RECIPE*, or humanistic ludification for Bonenfant (2023). It must be properly presented to players if we want them to play. It uses intrinsic motivation by creating a link between the game and the player’s life. This motivation can be triggered by several elements (Malone, 1981) such as the *challenge* (a well-balanced level of difficulty); the *fantasy* (narration), and the *curiosity* where players want to bridge a gap between known and unknown information. Morris et al (2013) also add *feed-back*; the *praise* with a positive evaluation of the performance (Henderlong and Lepper, 2002 as cited in Morris et al., 2013); the *motivation orientations* (praise allows players to ‘believe that effort is controllable’; Morris et al., 2013); the *fun-failure* (the debatable idea that a failure in a game will not have a negative impact but a constructive one); and the *flow state* (Csikszentmihalyi, 1990; which refers to the impact of a positive mindset on a task to be accomplished – making it easier to complete). The activity is intrinsically motivated if the players engage in the game ‘for its own sake’ (Malone, 1981), which makes it more difficult to design.

As the *BLAP* system can be summarised by ‘make someone do’, the *RECIPE* system can be related to ‘make someone be’, with the limits that it implies – e.g. power of persuasion to adhere to a discourse (Bonenfant and Philippette, 2018). However, not everyone will adhere to this, and not everyone will have a pleasant experience when playing. These motivations, as Malone (1981) explains, are conceived on the assumption that players have the choice of whether to play. Freedom itself is an essential element of motivation, as is the presence of other players. This relates to the subjective definition of play given above. Nonetheless, there are also advantages to this ludification if it is used to improve players’ daily lives or to teach them new subjects.

Finally, we can modify our previous analysis of the *Discovery Tour* (figure 6) by adding the period, the medium used and the type of motivation. As we can see, in some cases, the two types of motivation may overlap because it depends on the player’s intention, whether one type is more prevalent than the other.

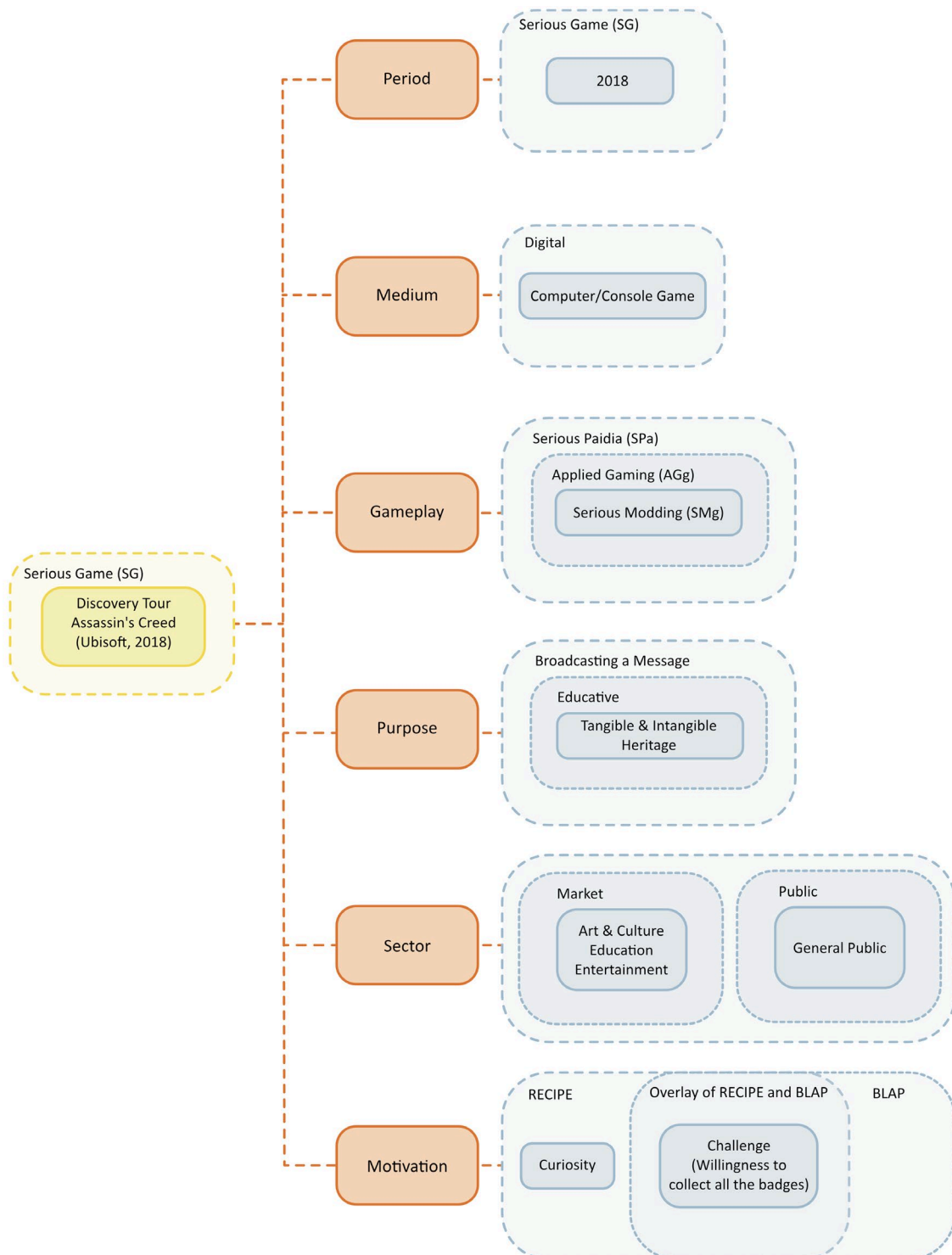


Figure 6: Adaptation of the analysis of the Discovery Tour (Ubisoft, 2018)

3. Conclusion

To conclude, we retain that subjectivity has an important place in the definition of game/play and SG. SG can be categorised across a wide range of applications and domains. Despite the emergence of new concepts, it seems to us that SG does not conflict with them but rather complements them. We have thus observed that SG forms part of ludification (highlighting the importance of specifying whether it is a SL or a SPa). Gamification, meanwhile, is a category of SL centred on AGg, and ludicisation is related to the category we created, known as SMa (if its objective is 'utilitarian'). We have added a new period of SG (ASG) and we have modified the previous one so that they are better aligned with the emergence of new SG linked to new media.

Finally, we described the impact of motivation and of the game strategy used on the player's experience, leading us to modify the model of classification by adding the period, the medium and the motivation.

Nonetheless, there are still many factors that can influence the SG's effectiveness, which will be analysed in the continuation of this doctoral research, such as interactivity, performance pressure, the necessary equipment, the development of soft skills, the need for a supervisor, ethical issues, etc.

Ethics Declaration: Not required.

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