

A Typology to describe Alternate Reality Games for Cultural Contexts

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Introduction

May 2011, Belfast, Ireland. Players worldwide helped Ana, a transfer student, unravel a mystery that led her, and the players along with her, to navigate through virtual and real spaces, to find answers about her father's death, to fight conspirators and to find an issue to the labyrinth of Belfast. To help Ana, players needed to search for clues hidden in videos and blog posts and to meet with game characters in person. These players experienced *[In]visible Belfast*, an Alternate Reality Game (ARG) created to promote the Belfast Book Festival, engaging and enabling participants to discover and to learn about Belfast and local author Ciaran Carson. This ARG is an example of how the rise of multimedia led cultural institutions to increasingly rely on digital technologies in order to reach new audiences. In this process, cultural institutions use Information and Communication Technologies (ICT) to foster leisure and informal learning activities around their collection. The design of cultural ARGs (CARGs) expects to align visitors' expectations and cultural institutions' goals. This is a theoretical and methodological challenge to help designers and cultural actors reaching a mutual understanding.

This chapter reflects on the use of Alternate Reality Games as learning tools in museums and other cultural institutions. In the first section, we present the assets of games and the use of technologies in a cultural context. Then, we define Alternate Reality Games, their main characteristics as well as additional interaction-stimulating and immersive features, observed in some ARGs, that can prove of particular interest in a cultural learning oriented game. In the third section, we define Cultural Alternate Reality Games, their purpose and specificities. Finally, we describe our proposition of typology to categorize CARGs, which could also be a tool to support the design of cultural alternate reality games.

1. Digital games and gamification in a cultural institutional context

Playing games is one of the most relevant human activities for the construction of the self (Mead, 1934), the connection of social links (Piaget, 1954), and the evolution of society (Bruner, 1972). According to Huizinga (1955), a game is a free activity, absorbing player's attention and in which the player is free to continue or quit, without a material rewarding, with fixed rules acting in a specific spatial area and time delay, favoring the building of social groups interacting each other. Caillois (2001) added that the outcomes of this activity are not predefined, according to the rules accepted by players, and these rules

replace the laws of human society during the time of the game. In a game, each player is aware of the fictional nature of the storyworld, she expects a quantifiable outcome (Salen & Zimmerman, 2003) of her activity, whose experience is highly satisfying (Csikszentmihalyi & Hermanson, 1999). In this sense, by playing a game human beings explore and rewrite their everyday experiences from an unexpected perspective. She acts 'as if' she was doing something else that is only metaphorically linked to what she is really doing. That led authors to define the game as a metaphor or as a fictive activity (Caillois, 2001 ; Huizinga, 1955).

The processes above ultimately concerns systems of culture. Given that culture is not an individual creation but a system of representations, which are specific to a human community and shared among its members (Moles, 1967), cultural institutions often commit artists and curators to create exhibits that stimulate social interaction about, around, or with artworks (Bannon & Bowers, 2001; Ciolfi & Bannon, 2002; Heath, Luff, Lehn, Hindmarsh, & Cleverly, 2002; Hindmarsh et al., 2001). Information and Communication Technologies (ICT) have been employed to actively engage the members of the audience cooperating each other and new forms of cultural learning experiences emerged aiming to present cultural heritage in a more appealing way (Kiefer, Matyas, & Schlieder, 2006; Michael et al., 2010). In fact, during museum and heritage sites visits, members of the audience do not simply receive information but they build interactions with other individuals and a specific environment, which are the key component of an audience's learning experience (Falk & Dierking, 2000; Heath, Lehn, Hindmarsh, Luff, & Cleverly, 2001; Laurillau & Paternò, 2004). To this end, museums and other cultural institutions are often seeking to benefit from the opportunities offered by digital technologies. In other words, museums growingly reflect on the use of communication and information technologies to engage actively visitors and to enable interaction and collaboration between them. This aim led museums to exploit these technologies (Hawkey, 2004; Parry, 2007, Tallon et. al., 2008) with either on-site resources such as guides or interactive kiosks, or online (e.g. websites) or home-based resources (e.g. interactive CD-ROMs). The use of technologies by museums and in heritage sites quickly evolved along a more global "media convergence" process (Jenkins, 2006; Lambert, 2003). Indeed, with the fast growing development and ubiquity of mobile devices, new forms of cultural learning experiences are emerging (Kiefer, Matyas, & Schlieder, 2006; Michael et al., 2010). At the same time, visitors, have complementary expectations. Indeed, they not only seek to be active in heritage sites and museums. They also seek to interact with other visitors (Davallon, Gottesdiener & Le Marec, 1999). Activity, especially is presented as a reassuring and gratifying need and not only a pleasant asset (Bannon & Bowers, 2001; Ciolfi & Bannon, 2002; Fourmentreaux, 2006; Lambert, 2003). In looking at these shifts in the experiences and expectations of cultural institutions, we argue that ARGs have the potential to be an appropriate response to both cultural institutions and visitors' expectations.

2. Alternate Reality Games (ARGs) as pervasive games : defining expansive boundaries

ARGs are sometimes considered “pervasive games” or “ubiquitous games”. Both pervasive and ubiquitous concepts originate from the computing domain where they describe a full integration of Information Technologies (IT) devices into the user's environment while becoming omnipresent and invisible (Weiser, 1999). If these terms are commonly used interchangeably, Nieuwdorp (2007) states that *ubiquitous* commonly refers to a technological approach while *pervasive* refers to a cultural approach, which focuses on the user and the integration of the artifact in her ordinary environment. Different perspectives coexist both in the computing and the game domains (Nieuwdorp, 2007).

In relation to games, the different perspectives lead authors to relate differently ARGs to pervasive or ubiquitous games. According to Montola, the pervasive game genre includes both ubiquitous games and ARGs as subgenres (Montola, 2005; Montola, 2011) while Bogost (2011) places ubiquitous games, pervasive games and Alternate Reality Games as distinct subgenres of mixed-reality games. McGonigal (2006) points at a semantic difference: "ubiquitous" stands as a synonym of omnipresent, therefore describing a passive state; "pervasive" describes a process, a transition between 2 states. According to her, an ubiquitous game would tend to a persistent rhythm while pervasive games would provide a more mobile and intermittent experience, thus making ARGs ubiquitous.

In this chapter, we consider that ARGs, as a subgenre of pervasive games. But, whether one considers whether ARGs share or inherit characteristics of pervasive or ubiquitous games, they blend a gameworld into the ordinary life of the player, blurring the social, temporal and/or spatial boundaries of a game (Montola 2005, 2007, 2011; Montola, Stenros, and Waern 2009). An ARG blurs its spatial boundaries if it is *not* played in a dedicated space virtual and/or physical (e.g game board, virtual space, field); its temporal boundaries if its game sessions are blended in ordinary life; and its social boundaries if there is ambiguity about participants, both players and actors of the game, and non-participants (Montola, 2005; Montola, 2007).

2.1. Main features

ARGs have some characteristic traits, such as transmedia storytelling (Bonsignore, 2012; Bonsignore, Hansen, Kraus, & Ruppel, 2011; Dena, 2008; McGonigal, 2006), anti-escapism and ambiguity. As ARG scholarship has traditionally focused on the first aspect, we focus here on the two other important elements of the genre.

Anti-escapism. As ARGs are played in the real world, McGonigal (2011) qualifies them as anti-escapist. In other words, people don't play ARGs to escape their life but to improve it in several ways including

enchancing it or making decisions that have impact in their life. McGonigal argues that reality is “broken” and can be fixed with games, especially ARGs that apply the collective intelligence of their players to real life problems encountered in fields such as environment or health. Indeed, in ARGs, players are lead to do things “for real” (Montola, 2007). In *World Without Oil*, players were invited to think about how their life would change during an unprecedented oil crisis: what problems they would encountered due to the resulting oil shortage and what solutions they would apply to these problems. They participated to the game with blog posts, videos or comic strips (JafariNaimi & Meyers, 2015; McGonigal, 2011).

Ambiguity. As a subgenre of pervasive games, ARGs are characterized by their blurring of boundaries. This generates ambiguity and confusion concerning what is part of the game and what is not. Ambiguity has proven to not only be a source of interaction but also of interest and enjoyment of players (Dansey, 2008; Gaver, Beaver & Benford, 2003; McGonigal, 2003; Montola, 2007; Bellotti, Ferretti & De Gloria, 2005; Reid, 2008; Benford et al., 2006). For example, in post-game interviews, players of the pervasive game *Uncle Roy All Around You* (Benford et al., 2004) referred to ambiguous events as one of the most disconcerting and thrill-inducing features of the game, making it an enjoyable experience. According to Gaver, Beaver and Benford (2003), there are three main types of ambiguity that can be exploited in interface design and pervasive games:

- i. Ambiguity of information: occurs when a player receives vague or strange information, sources of speculation or requiring interpretation. This type of ambiguity is common in ARGs as part of the intriguing nature of rabbit holes. For instance, in *The Beast* (Microsoft, 2001), a sentient machine therapist was credited in the trailer of the movie “Artificial Intelligence”. In that case, the ambiguous information was the strange reference to a nonexistent profession. In *Ghosts of a Chance* (Smithsonian American Art Museum, 2008), a bodybuilder stormed in a conference room during the ARGFest-o-con convention in Boston. He posed, flexing his henna-adorned muscles in front of more than 100 ARG players. A clue was written with henna on his shoulder. In that latter example, the ambiguity of information was provided not only by the very peculiar presence of a bodybuilder in the middle of a conference but also by his link to the Smithsonian Museum of American Art. Indeed, some players⁵ had a hard time believing a serious institution would send a stripper at an ARG convention. In both games, these oddities stimulated speculation and intrigued players.
- ii. Ambiguity of context: occurs when an object or game element is brought out of its usual context or when the usage conventions of said game element/object are broken. For instance, in the Danish

⁵ Example : <http://forums.unfiction.com/forums/viewtopic.php?t=26261#548977>

artist Jeppe Hein's *Modified Social Benches*, the confusion is created through the contrast between the expected usage of a public bench and the unusability of the artist's benches.

- iii. Ambiguity of relationship: provokes thoughts, questions and/or introspection, by exploiting the player's relationship with an object or an element of the game. Gaver, Beaver and Benford (2003) mentioned a device supposed to be controlled with the user's psychic powers.

Ambiguity, especially ambiguity of information, results from the pervasive nature of CARGs. However, it has also been exploited deliberately as a resource for designing other genres of pervasive games. In these case, ambiguity was considered a valuable feature, improving the enjoyment of the player with its thrill-inducing and interaction-stimulating characteristics. In addition to that, ambiguity is also at the root of a few immersive phenomena that were noticed in some ARGs and that do not have the same status as the above main characteristics.

2.2 Additional characteristics of ARGs

Each ARG shares the previous main characteristics, while other additional features do not appear in all ARGs. More precisely, these additional features would be important assets in games played in a cultural learning context.

Apophenia and pareidolia. Ambiguity of information stimulates a natural optical phenomenon called pareidolia (McGonigal, 2004). Pareidolia is a sort of perceptive illusion, a tendency to perceive as significant a meaningless stimulus. A typical example of pareidolia would be seeing a cloud and perceiving it as the shape of a Tyrannosaurus Rex playing a saxophone. It is pareidolic because the shape of the cloud itself is a random occurrence. Only the interpretation of an individual will link the shape of the cloud to the dinosaur. Another individual could very much interpret the same cloud as looking like a face or a sheep. Dansey (2008) describes pareidolia as a visual form of apophenia without attributing to the latter term its common clinic connotation (as a development stage of schizophrenia). Apophenia therefore covers a wider area than the simply pareidolia. Indeed, apophenia qualifies any tendency in an individual to attribute an incorrect meaning to a coincidental event. In other words, apophenia is the phenomenon in which “a sense is given to nonsense” (Dansey, 2008). In ARGs, apophenia can inspire a player to interpret a coincidental event as a game event (McGonigal, 2004; Dansey, 2008). McGonigal (2006) describes a case of apophenia in a *Go Game* session. During their game, one of the teams found a pile of materials (e.g. pieces of metal and old furniture) next to a sign stating, “Assembly required”. Thinking that this was part of the game, the team members spent 20 minutes building a chair with these materials. A few minutes after, one of the infiltrated game actors, an accomplice, approached the group (McGonigal, 2006). Not only had these players interpreted something totally unrelated (apophenia) as a game event, but the coincidental approach of the game actor at this very moment, while he was actually patrolling in the area, highlights another phenomenon: coincidence.

Coincidence. The "happy coincidence" (Reid, 2008), is a 'magical' moment when the overall context is favorable and fills the gap between the real world and the gameworld. According to Reid (2008), three types of coincidence can occur: i) natural coincidence: when natural events and game events are linked in some way. For example, thunder resonates in the real world while a player encounters a description of a tragic event happening during a thunderstorm; ii) social coincidence: when a player sees it as fortuitous to share a game event with another; iii) feigned coincidence: when actors or game elements are exploited to orchestrate or cause events that are interpreted as coincidences. In the case of the feigned coincidence, the player perceive it as a coincidence but it is an event that was planned and staged by the puppetmasters.

Coincidences make the space where a game is orchestrated more meaningful to the players, thus generating a sensation of connection to the place or historical site (Reid, 2008). Coincidences could also be interpreted as messages destined to the players and invites them to look beyond appearances and to search for potential game hints in the real world (McGonigal, 2003, 2006). Both coincidences and apophenia are natural phenomenon. Designers' choices can increase the chance for these two phenomena to occur in order to surprise and intrigue players. However, players are not always the main targets of the designers' choices. Indeed, some of them are aimed at bystanders (non-participants of the game) and seek to intrigue them, invite them to participate or increase their well-being.

Increase the jen ratio of a particular place. McGonigal (2011) provides successful examples of ARGs aimed at increasing the jen ratio of a particular place. The jen ratio is a mathematical measure of the well-being in a given public or semi-public environment such as a metro station, a bus stop, a supermarket or a museum. This increase depends of several factors: time and positive and negative interactions in a given environment. The higher the ratio is, the happier and the safer a person is supposed to feel and the more attached she will feel to this environment. Increasing the jen ratio by performing acts of kindness was therefore the mission given to players in one of the sessions of *Cruel 2 B Kind* (2006). In this game, players were tasked to eliminate other players in a city-based Doom-like game. However, instead of using factitious weapons, players were supposed to perform acts of kindness. In other words, players used a special type of "ammunition" : instead of bullets, they "shot" compliments, greetings or nice words at each other, thus making it necessary to be polite and kind in order to increase their score. The mechanisms of the game encouraged "misfires" and even made them unavoidable. Designers of these games were fully aware that compliments were not only uncalled for, most notably about a bystander's physical appearance, but they could also be considered as a kind of street harassment. However, according to McGonigal's observations (2011), the positive interactions were prominent compared to the negative ones. Although we remain skeptical of this conclusion due to the unavailability of a detailed study of the methodology and results concerning these observations, we suppose that implementing techniques to increase the jen ratio in a heritage site could facilitate the education mission of cultural institutions,

especially museums, for occasional visitors. These visitors represent around 40% of the global population but only half of the total number of museum visits, while regular visitors, who represent only 12% to 15% of the population stand for the remaining half (Hood, 1994). Increasing the jen ratio in museums could appeal to occasional visitors who first and foremost seek a social activity in a place they feel at ease in. It would lead them to consider these places as fun and entertaining instead of solemn, passive or boring and, subsequently, increase the frequency of their visits⁶. Besides the above features, Cultural Alternate Reality Games retain some characteristics that make them unique, as detailed below.

3. Cultural Alternate Reality Games (CARGs)

Cultural Alternate Reality Games (CARGs) refer to ARGs created for a specific purposes: forming an educational interface between the public and artwork to most notably support a cultural event, provide alternative cultural tours and enhanced visits, promote historical cultural heritage, and change the image of a cultural institution. In our research, we analyzed a selection of ten existing Cultural Alternate Reality Games.

Many more CARGs exist and some are created every year. However, we only selected CARGs for which we could find sufficient information to describe precisely: the virtual and physical spaces of the game, the relation between players, the nature of the content created/generated by players whether immaterial or material, the missions given or puzzles solved. In Alternate Reality Games, because of the use of, transmedia storytelling, this information is dispersed through several medias: webpages (ex: characters' blogs), social networks profiles, YouTube accounts, press releases, player-created wikis, specific websites, ... In some cases, some of these medias are not accessible anymore (expired domain names, deleted websites...).

Cultural Alternate Reality Games were created to:

a. Promote an event. These CARGs are orchestrated before or during the event. Their storyline encourages, and sometimes requires, players to attend it. CARGs created for this purpose include *Eduque le Troll* (Henry Jenkins' conference on transmedia storytelling at the Pompidou Center, France, 2012), *Cherche Tom dans la Nuit* (European Night of Museums, France, 2011) and *[In]visible Belfast* (Belfast Book Festival, Ireland, 2007).

⁶ According to Hood (1994), occasional visitors only go once or twice a year to museums. Plus, they take advantage of “special” circumstances such as festivals or tourism (Hood, 1994).

b. Offer new ways to visit a heritage site or museum. These CARGs aim to maximize the length of the visit and to increase the attention given to the artworks. In this category, we put *The Miracle Mile Paradox* (Los Angeles, U.S.A, 2012), *Ghosts of a Chance* (Smithsonian American Art Museum, U.S.A, 2008)

c. Teach pupils about historical cultural heritage and sciences. This type of CARGs complements school lessons. Therefore, they are supervised by teachers and orchestrated with a limited group of selected players. Games made in this purpose include *The Arcane Gallery of Gadgetry* (Learning about the Historic Patent Office of Washington, U.S.A, 2011) and *Vanished* (Smithsonian American Art Museum, U.S.A, 2011)

d. Change the image of a cultural institution before public’s eyes. A cultural institution, such as library or a museum, generally uses this sort of CPG to give the public a more convivial and less austere image of its related practices. In this category we recall *The Mystery Guest* (Finksburg Library of Carroll County, U.S.A, 2010), *Find Chesia* (Finksburg Library of Carroll County, U.S.A, 2009) and *Blood on the stacks* (Coates Library, U.S.A, 2007).

| Purpose | Name of the CARG | Year |
|---|---|------|
| Promote an event | <i>Eduque le Troll</i> , Georges Pompidou Center, (F) | 2012 |
| | <i>Cherche Tom dans la Nuit</i> , European Night of Museums, (F) | 2011 |
| | <i>[In]visible Belfast</i> , Belfast Book Festival, (IR) | 2011 |
| Offer new ways to visit a heritage site or museum | <i>The Miracle Mile Paradox</i> , Miracle Mile area (USA) | 2012 |
| | <i>Ghosts of a Chance</i> , Smithsonian American Art Museum, (USA) | 2008 |
| Change the image of a cultural institution before public’s eyes | <i>The Mystery Guest</i> , Finksburg Library of Carroll County, (USA) | 2010 |
| | <i>Find Chesia</i> , Finksburg Library of Carroll County, (USA) | 2009 |
| | <i>Blood on the stacks</i> , Coates Library, (USA) | 2007 |
| Teach pupils about historical cultural heritage and sciences | <i>The Arcane Gallery Of Gadgetry</i> , Historic Patent Office of Washington, (USA) | 2011 |
| | <i>Vanished</i> , Smithsonian American Art Museum (USA) | 2011 |

Table 1 - Selection of ARGs

Two main reasons led to this selection. First, to fully analyze the games, it was essential to retain enough information about their progress and characteristics. This limitation brought us to put aside several games that were not sufficiently documented, particularly concerning their real world aspects. Second, we selected games with various purposes, target audiences, organizers, and storyworlds.

This selection shows the richness of cultural domains of CARGs. Their production is at the crossing of different domains and professional backgrounds: artists, curators, game designers and developers. Indeed, the conception of CARGs must, on one hand, enable cultural institutions to reach specific objectives mentioned above. On the other hand, a CARG must fulfill the expectations of visitors: social interaction (Falk & Dierking, 2000; Heath, Lehn, Hindmarsh, Luff, & Cleverly, 2001; Laurillau & Paternò, 2004), activity or interactivity (Davallon, Gottesdiener & Le Marec, 1999), artistic creation and collective creation (Fourmentreaux, 2006; Lambert, 2003).

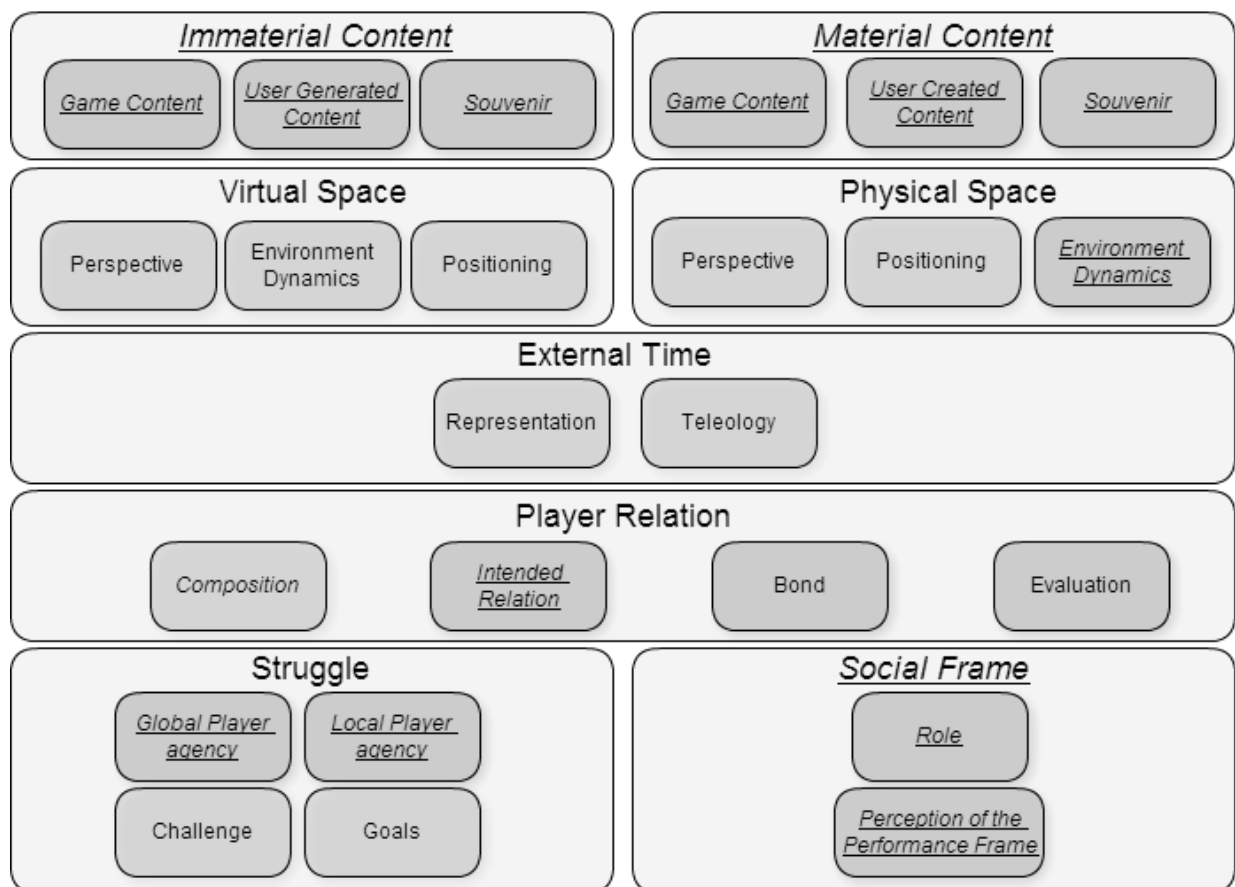
CARGs possess suitable assets to potentially fill these expectations. As anti-escapist games and games that enable players to “do things for real”, they can engage players in rewarding activities, including of (co)creation. For example, in the CARG *Ghosts of a Chance*, players were required to create several artworks that were registered as museums artifacts and presented in a temporary exposition. Some players also attended anthropology workshop during which a professional anthropologist taught them to deduce several basic information about a human skeleton, such as its sex. In another CARG, *Vanished*, pupils learned and applied the scientific method to some problems concerning various scientific fields. Apophenia and coincidence could let players build a feeling of connection to the heritage site or artworks.

Ultimately, the creation of efficient and appealing CARGs must take many factors into account due to their complexity, because they are both cultural learning tools and Alternate Reality Games. In order to reduce this complexity, designers need of analytical tools, such as typologies, in order to have a synoptic view over a wide range of possibilities of the design space (cf. Zagal and Bruckman, 2008). In fact, as in other design fields (e.g. architecture, health care, etc. Kuziemy, Borycki & Brassat-Latulippe, 2010), a typology provides a whole set of data for processes, information and factors related to a specific field.

4. Our typology to describe Cultural Alternate Reality Games

Many authors have highlighted the lack of standardized and precise vocabulary to describe games and their structure (Church, 1999; Elverdam & Aarseth, 2007; Zagal & Bruckman, 2008; Zagal, Mateas, Fernández-vara, Hochhalter, & Lichti, 2005). These authors also mention the need to develop design tools such as typologies in order to help designers to create games. This lack of tools have both theoretical effects on game studies researches and on game designers. For example, Zagal and al. (2008) asked college students taking game classes to participate in an exercise of formal description of video games to complete an ontology of games. Future professionals of the field, familiar with games, these students faced difficulties describing games and lacked vocabulary to do so. Participating in the ontology development and thus working with a tool composed of strict semantic categories had positive learning outcomes in terms of vocabulary (Zagal & Bruckman, 2008).

Two main observations are behind our proposition of typology for CARGs. First, most description tools created to this date are not suitable to describe and classify CARGs such as the genre-based classification widely adopted for marketing purpose or the GPS : Game Purpose Sector model to describe the serious dimension of serious games (Alvarez, Rampnoux, Jessel & Methel, 2007). Indeed, they can't help designers to describe the specificities of ARGs as cultural learning tools, characterize the extension and blurring of their boundaries (Gentes, Guyot-Mbodji, & Demeure, 2010), or detail the alternate reality they set. Secondly, most are structured with subjective criteria to ensure internal and external validity for this type of methodological tools (Elverdam & Aarseth, 2007).



Key :
 Italic and underlined elements : added elements.
 Italic : modified elements modifiés
 Others : elements unmodified taken from the original typology by Aarseth, Smedstad Solveig & Sunnanå (2003) and Elverdam & Aarseth (2007)

Figure 1 - Typology of Cultural Alternate Reality Games.

We have built our reflections on Aarseth, Smedstad-Solveig and Sunnanå (2003) and Elverdam & Aarseth's (2007) open-ended multidimensional classification model of games. Among the reasons that lead to choosing this typology for our proposition is the fact that this open-ended model allowed adding, modifying, or rejecting individual dimensions without compromising the integrity of the whole model

(Elverdam & Aarseth, 2007). Second, this typology helps describing games of any type, as varied as Chess, Volleyball, and World of Warcraft (i.e. games played in various spatial, temporal, and social configurations.) Elverdam & Aarseth's original classification is composed of 8 meta-categories, each of them containing up to three dimensions: 1) Virtual Space, 2) Physical Space, 3) Internal Time, 4) External Time, 5) Player Composition, 6) Player Relation, 7) Game State and 8) Struggle.

In developing our typology, we first identified meta-categories that were not adapted to CARGs. Thus, we rejected the seventh meta-category that described how the game state could be saved in a particular game. We also rejected the third category. This decision was based on logic: as ARGs and especially CARGs are intimately bound with reality, it is impossible to interrupt a game, save it, and load this game state before a new playing session. For the same reason, there is only one time frame in ARGs, controlling the passing of time and its related laws: reality. Time in ARGs defers from many videogames in which time passes on a different scale (i.e.. every minute in reality corresponds to 8 minutes in the game world) and with different laws (i.e. ability to pause time).

Second, we added two meta-categories (Figure 1) in order to characterize both the cultural aspect of these games and the alternate reality of CARGs: "Immaterial Content" and "Material Content". Each of these meta-categories is composed of 3 dimensions: the "game content" offered by the puppet masters respectively immaterial and material that significantly contribute to the narration (e.g. "call to actions" are not considered game contents); the "player generated content" and souvenirs. This last dimension identifies the significant tangible and/or lasting aspects of the game such as a collector object won during the game (material souvenir) or a virtual remnant of the player's activity in the game (immaterial souvenir). We then inserted dimensions to characterize expansions and blurring of the boundaries, essential to CARGs. To this end, we used the three available categories describing time and space: External Time, Virtual Space, Physical Space. In the latter, we added a dimension "Environment Dynamics", mirroring the one existing in Virtual Space: "Environment Dynamics". This dimension describes the type of modifications, if any, a player can make in the physical space of the game. As the modification of the player's real environment is not totally free, only two values are included in the physical space version of "Environment Dynamics", "none" and "fixed". In the ARG *Cherche Tom dans la Nuit*, designers could not modify anything ("none"). In ARG *Ghosts of a Chance*, players were invited to create artworks on a specific theme given by curators.

Though they could also be considered "User created content", these artworks were to be sent to the museum. Museum workers then recorded the players' creations following the same procedure as for any

museum piece (McGonigal, 2011). These works were then the subject of a temporary exposition. This particular case illustrates how player's creation can change the environment of the museum.

We created a new meta-category to describe the social frame of the game. It includes dimensions: "role" and "perception of the performance frame". Adding these dimensions to Elverdam & Aarseth's (2007) original typology was necessary to describe the relation between players, actors/performers and non-players. Indeed, their original typology described the player composition (single player, multiplayer, teams,...), the relation between them (can it change in the course of the game ?) and how it affected the challenge of the game (i.e. was the challenge set by an adversary or not ?). However, as pervasive games, ARGs blur their social boundaries making it necessary to describe the role of non-participants (people who are not taking part to the game and, often are not aware of its existence) and non-player participants (puppetmasters and in-game characters embodied by actors). Thus, the "perception of the performance frame" is particularly important for ARGs that include a dramatic performance aspect in the game. Benford et al. (2006) identified two different strategies to describe the blurring of the social boundaries of the game (i.e. the performance frame). The first one covers a situation in which the social boundaries of the game appear to the player as wider than the real boundaries. In this case, players tend to consider as performers/actors, people that are not at all involved in the game. An example of this perception, though not in a cultural context, can be found in several events during the ARG *Go Game* sessions. A team indeed reported having mistaken a hotel worker as an actor hired to help them in their mission (McGonigal, 2003). The second strategy covers a situation in which the social boundaries appear narrower than the real ones. It comes with the incorrect feeling that controlled spaces, game items, or performers are not part of the game. Along these two strategies, we added two others we called "Both", in case both mentioned strategies are getting used successively and "Identical". The latter covers situations in which designers decide to not create ambiguity between players and non-players thus not blurring the social boundaries of the game. This strategy was especially used in children-oriented CARGs such as *The Mystery Guest* (Finksburg Library of Carroll County, 2010, U.S.A). In this game, twitter accounts were presented as an initiative of the Finksburg Library and YouTube videos were posted by means of the official account of the library. The purpose was to help children and their parents identifying game elements.

In addition to that, we created two dimensions in the "Struggle" meta-category to describe a key component of ARGs: the control exerted by the community of players on the scenario, either locally with "Local Player Agency" to point out that players' actions have immediate consequences, or globally, with "Global Player Agency", to stress that players' actions have long-term consequences. For instance, in the ARG *Ghosts of a Chance*, players' actions had long-term consequences on the scenario, while in ARGs

Cherche Tom dans la Nuit or *Eduque le Troll*, the story ended the same way regardless of players' actions (“Global Player Agency” value is empty).

Having developed the typology described here, we applied it to our corpus of ten different CARGs. We noticed how time could be described with only one meta-category (External Time) instead of the two proposed in the original typology. This is a specificity of ARGs, that CARGs inherit. In other types of pervasive games, both the External Time and Internal Time meta-categories are necessary to describe the passing of time. It reflects the temporal expansion of CARGs boundaries: the game time is the real world time and no control can be exerted on its passing. Moreover, the “perception of the performance frame” of the analyzed CARGs gave us insights about design choices made by cultural institutions. For example, most of the analyzed CARGs did not implement social ambiguity although it is considered an asset and a source of satisfaction and interaction for players.

We also noticed that the CARGs lead by the Smithsonian American Art Museum such as *Ghosts of a Chance* and *Vanished*, were among the few that enabled the players to engage in creative or scientific activities. *Ghosts of a Chance* is of particular interest in this context since it enabled players to create artworks that were officially recorded as museum pieces and displayed in a public temporary exposition.

As a description and classification tool, the typology is used to analyze existing pervasive games and especially CARGs. Our typology describes formally many aspects of CARGs and thus, helps pointing at the key differences between them more precisely than a genre-based or purpose-based classification. For example, *Ghosts of a Chance* and *The Miracle Mile Paradox* are both CARGs aimed at offering new ways to visit heritage sites or museums. Though they share the same purpose and genre, they are distinguished most notably by the player-created content. *Ghosts of a Chance* required players to create artistic objects and send them to the museums while the material content created by players of *The Miracle Mile Paradox* (cardboard signs used during a protest) was done on the players' initiative.

With more than 60 values distributed in 24 dimensions, our version of the typology allows a great variety of combinations and thus, enables users to precisely characterizes games.

5. Conclusions and future works

Information and Communication technologies offer a constant challenge to cultural institutions and designers. Technology literate publics have important expectations related to contents and interactivity : activity, creation and social interaction for occasional visitors as well as learning and discovery activities for more regular users. As for cultural institutions, their mission is, among others, related to educational and informational objectives. In this context, Cultural Alternate Reality Games, influenced by both

pervasive computing and ubiquitous paradigms and by media convergence, would seem to be a suitable answer to both cultural institutions and the expectations of visitors of both types.

This chapter aimed to define CARGs. They are a complex cultural apparatus, whose production requires interdisciplinary work between groups with different specialties. In the cultural sector, the aim is to ensure interdisciplinary work between specialists of games and cultural institutions in order to help the understanding of a CARG, explain its structure and characterize them. We extended an existing open-ended multidimensional typology of games to adapt it to CARGs. Our typology enables ARGs designers to describe several extensions of the boundaries of the game: social expansion, spatial expansion and temporal expansion. At this stage, the typology has a descriptive purpose. Nonetheless, it is a preliminary step, necessary to identify and categorize the characteristics of this kind of games. Indeed, our aim is to use it in order to develop a tool to improve the design of CARGs. In fact, many authors highlighted the need of some methodological tools for the game designers (Elverdam & Aarseth, 2007; Zagal, Mateas, Fernández-Vara, Hochhalter, & Lichti, 2005). Our proposal is a semantic tool, like an ontology. This typology is not only a necessary step towards a specification of a conceptualization (Gruber, 1993), but helps determining a shared formal description of concepts and the relations between them (Borst, 1997; Szilagyi, 2014). In this context “shared” means that the community of stakeholders diffuses and reuses it. This semantic tool will be used in a web-application that will help designers and cultural institutions to share and talk about CARGs, helping both to find a mutual understanding and a shared vocabulary. For cultural institutions, it will also help them grasp the various possibilities of these kind of games and their benefits.

Indeed, to date, ARGs have been used as learning tools with satisfying results (Connolly, Stansfield & Hailey, 2011). In a constructivist view, where the mediation of human action through artifacts is the crucial moment of personal development (Cole & Cagigas, 2010; Engeström & al., 1999), we argue that ARGs can serve as levers for developing human beings and society. As interactive forms for increasing access to cultural information, ARGs can be a part of cognitive tools for development. However, they also retain specific assets, such as ambiguity, coincidences and apophenia, that are necessary to engage and stimulate interaction between people (Dansey, 2008; Gaver, Beaver & Benford, 2003; McGonigal, 2003; Montola, 2007; Bellotti, Ferretti, & De Gloria, 2005; Reid, 2008; Benford et al., 2006). Moreover, ARGs link with reality make them a perfect tool to stimulate artistic creation and give a more concrete aspect to scientific knowledge and answering visitors' expectations. By designing a typology of CARGs, our aim is to help designers and cultural institutions establish interdisciplinary work and especially to illustrate to cultural institutions what they could get from the use of the types of games.

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