



Serious games continuum: Between games for purpose and experiential environments for purpose

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ABSTRACT

While many categorizations and definitions have attempted to elucidate the elusive term serious games, we are still some way off formulating an agreed understanding of what serious games are and can be. This article argues that the term serious games challenges our understanding of generally accepted characteristics such as, challenge, play and fun, which are largely associated with and borrowed from video games. It is argued that key to understanding what serious games encapsulate is to look beyond these characteristics. This article proposes a definition and way to frame serious games technologies, applications and environments along a continuum of gaming characteristics or gameness. From those with traditional gaming activities and characteristics (challenge, play, fun, etc.) at one end to those with minimal traditional gaming characteristics at the other end, whose main purpose is to provide experience and emotion to convey meaning. The main advantages of the definition and continuum are to establish a shared understanding and arena for current and emerging serious games, frame and connect currently fragmented groups into a cohesive serious games movement and community and open opportunities for future collaborative research and development. In addition, it helps in identifying characteristics for the design and assessment of serious games.

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1. Introduction

It has been widely publicised that we can leverage upon the engaging and motivational aspects of video games to transform the way people learn and make learning more enjoyable. It is because of this that many sectors and organizations from business, health, military to education the world over are considering the potential of serious games to support learning and, for example, to complement existing teaching and learning materials and resources.

Interaction with serious games is for purposes other than, but may also include, entertainment. For example, an increasing array of categories are used to encapsulate emerging purposes for serious games, such as, learning, training, education, health, well-being, for change, persuasion, or as argued herein, simply for experience or emotion.

Many informative and well-surveyed publications in the emerging serious games literature outline the history of the term serious games (e.g. [2], pp. 54–59) and highlight the often conflicting interpretations of serious games in an attempt to pin-down what the term actually encapsulates (e.g. [1,32,33]). The term serious games is said to have originated from Abt's [1] book "Serious Games", largely applied to analogue board and card games. Later, the term

serious games was adopted by the Woodrow Wilson International Center for Scholars to refer to video game-based learning and simulation, which subsequently funded the Serious Games Initiative [29], a networking and resource facility. While the history of the term seems to have been well documented, we are however still some way off identifying a way to frame all technologies, applications and environments of what all players (academics, researchers, educators, practitioners, developers, etc.) would identify as serious games.

This is compounded by rapid technological and artistic developments and innovations of emerging virtual and gaming environments, media, interaction and gameplay that make problematic the proposal of precise definitions of serious games; being inaccurate in the short term and redundant in the long term.

This article argues that a categorization or definition of serious games should encapsulate all researchers, developers, academics, etc. working in the area of serious games. This is not intended to be a review or survey article per se, of which there are many, but proposes an approach to classify and categorize serious games along a continuum of gaming characteristics (e.g. challenge, play, fun) from video games for purpose at one end, through those with fewer traditional game characteristics, to environments with minimal traditional gaming characteristics at the other end, whose main purpose is to provide experience and emotion to convey meaning.

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By shifting further away from games and gameplay in the traditional sense of the term, the continuum thus provides an arena that opens opportunities to encapsulate emerging experimental and experiential environments and digital media (including: mixed reality/media, interactive cinema, movies, theatre, documentaries, storytelling, etc.) as serious games in which the purpose is to provide experience and emotions, and convey meaning. For example, through encounters with cultures, values and customs of past and present civilizations, or to participate in scenarios and social situations and make ethical and moral judgments and decisions.

Desirable outcomes from the proposed continuum are to establish a shared understanding and arena for current and emerging serious games, frame and connect currently fragmented groups into a cohesive serious games movement and community and open opportunities for future collaborative research and development. In addition, it helps in identifying characteristics for the design and assessment of serious games.

This article is organized as follows. In Section 2, some of the many diverse definitions of serious games are identified, and arguments, rationale and advantages for the development of a continuum are presented. In Section 3, the serious games continuum is presented which is an amalgamation of three interconnected groupings. This is followed by discussion and conclusion sections.

2. Serious games continuum: critique and rationale

While numerous, categorizations and definitions of serious games are, by-and-large, distinct and conflicting. For example, a survey of the literature reveals a deluge of definitions from Prensky's [30] short and succinct definition of serious games being "Entertainment Games with Non-Entertainment Goals" through Zyda's [36] definition highlighting the challenging and entertaining game-based nature of serious games for government, corporate and public service purposes, to Michael and Chen's [17] definition which highlights purpose as delivering a message, teach a lesson or provide an experience and emphasizing that serious games use the artistic medium of games. While sharing some similarities, this cross-section of definitions highlights some of the many diverse perspectives on serious games. In addition, there is some disagreement about whether purpose or entertainment is the primary importance. For example, Zyda [36] argues that "the entertainment component comes first" in serious games, just like that of video games, and pedagogy is "subordinate". Likewise, Prensky [20] argues that games should first be entertaining or fun and then should encourage learning. In contrast, Michael and Chen (2006, p. 287) state that "a serious game is a game in which education (in its various forms) is the primary goal, rather than entertainment". Herein, it is argued that, in general, it's not important whether or not entertainment or purpose is of primary importance, but the crucial issue is that the purpose is to some degree successful. For example, in being persuasive, informative or for health, well-being, etc. In addition, it may also be more appropriate to talk about experience than the sub-category of entertainment because, as outlined below, entertainment and associated terms like fun are not always appropriate descriptions for all serious games.

It can be argued that writers and researchers defining or categorizing serious games tend to emphasize a perspective or area of specialization that they are familiar and conversant with. A similar position has been made by Sawyer and Smith [24] and Sawyer [23] arguing that, "too often, serious games is defined only as that which the definer does!" In his keynote to the Singapore Serious Games Conference 2010 [27], Ben Sawyer [25] emphasized this point by drawing on the well-known Indian parable in which blind men describe an elephant through only the parts of the animal that they have touched. So for example, one would describe its big ears,

one its huge body; another would mention its tusks, another the tail, and so on. That is, from their own perspective without reference to others.

To address this, Sawyer and Smith [24] have developed a taxonomy incorporating everything that they argue serious games can be, and is "a more holistic and functional overview of the theory and application of the movement". However, while insightful and a huge undertaking, their taxonomy is complex, and as argued, does not encapsulate all characteristics that make up all serious games that would be acceptable to all players of serious games.

Perhaps one of the more contentious arguments in this article is that the term serious games challenges our understanding of generally accepted characteristics such as, *challenge*, *play* and *fun*, which are largely associated with and borrowed from video games. It is argued that key to providing a fuller understanding of what serious games encapsulate is to also look beyond these characteristics to frame and define serious games because they may not be appropriate for all serious games.

As mentioned, for some serious games it's more fitting to talk about experience rather than fun or entertainment because these terms are not appropriate for all serious games. For example, with serious games with weighty subject areas such as providing an insight into what it's like to starve or to understand what it's like to be hunted by militia, or with serious games that allow us to experience cultures, customs and values of past and present civilizations or to participate in scenarios and social situations and make ethical and moral judgments and decisions. While all games have rules that define the conditions and constraints about how a game is played, it is argued that rules or constraints can also be determined by social and cultural structures depicted within a serious game.

With examples such as these, characteristics such as being thought-provoking, informative, awareness-raising or stimulating are as important, if not more so, than *fun* or entertainment. In addition, using widely accepted terms like *play* borrowed directly from video games to describe interaction with all serious games is inapt and awkward and undermines some serious games subject areas. Furthermore, the concept of flow being an optimum balance between *challenge* and skill [4] and the associated state of engagement may not always be appropriate characteristics for serious games because of the inherent tensions between flow/engagement and reflection on a serious games' subject area, especially in learning, training and educational serious games [8].

This brings into question the use of the actual term *game* itself when applied to some serious games. So do serious games have to be a game and do we have to have a competitive and conflict game objective in serious games? In considering the above arguments about the inappropriateness of typical gaming characteristics (*challenge*, *play*, *fun*, etc.) applied to some serious games, as well as some serious games being more than just about competitiveness and levelling-up, and that classifications and definitions of games appear inadequate, it is problematic to categorize all serious games as *games*. In addition, games and gameplay are generally associated with voluntary play, or as Huizinga [10] describes it, all play is voluntary activity. However, serious games may "violate voluntariness" [32] in that students, trainees and military personnel may be required or "ordered" to play a particular game as part of their education or training. Hence, raising questions about the appropriateness, unease and tensions arising from the use of the term "games" applied to all serious games.

Finally, as widely discussed, the use and understanding of the term *serious* is not without difficulties, and this is further compounded when coupled with "*games*". However, this article concurs with similar discussions and views as argued by Bogost [2] in which he highlights the limitations, contradictions and inaccuracies of the term *serious games* but concludes that it is probably a

term that we are now stuck with to describe our discipline. With increasing public interest, awareness and recognition, the label serious games is emerging as a sort of accepted brand name.

In summary, it is argued that a definition or categorization of serious games must address or provide a means to overcome all the arguments and issues discussed and considered above to ensure that all serious games technologies, applications and environments created by all players involved in serious games research and development (academics, researchers, educators, developers, practitioners, etc.) are indeed identified as being serious games. As presented in the next section, the serious games continuum does just this through the amalgamation of three interconnected sections or groupings along a continuum.

3. Serious games continuum: how far do you go?

In this article it is argued that the whole gamut of games, simulations, environments and digital media (e.g. mixed reality/media) created by all serious games players (R&D: academics, researchers, educators, developers, practitioners, etc.) are identified as being serious games along a continuum and this can be divided into three sections or ranges, as illustrated in Fig. 1; from those with traditional gaming activities and characteristics (challenge, play, fun) at one end, through those with fewer traditional game characteristics, to those with minimal traditional gaming characteristics at the other end whose main purpose is to provide experience and emotion to convey meaning.

While we are all pretty much in agreement about the first section of the serious games continuum, that serious games encapsulate games with traditional gaming characteristics, such as, challenge, play, fun, and that these games are for purpose, and as discussed further below, for many, this first section is the most prominent if not the only way to identify serious games. However,

for others, serious games encapsulate environments and digital media that go beyond this grouping or range.

Using this continuum allows players (R&D) to frame and identify with a range of serious games that encapsulates their idea of what serious games are, identify how they relate to other games, environments and digital media that other players consider to be serious games, provide an arena for players to reflect on their own range of serious games that others may consider to be too narrow or limiting, and help to provide an arena to frame all players that belong to the serious games movement and community. In short, continuing the Indian parable, helping the blind men to see.

Herein, I propose the formal definition of serious games as follows:

Serious games are digital games, simulations, virtual environments and mixed reality/media that provide opportunities to engage in activities through responsive narrative/story, gameplay or encounters to inform, influence, for well-being, and/or experience to convey meaning. The quality or success of serious games is characterized by the degree to which purpose has been fulfilled. Serious games are identified along a continuum from games for purpose at one end, through to experiential environments with minimal or no gaming characteristics for experience at the other end.

3.1. Three ranges/groupings of the serious games continuum

3.1.1. First range/grouping: serious games as games for purpose

The first group of players would look no further than the first section or grouping to identify serious games as being synonymous with digital games with traditionally identified gaming characteristics, such as, challenge, play, fun, but that they are *games for purpose* (e.g. to learn and train, etc.) as identified by the shortest arrow and range illustrated in Fig. 1.

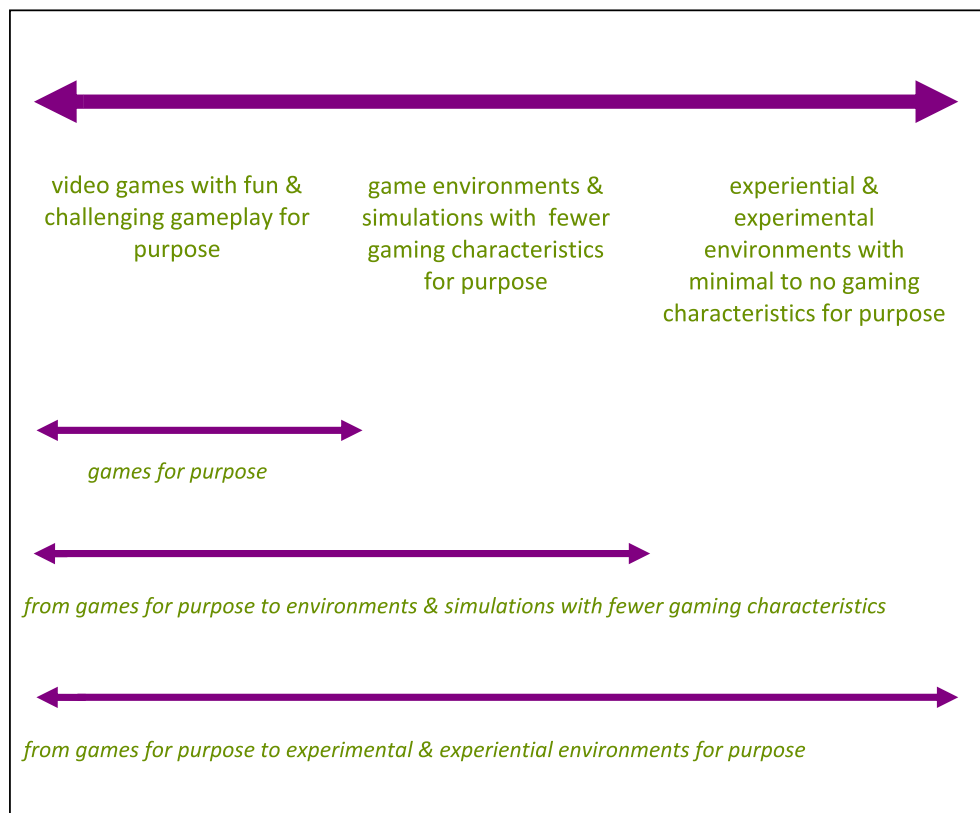


Fig. 1. Continuum of serious games: from games for purpose to experiential environments for purpose.



Fig. 2. DARWARS Ambush! purpose: skills learning and training. Photographer Jason Kaye.

Serious games falling in this category by-and-large can be identified through well-known definitions and classifications of video games. For example, Salen and Zimmerman's [22], p. 80, definition of a game as "... a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome"; or Prensky's [20] "six structural elements of games" as: rules, goals and objectives, outcomes and feedback, conflict/competition/challenge/opposition, interaction, and representation or story, that provide an indication of serious games as games belonging to this section. The only addition to these definitions for serious games is that they are for purpose. Definitions of serious games clearly falling into this section are for example, Zyda's [36] definition (as described earlier). It is acknowledged that digital commercial-off-the-shelf (COTS) games with gaming activities, characteristics (challenge, play, fun) and developed primarily for entertainment may provide some kind of unintentional or incidental training or enhancement purpose; for example, to improve motor sensory or visual perception ability. When games such as these are intentionally used for purpose, they fall into this first section.

Well-known serious games falling in this section of the continuum are for example, military associated serious games, such as, America's Army and Full Spectrum Warrior. These 3D games serve a dual purpose, to train and educate US Army Soldiers and to help with public relations and recruitment. Another example from this genre is DARWARS Ambush! As illustrated in Fig. 2, the purpose of DARWARS is to allow soldiers and marines to experience lessons learned by others and to construct their own scenarios based upon actual experience [5]. In addition, trainees operate ground and air vehicles, use small arms and vehicle-mounted weapons, and communicate over radios.

Other serious games falling into this section are for example, educational games such as Waker [34], shown in Fig. 3, developed through the Singapore-MIT GAMBIT Games Lab to help students learn about the mathematical concepts of displacement and velocity [15]. Waker is a 2D puzzle-based game wrapped in a narrative. Players figure out how to level-up through dreams to awaken a child trapped inside a dream. The core puzzle gameplay and game mechanic necessary to do this, is to figure out how to create or construct appropriately inclined paths that will enable the player to move up through levels (in the y-axis) by moving a corresponding direction, distance and speed along the x-axis. Path construction is akin to a constructionist learning approach. As the game proceeds gameplay becomes progressively more complex. Waker has been identified in studies and in on-line blogs as being challenging, fun and entertaining game.

For others, this first section is too limiting and they would identify serious games as extending beyond this range, from being



Fig. 3. Waker: Game. Purpose: learn about mathematical concepts of displacement and velocity. Reproduced with permission from Singapore-MIT GAMBIT Games Lab.

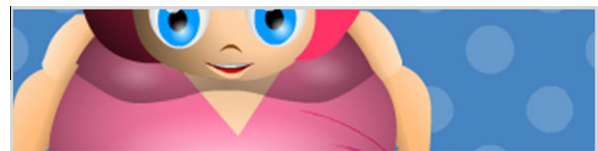


Fig. 4. Fatworld: Game. Purpose: learn about politics of nutrition. Reproduced with permission from Ian Bogost, Persuasive Games, LLC. Atlanta, GA, USA.

solely games with traditional gaming characteristics for purpose (as described above). But how far does it extend and what defines this extension?

3.1.2. Second range/grouping: serious games with reduced gaming characteristics

The next range in the continuum as identified by the middle sized arrow in Fig. 1, encapsulates environments and digital media for purpose with fewer traditional gaming characteristics. Hence, players identifying with this range would view serious games as extending from games for purpose to games, environments and digital media for purpose. So what are some of the examples of environments and digital media that belong in this category? One example is Fatworld (see Fig. 4), a game about the politics of nutrition developed by Bogost's company Persuasive Games [19]. Fatworld is an entertaining game-like environment for purpose; to explore the relationships between obesity, nutrition, and socio-economics in the US. But it has reduced conflict/competition/challenge/opposition and therefore it is argued that it falls into this second group.

Another well-known example of serious games (shown in Fig. 5) that falls into this section of the continuum is the evolving gaming simulation Virtual Iraq, developed by Albert 'Skip' Rizzo and team (with original art assets from Full Spectrum Warrior), whose purpose is to provide a tool to aid in the treatment of returning soldiers suffering from Post Traumatic Stress Disorder (PTSD). In Virtual Iraq the therapist largely controls the environment in an attempt to recreate the soldier's story so he is able to re-live and face the cause of his anxiety in order to come to terms with it [21].

Other examples falling into this second section are the many simulations for purpose created in the generic Second Life environment [26]. This is because of their reduced gaming characteristics, mechanics and gameplay. Indeed, it is argued that some Second Life-based environments with minimal, if any, gaming characteristics may fall better into the final section. The UK-based Serious



Fig. 5. Virtual Iraq: gaming simulation. Purpose: aid in the treatment of returning soldiers suffering from Post Traumatic Stress Disorder (PTSD). Reproduced with permission from Albert “Skip” Rizzo, Institute for Creative Technologies (ICT), University of Southern California (USC), Los Angeles, CA, USA.

Games Institute [28] uses Second Life as one of its key platforms, for example, to develop and run virtual learning seminars.

As illustrated schematically in Fig. 6, a final example from this grouping is a novel social musical exploration and creation system referred to as the Human Mixer [6]. Developed by students on the

authors’ serious games module, it is a mixed reality/media system blending the real with the virtual world through the capture of physical body movements in the real world to interact with the virtual world and help game players learn about the fundamentals of music theory (e.g. pitch, time signature and dynamics in music) through play and experimentation. It is a social, fun and playful system but with reduced challenge and rules and therefore it is argued that it falls between the middle and final ranges (as described next). Refer to Serious Games Singapore [31] for more details about this and serious games resources and services.

3.1.3. Third range/grouping: serious experiential and cultural purposes

The final range in the continuum encapsulates environments and digital media with minimal to no traditional gaming characteristics whose purpose is to provide potentials or opportunities for experience and emotion through encounters to provide meaning. Examples falling into this grouping have purposes such as, to participate in scenarios and understand past, present or even future cultures and their morals, principles, values, ethics, customs, etc. through experiential and emotional interaction with abstract, simulated, futuristic, etc. environments and digital media, supported on a variety of systems from hybrid games and interactive art to even “interactive movies and theatre”.

The first example, shown in Fig. 7, Scalable City, developed by Sheldon Brown’s Experimental Games Lab at UCSD, can be described as a game-cum-interactive art installation, in which the player plays with, and creates and disrupts an urban, suburban and rural environment as they travel through and explore landscapes [3]. While there is no clear challenge nor straightforwardly labeled as a game, the experience of interacting with Scalable City is both fun and thought-provoking whose purpose can be described well as a commentary on our culture and therefore, it is argued that it falls into this third grouping.

With reference to Fig. 8, another example falling into this group is SnowWorld developed at the University of Washington’s HITLab in collaboration with Harborview Burn Center [9]. SnowWorld was designed to help in the reduction of pain for burn patients during treatment and replacement of bandages. Burn patients, usually wearing a head-mount display (HMD), explore and engage with a virtual snow capped landscape and so helping to “put out the fire” by leaving less attention available to process pain signals.

The next example, shown in Fig. 9, *The Night Journey* is again probably best described as a hybrid between a game environment

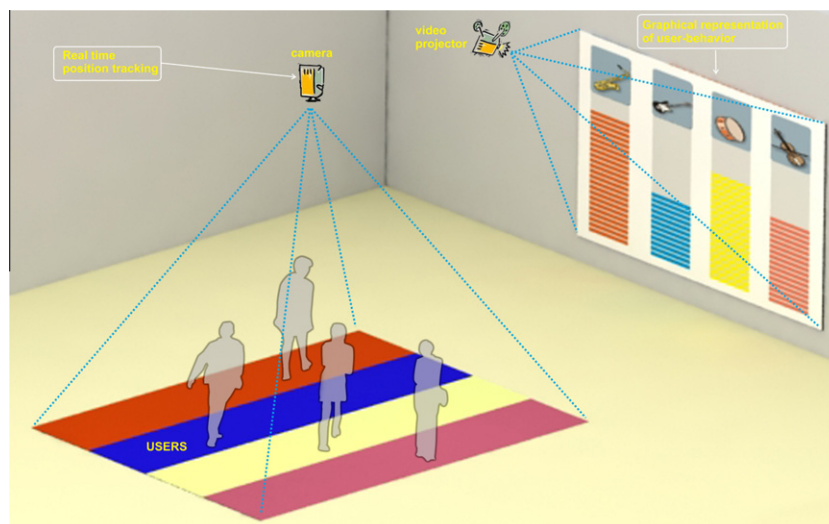


Fig. 6. Human mixer: social mixed reality/media system. Purpose: learn about music theory, such as, dynamics and time signatures. Reproduced from [6] with permission from E.T. Khoo et al.



Fig. 7. Scalable City. Hybrid game and interactive art installation. Purpose: commentary on culture. Reproduced with permission from Sheldon Brown, Experimental Game Lab, University of California at San Diego (UCSD), CA, USA.

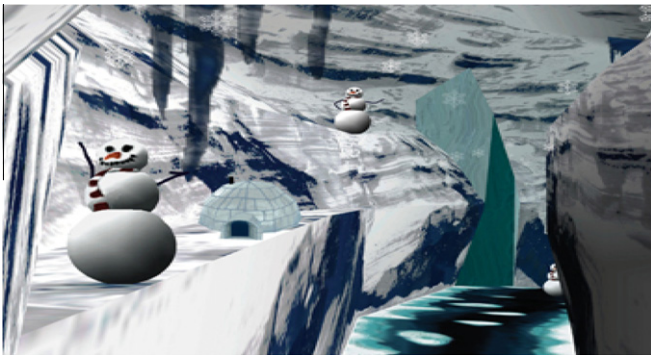


Fig. 8. SnowWorld: experiential and exploratory environment. Purpose: to engage burn patients' attention in the game and distract their attention away from bandages being redressed. Reproduced with permission from Hunter Hoffman, University of Washington, Seattle, WA, USA.

and interactive art. *The Night Journey* was the outcome of a collaborative project between educator and designer Tracy Fullerton, the artist Bill Viola and a development team from the University of Southern California's (USC) EA Game Innovation Lab. Its purpose is to provide experiences and spiritual meaning while travelling and reflecting "to explore the universal story of an individual mystic's journey towards enlightenment" [7].

Finally, not so much one example, but a suite of examples and research direction that neatly falls into this grouping's philosophy

comes from the company WILL Interactive [35]. WILL Interactive has created video simulations for serious experiential purposes, to provide a message, train, inform and educate on a wide variety of difficult life-issues as well as in-job training. Such as drug abuse,



Fig. 9. The Night Journey: Experiential and exploratory environment. Purpose: travelling and reflecting – to explore an individual mystic's journey towards enlightenment. Reproduced with permission from Tracy Fullerton, Game Innovation Lab, School of Cinematic Arts, University of Southern California (USC), Los Angeles, CA, USA.

sexual safety, health care, suicide prevention programs for the US Army and training on hostage negotiations for the FBI. Players take the lead character in “feature-length” “interactive movies” and “interactive storytelling” and make decisions that affect the outcome through their interactive behavior modification system that they call VEILS (Virtual Experience Immersive Learning Simulations).

4. Discussion and future work

Recent technological innovations and developments, such as, Nintendo’s Wii and Microsoft’s Kinect, have demonstrated a range of emerging participatory games and physical activities; from games for fitness and fun, to dance, running and jumping games that fall mainly between the first and second ranges of the continuum. Although, it is argued that the last grouping of the continuum is where some of the major future technological and artistic innovations and developments will be made. Through some of today’s innovations we have already glimpsed what is, and what will be, possible in the near future. Some of these will feature novel body interactions like the *Human Mixer* [6] and Microsoft’s Kinect while others will innovatively extend what is currently available. For example, similar to Fullerton’s and Viola’s *The Night Journey* who have pushed the boundaries of game engines and shown us what is possible by creating a truly innovative, experiential and experimental environment; and WILL Interactive whose many titles for purposes from law enforcement, drug abuse, sexual safety, health care, have pushed the envelope towards the creation of “interactive movies” and “interactive storytelling”. To aid and inform development of future serious games in this direction, methodologies and approaches are being fine-tuned to support design, development and assessment of narrative, scenarios and stories, for example, using activity theory based approaches [16].

To some extent it can be argued that the final grouping of the continuum can be considered to be a continuation of, or a reconnection to, a research agenda that has its roots in the simulation, virtual environment and virtual reality (VR) movements and communities. For example, as demonstrated in the visionary work of Brenda Laurel and colleagues reframing virtual worlds as theatre [11], informing their design from film [12,18] or the creation of serious games as “interactive movies” by WILL Interactive that has its roots in simulation going back to 1994. In addition, consider for example the following commentary and proposal from a decade ago, before the term Serious Games had been linked to computer, video or digital games, which advocates an experiential research agenda for serious purpose(s):

“To a large extent the VR community has been designing virtual or mediated environments for experience for some time. Consider for example potential applications and scenarios that may benefit from enhanced user experience. From education: history and geography – enable users to visit different places or past civilizations and experience them first hand; training: fire fighting, surgical, etc. – induce a feeling of concern or perhaps agitation and fear of the risks attached to the task at hand, flight simulator – feel what it’s like to take the controls of a 747 passenger airline; entertainment: become a character and feel the emotions of either interacting with the virtual world and with other characters or as an invisible observer (spectator) moving in-between the unfolding story, action or/and narration; engineering: vehicle design – go beyond ergonomic assessments and feel/experience what it’s like to sit behind the wheel and drive a car that is yet to be built; psychotherapy: treatment of phobias – allow patients to overcome their fears through gradual exposure to the cause of their anxiety; to e-commerce: in a shopping mall or supermarket – absorb the atmosphere as you

pass by stores and through shopping aisles with ambient sounds of check-out tills, eclectic muzak and announcements of price reductions” Marsh [13,14].

The important difference today is that the once hugely expensive technologies and platforms to realize such applications, environments and experiences such as these, are now widely available, and through digital development tools, environments and game engines we can realize all of the above examples in less time and at a fraction of the cost.

5. Conclusion

This article provides a critique of the term serious games, identifies problems associated with the term and identifies limitations in definitions of serious games. In particular, it argues that not all game characteristics, such as, challenge, fun and play are appropriate descriptions or labels for all serious games. The consequence of this is a fragmented and unconnected movement wherein, at best, factions or sub-groups begin to be formed and at worst, separate or detach themselves completely from the wider serious games community. This could potentially have a detrimental effect on future research and development collaborations, and so seriously damage the serious games movement. Hence, to appropriately describe and define serious games, it is argued that a way forward is to identify and frame serious games beyond characteristics that are largely associated with and borrowed from video games.

To address these issues this article proposed a definition and a way to frame serious games technologies, applications and environments created by all players involved in serious games research and development (academics, researchers, educators, developers, practitioners, etc.) along a continuum of game characteristics. From those with traditional gaming activities and characteristics (challenge, play, fun) at one end, through those with fewer traditional game characteristics, to those with minimal traditional gaming characteristics at the other end whose main purpose is to provide experience and emotion to convey meaning.

Using this continuum allows players (R&D) to frame and identify with a range of serious games that encapsulates their idea of what serious games are, identify how it relates to other games, environments and digital media that other players consider to be serious games, provide an arena for players to reflect on their own range of serious games that others may consider to be too narrow or limiting, and help to provide an arena to frame all players as belonging to the serious games movement and community. In addition, it helps in identifying characteristics for the design and assessment of serious games.

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