

НАЙ-ДОБРИ ПРАКТИКИ ЗА ПРИЛОЖЕНИЕ НА ГЕЙМИФИКАЦИЯ В ОБЛАСТТА НА КУЛТУРНОТО НАСЛЕДСТВО: БЪЛГАРСКИЯТ ОПИТ

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Резюме: През последните години геймификацията е обект на повишен интерес. Дори област като културното наследство не остава незабелязана, като са налице примери за успешното прилагане на разнообразни геймификационни техники за решаването на различни проблеми. България е сред държавите с изявен интерес по темата. Въпреки че са провеждани и все още се провеждат успешни инициативи за геймификация на културното наследство, липсва систематизирано знание за това какво не работи добре и защо е така, което би помогнало на практики, изследователи, публичните и местните власти в бъдеще да избягват вече допускани грешки. Целта на настоящото изследване е да се идентифицират най-добри практики за приложение на геймификацията в областта на културното наследство в България. За постигането на целта е предложена методология за подбор на най-добри практики за геймификация на културното наследство. На базата на 12 геймификационни критерия и 9 критерия за въздействие, както и при съблюдаване на тристъпкова процедура за подбор, са селектирани и описани двете най-добри инициативи в България.

Ключови думи: най-добра практика, геймификация, културно наследство

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**BEST PRACTICES FOR GAMIFICATION IN CULTURAL HERITAGE:
BULGARIAN EXPERIENCE**

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Abstract: Gamification has gained significant attention in recent years. Even the cultural heritage has not been unnoticed and various gamification techniques have been applied for different purposes. Bulgaria is among the countries with prominent interest in the matter. Although some successful initiatives have been carried out and are still implemented, there is a lack of systemised knowledge for what does not work well and why, which will help practitioners, researchers, public and local authorities in avoiding making the same mistakes in the future. The objective of the paper is to identify best practices for gamification in Bulgarian cultural heritage. The objective is addressed by providing a context specific framework for selecting best practices on gamification in Bulgarian cultural heritage. Based on a set of 12 gamification criteria and 9 impact criteria and by keeping to a 3-stage procedure, the first two top-rated initiatives have been selected as best practices and briefly described.

Key words: best practice, gamification, cultural heritage

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Introduction

Recently gamification has become a hot topic in a variety of fields and even within a given field it has been converted into a go-to toolset for various purposes (Marques, Pedro, & Araújo, 2023). By creating playful experiences and positively impacting users' attitudes, intentions, and behaviour while encouraging users' engagement, immersion, and active participation, gamification has penetrated all areas and revealed its potential on solving business, social, cultural, educational, and even health problems. In their analytical report, Mordor Intelligence Research & Advisory agency has estimated the gamification market size at USD 15,43 billion in 2024. The study has predicted the gamification market to reach USD 48,72 billion by the end of 2029, expanding at a CAGR of 25,85% between 2024 and 2029 (Mordor Intelligence Research & Advisory, December 2023). The widely spread of gamification and its positive impact, makes it attractive to various stakeholders as a source of knowledge and practices they can learn from.

Practitioners and scholars from all fields are familiar with the idea of best practices (Wu, Liu, & Bretschneider, 2023). However, the challenge is not whether to apply or not to apply the best practice approach. The bigger challenge is to develop a framework and set of criteria for selecting best practices.

Cultural heritage is a fertile area for the application of gamification and the practices in the field encompass various aspects of the heritage work, from heritage education to heritage dissemination. There are both interest and evidence for the power of gamification as a tool for heritage and destination marketing, safeguarding

and preservation of tangible and intangible heritage assets, tourism product design, etc. (DaCosta & Kinsell, 2022; Knah, Melro, Amaro, & Oliverira, 2022). In their paper, Marques et al. have found that most of the research on gamification in cultural heritage has been conducted in Europe and Bulgaria is among the designated countries (Marques, Pedro, Dionísio, Almeida, & Silva, 2022). Unfortunately, there is no study on the best practices for gamification in cultural heritage neither for Bulgaria, nor for any other European country, which could be used by practitioners, scholars or public and local authorities as examples to learn from.

The objective of the paper is to identify and describe best practices for gamification in Bulgarian cultural heritage. The paper addresses this objective by providing a context specific framework for selecting best practices on gamification in Bulgarian cultural heritage. The paper is organised as follows. It starts with a literature review on gamification and its application in various fields. It reveals the adoption of the gamification in the cultural heritage. Next section is dedicated on the methodology, and it covers a 3-stage framework for identification of best practices. The paper continues with the implementation of the proposed framework in Bulgarian cultural heritage and discussion of the top two gamified initiatives identified as best practice for Bulgaria.

1. Adoption of gamification

Game patterns support human development and have a thousand-year history (Huizinga, 1950; Freudmann & Bakamitsos, 2014). In the beginning, games had a socio-psychological nature, but over the time, their purpose expanded and found application in different fields of life (Wiklund & Wakerius, 2016). Deterding et al. (Deterding, Dixon, Khaled, & Nacke, 2011a; Deterding, Dixon, Khaled, & Nacke, 2011b) are among the first scholars who identified the use of game elements in non-game contexts. They have introduced the concept of gamification in the scientific literature and the interest in gamification has grown in recent years. Furthermore, gamification constantly broadens its scope, going beyond just being widespread. By departing from the traditional game structure, it improves user engagement, contentment, and overall experience across many applications (Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2015). Unlike games which are self-contained and defined by the player's interaction with the game itself and framed by its rules, the gamification or gamified application/tool/process involves outward interaction, and it has a purpose outside of just "playing" (Christians, 2018).

Gamification, as part of a rapid digital transformation, progressively affects game thinking, game culture, and digital technologies, resulting in the development of new forms of learning, engagement, and motivation (Nordby, Vibeto, Mobbs, & Sverdup, 2024). Gamification is not only used in digital environments. A significant number of research findings also demonstrate the impact of the gamification on the digital domain, driven by the global digitalisation that affects all aspects of the society and economy. The main objective of gamification is to engage the target audience in an entertaining way through the use of an intriguing game, but in areas that extend beyond entertainment. External incentives in the form of levels, rewards, leaderboards, etc. motivate an engaged target audience, but the inclusion of non-game contexts increases internal motivation, which can permanently change user's behaviour and enable the achievement of goals that would not be reached without the game mechanics (Ryan & Deci, 2000). In addition to the above-mentioned benefits, the widespread application and advancement of gamification raise concerns about its potential drawbacks. The number of mental disorders, addictions, and health issues

resulting from technology misuse steadily rise. On the other hand, the manipulative element of gamification, which can lead users to invest more time and resources in unnecessary things, can have negative consequences (Carrion & Rosales, 2023).

Although all areas of life use gamification, maybe education is the field where gamification is most prevalent because it fosters motivation, boosts student self-participation, and enhances learning outcomes (Cohen, 2011; Kim, 2014; De Santana, Souza, Florentin, Piava, Bittencourt, & Isotani, 2016; Gökalp, Sezer, & Inesi, 2024). Even health industry has been impacted by the gamification. Several studies (Bruggers, Altizer, Kessler, Caldwell, Coppersmith, Warner, Davies, Paterson, Wilcken, D'Ambrosio, German, Hanson, Gershan, Korenberg, & Bulaj, 2012; Al-Rayes, Yaqoub, Alfayez, Alsalman, Alanezi, Alyousef, AlNujaidi, Al-Saif, Attar, Aljabri, Al-Mubarak, Al-Juwair, Alrawiai, Saraireh, Saadah, Al-umran, & Alanzi, 2022) have shown that gamification could positively effect on patients' health by promoting the importance of medication adherence, boosting perseverance, and increasing their motivation to fight diseases. At business level, human resource management uses gamification to support recruitment, determine appropriate incentives for staff, increase employee's motivation, social interaction, and absorption of work-related knowledge (Senderek, Brenken, & Stich, 2015; Stanculescu, Bozzon, Sips, & Houben, 2016).

Marketing is among the business fields with the most profound application of gamification. Gamification is used as a modern marketing, communication and brand management tool to enhance customer engagement, retain customers, raise brand equity and brand love (Ebrahimi, Irani, Abbasi, & Abedini, 2024; Bitrian, Buil & Catalan, 2021; Arya, Sambyal, Sharma, & Dwivedi, 2023), activate positive emotions, increase purchase intentions, customer acceptance (Rodrigues, Oliveira, & Costa, 2016), customer satisfaction and loyalty (Kaur, Lavuri, Parida, & Singh, 2023; Al-Zyoud, 2020; Bauer, Linzmajer, Nagengast, Rudolph, & D'Cruz, 2020), reinforce brand recognition (Arce-Lopera, Avendano, Rodriguez, & Victoria, 2018), optimise brand attitude (Yand, Asaad & Dwivedi, 2017; Chen, 2017), improve customer's shopping experience (Bauer, Linzmajer, Nagengast, Rudolph, & D'Cruz, 2020), effect on positive word-of-mouth and resistance to negative information (Hsu & Chen, 2018), and boost marketing performance of the company (Yang, Xi, Tang, & Hamari, 2023). In the field of finance, gamification affects investor decision-making, trading behaviour, and experience with digital trading platforms (Chapkovski, Khapko, & Zolcan, 2024), as well as it increases the intention to use mobile banking services, and makes banking activities more exciting and engaging for the customers (Rodrigues, Oliveira, & Costa, 2016; Baptista & Oliveira, 2017; Akhtar, Sarea, Khan, Khan, & Singh, 2023). In transport and logistics, gamification promotes green driving (Magana & Munoz-Organero, 2015; Bahadoor & Hosein, 2016; Steinberger, Schroeter, & Walting, 2017), although the risks of its improper application driver distraction and could increase the danger on the road (Günther, Kasperski, & Krems, 2020; Stephens, 2022; Avril, Picco, Lescarret, Lemercier, Arguel, & Caroux, 2024).

In tourism, gamification affects the satisfaction and experience of the target audience through increased interactivity, personalisation, and formation of memories (Aebli, 2019; Pasca, Renzi, Pietro, & Mugion, 2021; Marcao, Santos, & Sampaio, 2024), as well as it involves tourists in eco-efficient practices (Aguiar-Castilo, Clavijo-Rodriguez, Saa-Perez, & Perez-Jimenez, 2019). Gamification is an innovative approach that helps to create tourism services and experiences that are appropriate to time and demand. The principle of applying game elements to motivate tourists and

their interaction with the tourist destination becomes an increasingly popular way to attract tourists' attention and build emotional attachment.

Linking gamification with cultural tourism primarily aims to capture tourists' interest and inspire them to visit destinations reflecting cultural legacies. The main objective is to utilise the potential of the mechanics applied in games, by providing visitors an opportunity to accumulate points, badges, or achievements for their efforts and achieved results, which rank them ahead in the game, while, in parallel, they can gain knowledge, learn stories, facts, and events related to the included cultural objects and/or sites. Along with getting to know cultural and historical heritage, the main goal of gamification in tourism is to create experiences for tourists that are more impactful, interactive, and memorable. Applying the gamification concept contributes to adding value to cultural tourism products. This creates a stronger connection with visitors, turning the cultural heritage into an educational and attractive centre.

There are several ways to use game mechanisms to promote and preserve cultural and historical heritage, some of which are associated with elements like:

- Marking – the participant (i.e., the visitor) receives badges or stamps for completing challenges or visiting specific places,
- Competitive aspect – placing participants in a competitive position to gain points as a reward for accomplishing a challenge or assignment,
- Ranking – determined by a variety of criteria, including the number of monuments or sites visited, the distance travelled, and other factors that are necessary to achieve specific levels,
- Narratives – stories or missions that involve overcoming obstacles or solving riddles as a component of gaining a understanding of the cultural heritage sites,
- Customisation – the visitor's routes are selected in a way that corresponds more to their interests,
- Awards – providing rewards to participants.

By increasing visitors' awareness and dedication, these gamification elements successfully enhance the promotion and conservation of cultural and historical assets. The historical and cultural heritage of the location where tourism is occurring serves as the basis for the majority of gamification applications in cultural tourism. Cultural tourism is increasingly using gamification as a marketing technique and strategy to boost engagement. This has contributed to the development of numerous game applications which enrich the visitor experience. Some of the game applications present virtual tours, interactive quizzes, and chasing badges as rewards for achievements, with the main goal being to create visitor engagement and encourage them to explore and gain new knowledge on the cultural sites and attractions involved.

Some of the most widely used gamification applications in cultural tourism are:

- Historical or cultural scavenger hunts. The goal of these applications is to encourage visitors to explore a destination and its sights by completing tasks or uncovering clues related to its history or culture.
- Virtual heritage tours. The essence of these applications lies in exploring historical and cultural sites via virtual tours, allowing users to get to know them remotely without the need to be physically present there, using 3D reconstructions of ancient ruins, historical buildings, and other significant cultural landmarks.

- Interactive quizzes and trivia gamified applications. They test visitors' knowledge of the destination's history, art, architecture, and traditions, which form the foundation of these gamified applications. In this way, the goal is to improve tourists' knowledge on the cultural significance of the places they visit.
- Augmented reality experiences. These types of applications use augmented reality to overlay information on top of the physical environment, creating interactive experiences that combine the real world with digital content.

At its core, the integration of gamification into cultural tourism transforms the way visitors engage with and appreciate cultural heritage.

Often, the promotion of tangible and intangible cultural heritage faces many communication challenges (Cunha, Mendonca, Morais, & Carvalho, 2018; Varinlioglu & Halici, 2019), which could be overcome by gamification, placing users at the core of the experience while simultaneously encouraging them to establish a strong bond with the cultural heritage (Thomas, Bader, Thomaschewski, & Rauschenberger, 2021; Casillo, Colace, Marongui, Santaniello, & Valentino, 2024) and develop a sense of belonging.

The use of gamification is widely spread in cultural heritage. Even within the cultural heritage field, its application objectives vary from safeguarding of digital intangible heritage resources (Alivizatou, 2019) to usage as a tourism marketing tool for deeper engagement with visitors and experience development (Xu, Weber, Buhalis, 2013; Xu, Tian, Buhalis, Weber, & Zhang, 2015) and crowdsourcing cultural heritage (Constantinidis, 2016; Seitsonen, 2017).

In Bulgaria, the application of gamification in cultural heritage was discussed by the scholars (Kovatcheva & Palikova, 2017; Stefanov, Bontchev, Boytchev, Georgiev, & Grigorov, 2017) first in 2017, primarily as a *strategy for learning* and improving educational outcomes of learners, as well as increasing their motivation, curiosity, creativity, skills, competences, and logical thinking (Paneva-Marinova & Pavlov, 2018; Paneva-Marinova, Rousseva, Dimova, & Pavlova, 2018; Luchev, Paneva-Marinova, Pavlov, Senka, & Pavlova, 2020; Krasteva & Alexova, 2023). Numerous studies highlight the *potential pitfalls of implementing gamification incorrectly in education* (Vitanova, 2019). These include the generation of "rewards for nothing", the exacerbation of team disparities, and the demotivation of lagging participants. Additionally, gamification can negatively impact traditional training approaches, methods, and forms, fostering a competitive environment that worsens the classroom atmosphere, and overloading learners with too many gamification elements, which can lead to a decrease in concentration and a loss of focus and attention. Other areas of gamification that Bulgarian authors have explored are the involvement of users in *the process of preservation and protection of cultural heritage* (Kouzov, 2019; Moumoutzis, et al., 2020; Georgiev & Nikolova, 2021; Dankov & Dankova, 2023) and its application as a strategy to promote sustainable climate practices and reduce negative climate effects (Bontchev, Antonova, Terzieva, & Dankov, 2022). Some authors (Dimova, 2017; Ivanova & Kadurin, 2020) are interested in gamification of cultural heritage as an *approach to attract visitors* through an interactive user experience. Other authors (Mileva, Assenova, Petrov, & Gyrova, 2020) have conducted a situational analysis of gamified location-based applications as a means of promoting a tourist destination in Bulgaria. Their research has identified the factors that contribute to the success and popularity of the gamification in Bulgaria's cultural heritage field. Among these factors are both the use of the built-in functionalities of the device (camera, microphone, GPS, the ability to work online and offline, etc.),

which makes it convenient to explore destinations and create a unique user experience and lasting memories of the adventure, and the linking of geolocation with gamification, which turns the game into a "play while you are here" experience, encourages on-site engagement, and increases visitor's awareness.

Despite the growing scientific interest and the existence of successful practical examples, more comprehensive research is required to explore the effective use and long-term viability of gamification in promoting and preserving Bulgaria's cultural heritage in the context of rapid technological advancements.

2. Implementation of the best practice approach to gamification in cultural heritage

For many years, cultural heritage has faced serious challenges due to human and natural factors, globalisation, and transformation of the society (Garcia-Fernandez & Medeiros, 2019; Skovfoged, Viktor, Sokolov, Hansen, Nielsen, & Rodil, 2018). That is why, it is more than urgent to consider and apply technologies and approaches, with proven potential to enrich cultural heritage environments, such as gamification, to preserve cultural heritage (Rubegni, Di Blas, Paolini, & Sabiescu, 2010), engage more people with safeguarding of cultural artefacts and sites, promote its better understanding and appreciation among current and future generations, and foster sense of belonging (Marques, Pedro, Dionísio, Almeida, & Silva, 2022; Garcia-Fernandez & Medeiros, 2019; Petridis, Dunwell, Liarokapis, Constantinou, Arnab, de Freitas, & Hendrix, 2013).

The importance of safeguarding cultural heritage and existence of successful examples of the application of the gamification in cultural heritage (Baptista & Oliveira, 2019; Garcia-Fernandez & Medeiros, 2019; DaCosta & Kinsell, 2023), allow to identify 'best practices' and apply the lessons learned from experience to engage communities with cultural heritage preservation and revalorisation. There is value in learning from others and understanding what works and what not.

Best practices approach is widely used in many fields, from *education* (Peters & Heron, 1993) to *business* (Dani, Harding, Case, Yuong, Cochrane, Gao, & Baxter, 2006), *heritage management* (Sodangi, Khamdi, Idrus, Hammad, & AhmedUmar, 2013), *public management* (Wu, Liu, & Bretschneider, 2023), *risk management* (Rana, Wickramasinghe, & Bracci, 2019), and even *medicine, public health* (Ng & de Colombani, 2015), and *family planning* (WHO Regional Office for Africa, 2017). However, various definitions and frameworks exist. The criteria for selecting best practices and definition of the term vary from field to field. 'Best practice' is defined as a technique or method that, through experience and research, has proven reliably to lead to the desired result (WHO Regional Office for Africa, 2008); standard or set of guidelines that is known to produce good outcomes if followed (WHO Regional Office for Africa, 2017); practices that specific groups believe are more effective at delivering particular outcomes than other practices, and are subsequently used as benchmarks to strive for (Andrews, 2012). Best practice is conceptualised as a knowledge about what works well in specific situations and contexts, achieves the desired results, and can be used to develop and implement solutions adapted to similar problems in other situations and contexts (Smokova, Markques, Simões, Mateus, Miloiu, Musteață, & Parashkevova, 2024).

Regardless the field of their application, best practices hold some specific features that should be considered in their conceptualisation:

- The term ‘best’ should not be used in superlative sense. Best practices are not considered to be the perfect practices. They are ‘best’ regarding specific criteria and among specific projects.
- Best practices could be used as a benchmark as they are usually evidence-based. Their integral parts are documentation and application of the lessons learnt on what works well and what facilitates it, as well as what does not work well and what the reasons for non-working are. The general idea is to improve other projects by avoiding making the same mistakes.
- Selection and documenting of best practices should not be conducted in vain. Best practices and lessons learnt need to be shared and adopted to benefit more people and/or organisations.

Although there is plenty of definitions, to apply the best practices approach for selecting projects on gamification in cultural heritage, it is necessary to develop a specific selection framework and unambiguously to conceptualise the term ‘best practices’ in the context of gamification in cultural heritage. In this paper, the working definition proposed by Smokova et al. (Smokova, Markques, Simões, Mateus, Miloïu, Musteață, & Parashkevova, 2024) has been adopted. The definition states that the ‘best practice’ could be conceptualised as a learning tool, knowledge on what gamification tools applied to cultural heritage work well, achieve the desired outputs and outcomes, generate multiplier effects, and engage the target audience.

Identification of best practices for gamification in cultural heritage requires a selection framework as well. In this paper, a 3-stage procedure for identification of practices and differentiation of those which are considered to be ‘the best’ has been proposed. First stage is called ‘*Research stage*’ and it concerns conducting desk research and working primarily with secondary data. It also covers collecting primary data by experiencing, i.e., research by installing a gamified application and/or visiting the heritage sites. In this research, the *Research stage* was conducted in March 2024. To identify best practices for Bulgaria, the research work has not been restricted to academic content and English language. A wide type of sources has been used, varying from scientific articles and conference papers, publications on corporate, tourism, or community websites, articles and interviews in newspapers, communication materials, personal experience, and observation. A combination of keywords represented by the statement (“gamification” OR “gamified application” OR “gamified process” OR “gamified tool”) AND (“heritage” OR “cultural heritage”), both in Bulgarian and English languages, has been used in searching for Bulgarian practices. To differentiate Bulgarian cultural heritage, the term AND “Bulgaria” has been added to the general statement in English language. The search has resulted in a large list of sources. The sources have been scrutinised for relevance, overlapping, completeness of information. As a result of the research work, a list of 16 active (ongoing) projects on the application of gamification in Bulgarian cultural heritage has been composed.

Second stage is called ‘*Assessment stage*’ and it encompasses various activities related with the design/adoption of criteria for selecting best practices, involvement of raters, allocation of projects among the raters, critical assessment of the projects and characterisation, measurement of inter-rater agreement, calculation of project scores and ranking of the projects. In this paper, the list of criteria proposed by Smokova et al. (Smokova, Markques, Simões, Mateus, Miloïu, Musteață, & Parashkevova, 2024) has been adopted. The authors have proposed and explained in detail two groups of criteria for selecting best practices for gamification in cultural heritage. First group includes the so called ‘*impact criteria*’ and they encompass 9 criteria organised in 4

sub-groups – performance (*effectiveness, sustainability*), accessibility and inclusion (*accessibility, inclusion*), innovation and creativity (*originality, creativity*), and social and cultural impact (*social development, enhancement of social culture, multiplier effects*). Second group, referred to as ‘*gamification criteria*’, is inspired by the gamification heuristics designed by Tondello et al. (Tondello, Kappen, Ganaba, & Nacke, 2019) and encompasses 12 criteria – intrinsic motivation heuristics (*purpose and meaning, challenge and competence, completeness and mastery, autonomy and creativity, relatedness, immersion*), extrinsic motivation heuristics (*ownership and rewards, scarcity, loss avoidance*), and context-dependent heuristics (*feedback, unpredictability, change and disruption*).

At this stage, the identified projects, which represent Bulgarian experience on gamification in cultural heritage, have been allocated between 14 raters so that each project to be assessed by two raters. Two-rater assessment is required to avoid subjectivity and provide more unbiased assessments. Raters’ assessments were carried out in April and May 2024. Before the assessment, all raters have passed a practical training on how to apply and interpret the criteria, what rating scheme to use, how to document all assessed projects, and how to characterise them. The task of the raters was to assess the assigned project regarding the adopted best practice criteria by using a unified 6-point rating scale for all criteria, where 5 was awarded if the level of a given criterion was very high, 4 – if it was high, 3 – if it was neither high, nor low, 2 – if it was low, 1 – very low, and 0 – in case of no existence, no value, no applicability of the criterion. Their task was also to characterise the projects regarding the cultural heritage involved, categorise it as tangible, intangible, or natural, classify it as local, national or international, describe the gamification process and gamification tools used, and define if the project is community-based and concerns a low-density territory.

After the assessment of all projects, a inter-rater reliability has been measured for each pair of assessments. Intraclass correlation coefficient (ICC) has been calculated for all assessed projects. ICC is widely used measure of reliability of ratings and amount of consistency between the ratings of the different raters. It is based on Repeated-measures ANOVA (Two-Factor ANOVA without replications procedure in MS Excel). ICC is above the threshold value of 0,60 for 13 of 16 projects, which indicates existence of substantial or better level of agreement. The three projects with a poor reliability of ratings (below 0,51) have been assigned for assessment by a third rater. After the third raters’ assessments, all projects have demonstrated an acceptable inter-rater reliability and their ratings have been further aggregated.

Last stage is called ‘*Ranking stage*’ and it covers activities related with calculating the final score for each project, sorting the projects in descending order according to their final scores, and identifying the best practices. The final score of a project has been calculated in 3 steps. It was conducted in May 2024. On the first step, the relative rate per group of criteria has been calculated by dividing the rates given by the rater to each of the criterion composing a specific group of criteria (3 gamification and 4 impact groups of criteria) to the sum of the maximum rates for the group (e.g., if a group is composed of 6 criteria and the maximum rate for each criterion is 5, the sum of the maximum rates for the group is 6x5 or 30). On the second step, the average of the relative rates of the groups of criteria has been derived by dividing the sum of the relative rates for all groups of criteria to 7. This average rate is considered to be the rater’s project score. At the last step, the final project score has been calculated by averaging raters’ project scores for all raters involved in the assessment of a given project.

The final project scores for the 16 assessed projects vary between 27,86 for the to 75,71 (Figure 1). Most of the projects (14 of 16) encompass tangible aspects of the cultural heritage, and 2 of them cover elements of intangible and natural heritage. The local heritage is addressed in 5 of 16 projects. The other 11 projects are focused on national (3 of 11) and international cultural heritage (8 of 11). Most of the assessed projects (13 of 16) are community-based. A community has not been involved neither in the project design nor in the project development and aftermath for 3 of the projects. Only 4 of the projects being assessed are focused on low-density territories in Bulgaria.

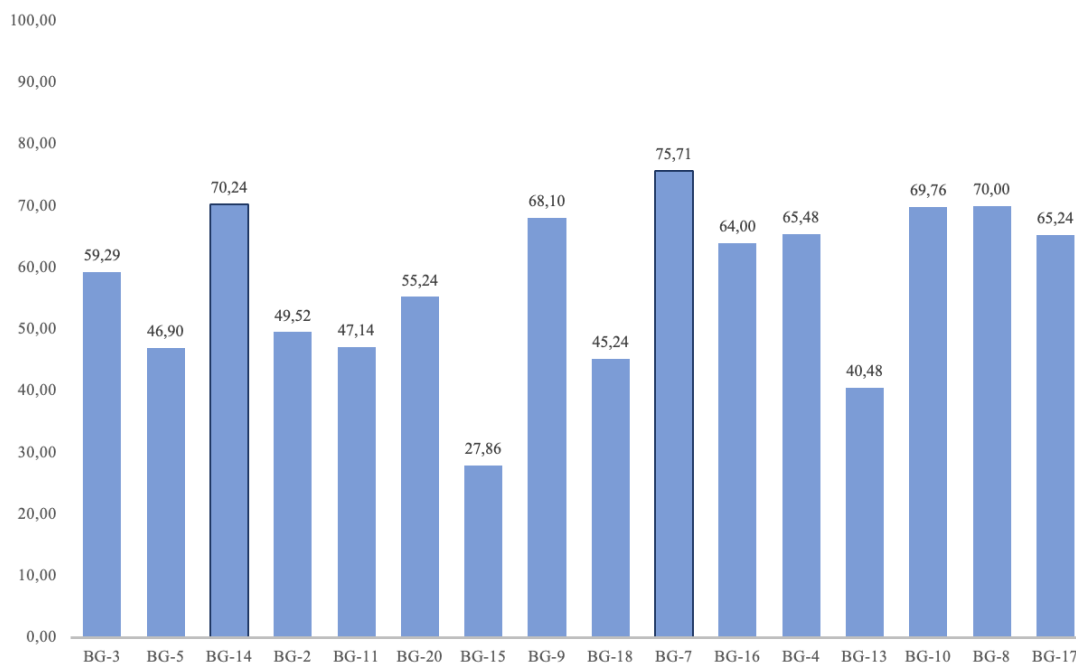


Figure 1. Final scores for all assessed projects
Source: Authors research

Initiatives utilise various digital and analogues technologies and tools varying from mobile apps to QR codes, geolocations, storytelling, 360° VR, 3D visualisations and even paper maps, which allow to immerse and engage the visitors by unlocking content, solving puzzles and riddles, answering questions, and collecting points, badges, receiving medals and moving ahead on a leaderboard.

3. Best practices for gamification in Bulgarian cultural heritage

The application of gamification in Bulgarian cultural heritage has a long history. It began in 1966 with the launch of the national movement "Know Bulgaria – 100 National Tourist Sites", initiated by the Bulgarian Tourist Union. It is still active today, but, in recent years, it is in the process of updating and digitalisation. Over the years, other applications of gamification in cultural heritage have been launched. Some of them are still active, others have been withdrawn due to different reasons. In this paper, 16 active projects on gamification in Bulgarian cultural heritage have been studied, assessed on the established 21 impact and gamification criteria for best practices selection and ranked in accordance with their final score granted. The top-ranked projects are “Belogradchik highlights: A high wizard's legacy” with a final

score of 75,71. The project ranked on second place is “Roman Plovdiv – urban game” with a final score of 70,24 (Figure 1).

3.1. Best practice 1: “Belogradchik highlights: A high wizard's legacy”

Description of the best practice

Belogradchik Highlights: A High Wizard's Legacy (Belogradchik Highlights: A High Wizard's Legacy, 2023) is a real-life city exploration gamified application in which participants have the opportunity to get to know 10 historical places in Belogradchik, incl. the Fortress of Belogradchik, the Church of 'St. George The Victorious', the Astronomical Observatory of Belogradchik, etc. The objective of the project is to increase awareness of the places located in Belogradchik, some of which are placed in the UNESCO's world heritage site list. By offering a gamified environment, the application tries to push the participants to visit Belogradchik's most iconic locations, meet Bulgarian war heroes from throughout the ages, explore Bulgaria's naive and intuitive art scene, admire the unique local Balkan architecture, visit an ancient mosque since 1751 and hear its tale of tragic romance. This local initiative is focused primarily on the tangible cultural heritage with international significance, located in a low-density territory.

Logical challenges for visitors are of the "problem solving" type to move forward in the game and reach the end of the route and the tale. Every participant must physically present at these places. The individuals with the highest scores receive medals, specifically gold, silver, and bronze, on a leaderboard. To play the game, it is necessary to use a smartphone or tablet on which the Questo app is installed.

A quest usually takes between 60 and 120 minutes to complete, depending on the participant's speed. The routes pass by the most important sites while offering a glimpse of places and stories that may be overlooked by regular tourism.

The target group is foreign tourists. The gamified applications are available in English, and the plans are to add more languages in the future.

Questo App (Questo: Play & Explore Fun Tours by Local Storytellers, 2017; Vasiliu, 2017), on which the practice is based, was developed by a Romanian startup in 2017 on the principle of the so-called a quest or quiz about interesting and authentic tourist sites. App users become “discoverers” following riddles, hints, clues, and questions. The app has been a huge success, receiving an award from the World Trade Organization for innovative start-ups and a winner of people's choice award at Phocuswright Europe 2019 (Florian, 2019).

The platform is developed for mobile devices. According to Startups&TheCity, the Questo app can be purchased for iOS and Android, via TripAdvisor, GetYourGuide and Booking.com at prices ranging from 8 to 30 euros. Questo is also a previous winner of the Booking.com Booster Lab 2018 in Tel Aviv. For Belogradchik Highlights, the advertised price is in the lowest price range.

The creators of Questo work with local tour guides, local historians, tour operators, with 70% of the revenue going to those who develop the content of the tours in the local destination, and the remaining 30% is retained by the platform for the provision and marketing service. The 70:30 practice applies to all mobile and web application providers to platforms such as Google Play, App Store, Microsoft Store, Amazon Store, and others. The common feature of all applications analysed as gamification practices is that they use as a supporting foundation tourist attractions and resources of the destination, highlighting the place and the role of cultural and historical heritage (Mileva, Assenova, Petrov, & Gyurova, 2020).

Assessment results of the best practice

The assessment of Belogradchik Highlights has gone through assessment of 12 gamification and 9 impact criteria. The ratings awarded to the gamification criteria are presented on Figure 2. The gamification criteria ($\mu=3,22$) have been assessed by three dimensions. The dimension ‘*intrinsic motivation heuristics*’ ($\mu=3,43$; $\sigma=1,59$) has highest contribution, followed by ‘*context-dependent heuristics*’ ($\mu=3,27$; $\sigma=2,31$) and ‘*extrinsic motivation heuristics*’ ($\mu=2,73$; $\sigma=1,90$).

The highest ratings for the group of ‘*intrinsic motivation heuristics*’ have been awarded to the ‘*purpose and meaning*’ criterion ($\mu=4,80$), followed by ‘*completeness and mastery*’ ($\mu=4,60$), ‘*relatedness*’ ($\mu=4,60$), and ‘*immersion*’ ($\mu=3,60$). This means that the gamified application allows the users to achieve a meaningful goal that is important to them, while, by offering a series of tasks, they can increase their competence, and receive a virtual reward – a leaderboard of participants who have ever played the game. In addition, users have the possibility of social integration with other potential participants through joint games or via comments in the review section of the game. The fantasy story that participants must unravel within the game relates real-world locations with fictional first-person stories, allowing users to be transported into an imaginary world. Lowest ratings for the group ‘*intrinsic motivation heuristics*’ have been awarded to the criteria: ‘*challenge and competence*’ ($\mu=1,00$) and ‘*autonomy and creativity*’ ($\mu=2,00$), which means that the offered challenges neither help users to increase their competence, nor provide possibilities for self-expression.

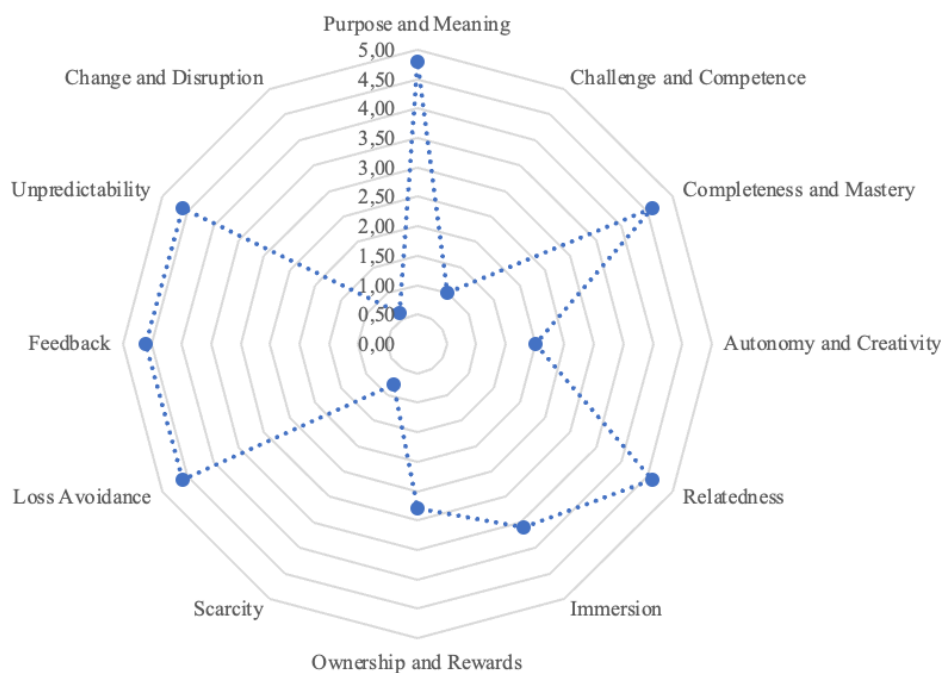


Figure 2. Average ratings of gamification criteria for best practice 1
Source: Authors research

In general, the group of ‘*extrinsic motivation heuristics*’ criteria has been rated lowest. Highest rating within the group has been awarded to the criterion ‘*loss avoidance*’ ($\mu=4,60$), followed by ‘*ownership and rewards*’ ($\mu=2,80$). This project

lacks ‘*scarcity*’ ($\mu=0,00$). As the gamified application uses an all-time leaderboard, it pushes participants to rush through the game so they can rank higher and fight for gold, silver, or/and bronze virtual medals. The participation does not provide special rewards or achievements outside of the specified leaderboard.

The top-rated criteria within the group of ‘*context-dependent heuristics*’ criteria are ‘*feedback*’ ($\mu=4,60$), as participants are able to track their progress and reveal the next tasks and challenges in real time, and ‘*unpredictability*’ ($\mu=4,60$), as the next task is unknown which make it difficult to make assumptions. As the initiative does not allow participants to change the rules of the game neither for improvement, nor for abuse, the criterion ‘*change and disruption*’ has been ranked the lowest ($\mu=0,60$).

It could be summarised that the advantages of the best practice “Belogradchik Highlights” are related to its gamification mechanisms for involving users in an imaginary story with real places that carry the spirit of challenge, urgency and the unknown, the possibility of virtual reward and social integration during and after the game. However, outside of its scope remain the creativity and self-expression of users, as well as the possibility of special and prestigious rewards, there is no free choice between several options, as well as opportunities for improvements to the game by users.

The ratings awarded to the impact criteria are presented on Figure 3. Impact criteria ($\mu=4,20$) are covered by four dimensions. The dimensions ‘*performance*’ ($\mu=4,60$; $\sigma=0,00$) and ‘*accessibility and inclusion*’ ($\mu=4,60$; $\sigma=0,57$) are top-ranked being rated with the highest ratings, followed by ‘*innovation and creativity*’ ($\mu=4,20$; $\sigma=0,28$) and finally, ‘*social and cultural impact*’ ($\mu=3,67$; $\sigma=0,64$) with a rating below the group average. The best practice “Belogradchik Highlights” raises community awareness of the cultural heritage located in low-density area of Belogradchik. Although the gamified application has been launched in 2023, it is a part of a platform with a proven long-term viability.

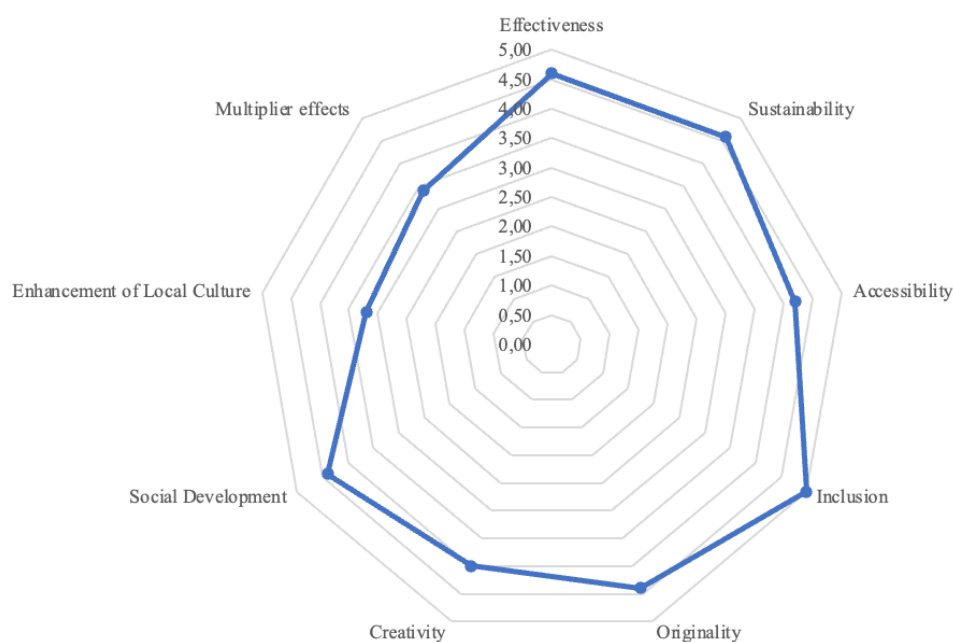


Figure 3. Average ratings of impact criteria for best practice 1
Source: Authors research

'Accessibility' ($\mu=4,20$) and 'Inclusion' ($\mu=5,00$) are related to providing equal access to all users who have a mobile device. Regardless of the brand, they can install the application and play. The gamified application is inclusive and offers social integration by cooperating with up to three participants at preferential prices regardless of gender, age, race, nationality, etc.

The dimension '*innovation and creativity*' has been rated high through the criteria '*originality*' ($\mu=4,40$) and '*creativity*' ($\mu=4,00$). In the gamified application, they are manifested through the unique plot, which offers a unique experience in real sites and imaginary events and characters in the spirit of ancient eras.

The last dimension '*social and cultural impact*' has been represented by the criteria '*social development*' ($\mu=4,40$), '*enhancement of local culture*' ($\mu=3,20$) and '*multiplier effects*' ($\mu=3,40$). An important role in the gamified application is the establishment of a community of people who play or have played the quest, while simultaneously offering immersion in local culture, religious practices and experiences that generate spin-off and spin-over effects.

It could be summarised that the best practice "Belogradchik Highlights" is both effective and sustainable. It is extremely easily accessible, socially integrative, innovative, and creative, while, at the same time, it promotes the cultural heritage of Bulgaria, meets or even exceeds the intended objectives and generates multiple multiplier effects.

Lessons learnt from the best practice

One of the main advantages of the best practice "Belogradchik Highlights" is that it can be played 24/7 by one person, in pairs or in larger groups and even in competition with each other, due to its autonomy from local participation (e.g. on tour guides). The application has the potential to involve users even more actively in its mechanics by allowing a free choice between several variants of routes and stories, an opportunity for creativity and self-expression – options to create a personalised avatar or own distinctive badges and special prestigious awards (e.g., for master level when playing the route more than 3 times, for "biggest party" if played by many users at the same time, etc.). It is possible to create improved or changed editions of the gamified application, as a result of user recommendations, etc.

One of the biggest challenges that the practices for gamification in Bulgarian cultural heritage face is to ensure the sustainability of the solutions. That is why they often have a short life cycle. Integrating the game concept within an already established and working application/platform ensures its sustainability, which allows minimising the investment for development and maintenance of a separate application.

At the same time, it is striking that the gamified application is not promoted at the municipality or district level and is completely absent from the tourist entertainment map at the local tourist information centre (Tourist information center Belogradchik fortress, 2023), relying on distribution primarily within the Questo App advertising campaign. In Bulgaria, however, access to the gamified application can be found through the website of a neighbouring regional city – Vratsa (located in the same region) (Questo – Gemified Routes, 2023), which promotes games to explore the cultural heritage in North-West Bulgaria through the Questo application.

Another drawback of the best practice 'Belogradchik Highlights' is that, since its launch, it has been primarily oriented towards international visitors. The gamified

application is offered only in English and there is no Bulgarian translation yet, which hinders its broad adoption, especially within locals. As the Plan for integrated development of Belogradchik municipality (Integrated development plan of Belogradchik municipality for the period 2021-2027, 2023) highlights that no interventions in the gamified tool are foreseen to promote the destination and there is no partnership with providers of such type of service to attract visitors who wish to explore the sights of the place by gamification. This indicates that gamification in Bulgaria has not yet been recognised by the local public authorities as a place promotion strategy and its potential opportunities for attracting visitors and expansion have not yet been exploited.

Concluding remarks on the best practice

Despite the identified drawbacks of the initiative, it is classified as the best because, in addition to good results, it also has a great potential for development and an undeniable impact. The use of an already established and working application increases its sustainability, but it is necessary to extend the popularisation of the project on local level to harness its potential impact on increasing the attractiveness of the place and generating multiplier effects for the community. The inclusion of other games within this application will promote Bulgaria's rich cultural and historical heritage and increase its appeal to both foreign visitors and local communities.

3.2. Best practice 2: “Roman Plovdiv – urban game”

Description of the best practice

The initiative “Roman Plovdiv – urban game” has been launched with the aim of popularising the ancient sights of the modern city of Plovdiv, which is the second largest city in Bulgaria and it has a rich history. Over the years it has had different names, such as Eumolpia, Filipopol, Pulpudeva, Trimontsium, Puldin, Philibe and others. These names carry layers of different cultures related to the historical processes of this place over the centuries. This makes Plovdiv suitable for creating gamified models. The city gamified application has been developed that provides an opportunity for city visitors to get to know historical sites with different purposes (e.g., worship, art, knowledge, authentic parts of stadiums, theatres, forums, and others), which have been mostly preserved since ancient times. Although Plovdiv is a relatively popular destination, the creators of the game recognised the need to introduce a more user-engaging way to offer an experience combining cognitive, tourist and team aspects.

“Roman Plovdiv – urban game” is intended to solve a problem that is significant for the historical tourism of famous sites, namely the gathering of a large number of visitors in certain time periods, most often determined by the periods of traditional organised visits. The gamified application provides the visitors with flexibility and possibility to individually choose the most suitable time for participation. It is available for playing 24/7. Although its geographical connectivity is entirely local, its impact could also be sought at a national level, as the experience could be often continued by visiting other ancient tourist destinations. An essential aspect is the focus on community involvement. The gamified application allows building a network of interactions between the participants, on the one hand, letting them to play in a team, and between the virtual and real environments, on the other hand, due to the requirement that participants walk around physical sites.

“Roman Plovdiv – urban game” involves interactive adventures within real city routes. It creates a unique experience by integrating exploration activities, solving

puzzles, overcoming challenges and teamwork. One of its advantages is, unlike a traditional treasure hunt, “Roman Plovdiv – urban game” includes a specific theme (i.e., mission). The Ancient Plovdiv game itself is one of the five missions developed by 2024, which, creates emotions and experiences through an engaging and exciting customer experience for the participant. This is a basis for permanent memorisation of facts and circumstances.

In terms of content, the best practice includes a tourist tour of 16 ancient sites in Plovdiv within a range of 2.5 km. The real tour is accompanied by a web-based game allowing participation in a team of 1 to 5 participants. During the tour, “Roman Plovdiv – urban game” acts as a virtual guide, while, at the same time, offers an interactive engagement by posing puzzles that unlock the next stage of the game. The mission is synchronised between participants via their devices, so if one participant solves a puzzle, all participants in the team will unlock the next one. This has a positive impact on team development, cohesion, and contribution to the common cause, making the gamified application suitable for inclusion in team building programmes.

A gamification approach is also applied in the point system used which ranks the best performing users. The working languages are Bulgarian and English, which allows both locals and foreign tourists to get involved. The range of target groups is wide and can include researchers, family, friends, work teams, etc., without age restrictions. Access to the game is paid, and its purchase is through various online platforms. The game subscription code purchased has a long validity period of 3 years, giving participants more flexibility in terms of their time commitment. The mission can be stopped at any time in view of weather conditions, the occurrence of commitments of the participants, the desire to extend the user experience, etc. Participants have a high degree of autonomy in the gamified application and technical support from the development team is available at any time.

Assessment results of the best practice

Information about the gamified application is distributed both through the official website of the developers and some popular international platforms for travel services such as Tripadvisor and GuideandGo. The ratings based on user reviews are between 4 and 5 on a 5-point scale, which are in full compliance with the assessment criteria proposed in this paper.

Figure 4 and Figure 5 show the assessment on both groups of criteria – gamification and impact. In general, the gamification criteria ($\mu=3,00$) have been assessed lower than the impact criteria ($\mu=3,39$). The dimension ‘*intrinsic motivation heuristics*’ ($\mu=3,50$; $\sigma=0,84$) has highest contribution, followed by ‘*context-dependent heuristics*’ ($\mu=3,33$; $\sigma=0,29$) and ‘*extrinsic motivation heuristics*’ ($\mu=1,67$; $\sigma=1,44$).

The highest ratings for the group of ‘*intrinsic motivation heuristics*’ have been awarded to the ‘*relatedness*’ ($\mu=4,50$), followed by ‘*purpose and meaning*’ ($\mu=4,00$), ‘*autonomy and creativity*’ ($\mu=4,00$), and ‘*immersion*’ ($\mu=3,50$).

In general, the group of ‘*extrinsic motivation heuristics*’ criteria has been rated lowest. Highest rating within the group has been awarded to the criterion ‘*loss avoidance*’ ($\mu=4,60$) and ‘*ownership and rewards*’ ($\mu=2,80$), and lowest – to the criterion ‘*scarcity*’ ($\mu=0,00$).

The top-rated criteria within the group of ‘*context-dependent heuristics*’ criteria are both ‘*feedback*’ ($\mu=3,50$) and ‘*unpredictability*’ ($\mu=3,50$).

It can be summarised that the best practice “Roman Plovdiv – urban game” helps users to satisfy their intrinsic need of autonomy by offering meaningful choices, opportunities for self-expression and relatedness through social interaction, usually with other users.

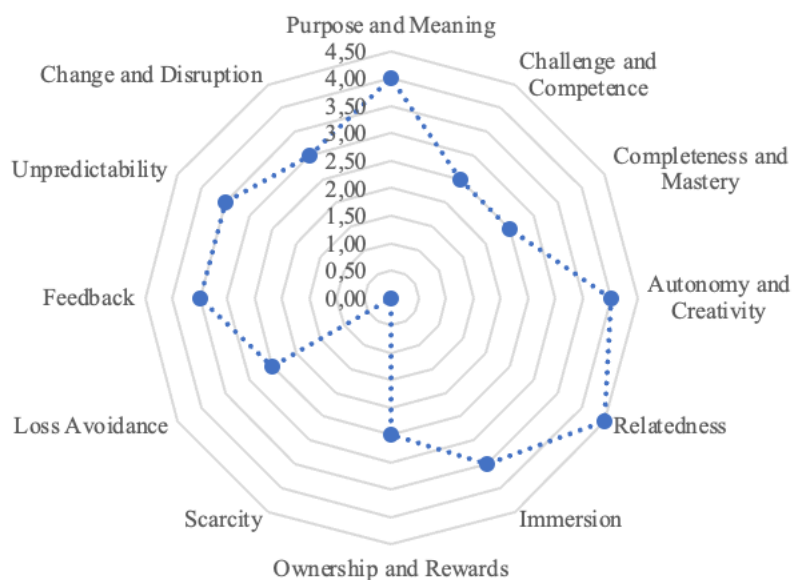


Figure 4. Average ratings of gamification criteria for best practice 2
Source: Authors research

The ratings awarded to the impact criteria are presented on Figure 5. Impact criteria ($\mu=3,39$) are covered by the dimensions which concern the performance and impact of the best practice. Top-ranked dimensions are ‘*accessibility and inclusion*’ ($\mu=4,25$; $\sigma=0,35$), followed by ‘*innovation and creativity*’ ($\mu=4,00$; $\sigma=0,00$) and ‘*performance*’ ($\mu=3,75$; $\sigma=1,06$), which contribute most the final score. The dimension ‘*social and cultural impact*’ ($\mu=2,17$; $\sigma=0,76$) has received the lowest rating which is below the group average of 3,39. The best practice “Roman Plovdiv – urban game” works well, achieves desirable results, and meets the prespecified objectives. It allows all audiences to benefit the initiative and its outcomes, to experience it and be engaged with the settings and the characters.

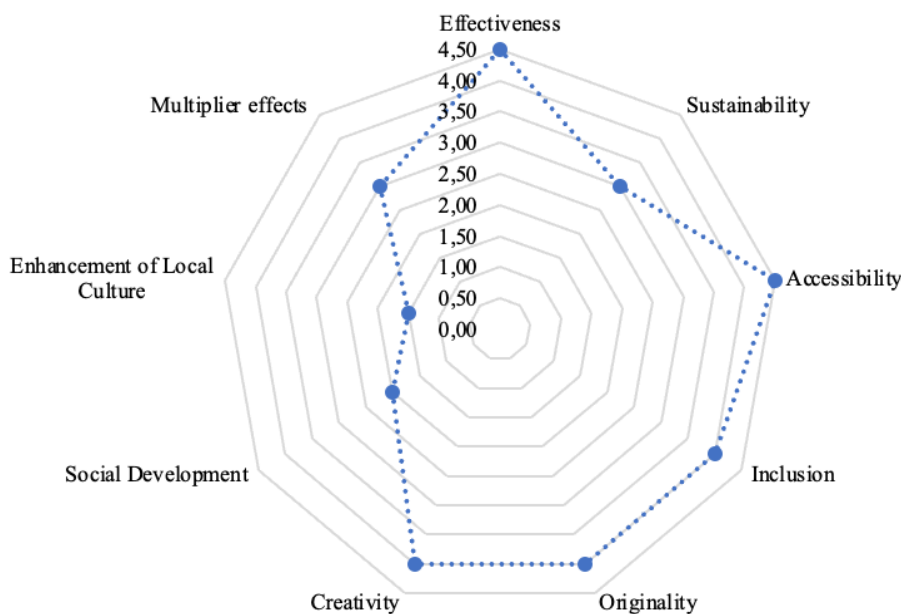


Figure 5. Average ratings of the impact criteria for best practice 2
Source: Authors research

Lessons learnt from the best practice

Gamification, as a tool to engage participants, is a forward-looking approach that comes in response to the growing demands and expectations of users. The best practice “Roman Plovdiv – Urban game” fully follows this model by offering a combination of virtual and real experience. In this way, users have the opportunity to physically visit ancient historical sites, which is a suitable way to intensify perceptions compared to a fully digital tour. As strengths of the best practice (some of them have a long-term positive impact) could be pointed out:

- The possibility of team participation, which can have a highly motivating effect and enhance the hedonism of those involved.
- Bilingual option for choosing the game (Bulgarian and English), so the gamified application allows international participation.
- Stimulating psychological mechanisms based on achieving the goal and distinguishing the best one.
- Provision of a scientifically based information. The facts about the visited sites are presented in an accessible language and in an intriguing way, which makes the participants immerse themselves in time.
- Challenge is tightly integrated into the game, as solving puzzles unlocks the next stage of the game.
- Flexibility – both in terms of time to visit the sites and start the game, and in terms of interruption and continuation from the same place at a desired time. The game is available 24/7.
- Focus on the customer – provided technical assistance from the development team in case of difficulties.
- Absence of a rigid schedule, i.e., the validity of the subscription is long, which makes allows people to share experiences and create memories.

The best practice “Roman Plovdiv – Urban game” has room for improvement. These are generally:

- Expansion of communication channels to promote the game, including by networking with tourist operators, tourist information centres, etc. Seeking more diverse and widely available channels to spread information about the game.
- Integrating the game into a wider tourism product to ensure greater efficiency and effectiveness.
- Diversification of marketing interventions, including by communication channels and messages.
- Minimising technological limitations by introducing the possibility to download a mobile application.
- In-game integration of augmented reality, virtual reality or mixed reality, based on user feedback.

It is extremely important to note that the best practice “Roman Plovdiv – Urban game” is committed to socially responsible and significant causes. For example, 20% of the revenue from the purchase of the game in the period June-July 2024 were donated to a non-governmental organisation that works with elderly people in municipal homes. Commitment to a cause significantly contributes to a higher public interest in the project which shows an adequate policy of the company regarding the principles of corporate social responsibility.

The problem of the Bulgarian gamified practices in terms of sustainability has been solved to some extent in “Roman Plovdiv – Urban game”. Diversification with other products (Roman Secrets of the City – A Weekend in Plovdiv 2024; Awaken Plovdiv – Night City Game; Plovdiv in Love; On the Hunt for Red February) from the same company makes it possible to extend the life cycle of the application. Here, in practice, the method of the Boston Consulting Group is reflected. It is important to note that the localisation of all gamified heritage is Plovdiv. This is a serious request for the development of alternative forms of tourism based on gamification. However, they still remain out of sight of those responsible for public policies in the field of tourism, as gamification is not mentioned as an opportunity for providing tourist products and attracting tourists neither in the Strategy for Integrated and Sustainable Tourism of the Plovdiv Region 2019-2027, nor in the Integrated Development Plan of the Plovdiv Municipality 2021-2027, and even in the Annual Program for the Development of Tourism in the Plovdiv Municipality for 2024.

A drawback of the project, which to some extent is also its advantage, is the requirement of physical presence on the field. The expansion of communication channels, the application of artificial intelligence and different types of reality can help to make the application alternative, but to stimulate participation through physical reality. For example, through simulations, videos, etc. to give a realistic representation to the virtual participant of what he would experience on location.

Concluding remarks on the best practice

The best practice “Roman Plovdiv – Urban game” is created around a specific plot related to the historical development of old town Plovdiv and allows for physical and emotional immersion through engaging attention and sensory participation. The combination of interactivity with reality is a good combination that provides a high degree of users’ involvement and a higher probability to complete the game. Technology integration maintains interest by providing participants with real-time updates, directions, and other information as the game progresses. Participants are

drawn into a series of challenges, riddles, and mysteries that they must find the answer to in order to move forward. Challenges are related to exploring local landmarks and historical sites, discovering hidden places, active interaction. This leads to emotional involvement and increased engagement of the participants. At the same time, physical inclusion brings its own spatial and temporal limitations to individual participants.

“Roman Plovdiv – Urban game” was selected as one of the two best practice in Bulgaria. The criteria on which the project shows good results are mainly related to the creativity, originality, and accessibility of the idea. The offered experience combines, in a balanced way, virtual and real elements, while, at the same time, informing the visitors about important and interesting historical facts. Although, the practice show a relatively complex and effectively working approach for engaging participants, areas for improvement can be suggested. They are mainly related to the ways of distribution of the application, its recognition, and the possibilities of introducing new elements reflecting individual searches of the users. Creativity and originality, adaptability and the ability to develop solutions are guiding principles both in the application and many other fields. Apart from enriching an individual's cultural life in a unique and memorable way, the application also develops skills that can be applied in other situations. Both the functioning of the practice and the way in which it is structured makes it possible to adapt it to other spheres of public life (e.g., in the field of education and training, culture, sports, and youth activities, etc.).

Conclusion

This paper presents the Bulgarian experience in the application of gamification in cultural heritage. It is focused on the best practice approach as a source of practice-based evidence on how well gamification tools have been applied in Bulgaria to meet the challenges the cultural heritage faces. A 3-stage assessment methodology has been applied to search for projects on gamification in Bulgarian cultural heritage, assess them based on a group of relevant criteria and select the ones which perform best. Following the adopted standard for documentation of best practices, only two of the identified projects have been briefly described.

This paper is useful for practitioners, scholars, and policy makers as it offers a framework for assessing projects on gamification in cultural heritage. The framework covers three stages – research, assessment and ranking of the projects – and its core is the application of a set of context specific criteria for selecting best practices for gamification in Bulgarian cultural heritage. By applying the proposed framework on real-life initiatives in Bulgaria, the paper presents what works, what does not work and why it does not work for two of the assessed projects identifies as ‘best practice’ for Bulgaria. The knowledge gained could be used by museums, public and local authorities, communities, and other stakeholders who believe that culture and heritage are levers for the national, regional, and local development. More people and organisations could apply the gamification technology to increase visitors and raise awareness of the cultural heritage in Bulgaria, to promote preservation and safeguarding of the cultural assets among generations in highly engaging environments.

The research has some limitations. During the proposed Research stage, only 16 ongoing projects on gamification in Bulgarian cultural heritage have been identified. There is high risk for the list of gamified initiatives not to be exhaustive as the database has been created only via an online search and on the available secondary data for project impact. However, these limitations concern the completeness of the

database and makes the accuracy of the assessment questionable. Regardless of the study limitation, the proposed framework should be used as a general toolkit for identifying and selecting projects which perform best on a given set of criteria.

Acknowledgements

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