Virtual Museums and Audience Studies

The case of "Keys To Rome" exhibition

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***Abstract*— In this paper we present an overview of two audience studies aimed at identifying museum visitors' attitudes, behaviours and expectations. In the framework of V-MUST.NET an interactive exhibition, named "Keys To Rome", has been organized within the Imperial Fora Museum, Rome. Permanent collection has been integrated with a digital itinerary using computer graphics movies, natural interaction installations, multimedia supports and mobile applications. The evaluation of the audience feedback allowed us to study and justify some interaction choices and communication paradigms made so to enhance the user experience and enabling a fruitful discussion around virtual museums dissemination into cultural heritage environments. What came out is the need for technology to remain invisible and grant a cross-referencing visit path in a continuous parallelism between real objects and their digital copies.**

***Index Terms*—Evaluation, User Experience, Virtual Museum, Virtual Exhibition, Interaction**

I. Audience studies in virtual museum projects

Nowadays the need to understand how people react to digital cultural heritage projects is extremely increased. There is in fact a wide range of media studies and communication theories about the audience's role in any kind of mediated communication. This datum is justified by the will of investigating more on the social, pedagogical and cognitive aspects of human-computer interaction. Not only usability evaluations are valuable in order to gain a deeper overview about how people interact and behave in a certain context of usage, but also pedagogical affordance inquiries and instrumental qualities surveys give their contribution. User's behaviour and attitude towards specific digital or virtual products is the core content of the user experience (UX) studies. But what is an audience? One of the first conceptualization of the audience in media communication studies largely refers to a mass of undifferentiated people who are anonymous to the producer of the mediated message(s) and become a collective of unorganized individuals centred on the use or exposure to a particular media text [3],[7]. Likely, recent conceptualizations see the audience as a network of people who have the potential to interact with a particular object of interest in the media.

So said, how can we define experience? And what is *in* experience? An experience emerges from the integration of perception, action, motivation, and cognition into an inseparable, meaningful whole. An experience is "an episode, a chunk of time that one went through [...] sights and sounds, feelings and thoughts, motives and actions [...] An experience is a story, emerging from the dialogue of a person with her or his world through action" [4]. Once generated, it becomes an immaterial, personal story. When designing UX, is thus relevant the storytelling to help people immerse themselves into what they are experiencing while interacting with [9].

The core of UX studies is ensuring that people find value in what they are provided with. In order to have a meaningful "event", digital products must be credible (well comparable with real life and background experience), desirable (image, and other design elements are used to evoke emotion and appreciation), useful (content should be original and fulfill a real need) and usable [1],[5],[8]. A virtual museum project is indeed of interest as it is identified as being crucial in creating new experience: the latter can either be in terms of new content delivery or strengthening of notions already part of our own background. When facing digital products, users have the chance to immerse themselves into a context of informal learning, where cognitive processes (i.e. attention, memorization, pattern recognition, etc.) take place [6]. The educational vocation of virtual museum projects stays in the ability to vehiculate meaningful "pieces" of Culture, granting their accessibility and overall satisfaction. Hence, experience or user experience is not about technology, design, or interfaces but about creating a reliable moment through a tangible tool. To understand how virtual museum projects have meaning for audiences it is crucial thus to take the social context in which they are used into account. That is why we tried to explore the case of the Keys to Rome (K2R) exhibition, hosted at the Imperial Fora Museum, an international exhibition made up of 11 technologies developed starting from the permanent collection of the museum.

II. The "Keys to Rome" event

The Keys to Rome (K2R) exhibition is organized by V-MUST.NET, coordinated by the Italian National Council of Research and it is stands as the biggest attempt of more than 10 European partners to build up cross-fertilization between technology and the cultural heritage domain [10]. Permanent collections of four different museums have been integrated with a digital itinerary using computer graphics movies, natural interaction installations, multimedia supports and mobile applications. It is conceived as a virtual journey to discover

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Roman Culture, starting from the city of Augustus and reaching the entire Roman Empire. From the objects belonging to the permanent collections, it has been possible to create a mix of real and virtual through the redundancy of contents and some iconographic elements recurring in multiple interactive applications. These objects and applications are spread all over the museums: in Rome, they are located on the ground floor and the first floor of the Imperial Fora Museum, as shown in the official catalogue of K2R [11].

A. The Imperial Fora Museum and the Audience

Since 2007, the monument that hosts the K2R exhibition in Rome, known as Trajan Markets, has included the Imperial Fora Museum [12],[13]. The original historical complex, made up of buildings on different levels, was erected contextually to the Trajan Forum in 112-113 AD and it is placed in the centre of Rome, in the wider area of the Imperial Fora. Findings coming out from the excavations of this area are part of the permanent collection exhibited in the museum. They are displayed on two floors of the Trajan's complex: on the ground floor it is distributed between the wide central area and the rooms (*tabernae*), which overlook it; the correspondent rooms on the upper floor are also occupied. On the same level, the exposition goes on in the rooms of the central part (whose shape follows the *exhedra* of the Forum of Trajan underneath). The K2R temporary exhibition occupies the places just described, the second floor and some lateral sections. The audience studies carried out in the last years (2013-2015) have showed a great presence of two biggest groups of museum public: school groups and tourists, with a medium-high academic profile[1] [14].

B. The Imperial Fora Museum and Keys To Rome

The Imperial Fora Museum saw an increase of visits during the K2R temporary exhibition of the 27% on the global visits [15], between the 23rd of September 2014 and the 10th of May 2015, in comparison with the previous year. It is possible to notice in figure 1 that in October the number of visitors was quite high. The month of December shows the biggest growth in comparison with the previous year: nevertheless, a decrease in the number of visitors occurred on the days before winter holidays[2], but the overall data of the month reached a peak, on the days of the 6th and 7th (respectively 3373 and 2101 persons). It is noticeable that days with particular peaks of attendance are due to the initiative, practicable from July 2014 and operative at the Imperial Fora Museum since October, which promotes the free admission to state museums on the first Sunday of each month. Also in March there was a great increase of the visitors; even though in April the exhibition presented the highest number of visitors of the year, a slight decrease is present in comparison with April 2014. In conclusion it is possible to notice that the general course, month by month, enhances in terms of attendance.

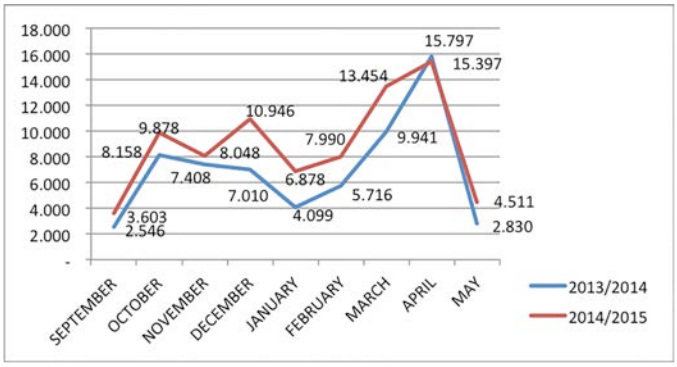

Fig.1 - Chart representing the audience flow during September 23rd – May 10th 2013/2014 and 2014/2015.

III. Scope of the evaluation studies

The main aim of the evaluation programme was basically to understand *what* and *how much* of K2R contents remain in users' mind, together with the impact of technological solutions used into a museum environment. Specifically, it was relevant to grab information about (a) the memorization processes that are involved when visiting the exhibition, (b) the comprehension of what has been watched/listened to/interacted with, (c) the elaboration processes in action after the cultural museum experience; (d) the overall satisfaction and knowledge accessibility. Two evaluations have been planned so to survey such parameters: a Customer Satisfaction (CS) and a Quality Label for Virtual Museums (QLVM).

IV. Conduction of the evaluation activities

In January 2015, a first survey[3] (QLVM) was planned on the use of virtual technology in museums in general. The survey primarily attempted to state (a) the frequency of attendance in the Imperial For a Museum, (b) general public familiarity with technology, (c) general expectations of museum's visitors, and (d) expectations in the Museum towards technology linked to cultural heritage. In February 2015, a second survey (CS) that investigated how visitors impacted with the Museum and the K2R exhibition was needed, given also some concerns about the suitability of the K2R exhibition in such a monumental environment.

The surveys have been delivered in two different languages, English and Italian, by means of two tablets (iPad and Samsung). For the QLVM, a sample of 100 people has been chosen, 50 for natives, and 50 for foreigners[4]. The questionnaire has been proposed at the beginning of the K2R exhibition, to let the users express a first impartial impression. For the CS, no sample of users has been selected[5] and we collected 260 responses. The questionnaire has been proposed at the end of the K2R visit path, coinciding with the second floor of the Museum.

Both questionnaires were made up of 23 questions; in the QLVM, questions 1 to 4 ask for demographic information; questions 5 and 6 how often and with whom visitors usually

[1] Inquiries reveal an audience consisting mainly of women (55%), aged between 26 and 65 (33% 26-40; 33% 41-65), coming from humanistic studies (44%). Most of the people visit at least four museums a year: 27% visit 2-4 museums; 26% visit 4-6 museums; 24% more than 6 museums.

[2] Such a decrease of public between December and January occurs almost regularly year-by-year.

[3] The questionnaire has been organized by Alfonsina Pagano and Mickaël Maillé and submitted by stagiaires of "Interactive Exhibitions" course.

[4] This choice arose from the necessity to exploit both the locals and the tourists, as demographic data in section II.A revealed.

[5] Customer satisfaction in general does not need to fix a general trend among a specific set of persons but, on the contrary, want to discover one taking into consideration the audience as representative of a multi-faced potential museum public.

visit a museum. From 7 to 10, questions concentrate on the attitude of users towards smartphone, tablet and video games. From questions 11, the survey asks what type of visit they prefer and what tool they mostly use for information retrieval. A third section, from questions 18-21, concerns the approach of users with ICT applications. The last two points refer to how important is to learn contents and to be entertained during the visit. The CS meanwhile involves five main sections: always a demographic one from questions 1 to 6, the overall exhibition evaluation from questions 7 to 13; feedback related to K2R exhibition contents and delivery from questions 14 to 20. Last sessions compete the logistics and the closing questions, from questions 20 to 23.

V. Results

Both evaluations have seen over 70% of the interviewees coming from Europe, and about 40% of them were Italian. They quite rarely visit museums, which might induce high expectations when doing so. QLVM results have pointed out that interviewees in general demand more interactive applications which are portable and handy (56% of visitors) while minor expectations for interactive site-specific installations (44% of visitors). They mostly use mobile applications (especially smartphones) and would also be willing to use their own mobile phones to explore the Museum, if possible. They would like to be guided throughout the museum rooms (38% of visitors), especially by following a pre-established and well-addressed narrative path (41% of visitors), which signifies that there is still a great opportunity for digital storytelling strategies to be exploited. All visitors admit to expect increasing their knowledge that they place as primary goal when visiting a cultural venue, possibly also before and after their visit. Self-preparation, self-informal education towards the museum contents is thus an important datum to consider when designing UX for museums. Moreover, the results have indicated that the majority of visitors are willing to be actively challenged during their museum visit (40 out of 100 stated ICT to be "extremely relevant" in museums, plus 52 of them who stated to be "relevant") and agree with the role played by technology in enhancing their experience and knowledge (fig. 2). This datum calls therefore for major interactive virtual environments that could allow managing tasks where to be physically involved while enriching informal educational experience and entertainment.

CS results have told that interactivity, intended as the chance to use tools to explore artifacts or touch a multimedia surface, is generally appreciated: it is considered as a mean useful to first impact the various cultural topics and through which deepen the museum contents (57% of visitors stated digital products available at K2R to be "very useful" and 28% "useful"). Interviewees seem to develop a predisposition to high-profile language, accepting the jargon and opening themselves to technical concepts and terms (59% of visitors found panels and texts' language to be relevant given the specificity of the topic). This reveals a great potential in people's will to learn and be trained, even though the arguments are sometimes not fully exhaustive if handled alone (29% of visitors admitted the relevance even if help was needed too).

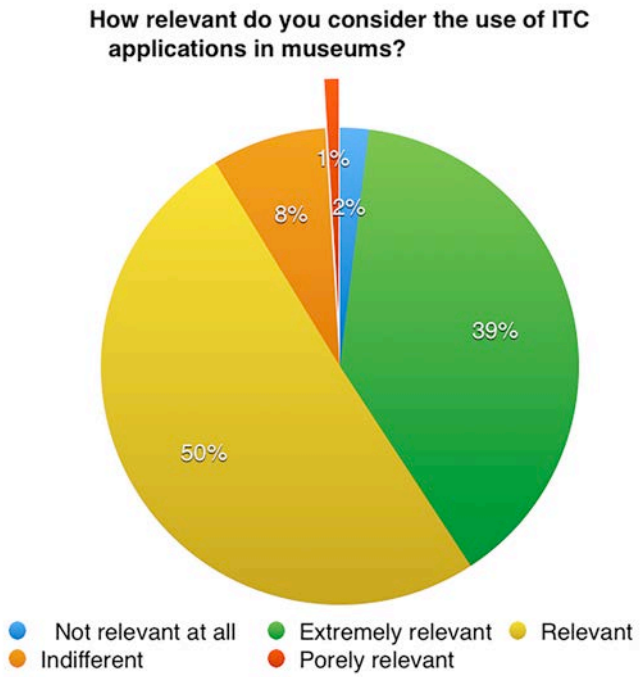

Fig. 2 - Graphic representing QLVM question regarding the usage of ICT in museums.

Technology is positively perceived into the K2R visit path, noticing an equilibrated dissemination of digital products among the museum pieces (68% of visitors stated installations to be well included in the visit path while 50% considered technologies not overshadowing the artifacts). Furthermore, the redundancy of objects and their digital copies used in K2R seems to be an advantage since it helps the visitors' memorization (most visitors stated to have seen more than 70% of exhibited objects or their replicas, avoiding false suggested items). Questions on objects' recognition reveal that artifacts not well visible at the Museum seem to "win" a relevant position in the user's mind thanks to technology (i.e. Oratious Rogatus' statue).

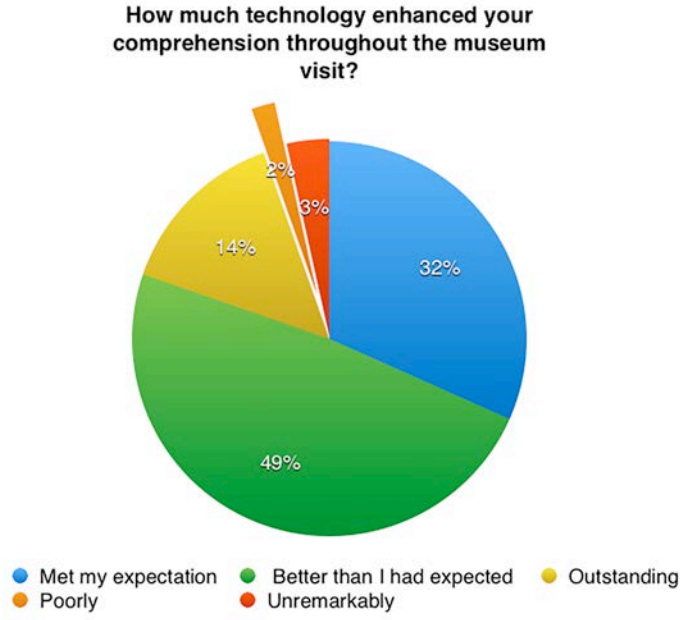

Fig. 3 - Graphic representing CS question about the comprehension stimulated through technology at K2R.

Finally the general comprehension of the Roman Empire (at uncertain level of understanding) is presumably enhanced by technology: the majority of the audience stressed indeed that technology does help their understanding during the museum visit as they expect to meet (21% of visitors stated the exhibition to be outstanding plus a 44% to be better than what expected) (fig. 3).

VI. Discussion

Discussing audience observations and visitors direct feedbacks, it is possible to state that they felt involved into a rich and engaged location; they were also pleasantly surprised by a cohesiveness between the new technologies and the historical relevance of the monument: comments like "It is nice to see multimedia from time to time between the real objects, it makes me more relaxed" and "It comes quite natural after a while to see monitors and touch-tables along the visit path" helped us understanding a sense of comfort during the exhibition's exploration. However, it is exactly the majesty and complexity of the Trajan's Market that generated a kind of confusion in the comprehension of the exhibition's itinerary too. In fact, lots of users showed the necessity of being accompanied around by a guide or room attendant; in particular, it was needed to encourage visitors to interact with specific applications such as the natural interaction station and the holographic display. This is mostly due to the lack of attention at textual instructions that generally people pay to; secondly, to the quite basic knowledge about technologies in general and how they work. In the future, the "miseducation" in interacting with digital products may be overcome by suggesting the Museum staff of permanent guides or holographic/projected avatars, explaining people what to do and how.

QLVM and CS proved that recent widespread of tablet and smart surfaces could largely benefit museums: positive feedback gained from the usage of Augmented Reality application at K2R (68% of visitors stated to be one of their favourite applications) and the official mobile application, MatrixApp, confirm this datum. Portable and mobile products might allow museum curators to increase the level of spreading of knowledge within their walls and boost the usage of visual digital assets.

The permanent collection and technologies of the Imperial Fora Museum seemed to be perceived as strictly combined in an alternation of real and digital. This has been possible through the use of digital storytelling and the creation of a story that blended together all the K2R pieces – the story of an old merchant and his nephew guides the visitors through the multimedia products and ends with their transposition into the virtual world with their avatars.

VIII. Conclusions

As largely presented in section I, to understand how virtual museum projects have meaning for audiences it is important to take the social context in which they are used into account. For tourists who are not familiar with archaeological environments but more technologically-vocated, for local people who look at such remains as part of their ancient history but not so skilled in imagining how they were in origins, the fruition of the Past can be really enhanced and supported by mean of multimedia products so to provide them a meaningful experience. The latter emerges indeed from the integration of various aspects that connote a single person: perception of the world around us, action asked to be performed, motivation stimulated for acting, and cognition. In this matrix of elements, technology needs to be invisible: the audience does not have to perceive the digital applications separated from the monument - from the cultural heritage - neither to be a substitute of the formal learning strategy. For the next future, technological "islands" need to be always more avoided, granting a deeper cohesion between museum settings and digital devices, ensuring people to find value in what it is provided to them.

IX. Acknowledgements

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