






Gaeta: The Great Adventure - A Cultural Heritage Game about the History of Gaeta

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Abstract. As new historical sites are continuously discovered many existing ones are suffering from deterioration due to age, war, and natural disasters. Given the inability for us to travel due to the COVID-19 pandemic, we must adapt ways to experience the world in a safe and accessible way. One such area that enables us to interact with the world safely is video games. Therefore, the use of games for cultural heritage can allow us to not only preserve a digital “copy” of such places and artifacts thus providing the opportunity to educate and inform current generations as well as promote tourism. Therefore, this paper proposes a game about the Italian city of Gaeta, which adopts principles seen in commercial entertainment games with the intention of educating the user of historical periods leading up to the modern-day Gaeta. Results from empirical testing using focused groups and semi-structured interviews have been positive.

Keywords: Gaeta · Cultural heritage · Game design · Game development · Interactive experience · Mobile gaming · Interactive experience

1 Introduction

It is clear the affordances that games can offer in modern day society. Games are no longer used solely for entertaining us they have the power to engage us in enticing, interesting, and educational experiences. In recent times, we have seen the use of games and gaming technology (e.g. virtual and augmented reality) as a way to enhance museum visits. There have been many entertainment games that contain a historical aspect (including real information) such as Sid Meier’s Civilization¹ series and Assassin’s Creed Series². In addition, we have also seen commercial games offer stand-alone experiences that allow players to engage with historical periods of time (e.g. Assassin’s Creed Discovery Tour) that bring to life periods of time that we have previously only read or watch documentaries about.

¹ www.civilization.com/.

² <https://www.ubisoft.com/en-us/game/assassins-creed>.

Games of cultural heritage exist under the umbrella of *Serious* and *Educational* games. In some cases, they may also employ approaches used in *gamified/gamification*.

We must consider the context that such games are to be played in. For example, unlike traditional *Serious* or *Educational* games, games for cultural heritage are often restricted due to time, budget, and technology [3,5,9]. Moreover, the consideration that such experiences are intended to be engaged with in a context such as a museum or stand alone exhibition and users are considered unlikely to engage in the experience again. However, we argue that this should not necessarily be the case. Therefore, this game proposes a demonstration towards designing and developing games within context of cultural heritage/preservation in such a way that reflects contemporary games.

After introducing current research in *Games and Cultural Heritage* (Sect. 2), this paper describes elements of design (Sect. 3) and development (Sect. 4) of the serious game *Gaeta: Great Adventure*. Conclusions are drawn and future research outlined in Sect. 6.

2 Cultural Heritage and Games

As we move towards a more digitally interactive world, cultural heritage and tourism has also begun to follow suit [6]. Many historical sites have adapted or even created entirely new experiences that connect the digital world to a physical historical location in ways that enhance the experience or provide an added layer of interactivity. To this end, games in the context of cultural heritage are not only preserving what was, but also adapting it towards a modern audience and their expectations. Therefore, to maintain relevancy with digital natives, such approaches are also fundamental.

The use of games towards cultural heritage or cultural preservation has been analyzed in many studies and publications [1,13] that stress the importance of both the preservation and the ability of games to achieve that.

Games in the context of cultural heritage include many different approaches that span museums [6] and various exhibits within it and as well as stand alone experiences like VR [12], some of which the user can download (AR) [4].

In addition, some authors, such as [7] and [8], try to propose different models that can inform designers on how to better include cultural heritage information within the context of commercial games. Other frameworks and models, such as Andreoli et al. [2], try to include the whole process, from the design phase all the way through development and the eventual evaluation of a *Serious Game*.

Liarokapis et al. [10] describes how multimodal serious games can create an immersive experiences that work towards enhancing a visitor's experience.

3 Designing *Gaeta: The Great Adventure*

Gaeta is an Italian town of 20,000 inhabitants located in lower Lazio. It has a remarkable historical relevance, a rich artistic heritage and tourist resources that

make it a very popular tourist destination. For this reason, the municipality of Gaeta is supporting the development of a Serious Game aimed at preserving the cultural heritage of the city, named *Gaeta: The Great Adventure*.

3.1 Overview

Gaeta: The Great Adventure is a 3D mobile city building game in which the user has to reconstruct the city of Gaeta through different historical periods. The premise is that the player needs to collect resources, construct buildings, and optimize the city economy to complete the game. Popular mobile commercial games with similar mechanics include *Disney Magic Kingdoms*³ and *Townsmen*⁴.

The aim is not only to provide entertainment, which remains one of the key aspects of the game, but also touristic promotion and the preservation of cultural heritage. In fact, *Gaeta: The Great Adventure* differs from other cultural heritage game, because the focus is still on making the game appealing by its own, while having cultural heritage and touristic promotion as side effects.

3.2 A Co-design Approach

During development of *Gaeta: The Great Adventure*, we adopted a co-design approach, by involving the stakeholders and the development team, along with some expert figures in order to achieve the goals we decided. In particular, we have organised four focus groups and several semi-structured interview, so to gather feedback to better iterate the game. Also, we collected some preliminary quantitative data regarding the game with the use of a small sample of beta testers.

Focus groups are a standard practice in social sciences, allowing interviewers to study people in a more natural setting than a one-to-one interview. They can be used for gaining access to various cultural and social groups and raising issues for exploration [11]. In particular, we organised four focus groups during the development of the game. Two of which have been in presence, and the last two were over distance due to the recent COVID-19 pandemic. At each group there were present: the mayor of the city of Gaeta, the local councilor of cultural heritage, the local minister of cultural heritage, a gamification expert, a UX expert, a psychologist, four inhabitants of the city of Gaeta, and the whole development team. Results of the focus groups are the different iterations of the game, leading to the current one described in Sect. 4.

After a few days from the last two focus groups, all the participants (excluding the development team) were video-called for a semi-structured interview with three sets of questions. The first set of questions regarded the learning, education, promotional, and touristic aspects of the game. The questions in the second set were about the user experience and how enjoyable the game was to play. The last set concerned the usability of the game by different types of people (e.g. young or elderly groups of people).

³ <https://www.gameloft.com/game/disney-magic-kingdom>.

⁴ <https://handy-games.com/en/games/townsmen-mobile/>.

4 Developing *Gaeta: The Great Adventure*

In *Gaeta: The Great Adventure* we tried to meet the lines of work mentioned in Sects. 2 and 3, aiming at developing a serious game to improve the sensibilisation toward a specific cultural heritage site.



Fig. 1. Overview of the Gaeta in the game, once the player has fully built it.

4.1 Historical Periods

During the game-play the player will rebuild the city of Gaeta, through different Historical Periods:

- ***Mythological Era***: the legends associated with the origins of the city.
- ***Roman Era***: Gaeta became a popular holiday resort for Roman emperors and a port of considerable importance.
- ***Ducal Era***: The Docibili dynasty made Gaeta an independent duchy and a Maritime Republic, with its own laws, naval fleet and currency, the “*Follaro*”.
- ***Medieval Era***: a period characterized by the dominion of the Angevins and the Aragonese, and by the spread of religious orders which introduced the Italian Gothic style to Gaeta.
- ***Renaissance Era***: renowned artists embellished Gaeta with their creations, while the city grew of strategic importance and was equipped with imposing fortifications.
- ***Nineteenth Century***: a century characterized by the exile of Pope Pius IX, and by the siege of 1860-61, which marked the ending of the Bourbon reign in the south of Italy.

In Fig. 1 is possible to observe Gaeta once it has been fully rebuilt by the player.

During gameplay or during certain quests, the player will face some special events that characterized the history of Gaeta. Some of these events, such as the “*Raids by the Saraceni*” or the “*Earthquake*” create an obstacle to the player (e.g. resources get lost, buildings get destroyed or loose some levels). Other events, such as “*The Battle of Lepanto*”, are part of a quest in which the player needs to prepare the fleet for Pope Pious V.

4.2 Resources

In order to build and upgrade new structures and buildings, the player will need to manage four resources (shown in Fig. 2) as well as time, in order to leverage the game economy and to complete all the assigned quests.



Fig. 2. Resources Icons shown in the game. From the left: *Gold*, *Lumber*, *Stone* and *Food*.

In particular, the player can collect (or exchange with trading activities) three resources:

- **Gold**: while the population of the city grows, *Gold* can be accumulated by collecting taxes from the people.
- **Lumber**: with the use of a *Lumber Mill* the player can produce *Lumber*, however its availability is limited, pushing the player to trade more often.
- **Stone**: is an important element to build historical buildings, and it is very rare; in fact, *Stone* can be obtained mainly by trading.

The fourth resource, “**Food**”, provides an upper limit to the number (and levels) of the buildings that the player can have (or reach).

The player can obtain these resources by building **Resources Building**. For instance, *Farms* produce *Food* at a constant rate, whereas *Houses* generate *Gold* from taxes. The *Harbour* provides a way for the player to trade resources.

Most of the buildings of the game can be upgraded by the player (e.g. *Farms*, *Lumber Mills*, *Houses*) will provide more resources, whereas other buildings, like the *Storages*, will provide a better general storage for the player).

4.3 Wonders

Wonders are special buildings that characterize the history of Gaeta and nowadays provide a point of interest for tourism. During the game, the player is asked to

build nine wonders in their respective historical period. Differently from the other building type, they have only one level, and it takes a lot of resources to build them (especially *Stone*, which is the rarer among the resources). All of them have been recreated in 3D by keeping their visual aspect, but at the same time they have been stylized.



(a) Bell Tower



(b) Lucio Munazio Planco Mausoleum

Fig. 3. Some examples of the stylized 3D models in the game.

In *Gaeta: The Great Adventure*, some of the wonders that the player can build are: the ***Lucio Munazio Planco Mausoleum*** (shown in Fig. 3(b)), the best-preserved Roman tomb in all of Italy; the ***Castle***, an impressive rectangular fortress with four formidable cylindrical towers, built in different phases by the Angevin and Aragonese rulers; ***Cathedral and Belltower*** (shown in Fig. 3(a)), built in the 12th century and complemented by a beautifully ornate byzantine bell tower; or even the ***Sanctuary of Montagna Spaccata***, built during the 11th century by the Benedictine monks to honor the giant cracks in the mountain said to be produced at the crucifixion of Christ.

4.4 Research

Among the different city management options, the player can perform “*Research*” by spending resources and time. Researches, once they are completed, provide a permanent advantage/effect for the city. Research effect types include *increasing production rates*, *decreasing building time* or *Unlocking features and/or buildings* among others.

The player is limited by a “*Research Tree*” that creates dependencies between researches, making the game more challenging.

5 Preliminary Test Results

In this first phase, we decided to test just some of the learning objective of the game to gather some preliminary results, before finalizing the game and releasing it to the public. We selected $N = 15$ beta testers for the game and administered them a questionnaire about the culture and history of Gaeta, before and after playing the beta version of the game (for at least one hour).

Some of the learning objectives of *Gaeta: The Great Adventure* were validated using a paired t -test (with a confidence level set to 95%) in order to evaluate if the beta testes learnt something about the history of Gaeta by playing the game. We intentionally did not have a control group, because our focus was not to compare this game with more traditional methods, but rather understanding and testing whether the game can achieve some of the basic learning aims defined. In fact, the Experimental Hypothesis was about the knowledge retention about the culture and history of Gaeta.

The questionnaire was comprised of 4 parts depending on the historical period. Each question was a culture or historical question, with 5 possible choices, only one correct. For each corrected answer, a single point was awarded. In Table 1 are the p -values for each section of the questionnaire.

Table 1. p -values for each scenarios resulted from the paired t -test.

Questionnaire section	p -value
Mythological era	0.0251
Roman and ducal era	0.0297
Medieval era	0.0066
Renaissance era and nineteenth century	0.0196

Future tests will be conducted on a larger scale, once the game is published, and results published in a separate work.

6 Conclusions and Future Work

In this paper, we presented a serious game, *Gaeta: The Great Adventure*, aimed at both educating the player and providing a way to preserve the cultural and historical heritage of the Italian town of Gaeta as well as to promote tourism and interest in the town.

Our approach tries to place the content first, and continuing assessing this goal with a co-design approach. In fact, we consider the appeal of popular titles of games for entertainment to find a way to develop a game that aligns with such directions, while at the same time providing educational or promotional material.

In this way, we expect that such approaches might even generate more interest and longer engagement than standalone experiences as the player unfolds the story.

From the preliminary tests, the game has the potential to educate the players; however it is still under development. In fact, more data will be collected after the game has launched to assess the effectiveness of *Gaeta: The Great Adventure* for entertaining, tourism, promotion, and cultural heritage purposes. In-game player data along with player profiling techniques, marketing data, questionnaires and survey are among the methodologies we will adopt to assess the quality of our game.

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