Exploring the challenges of interactive technologies in museum spaces

Panel Discussion: The future of technology in museums

Maria Shehade and Theopisti Stylianou-Lambert

Introduction

In recent years, a growing emphasis is placed on the introduction of new technologies in museums and heritage sites which is based on the idea that these technologies can offer many advantages to the overall visitor experience. Thus, a growing amount of literature focuses on the investigation of the potential of different technologies and their advantages (Smithsonian Institution, 2001; Witcomb, 2010; Stogner, 2011; Kounavis et al., 2012; Johnson et al., 2015; Freeman et al., 2016).

Indeed, the application of new technologies in museum spaces offers many advantages to their visitors, which is why their effect has been characterised as 'catalytic' (Parry, 2007, p.140). The advantages are multifaceted and it has been argued that 'the opportunities offered by today's digital technology are bringing museums even closer to their goals of accessibility inclusion and democratisation of culture' (MacDevitt, 2018, p.2). In many cases the future of museums has been associated with new technologies, which have also been defined as 'the catalyst for change in the future of museums' (Stein, 2018).

Despite the undisputable advantages that new technologies offer in museum environments, however, the use of interactive technologies comes with a set of challenges that should also be discussed. These challenges are somewhat 'neglected' by relevant literature and therefore the possible implications and limitations of these technologies remain an under-studied area. Thus, we argue that before discussing or envisioning the future of technology in museums it is imperative to first examine the current challenges so that these can inform our future decisions.

The research presented in this paper is based on a research project currently carried out at the Research Centre on Interactive Media, Smart Systems and Emerging Technologies (RISE), which focuses on the uses of interactive and emerging technologies in museum spaces and on what the future holds for technological applications in museums and heritage sites. More specifically the project investigates current technologies used in museum spaces, explores technology-related problems faced in museum environments and investigates the limitations or challenges that are associated with the use of such technologies in museums. The research also identifies potential gaps that technology can fill in museums. Thus, one of the aims of the project is the identification of key theoretical and practical debates, as well as the creation of specific directions and guidelines for the ideal future technology in museums and for the application of emerging technologies in museum spaces. The produced directions/ guidelines will be addressed to museum professionals and designers and will be based

on the actual needs of museum professionals and the potential challenges they have identified.

As such this paper focuses on the exploration of some of the challenges of the interactive technologies currently used in museum spaces and concludes with some suggestions on how these challenges can be addressed as we move forward.

Which are the challenges of interactive technologies currently used in museum spaces?

Currently when museums use technology in their exhibition spaces the prevalent uses are in the form of tablets, interactive tables and boards, or mobile phone applications. Most of these applications are screen based, which has created an absorption of visitors into screens and a screen dependency which may create a tension between physical and digital experiences, with digital experiences gaining more ground rather than the promotion of personal human interactions with objects. This absorption of visitors into screens and mobile devices has been called 'the heads-down phenomenon' or the 'lure of the screen concern' (Mayr & Wessel, 2007, p.18).

Despite the argument that the incorporation of screens may facilitate the inclusion of younger visitors, it may also take their attention away from the physical objects on display. In many cases visitors may spend 'more time with the system than with the original object' (VomLehn et al., 2005, p.133). Thus, digital technologies, may start to 'compete' with the physical museum, rather than complement the physical museum.

Interactive technology in museums may also affect the exhibition flow and diminish the overall experience. As noted by Ciolfi et al. as a result of their evaluation studies (2001, p.605), 'kiosks interpose themselves between the visitors and the objects, preventing the visitors from maintaining their physical proximity to the exhibit'. Moreover, touch screens may also create an impoverished experience to the rest of the visitors not using the screen and waiting in long queues for their turn. As Vom Lehn et al. (2005) explain, 'the interface and the structure of the interaction afforded by the system, do not simply prioritise the individual user, but also transform those gathered around, often waiting to use the exhibits, into an audience that has impoverished access to the activity that they are witnessing' (p.132).

Although visiting a museum is often a social occasion, most technologies used in museums are designed for a single-user and do not allow shared experiences with other visitors. Thus, new technologies may change the 'visitor-group-relationship' (Mayr & Wessel, 2007, p.18), with the museum visit being transformed into an individual experience which reduces social interaction to the minimum. As Li et al. argue (2012), 'the physical museum is becoming more isolated and functionless without visitors participation' while 'the audiences are also losing the opportunities for sharing and communicating their viewpoint with others' since they are absorbed by the screens and smart phones used in the museum space' (p.647). However, as emphasised by the American Alliance of Museums (2018), the social aspect of the museum visit is valuable:

> We observe that the social experience of museum-going is frequently cited as among the top motivations for visiting at all. We know that museum visitors value the authenticity of the 'real thing' and despite the influences of a visually-laden social media culture, the interest and dedication of audiences to hyper-local, artisanal, and delicately nuanced physical experiences hints at a desire for the real over the virtual (p.1).

In many cases due to the desire to attract younger audiences or keep up to date with advancements in our everyday life, museums tend to incorporate technology in their spaces just for the sake of it and without addressing the real needs of visitors. However, this means that in many cases technology becomes the 'starting point' (Elliott, 2014), with technological applications being created only for marketing purposes and for 'visitors' consumption' (Ashton, 2018, p.421). Thus, in many cases, the result is an 'uncritical use of technology' with disputable results (ibid).

From a practical point of view, users of VR and AR applications have pointed out particular problems caused by the hardware used for such applications. An example is the different types of head-mounted displays (HMDs). Some users argue that most HMDs are uncomfortable, 'bulky and hot' and do not allow users to see the environment around them, meaning that because of these characteristics they cannot be used for very long (Kain, 2016). VR headsets may also cause headaches and nausea to some users, which also impede their prolonged use (ibid).

Another very important limitation is the high cost of implementing such technologies in museums. New technologies are usually installed in museums with a plan to be permanently incorporated into the exhibition for the years to come. However, due to the rapid advancement of technology such installations can easily and quickly become obsolete and old-fashioned. Apart from quickly becoming obsolete technologies such as the ones discussed in this paper are in constant need of updating and maintenance, which requires investment of both money and the appropriate personnel (Dodge, 2016).

This rapid advancement and the need to constantly update the provided technology, also means that targeted technological expertise is needed. This is especially difficult for small museums with limited staff and budgets. In many cases, however, it has also proved challenging for bigger museums as well, which may outsource their technological needs to third-parties, meaning that they may end up 'spending too much time helping contractors understand why certain approaches do not work in a museum' (Duff et al., 2009).

The above brief analysis includes only some of the several challenges associated with the use of interactive technologies in museums. There is a need to explore new ways of overcoming the barriers created by the use of new technologies and to be able to enjoy their advantages without diminishing the museum experience. So how can we approach the use of new technologies in museums so as to address these challenges?

Brief points on the way forward

The key to the successful implementation of new technologies in museums is not the technology itself but the visitor. It is important to adopt a 'user-centric' approach when developing new technologies for museum spaces so that the technology used offers an improved experience or addresses some of the visitors' needs. As emphasised by Kati Price, head of digital media at the V&A museum, the starting point should always be the people, as 'some of the most enduring, compelling innovations come from looking at what people want, and at their latent needs' (Elliott, 2014, n.d.). Although the use of technology can be a powerful tool that may produce memorable immersive and interactive experiences, museums need to 'identify what service they are offering, who it will serve, and how the audience will benefit from the experience' (Price in Elliott, 2014).

In order to encourage truly engaging activities we should invent new ways to encourage visitors' critical thinking, beyond the simple physical interactions with multimedia tools (Stylianou-Lambert, 2010). This is a critical issue that museums should deal with, since 'the enduring enjoyment that comes from investing attention and creating meaningfulness can be easily distracted by brief moments of sensory pleasure' offered by new technology applications (He et al., 2018, p.134).

Museum experiences require a level of social interaction and the isolation of visitors using these technologies is a major challenge which should be overcome. In order to facilitate social interaction and collaboration it should be recognised that 'social interaction is critical to people's experience of exhibits' (Vom Lehn et al., 2005, p.135). Therefore, museums need 'experiences that work well with multiple users, and provide points of social interaction' (Chan & Cope, 2015). One such idea is the development of VR or AR applications that allow the interaction of multiple visitors or groups of people which will greatly enhance the user experience.

Moreover, new technological applications should focus on the integration of digital applications to the museum environment without distracting from the object itself and 'without disturbing the aura of an exhibit' (Mayr and Wessel, 2007, p.7). As Ciolfi et al. (2005) note, the technology used should 'support visitors' experiences of the physical museum space rather than replace it with a virtual experience' (p.2). The museum space should offer something else than what a visitor can experience at home or another place/institution.

Particular note should also be made to the concepts of 'interactivity' and 'participation'. In recent years there is growing interest in creating participatory approaches in museums, with the current trend focusing on the stimulations of more 'active, hands-on opportunities' that can 'foster deeper knowledge acquisition' (Freeman et al., 2016, p.18). Indeed, the new technological tools available have facilitated in many cases the design of interactive exhibitions and the implementation of more 'complex forms of participation' (Vom Lehn et al., 2005, p.131).

However, although these new forms of interactivity may enhance educational experiences, they often do so at the expense of other museum experiences which are more personal or social. Thus, 'interactivity is not infrequently conflated with social interaction' (ibid). A re-conceptualisation, therefore, of the notions of 'interactivity' and 'participation' is needed so as to reflect what active participation really stands for in

museums. In this context, it would be useful to shift the focus from creating 'hands-on' interactive experiences to creating a 'heart-on' interactive experience (Zheng et al., 2005, p.19).

Conclusion

As evident from this brief analysis the use of interactive and emerging technologies in museum environments not only offers particular advantages but also poses several challenges that should not be overlooked. All the points raised in this paper are elements for consideration in the context of the implementation of new technologies in museum spaces if the aim is for these technologies to promote the social aspect of the museum space and its learning dimension.

We argue here that the incorporation of new technologies in museum spaces should be based on a 'user-centric' approach, which takes into account the real needs of the visitors. Moreover, any technological applications should ideally be seamless, non intrusive and should also promote social engagement and critical thinking. In this way new technologies may not only promote knowledge but may also promote imagination, inspiration and collaborative experiences.

References

American Alliance of Museums. (2018) *Immersion in museums: AR, VR or just plain R?*, American Alliance of Museums and Knight Foundation. Retrieved 11 December 2018, from https://www.aam-us.org/wp-content/uploads/2018/10/Immersion-in-Museums-primer.pdf

Chan, S. and Cope, A. (2015). Strategies against architecture: interactive media and transformative technology at Cooper Hewitt, *MW2015: Museums and the Web 2015*. Retrieved 15 December 2018, from http://mw2015.museumsandtheweb.com/paper/strategies-against-architecture-interactive-media-and-transformative-technology-at-cooper-hewitt/ Ciolfi, L., Bannon, L., and Fernström, M. (2001) Envisioning and Evaluating 'Out-of-Storage' Solutions, In: Bearman, D. and Garzotto, F. (eds.), *Proceedings of ICHIM01 International Cultural Heritage Informatics Meeting*: Milan, September 2001, 595-607

Ciolfi, L., Cooke, M., Hall, T., Bannon, L. and Oliva, S. (eds.). (2005) *Re-Thinking technology in museums: Towards a new understanding of people's experience in museums*, Proceedings of the international workshop: "Re-Thinking Technology in Museums: Towards a New Understanding of People's Experience in Museums", Interaction Design Centre - University of Limerick (Ireland), 29 and 30 June 2005.

Dodge, R. (2016) Technology- Are museums keeping pace?, *MUSE: The voice of Canada's museum community* (The Canadian Museums Association's magazine), 35 (1), 40-45.

Duff, W., Carter, J., Dallas, C., Howarth, L., Ross, S., Sheffield, R. and Tilson, C. (2009) *Museum knowledge workers for the 21st Century*, Government of Canada Report.

Elliott, L. (2014). *How to use technology to improve the museum experience : An interview with Kati Price from the V&A. Retrieved 20 January 2019, from* https://www.techstars.com/content/homepage/can-use-technology-improve-museum-experience-interview-kati-price-va/

Freeman, A., Adams Becker, S., Cummins, M., McKelroy, E., Giesinger, C. & Yuhnke, B. (2016). *NMC Horizon Report: 2016 Museum Edition*. Austin: The New Media Consortium.

He, Z., Wu, L. and Li, X. (2018). When art meets tech: The role of augmented reality in enhancing museum experiences and purchase intentions, *Tourism Management*, 68, 127-139.

Johnson, L., Adams Becker, S., Estrada, V. and Freeman, A. (2015). *NMC Horizon Report: 2015 Museum Edition*. Austin, Texas: The New Media Consortium.

Kounavis, C., Kasimati, A. and Zamani, D. (2012). Enhancing the tourism experience through mobile augmented reality: Challenges and prospects. *International Journal of Engineering Business Management*, 4 (10), 1-6.

Li, Y., Liew, A. and Su, W. (2012). The digital museum: challenges and solution, In: *Proceedings of the 8th international conference on information science and digital content technology* (ICIDT2012), pp. 646-649.

Mac Devitt, A. (2018). Editorial. *Museum International*, 70, 3-4.

Mayr, E. & Wessel, D. (2007). Potentials and challenges of mobile media in museums. *International Journal of Interactive Mobile Technologies*, 1, 1-30.

Parry, R. (2007). *Recoding the Museum: Digital Heritage and the Technologies of Change.* Oxon, New York: Routledge.

Smithsonian Institution. (2001). *The impact of technology on art museums*, The Smithsonian Institution Council Report, Office of Policy and Analysis.

Stein, R. (2018). Technology: The catalyst for change in the cuture of museums, *Museum-iD Magazine*, Vol 21.Retrieved 1 July 2019, from https://museum-id.com/technology-catalyst-change-future-museums-robert-stein/

Stogner, M.B. (2011). The immersive cultural museum experience –Creating context and story with new media technology. *The international journal of the inclusive museum*, 3 (3), 117-130.

Stylianou-Lambert, T. (2010). Re-conceptualizing museum audiences: Power, activity, responsibility. *Visitor Studies*, 13, 130-144.

Vom Lehn, D., Heath, C. & Hindmarsh, J. (2005). Rethinking Interactivity: Design for participation in museums and galleries. In Ciolfi, L., Cooke, M., Hall, T.,

Bannon, L. & Oliva, S. (eds.), *Re-Thinking technology in museums: towards a new understanding of people's experience in museums* (pp.131-136).

Witcomb, A. (2010). The materiality of virtual technologies: A new approach to thinking about the impact of multimedia in museums. In Cameron, F. & Kenderdine, S. (eds.). *Theorizing digital cultural heritage: A critical discourse* (pp.35-48). Cambridge, London: The MIT Press.

Zheng, S., Adam, M. & Woodcock, A. (2005). Surprise and illusion: Design strategies for interactive museum exhibits. In Ciolfi, L., Cooke, M., Hall, T., Bannon, L. & Oliva, S. (eds.). *Re-thinking technology in museums: towards a new understanding of people's experience in museums* (pp.18-25).

Acknowledgements

This research is part of the project that has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 739578 (RISE – Call: H2020-WIDESPREAD-01-2016-2017-TeamingPhase2) and the Government of the Republic of Cyprus through the Directorate General for European Programmes, Coordination and Development.

Dr. Maria Shehade, Research Associate, Museum Lab MRG, Research Centre on Interactive Media, Smart Systems and Emerging Technologies (RISE) - maria.shehade.09@ucl.ac.uk

Dr. Theopisti Stylianou-Lambert, Cyprus University of Technology/ Research Centre on Interactive Media, Smart Systems and Emerging Technologies (RISE), Cyprus - theopisti.stylianou@cut.ac.cy