




# Peer Community In Archaeology

## AR and VR Gamification as a proof-of-concept

**Sebastian Hageneuer**  based on peer reviews by **Sophie C. Schmidt** and **Tine Rassalle**

Tsaknaki, Electra; Anastasovitis, Eleftherios; Georgiou, Georgia; Alagiologlou, Kleopatra; Mavrokostidou, Maria; Kartsiakli, Vasiliki; Aidonis, Asterios; Protopsalti, Tania; Nikolopoulos, Spiros; Kompatsiaris, Ioannis (2023) Designing Stories from the Grave: Reviving the History of a City through Human Remains and Serious Games. Zenodo, ver. 4, peer-reviewed and recommended by Peer Community in Archaeology.

<https://doi.org/10.5281/zenodo.7981323>

Submitted: 02 June 2023, Recommended: 29 August 2023

### Cite this recommendation as:

Hageneuer, S. (2023) AR and VR Gamification as a proof-of-concept. *Peer Community in Archaeology*, 100337. [10.24072/pci.archaeo.100337](https://doi.org/10.24072/pci.archaeo.100337)

Published: 29 August 2023

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Tsaknaki et al. (2023) discuss a work-in-progress project in which the presentation of Cultural Heritage is communicated using Serious Games techniques in a story-centric immersive narration instead of an exhibit-centered presentation with the use of Gamification, Augmented and Virtual Reality technologies. In the introduction the authors present the project called ECHOES, in which knowledge about the past of Thessaloniki, Greece is planned to be processed as an immersive and interactive experience. After presenting related work and the methodology, the authors describe the proposed design of the Serious Game and close the article with a discussion and conclusions.

The paper is interesting because it highlights an ongoing process in the realm of the visualization of Cultural Heritage (see for example Champion 2016). The process described by the authors on how to accomplish this by using Serious Games, Gamification, Augmented and Virtual Reality is promising, although still hypothetical as the project is ongoing. It remains to be seen if the proposed visuals and interactive elements will work in the way intended and offer users an immersive experience after all. A preliminary questionnaire already showed that most of the respondents were not familiar with these technologies (AR, VR) and in my experience these numbers only change slowly. One way to overcome the technological barrier however might be the gamification of the experience, which the authors are planning to implement.

I decided to recommend this article based on the remarks of the two reviewers, which the authors implemented perfectly, as well as my own evaluation of the paper. Although still in progress it seems worthwhile to have this article as a basis for discussion and comparison to similar projects. However, the article did not

mention the possible longevity of data and in which ways the usability of the Serious Game will be secured for long-term storage. One eminent problem in these endeavors is, that we can read about these projects, but never find them anywhere to test them ourselves (see for example Gabellone et al. 2016). It is my intention with this review and the recommendation, that the ECHOES project will find a solution for this problem and that we are not only able to read this (and forthcoming) article(s) about the ECHOES project, but also play the Serious Game they are proposing in the near and distant future.

### **References:**

Champion, Erik Malcolm. 2016. „Entertaining the Similarities and Distinctions between Serious Games and Virtual Heritage Projects“. Entertainment Computing 14 (Mai): 67–74.

<https://doi.org/10.1016/j.entcom.2015.11.003>

Gabellone, Francesco, Antonio Lanorte, Nicola Masini, und Rosa Lasaponara. 2016. „From Remote Sensing to a Serious Game: Digital Reconstruction of an Abandoned Medieval Village in Southern Italy“. Journal of Cultural Heritage. <https://doi.org/10.1016/j.culher.2016.01.012>

Tsaknaki, Electra, Anastasovitis, Eleftherios, Georgiou, Georgia, Alagialoglou, Kleopatra, Mavrokostidou, Maria, Kartsiakli, Vasiliki, Aidonis, Asterios, Protopsalti, Tania, Nikolopoulos, Spiros, and Kompatsiaris, Ioannis. (2023). Designing Stories from the Grave: Reviving the History of a City through Human Remains and Serious Games, Zenodo, 7981323, ver. 4 peer-reviewed and recommended by Peer Community in Archaeology. <https://doi.org/10.5281/zenodo.7981323>

## **Reviews**

### **Evaluation round #2**

DOI or URL of the preprint: <https://doi.org/10.5281/zenodo.8163642>

Version of the preprint: 2

### **Authors' reply, 22 August 2023**

Dear Sebastian Hageneuer, Tina Rassalle and Sophie C. Schmidt,  
on behalf of the authors of this paper, I would like to thank you all once again for your time and effort to review our article. Your comments have indeed made this preprint more suitable for publication.

Sebastian, your comments regarding lines 74 and 209 refer to an earlier version of the preprint (v1). These changes have been made for the last version (v3) of the preprint and this is the one that will be published.

Once again, we were grateful for the opportunity to improve our work with your guidance!

Best of luck to your next chapters!

Kind regards,

Electra Tsaknaki

### **Decision by Sebastian Hageneuer , posted 21 August 2023, validated 21 August 2023**

#### **Just very minor corrections**

Dear authors,

the article is now much better than before and I will recommend it ASAP. As PCI asked me to only recommend nearly perfect papers, I would urge you to do the following last edits. Another reviewer round is not necessary.

- Line 74: ...tto... should be ...to...
- Line 209: Afterward... should be Afterwards....
- One reviewer criticised the wrong usage of the word "Moreover", please check
- If you have the time and means, please let a native-speaker read over the article one more time

As soon as you revised these last steps, I will recommend your article. Good job!

Best

Sebastian

### Reviewed by **Tine Rassalle**, 18 August 2023

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### Reviewed by **Sophie C. Schmidt**, 02 August 2023

The second version of the preprint Designing Stories from the Grave: Reviving the History of a City through Human Remains and Serious Games has been thoroughly revised.

Generally speaking, the language is now appropriate and terms are better defined. The parts of the article as a whole tie in better with each other. The topic of ethical presentation of human remains has been well developed and the limitations of the proposed method added.

The concerns I had raised have been answered fully and adequately.

Congratulations to the authors for the great project and interesting paper!

## Evaluation round #1

DOI or URL of the preprint: <https://doi.org/10.5281/zenodo.7981324>

Version of the preprint: 1

### Authors' reply, 21 July 2023

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### Decision by **Sebastian Hageneuer** , posted 14 July 2023, validated 14 July 2023

#### Please revise the article

After reading your article and the corresponding reviews, I have to agree to the points taken by both reviewers. The article is in need of much work to make it suitable for publication. Please refer to the reviews. What certainly needs to be done:

- The beginning and end of the article speak of the ethics surrounding the display of human remains, but the text never touches that topic in the main body. Either leave this topic out completely, or incorporate it into the main text.
- There is the need for a language revision by a native speaker.
- The potentiality of the project is discussed in too much detail, as the project is still in progress and has nothing to show yet. I would suggest to shift the focus of the article towards the discussion on how to present the past with these technologies and what to gain from it in comparison to other projects. The article often suggests that what the project has planned is going to succeed, without any proof (as the work has not yet been done). This is way too positivistic and unscientific and needs to be rephrased/refocused.

- It is unusual to write a scientific paper that mentions questionnaires without providing the data in some form. If you include questionnaires, include the data into the article. The new digital form of the proceedings can include any form of data.
- Some terms need more explanation and citation, like Serious Games, the ECHOES project, Immersion, Thematic Axes, etc. Please refer to the reviews.
- The idea of immersion to create a narrative of the past is not new (Microsoft HoloTours for example), but there is no (not enough) mention of other projects and studies. This needs to be fixed. In general, there needs to be more discussion about the concept of emotions in digital technologies (with references) and less focus on the technologies planned to use.

Dear authors, I know, I know. I have received many reviews that forced me to rewrite my own articles and I was always disappointed. I get it. But we need to work together on this one to create an article that is worthy of the wonderful project you have planned to do. Please take this criticism constructively, it is only about the quality of the article and not in the slightest about you personally.

Best of luck!

### Reviewed by **Sophie C. Schmidt**, 16 June 2023

The preprint „Designing Stories from the Grave: Reviving the History of a City through Human Remains and Serious Games“ describes a project in its planning stage, which may be one reason, why it is in parts a bit vague. I would encourage the authors to give this more precise information in the beginning instead of “a work in progress” (WIP might also mean “we have been working on this for 10 years, but don’t feel done yet”), to make readers aware of this fact before reading the article.

The planned project is very promising and especially the methodology of framing the project in evaluations of the user VR/AR pre-knowledge and the experience gained by questionnaires will lead to interesting and valuable results.

In this light I would like to suggest a few topics to improve comprehension by the readers and level of reflection of the topic:

In the abstract preprint the authors state the aim of using serious game theory to broaden the audience and their immersion in story telling around cultural heritage. In my reading this is what the paper focuses on.

The introduction first focuses on dealing with human remains in an ethical way and then leads to serious games as an ecosystem within which human biographies may be narrated and which has positive outcomes on learning activities. The ECHOES project aims to use „immersive technologies“ (AR and VR) to ethically deal with human remains.

In the introduction it might be beneficial to discuss the concept of „immersion“, as the text as it is now seems to imply that immersion works „automatically“ in AR and VR environments and that these techniques are needed for a successful immersion. If one is not immersed in the AR/VR-milieu, one does not use the word “immersion” as a technical term and understands that there are different ways to become “immersed” in something. ;-). Therefore a definition of the term “immersion” is needed here. I would also suggest adding the information on gamification (chapter 4.3) to the introduction to further explore why this approach has been taken.

The chapter 2 “Related work” starts with a strong statement about the intersection between CH and creative industries, which sadly lacks examples or citations. It seems a bit vague and would be strengthened by the inclusion of concrete examples.

Chapter 2.1 on the archaeology of Thessaloniki is very short and its broad statement about using GIS and databases does not add to the article. I also believe the word “diffuse” might be not the one intended. Maybe more detail on which data sources the reconstructions are based on would not go amiss.

Because of my own lack of expertise in the area of anthropology I cannot comment on this section. I just wonder what “secular changes” in this context mean.

The chapter 2.3 on the creative industries in CH feels a bit rushed in the beginning. There is no introduction to who “the learners” might be. The definition of the target audience is very important for the development of outreach projects and should be done here as well.

In the following paragraph I have a few questions that might be due to my own ignorance:

Is it a fact, that narration on cultural assets usually only focuses on the description of its traits? Because this seems to me to be an a bit outdated take and newer applications (even audio guide tours in museums) are more encompassing in their design. Also, I would like to see a more clear take on “emotions and morals, which are the main motivations of people”. For me it is at the moment unclear, whether this refers to the modern users or the ancient people.

I am not sure, whether the authors differentiate between “narration” and “narrative” in this paragraph and would like to put forward that there is a difference, that is important for the understanding of the topic. Maybe some re-phrasing might clear this up.

The chapter “3 Methodology” is in parts very convincing in some parts lacking precision:

The questionnaire (3.1) approach sounds well designed and the sample size looks great. I am looking forward to a more detailed report of the study!

The phrase “thematic axes” hasn’t been discussed before and it is at this point not clear what is meant. The description of the first results of the questionnaire regarding AR and VR is a bit stilted, some re-wording might make it easier to read.

The introduction to the chapter “3.2 Game Scenarios and Reward System” reads a bit like an advertisement (“captivating”, “rich tapestry”), though the approach of the reward system underlying the project sounds sensible. It might tie in better with the article as a whole, if the topic of a reward system – linked to the gamification aspect – would be explained beforehand.

The chapter on AR environments has some wording that sounds a bit like taken from the grant proposal. I understand that this aspect is still being planned. Nonetheless: Could you focus here on HOW the tours will be informative? Will you provide walls of text, a narration of facts, is the information contained within a pop-up, does it appear automatically or on demand?

For the guided tours I would like to know at this point what kind of “past stories” are being discussed: are these fictional stories set in the past? Are these stories about researching the past? How is the archaeological evidence linked with the story you are creating here? How will users be able to interact with objects and characters? Can they talk to them, “pick them up”, move objects around in the virtual space and how are users encouraged to do certain things? Is there a difference between the serious game and the interactive tour? Or are these one and the same? (This might be too much for this paper here, but these questions come up when reading as it is now.)

The part on VR environments gives a well-rounded introduction to how the VR environments are designed. I have just a quibble with the phrase of an “accurate depiction of the past”. There is a bit of a debate about accuracy and authenticity in historic game development. As there is always an element of reconstruction involved, no depiction will be completely accurate and this should be acknowledged in an academic paper. Is there a way for the player to differentiate between the levels of certainty of the reconstructed world he is playing in?

The evaluation at the end (3.2.3) is an important part of the project and will be the basis of an interesting and important contribution to the field, as there are not yet many studies who critically evaluate the success of their outreach project.

In chapter “4 Design and Development” again the wording is not always as analytical as could be for an academic paper (“bring to life”, “takes us back”). As mentioned before, the terms “accuracy” and “authenticity” need a bit of a discussion.

Especially the chapter “4.2 Technologies” uses words that are a bit too evocative and too vague for an academic paper (“unparalleled level of engagement”, “visually stunning”). The VR and AR chapters talk about “realistic interaction” without explaining what this might entail and “intuitive controls”, which is a claim especially

older tourists may contest. As above I would also like to see the topic of the reconstruction involved in “accurately depict decayed artifacts” to be addressed.

As stated before the part “4.3 Gamification” is an important chapter, which is closely related to the serious games aspect. In my opinion it would make sense to move it up to the introduction to better explain the general approach taken.

The discussion on the Metaverse is lacking in critical evaluation of the possibilities and the limitations at the moment (hardware, software, usability, prices in development?). I believe you are right about the possibilities in general, but it is surprising to read such a positive take on the Metaverse without one mention of the not quite as successful as envisioned project with the same name by Mark Zuckerberg. I know this is a different kind of project, but it plays in the same area and the distinction should be drawn.

After reading the conclusions I was reminded again of the ethical considerations around human remains, that are the topic framing the paper. Are the actual remains part of the story telling or are they completely “transformed” into the reconstructed avatars?

I also noticed: At the moment this framing topic is actually “not needed” for the paper – it could be cut, and the paper would still make sense as a paper about using AR/VR for outreach. I would suggest either integrating the topic a bit more or cutting it, as at the moment it seems a bit disconnected.

All in all this is a great project and I believe the paper will be a valuable contribution to the CAA proceedings. It just needs some work in clearing up misunderstandings due to wording (and in some cases there seem to be spelling mistakes). I would also suggest some more critical discussion or at least reference of critique of the mentioned concepts.

I hope this review was helpful.

**Reviewed by [Tine Rassalle](#), 08 June 2023**

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