

Best practices in serious games: Gamification strategies to support public participation in citizen observatories

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KEY POINTS

- *This paper reviews a selection of serious games to identify effective gamification strategies*
- *Such gamification strategies can support public participation in citizen observatories*
- *Best practices are presented, from technical elements up to strategic and design aspects*

1 INTRODUCTION

This paper summarizes the outcomes of an analysis aimed at identifying a set of best practices in serious games, which can support public participation in citizen observatories. The analysis was carried out within the context of Scent, a European Union research project funded under the Horizon 2020 programme. Scent is oriented toward creating a variety of software applications – including serious games – that can engage citizens in observing and documenting land-cover use and changes. For example, in Scent Explore, one of these software applications, citizens are invited to explore specific geographic areas like the Danube Delta or the Kifisos river, take pictures and annotate these pictures. Citizens can either (1) take and annotate pictures of specific objects in a predefined area (e.g., vegetation in the river bank, waste and brought materials in the manholes, tree banks/branches, dustbins, cars and vehicles along the river bank or in smaller streams connected to the main river, waste and brought materials in the smaller streams connected to the main river, urban sites at small spatial scales e.g. buildings, blocks of flats) or (2) take pictures of water flows in a very specific and limited geographic area so that the Scent software applications can estimate the water levels or the cross section geometry. All the pictures and the related annotations provided by the citizens are then collected and processed and can complement existing forms of monitoring such as satellite and remote sensing which are costly and less dynamic. The Scent applications will be freely distributed with the hope that they will support the activities of citizen observatories in relation to land-cover use and changes.

A common problem of such citizen observatories is in how to support the public participation (Rotman et al., 2014). Scent relies on a number of gamification mechanisms (rewards, badges, levels, leaderboards) as a strategy to ignite and sustain the interest of citizens. This gamification-based engagement strategy was developed after a thorough investigation of existing serious games, which allowed to distill some key learning points. This paper presents these key learning points and elaborates on best practices that can be replicated by other projects interested in igniting and securing public participation.

2 APPROACH AND THEORETICAL FRAMEWORK

The findings presented in this paper emerged from an initial review of 115 games (mostly videogames,

even though some were also connected to board games) and a subsequent and more thorough analysis of 28 games. The selection of the games to be reviewed emerged while looking at both academic sources (i.e., conference papers and journal articles in the areas of environmental sciences, geography and game studies) and non-academic sources (e.g., websites that collect best examples in gamification, like Climate Interactive¹, Make Us of², Game4Sustainability³). This review helped us in selecting games that were well-documented (also in terms of accompanying visual material) and that had the potential to further the understanding of some gamification mechanisms considering the specific context of the citizen observatories.

The work of a variety of scholars and practitioners provided a framework to analyze the motivational dimension of gamification and serious games. With a perspective crossing social and positive psychology, McGonigal (2011) argues how a good gameplay can elicit rewarding emotional and cognitive states and act as a powerful motivational factor. This is one of the reasons why in recent times various gamification mechanisms have been increasingly used in non-leisure contexts (Hamari, 2013). As the gamification expert Yu-kai Chou points out: “in a few short years, gamification has reached a social tipping point and is starting to creep into every aspect of our lives - from education, work, marketing, parenting, sustainability, all the way to healthcare and scientific research” (Chou, 2015: pp. 10-11). Games can become an immersive experience that engages the player at a level that is fulfilling and rewarding (Schell, 2008). This is a key point, stressed by many authors who focused on how fun is a critical component of games and their capacity to motivate people (Burke, 2011; Koster, 2005; Groh, 2012; Lee and Hammer, 2011; Levtov et al., 2016).

Various authors offer a characterization of the various components of gamification (Deterding et al., 2011; Zichermann & Cunningham, 2011). The categorization offered by Schell (2008) has the advantage to look at the overall elements of a game and to see how the game mechanics (procedures and rules of a game, goals, incentives, change of levels, points, badges, etc.) interact with three other key elements (story, aesthetics and technology). We used these four categories for our analysis.

3 FINDINGS

Our analysis showed that some gamification strategies work particularly well as engaging mechanisms to support public participation (Table 1).

Table 1. Gamification strategies emerged from our analysis of serious games to support public engagement and citizen observatories.

Category	Strategy
Story	Some games contain some educational components (e.g., diagrams, short videos, and illustrations) that visually ‘translate’ scientific knowledge (e.g., concepts from earth observation) into visual formats that are easier to understand to broader publics, thus activating knowledge translation mechanisms (Simeone et al., 2017a; Simeone et al., 2017b). These knowledge translation mechanisms can align and motivate diverse target audiences (e.g., scientific experts and normal citizens).
Story	However, in some games, the educational aspect overshadows the gamification. To secure the players’ engagement, it is important to carefully balance the education aspect with solid game mechanics.
Story	In relation to the narrative dimension of the games, stories that are simple, predetermined and easy to grasp seem to be particularly suitable for serious games. In some particularly successful games, the narrative layer within the game (e.g., stories of the main characters and their actions) is intertwined with real life stories anchored to a real location and/or real life conditions.
Game mechanics	In terms of gameplay, fast and straightforward game mechanics that allow to play also for just few minutes seem to be particularly suitable for a public of casual gamers and, as such, for broader audiences. These game mechanics also work well for those games that require the players to carry

¹ <https://www.climateinteractive.org/policy-exercises-and-serious-games/19-climate-games-that-could-change-the-future/>

² <http://www.makeuseof.com/tag/10-environmental-games-teach-kids-earth-ecology-conservation/>

³ <http://www.games4sustainability.org/>

	out operations of data collection (e.g., taking pictures, recording measurements, etc.). Such operations should be seamlessly integrated within the whole gameplay.
Game mechanics	Strategic and complex simulation games do not seem to work particularly well for citizen observatories since they require significant resources to be designed, developed and maintained, and since they require time and sustained commitment from the players. An easier engagement strategy is to articulate the overall game mechanics around a series of mini-games anchored to a main unifying educational narrative (e.g., the main storyline driving the specific citizen observatory). These mini-games make the overall gameplay dynamic, fun and diverse.
Game mechanics	Interactions among players is a key element to support challenges, rewards and the players' overall level of engagement. Within the context of citizen observatories, players should not only compete against each other in relation to their scores and their position in a leaderboard, but be rewarded with messages that clearly show the impact that their individual and collective actions are having on the real world.
Technology	A browser-based distribution strategy - e.g., cross-platform games, such as HTML5-based games that can be played on various devices: laptops, desktop computers, tablets and smartphones - gives the players the greatest flexibility in terms of accessing the game.
Technology	In some cases, to play a videogame a preliminary user registration is required. Our recommendation would be to also offer the possibility to play without any registration (e.g., following what can be termed as a 'guest mode'). Some users do not want to register and provide their personal data to play the game.
Aesthetics	Bidimensional graphics, simple but still curated and polished, seem to be more suitable for cross-platform design and development strategies. A basic but effective graphics can contribute to the playability and enjoyment of the game. 3D elements can be used, but with flat rendering so as not to require high processing power from devices such as smartphones and tablets.

4 CONCLUDING REMARKS

Gamification strategies, such as the ones presented in the Table 1, have the potential to support the engagement of broad audiences. As such, we are currently using some of these gamification strategies in the Scent applications. Figure 1 shows some features of a Scent application where the players are requested to explore some geographic areas and locate and capture some little monsters. While doing so, the players are also invited to take and annotate pictures in relation to land-cover use and changes.

Gamification is a powerful tool, but it is also important to keep in mind that it has some limitations. Beside the many voices praising the potential of gamification and serious games, various authors and scholars have expressed quite critical positions in relation to gamification. The media studies scholars and game designer Ian Bogost states that “gamification is marketing bullshit” (Bogost, 2011) as the concept and the application of it have been extremely oversimplified, at a point that the complex dynamics behind the creation of a successful game have been reduced to the mere use of game properties such as points or levels. Similarly, Werbach and Hunter (2012) state that many gamified systems fail due to poor design and the uncritical application of easy gamification-based fixes. In a quite vocal way, Chang (2012) states that gamification as applied to many current projects is a techno-utopian fantasy. Antin (2012) posits that it is not really elements such as the uncritical use of points that drive engagement, but rather social factors such as self-efficacy, community and peer approval that reward users.

This final point is particularly important in relation to citizen observatories. It is the case that several citizen observatories precisely ask the users or the citizens to perform actions that can have an effective impact on the real world. This can support self-efficacy and dynamics of community building and peer approval. Our final consideration is, therefore, to make use of gamification strategies such as the ones we presented in this paper, but to keep in mind that gamification is not a panacea that can be uncritically applied and fix any project, but that it must be coherently intertwined with a broad engagement strategy where the citizens can fully appreciate the positive impact provided by their support.

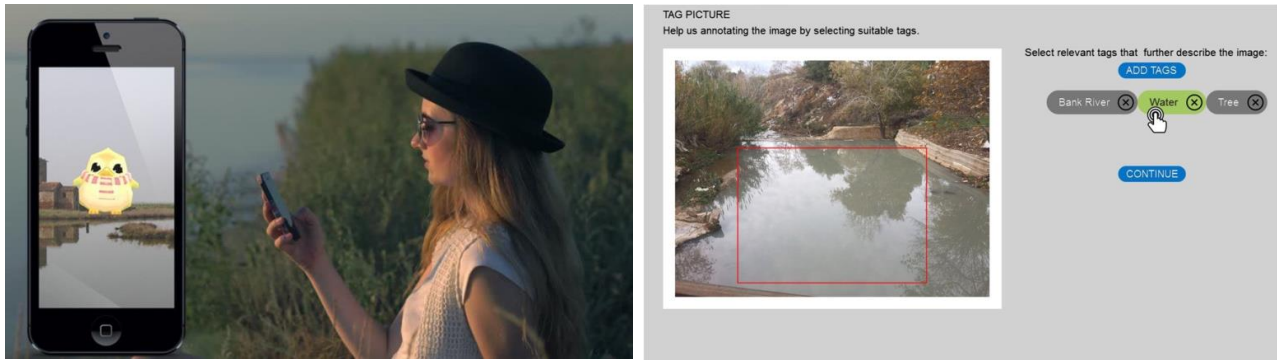


Figure 1. Scent Explore: the player explores a geographic area, locates some little monsters, takes and annotates pictures and thus increases her score.

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