

Serious Games and their Potential to Increase Museum Visitation

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Abstract—Museum visitation is a measure of efficiency, determining museum’s popularity and cultural outreach. Lack of interest and awareness about exhibitions leads to the visitation drop, especially noticeable among youth audience. In this paper we propose serious advergaming, distributed via social networks, as a primary tool that would allow museums to regain attractiveness and cater to the needs of digital generation. Presented serious games are intended to serve as a first point of contact with target audience, and it is envisioned that personalized museum tour would be delivered to the potential museum visitor through the guide mobile app once user profiling would be performed through in-game behaviour and social network profile details. While we explore the application of heritage-awareness oriented serious games to the current situation at the National Museum of Bosnia and Herzegovina, offered visitation framework is generally applicable towards any museum institution, regardless of geographical location.

Keywords—serious games, user profiling, museum visitation, interactive guide, social networks.

I. INTRODUCTION

Emerging digital technologies redefine the ways in which humanity interacts with past and present. With digital media disrupting our everyday lives and established behavioral patterns, all institutions are expected to adapt in order to remain efficient in the upcoming digital age. Adapting is especially relevant for traditional, well-established institutions, including museums. While being non-profit organizations, museums also have an efficiency metrics number of visitors, which is steadily declining over the decade [6]. One approach to turn back the downward trend is to utilize the emerging technologies and ensure that museum meets the altered needs of digital natives. Video games, as one of top contenders in entertainment market, are an obvious choice for making museums more appealing to the last version of user audience. When games are intended to be used for serious purposes, including education and skill transfer, they could be called serious games. Following the overall gamification trend, serious games as of now are established tools in the toolbox of heritage institutions. According to the mapping study [19], there are over 48 serious games already developed for the heritage-related purposes. Currently, games are developed along the lines either one of three following streams: cultural awareness, historical reconstruction and heritage awareness [16]. While it could be said that first two are quite widespread and are usually associated with serious games, its the third one that is of high importance for the purposes of this paper. As defined in [16], a particular subset of heritage awareness-related games offers engaging

mechanism to interest users in having a real-world experience. In other words, this specific set of learning games serves marketing purposes, promoting real-world heritage institutions among virtual-world crowd. While the primary focus of this work is the application of heritage awareness-oriented serious games to the current situation at National Museum of Bosnia and Herzegovina, it should be noted that described approach is generally applicable towards any museum institution, with no regards to geographical location.

A. National Museum of Bosnia and Herzegovina: Historical Reference

Established in 1888, the national Museum of BiH is the oldest western-style cultural and scientific institution in the country [1]. After a brief period of Museum being located in an unsuitable facility, new museum complex was built in 1909, and the National Museum remains housed in that location ever since. Several conflicts have occurred on Bosnian soil since 1909, but despite being endangered during two subsequent World Wars and more recent Bosnian War, the Museum was never shut down completely. However, it was forced to do so in 2012, affected by the lack of financing amid political crisis [10]. After three years, funds from budget reserves and donations allowed the Museum to reopen, and it remains accessible to the general public ever since [11]. This situation took its toll on Museums visitation figures, as information campaign, dedicated to the opening, was quite modest and the status of museum remains unclear, especially in the eyes of international visitors. Since the current downward trend at the Historical Museum of Bosnia and Herzegovina should be clearly be counterbalanced, this work explores the potential of serious games in improving museum awareness among audiences and raising visitation figures. Furthermore, since proposed serious game-based solution should be suitable to museums regardless of geographical location, the paper also proposes explicit guidelines on how could serious games be exploited in terms of museum attendance and promotion.

II. RELATED WORK

Serious games could be defined as games that engage the user and contribute to the achievement of defined purpose, other than pure entertainment [21]. Following the definition, serious games are focused not on simply having fun, but rather on obtaining learning skills through a joyful gaming process. Given the rich transformation potential, serious games have been extensively used in cultural heritage domain, with

genres and possible applications ranging from simple quizzes to sophisticated 3D archeological reconstructions [19]. Considering the museum visitation, serious games, as following the overall gamification trend, could be effective in reversing the established downward trend, particularly evidential in the case of youth. As reported in [13], young audience feels that museums are boring, didactic and unapproachable. This is further reinforced in [9], where authors state that less than half of participants (41 %) would be interested in attending an exhibition. Furthermore, authors also revealed three distinct consumer segments, as well as outlined their preferences and likes. Based on provided preferences, it could be said that gamification approach could increase interactivity and make museum a good place for friendly get together, catering to the interests of the majority of segments (2 out of 3). Additionally, in [15] authors point out that video games are highly engaging and motivating, and provide tools to reach out to the digital generation, growing up in the era of technology. Thus, it could be said that serious games would allow museums to increase youth awareness and visitation numbers, while catering to indicated needs and preferences of future generations. However, serious games can be no means be a substitute for brick-and-mortar museums, and should be first of all exploited in the context of attraction, debunking the belief that museums are boring, didactic and unapproachable [13]. In that sense proposed serious games are closely aligned with advergames, which are intended to deliver brand information and are easy and fun to play [22]. Furthermore, those characteristics ensure similarity of advergames to social network games, as latter are inexpensive, easy to play and can be played for very short intervals of time [25]. Indeed, as indicated in [25], advertisement in social network games is on the rise, and due to the high popularity of social networks number of players is often high. Having overviewed the advergames in general, we also decided to explore the situation with advergames in serious games.

In performed survey [19], authors identified 48 games, aimed at being utilized within the cultural heritage field. In their paper [19], Paliokas and Sylaiou employ two approaches to serious games classification, namely the 3-categorical approach [16] and a more refined model, as defined in [8]. Since the focus is made on the latter schema, Paliokas and Sylaiou [19] perform a detailed classification of 48 serious games according to their purpose. However, out of all games identified, only 5 (13.51 %) are related to Pervasive category, which according to [8] also comprises advergames. However, having analyzed those 5 games it is possible to conclude that they are more related to cultural awareness promotion and have little to do with museum marketing activities.

Based on the performed literature review, it could be said that despite the wide popularity of heritage serious games in general, coverage of promotion games still remains fairly limited. In one of available works [3], authors propose a design of 5 serious games which are intended to support museum visit [3]. While this definition sounds rather ambiguous, it is further refined that games should promote the museum and the application using quick dissemination channels such as social media [3]. Since games are intended to be distributed via social media, authors put emphasis on the development of mini games, based on well-known game mechanics (Quiz, Face in the hole, Pacman), tailored to the specifics and historical

period of target museum. As for the design of serious games, it should also be noted that proposed games were also described according to the descriptive model, proposed by [2]. However, paper contains only the game design proposals, meaning that no implementation details or success metrics are provided due to the fact that project pilot has not been finished yet. Since the content of the [16] is heavily connected to museum marketing (promotion) and utilization of social networks for raising museum awareness, it would be beneficial to take a look the state of the art in the utilization of social media for museum marketing. First of all, it should be noted that while researchers and practitioners have access to a wide collection of knowledge, related to museum marketing, few works actually cover the practical approaches to increase museum visitation. Thus, it was decided to analyze techniques, proposed by [5] and see what could be by the museum to generate sufficient levels of visitor income to survive and compete with other providers for these visitors [5]. As defined by the author, museums are offered with several approaches, namely raising visitor commitment, targeting local communities, targeting the schools segment, targeting mining heritage enthusiast and the cultural tourist, providing competitive product design by edutainment and diversification and finally, branding the museum. While ideas regarding targeting mining heritage enthusiast and cultural tourist are present due to the fact that paper [5] touches the specific perspective of mining museum, it could be seen that all other principles are generally applicable to any museum in need of visitor attraction. Furthermore, two of mentioned techniques, namely branding (as brands) and targeting the local community (as interpersonal relations) are further reinforced and mentioned in the [14], focusing on marketing strategies in small museums.

Considering the key principles, it could be seen that serious games, explicitly mentioned in the edutainment and diversification, could also be extremely beneficial in ensuring the efficiency of remaining symbols and be instrumental in implementing them. As outlined by Kidd [12], social media could be used by the museum to optimize one of three key activities: marketing, inclusiveness and collaboration. Marketing, being the most obvious choice for practical implementation, could be broadly defined as a way of informing the target audience about upcoming events and exhibitions. Additionally, social media are also tasked with a mission to ensure that museum has a recognizable face (essentially, branding). As for the inclusivity-related activities, they focus on establishing and maintaining internet communities, tailored to the interests of target audience. In this particular case, social networks serve as means to bring like-minded individuals together and provide them with familiar and easy-to-use collaborative tools [12]. Finally, the last group of collaborative activities are envisioned as an opportunity, allowing people to produce museum-related narratives. These activities are relying on co-creation, resulting in public members providing personal experiences, multiple forms of heritage and various artefacts via collaboration-enhancing social platform. Overall, collaboration in social networks could be considered a highly engaging activity, forging bonds between museum and relevant audience. In the following years researchers have produced a number of papers, revealing a new dimension to the potential usage of serious games in museum setting. Authors of [20] consider social networks as a potential source of information for adaptive storytelling.

Mainstream approach is currently defined as Visitor Survey, which is intended to be filled in prior to the museum visit and should provide sufficient information to match visitors to one of predefined user personas, which are later used as a basis for the personalized storytelling-based museum experience. At the same time, authors acknowledge that another approach would be to extract user data automatically from the social networks [20]. If we are to further explore the approaches to museum personalization and adaptation, several papers, including [18], [17] and [23] cover the aspects of developing adaptive museum guide. However, instead of social networks authors propose to use already seen exhibits [18], preferences, indicated prior to the museum visit [17] and user ratings [23] to develop personalized recommendations and tours.

Finally, in [24] it is proposed to utilize social networks to promote designed social media serious games, attract users, extract user profile information, enable visitors to share experience, facilitate sharing of topics, link current hot topics with the museum artefacts and trigger visitor reflection. Overall, authors consider a serious social network games as crucial component of the CrossCult Project platform, since user preferences (profile data), obtained through gaming activities, are further utilized to form personalized interactive experiences [24], which range from personalized tour recommendations to suggestions of users with similar interests, with relevant digital objects and related exhibits in between. As for the users with similar interests, authors of [24] propose a concept of social influencers, with the idea that social friendship is to be suggested by the proprietary platform in case of interest match, and notifications are to be sent in the event of likes, posts or other socially visible activities. However, it should be noted that while it is stated that mode of delivery for notifications could be specified as notification in the app; on the smartphone notification area; on their social network; through email [24], it is unclear whether authors suggest to roll out a dedicated museum social network or just send relevant notifications via mechanisms, already available in existing networks. Furthermore, CrossCult platform is intended to exploit other social network-related functionality, as museum visitors would be offered functionality to share experience and remarkable artifacts via social networks, as well as post reflections and ideas to the virtual visitor book [24]. These activities are envisioned to further extend the social media coverage of the museum and improve visibility in internet. Additionally, [24] propose to use Twitter as a way of keeping track of trending topics and promoting museum artefacts, somehow related to those topics. A service, represented by the means of designed ontology, is developed to match trending topics against museum information content, and realization is to be done with Apache Solr and Semantic Search from the Numpy plugin. It is also stated that once match between trend and museum concepts is found, trending topic is to be suggested to the museum curator, who is then to decide whether the relationship should be used in promotion as well as on the means on promotion. It should also be noted that additional information on the promotion details is provided. Overall, it should be also mentioned that the aim of CrossCult project platform as stated in [24] is to promote deep engagement of exhibits via reflections and discussions between users. Unlike in the [24], focused on encouraging visitors to form deep, reflective connections with the exhibits,

our paper is primarily concentrated on the stream of visitors and proposes a technological solution that would cater to the needs of digital generation while making the museum more exciting and interactive.

III. PROPOSED SOLUTION

Based on the overall methodology, pioneered in [24], in this work we propose a social network-delivered and serious games-fueled approach to address the visitation issues at the Historical Museum of Bosnia and Herzegovina. Since, as already mentioned, suggested solution could potentially be applied to any under visited museum, regardless of geographical location, a framework, based on advocated approach, is also provided and could be seen on Figure 1. Figure 1

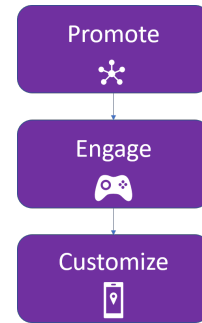


Fig. 1: Visitation framework

shows that proposed strategy could be further divided into three distinct activities: Promote, Engage and Customize. Promotion related activities are to be performed via Facebook and rely on serious games and their dissemination across the target audience with the assistance of Facebook targeting tools. After social network users have been made aware of serious social games existence, they would be encouraged to explore and engage in the gaming activities. Since proposed games are to be designed around the most prominent museum exhibits and artifacts, users are expected to obtain knowledge regarding relevant historical periods, while at the same time providing information for precise user profiling. As depicted in Figure 2, purpose of serious games is threefold, since they simultaneously serve to promote museum, encourage heritage learning process and capture user preferences. Finally, user

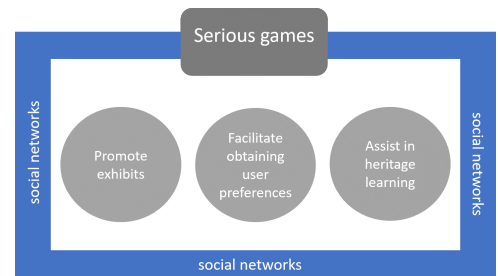


Fig. 2: Serious games application

preferences, obtained from social media profile and through serious game playing process, would at the same time provide information to compose personalized museum tour, tailored

according to likes, dislikes and interests of social network user. It is envisioned that the engagement in serious games would spark off interest in the intended users, who would afterwards pay an actual visit to the museum. After commencing game-related activities, users would be offered to download museum interactive app and perform synchronization. Thus, upon arrival at the museum, acquired visitors would have access to tailored personalized tour, accessible on their smartphone. Personalized tour, available through the interactive guide app, would ensure that visitors have engaging and fulfilling museum experience. The proposed system architecture could be found on Figure 3. As shown in the Figure 3, proposed solution

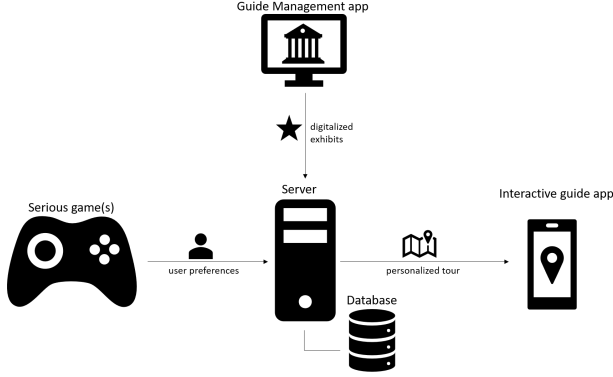


Fig. 3: System Architecture

includes five key components: Serious game(s), Guide management app, Server, database and Interactive guide app. Process of interaction is intended to start with serious games that can be accessed by user via social network. Upon gaming process completion, information regarding user preferences is collected on the server. Digitalized exhibits, featuring details and descriptions, are to be entered through Guide management app and will be stored in the database, connected to the server. Afterwards, user preferences and digitalized exhibits should be matched together and, with the assistance of business logic, transformed into customized museum tours, generated on the server and available to user via dedicated Interactive guide smartphone app. Finally, upon museum visitation user is expected to download the interactive guide app (prior to the visit or on premises) and utilize it to access the tailored museum guide on personal device. It should be also noted that practical implementation of the project is expected to start with designing game prototypes.

While overview of suggested game designs is represented in Table I, game ideas should be further refined to be in compliance with the serious games conceptual framework, as outlined in [26].

Designed games are intended to be developed as social network advergames, characterized by minimal learning time and brief playing periods [25]. Motivated by engaging gaming experience and informed about key exhibits, game players are expected to become interested in museums offer and engage in museum visit as a form of leisure. It should also be mentioned that prior to realization, playability of designed prototypes should be ensured via following the heuristics, outlined in [7]. Heuristic-based evaluation has shown itself as instrumental

TABLE I: Proposed game designs

Department	Exhibit	Game Genre	Proposed game concept
Archeology	Sarajevo Haggadah (Sacred Jewish text)	Puzzle game	Spot the difference distinction between two versions of Haggadah with minor alterations
	Charter of King Tvrtko I medieval manuscript writing process	Simulation video game, incremental video game	Medieval manuscript scribe simulator.
Natural History	Gem and Mineral Collection	Quiz video game	Based on players personality (MBTI) most suitable gem is suggested.
	Staffed animals Taxidermy Collection	Quiz game, Trivia game	Animal tracks and footprints quiz
Ethnology	Traditional interior door patterns	Brick buster video game	Player-controlled block hits a ball towards colored tiles (object), traditional patterns revealed after level completion
	Photograph Collection by Frantisek Topic Between Two Empires	Hidden object game	Player must find items from a list that are hidden within a picture which is taken in Sarajevo between 1885-1919

for obtaining engaging and entertaining game design and is performed during the prototyping stage. Finally, overview of intended visitor acquisition approach, modeled as a business process, is depicted on Figure 4. Upon deployment, serious

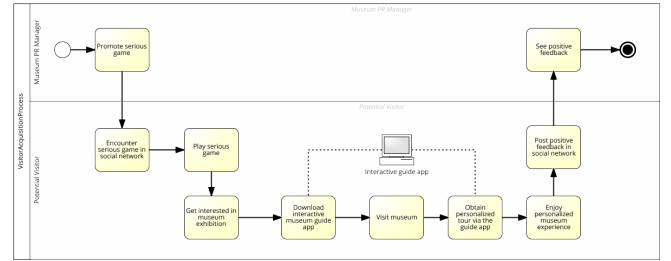


Fig. 4: Visitor acquisition

games should be promoted by the PR department of the museum via targeting tools, provided by Facebook. Following the successful targeting strategy, potential museum visitor is expected to encounter the serious game and have a relatively brief (due to the specifics of advergames) gameplay experience. Upon fulfilling the game objectives, user would be offered museum promotion materials, as well as information regarding Interactive museum guide. It is envisioned that these steps should be sufficient to convert a casual game player into a real-world museum visitor. After freshly acquired visitors arrives at the museum, personalized tour could be accessed on the smartphone (via the Interactive guide app) so that visitor will enjoy highly customized museum experience. Finally, positive experience could also be converted into a valuable promotion asset, since mobile app would also prompt users to post positive reviews, exploiting the positive effect of electronic word-of mouth customer acquisition [4].

IV. CONCLUSION

In this paper we outlined how serious games, disseminated through social networks, could improve museum visitation numbers and raise museum's awareness among target audience and, particularly, among youth. It should be noted that serious games are envisioned as a first point of contact, introducing potential visitors to fascinating exhibits while simultaneously providing teaching experience and serving as a medium for user profiling purposes. According to the proposal, serious

games could be described as a tip of the iceberg, acting like foremost but not final interface. User profile, obtained through both analysis of social network data and game behaviour, is to be further utilized for creating tailored museum tours, delivered to museum visitors via dedicated interactive guide app. Thus, serious games could be considered an integral part of the entire ecosystem, comprised also of server, database, mobile interactive guide app and guide management app. Serious games in this setting could be described as social network advergames, with their main goal being brand building. Apart from the overall approach, a number of game designs are proposed in the paper for the Historical Museum of Bosnia and Herzegovina, and it is expected that those designs are to be developed and transformed into functional applications. As mostly theoretical aspects of increasing visitation are presently covered, future work should include the game design and development. Once the proposed games would be implemented, the researchers would have the opportunity to focus on the surrounding applications, as well as evaluate the game dissemination strategy and museum's social network policy.

Finally, it should also be noted that while the project's primarily intention is to tackle the visitation drop at the National Museum of Bosnia and Herzegovina, the overall proposal (except proposed serious games design) is location-independent and could be universally utilized across the museums, suffering from visitation issues.

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