Creating live experiences with real and stuffed animals: 
The use of mobile technologies in museums

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Abstract
In this paper, we present a preliminary analysis of ongoing work that examines ways smartphones have created new forms of sociality and participation in museums. We draw upon initial findings from a study at the Gothenburg Natural History Museum as well as a number of studies conducted at the Universeum, a science center in Gothenburg. Drawing upon these studies, we focus on the documentation practices that take place during museum visits (i.e. the process of taking photographs and recording videos), as well as on sharing practices (i.e. how photos and videos are shared during and after visits).

Introduction
Technologies like smartphones that many visitors bring with them into museums offer a wide range of features for creating and sharing media such as text, images and video (Pierroux, Krange, & Sem, 2010). Responding to the increasingly prevalent role of these technologies in combination with online social media, researchers have begun to deepen our understanding of their use in museums and science centers and, in particular, their role in visitor learning (c.f. Gammon & Burch, 2008; Kelly & Russo, 2008; Pierroux, Krange, & Sem, 2010; Russo, Watkins, Kelly, & Chan, 2006). In this paper, we present preliminary analysis of from our ongoing work to understand how visitors’ use of smartphones creates new forms of sociality and participation in museums. Our analysis builds on empirical material collected through an ongoing study at the Gothenburg Natural History Museum as well as a number of studies conducted at Universeum, a science center in Gothenburg. Drawing upon these studies, we focus on the documentation practices that take place during museum visits (i.e. the process of taking photographs and recording videos), as well as on sharing practices (i.e. how photos and videos are shared during and after visits). First, we show how the museum visit is challenged when the experience is documented, and how documentation itself becomes a key concern for the visitors. Second, we discuss how online sharing of videos and photos opens up the museum exhibit to new types of visitors, thereby expanding the reach of the museum. Third, we discuss how visitors use mobile photography apps to manipulate photos to communicate their experiences through both the subject and style of images.
Interactivity and sociality in museums

Technologies such as smartphones are now often brought into museum contexts by visitors but even before the development of these devices, museums and science centre exhibitions were often the site of technologies for visitors to interact with. The notion that a museum exhibit is interactive in nature is one that is tied to the technology of the exhibit itself. The phrase ‘interactive exhibit’ conjures up a vision of a hands-on mechanical or digital device that, in contrast to traditional exhibits, invites visitors to touch and manipulate it. This idea can be traced back to the work of Frank Oppenheimer in the creation of the first modern science centre the Exploratorium in 1969, and to the work of Jean Perrin at the Palais de la Découverte in 1937 (Butler, 1992). Both these scientists sought to share their passion for science with the public by creating experiences that made science and a sense of discovery accessible. Interactive exhibits in the tradition of Oppenheimer and Perrin have been widely acknowledged as beneficial in supporting sustained engagement from visitors and this has been linked to creating rich learning opportunities (Henderlong & Paris, 1996; Sandifer, 2003). Research into visitors’ experiences with interactive exhibits has tended to focus on such positive aspects of the genre. For example, research indicates that such exhibits foster intrinsic motivation (Csikszentmihalyi & Hermanson, 1995) and reduce the effects of museum fatigue, a concept used in the exhibition design and research communities to describe the effect that manifests itself when visitors become mentally tired during a visit (Falk & Storksdieck, 2005).

While much of the discussion around interactive exhibits has referred to positive qualities related to supporting visitor engagement, recently researchers have begun to question the nature of the interactivity at interactive exhibits and their effects on visitor sociality. Heath and vom Lehn (2008), for example, question the ‘interactive’ nature of interactive exhibits by suggesting that many exhibits are designed to be used by a ‘principal user’ and are often designed in ways that restrict interaction between visitors. Similarly, Bowers et al. deflate ”the myth of the individual user” and argue that when designing an exhibit there should be less single-user applications, and more ”open” applications that encourage interaction, not only with exhibition, but in between the visitors as well. The authors suggest that single-user applications (such as computers and individual screens) should be removed, as these seem to interrupt the ”sociality of the museum visit” (Bowers et al. 2007). Instead, they argue that museum exhibitions should be designed in order to allow social interaction, as well as interaction with the exhibit. The work of these researchers suggests that some technologies introduced into museums and science centres with the specific intention of increasing the ‘interactivity’ of visitor experiences does so at the expense of interactions among visitors.

Another type of technology widely used in museum exhibitions, is audio guides. Like many interactive exhibits, a key characteristic of an audio guide is that it is a personal technology and as such may inhibit sociality between visitors. With this technology the restriction of interaction
between visitors is manifested through the requirement that visitors wear headphones. Once wearing headphones it becomes difficult for visitors to interact and this may not only disrupt sociality but even lead to a sense of isolation (Grinter, Aoki, Hurst, Szymbanski, Thornton, and Woodruff, 2002). This phenomenon is similar to critiques of mobile phone technologies that claim the use of smartphones inhibits interaction between physically co-located individuals. The technology in focus in this study, the smartphone, however, does not require the use of headphones and many of its uses are tied to visual media such as text, images and video. Equally, smartphones are by their nature communication devices that facilitate interaction between people through a variety of different modes and media. Particularly in combination with social media platforms such as Facebook, Youtube, Twitter, Flickr, and blogs, the always online nature of smartphones makes them a powerful technology for facilitating social interaction through multimedia. It has become relatively common for museums and science centers to use social network technologies in order to facilitate new types of participation in museum exhibits. Stuedahl and Smøradal (2011) claim that one reason social media has been adopted by an increasing number of museums and science centers is its potential to help visitors co-create and interact socially with museum exhibits themselves. This aligns with the now common call for museums to be more responsive, democratic, reflective and to take the ‘museum conversation’ beyond the walls of the museum (Black, 2010).

Although claims have been made about the potential for social media to take a central role in learning in informal environments such as museums, libraries and galleries (Russo, Watkins, Kelly, & Chan, 2006), the technology is also considered to be a growing issue in museum environments. Unlike museum owned technologies such as interactive exhibits and audio guides, visitor owned technologies like smartphones are outside the control of exhibition developers and museum administrators. By opening up new forms of interaction, social media challenges existing communication models and few museums have a clear strategy for engaging communities in content creation. Key amongst these issues is a concern that the authenticity of information from museums will be reduced when it appears in a social media context and this raises questions about how far museums are willing to relax their authority over the content associated with them. In contrast to this view, however, there is also a perception of social media as enriching a museums authenticity by enabling it to maintain a cultural dialog with its audience in real time. (Russo, Watkins, Kelly, & Chan, 2006).

As technology develops and new uses and behaviours emerge, both the possibilities and issues associated with visitor use of smartphones constantly challenge museums and science centres to respond. What is already clear from a variety of research studies including our own work, however, is that many visitors make extensive use of their smartphones while visiting museums whether those museums have strategies that address the behaviour or not (e.g. Gammon & Burch, 2008; Pierroux, Krange, & Sem, 2010; Weilenmann & Hillman, 2012). In this study, we examine the visitors are already using their smartphones during museum visits and, in particular, investigate changes in interactivity and sociality.
Setting and data collection
As part of the larger study this paper reports on, data collection is currently taking place at the Gothenburg Natural History Museum which is the oldest museum in Gothenburg. The museum, which was founded in 1833, is located in central Gothenburg and appeals to a wide range of visitors of different genders, ages and social backgrounds. The museum’s exhibitions are notably traditional and the interior has been well kept and barely modified over the past decades. In addition, adding to the traditional feel there is very little digital technology and few interactive exhibits in the museum. In contrast, this paper also reports on data collected at the Universeum science centre. This institution is also in central Gothenburg but as the largest science centre in the nordic region, has a distinctly different character to Gothenburg Natural History Museum. While the natural history museum is traditional in nature, with exhibitions consisting almost entirely of preserved and mounted animals, the exhibitions at Universeum are either hands-on in character or feature live animals in simulated jungle and ocean environments.

Figure 1: Visitor taking photograph with a smartphone

The material this paper reports on is part of a larger project that explores the contemporary informal learning experiences of young people by focusing on ways that mobile technologies are integrated into learning in informal settings (see Figure 1). Locations for empirical work
in this project include a number of informal educational contexts where nature is a theme such as natural history museums, zoos and nature schools. These settings are explored using ethnographic fieldwork, including informal interviews, observations and video recordings of interactions (cf. Heath & vom Lehn, 2008; vom Lehn & Heath, 2005). Fieldwork in these settings allows us to explore a range of issues connected to ways that young people engage with and develop knowledge about nature, document their experiences and communicate about them. The work is a continuation and development of a previous study that focused on the ways in which young people use mobile technologies to engage with scientific content in science centers. While the science center context we examined featured a wide variety of digitally based exhibits that support rich interactive experiences, the natural history museum context is, by contrast, a much more traditional museum environment with little digital technology. In both contexts, however, we have observed that many visitors bring their own mobile digital technologies with them that they use to document and share their experiences in a variety of ways. Content analysis (Hodder, 2003) of this ‘visitor generated’ content and ways it is shared online (Rogers, 2010) is then performed. Data collected in relation to the natural history museum setting is then compared to our previously collected material at the science center, allowing us to highlight differences and similarities in these settings.

**Emerging uses of smartphones in museums**

In this section, we describe the *documentation practices* that take place during museum visits (i.e. the process of taking photographs and recording videos), as well as on *sharing practices* (i.e. how photos and videos are shared during and after visits). First, we discuss ways the museum visit is re-configured when the experience is digitally documented, and how documentation itself becomes a key concern for visitors. Second, we discuss ways the online sharing of video and photos opens up the museum exhibit to new types of visitors, expanding the reach of the museum; and finally, we discuss ways mobile photo applications are used to manipulate photos, creating multi-layered, aesthetic documents of an experience.

**New forms of participation around exhibits**

Traditionally, interactivity in museum settings is considered as something related to the event there and then, but with smartphones the notion of interactivity is changing. Smartphones re-configure the interactivity of the museum exhibits in that it allows for new forms of interactions around exhibits. It is no longer the case that the principal activity is necessarily that of interacting with the exhibit, but there are also other ways of engaging with the exhibit. Documenting and making records of the museum visit is an important activity in itself. Clearly, the presences of cameras in museums is not new, but the advent of smartphones where it is quick and easy to share content online, entails the notion of a potential audience, when “the gaze of others is always present as a potentiality” (Okabe, 2004).

As part of our larger project on the use of mobile technologies in museums, we experimented
with the use of a new video editing tool. In Figure 2 below, we see how our users are engaged in both documenting and experiencing a particular exhibit. The girl to the right is sitting in a chair, which is part of the exhibit, recording her picture in the mirror. The two girls to the right are busy capturing this experience on their mobile phones.

![Figure 2: Visitors to a museum engaging in documenting the exhibit.](image)

In this way, the activity of capturing the interaction with the exhibit mobile phones creates new opportunities for involvement. Also, adding the activity of documenting the interaction with the exhibit, challenge the notion of a ‘principal user’ of an exhibit. Interacting with the exhibit and documenting that interaction, are two activities that are mutually co-produced and are inseparably intertwined.

**Sharing exhibit experiences outside the museum through online video**

Beyond re-configuring the ‘principal user’ of an exhibit and supporting new visitor roles, during our work to examine the ways visitors document and share their museum experiences, we have also found that mobile technology offers the possibility of extending the museum experience. By sharing photos and video through social media such as YouTube, visitors are able to expand museum experiences across both time and space. On YouTube, for instance, viewers are able to comment on and discuss an uploaded video. The following example of a YouTube conversation is taken from the comment field from a YouTube video posted by a visitor to the Universeum (see Figure 3 below). The person named “Y” is the creator of the movie.
Figure 3: Image of a video sequence from YouTube showing an electric eel at the Universeum

X1 - its beautiful
X2 - shut up your balls are heavy
X3 - is that in cologne zoo?
Y - Like the description says "Universeum in Gothenburg" it's in Gothenburg, Sweden, at a place called Universeum, a huge in-door rainforest place, totally awedome.
X5 - The electric eel is the animal that is the closest to being "invincible!" They have been known to kill caimans anacondas and just about anything that gets too close to it!
X2 - shut up
X6 - never heard of them killing them, I have seen them kill the eels but ot the other way around, it usually makes any large reptiles get away.
X7 - That eel was coolness! X3 love you, x7! You must put up more videos!!

As is the case with many online forums, the discussion above contains offensive posts from one user who displays no interest in the video. Five other users, none of whom represent themselves as having visited the Universeum, however, show interest in both the content of the video and the location it was shot in. This example shows how the interaction around a museum experience
may continue beyond the walls of the museum mediated by video recorded during a visit that has been uploaded so that is can be discussed online. The comments above also illustrate the possibility that discussion outside the walls of the museum may not only expand the reach of a museum experience but also enrich it through additional perspectives.

Communicating exhibit experiences through smartphone photographic choices

In addition to simply recording media such as video and posting it online, we have observed that many visitors use their smartphones to manipulate the media they produce before sharing it. A particularly common use of smartphones in exhibition spaces is taking still photographs. While some visitors to the Gothenburg Natural History Museum, for example, carry a dedicated camera such as a single lens reflex (SLR) camera, we have observed many more using their smartphones as cameras. These visitors also often take advantage of other smartphone features not available on dedicated cameras to, for example, directly edit and share their photographs on the Internet. Having observed that visitors were taking and directly sharing photographs while visiting exhibitions, we searched for their work on a variety of online image sharing platforms such as Flickr, Picassa and Instagram. Some of these platforms such as Flickr provide users with opportunity to simply display their photographs on a site with social media features such as location tagging and comments. Others, such as Instagram combine a social media network with a specific application on a user’s smartphone that allows them the possibility to manipulate their photographs before sharing them. Specifically in the case of Instagram, we found that a large number of visitors manipulated their photographs of exhibits by adding filters that changed the look of an image, for instance, to make it appear as if it were taken by an old film based camera and not a digital smartphone. Examining the 66 most recent photographs shared on Instagram from Gothenburg Natural History Museum, only five had been posted without first being manipulated with a filter. Of those visitors who had posted more than one image, over 50% had chosen a new filter for each of their photographs. Though Instagram has a wide variety of filters that can be used, the majority of those chosen by visitors were filters that gave their images a vintage feel by, for example, reducing colour depth, making parts of the image appear out of focus, or adding a border. In Figure 4, an example of a visitor’s photograph manipulated and shared with Instagram can be seen.
This photograph is representative of many of the photographs posted from the Gothenburg Natural History Museum. It is taken in the Whale Room exhibit where a number of full size whale skeletons and mounts are arranged. Like much of the museum, this room has the feel of a classic museum with an interior filled with ornate carvings and dark hardwood surfaces. In keeping with the look of the exhibition, the visitor has chosen to manipulate her photograph by adding the ‘Earlybird’ filter. This filter desaturates the colours of an image, gives it a yellow cast, and applies rounded corners and a thick off-white border. The overall effect of this filter is close to the look of photographs taken with 1970s Polaroid instant cameras. In this case as with many of the images shared by visitors while at the museum, both the subject and the chosen manipulation reflect the vintage character of the exhibition. With this photograph, as with many of those shared from the museum, the visitor shares her experience of the exhibit not only through the choice of subject but also through the choice of filters. Exploiting the features that smartphones provide beyond those available from dedicated cameras, visitors create complex layered forms of visual communication and share them online all from within an exhibition.

**Conclusion**

In this paper, we examine three specific topics related to the *documentation and sharing practices* of museum visitors who use smartphones during their visits. These topics have emerged from the preliminary analysis of data collected through ongoing fieldwork at a variety of informal learning settings. First, we addressed the r-configuration of the museum visit through digital documentation, and ways that documentation itself becomes a central concern for visitors.
Through the activity of documenting interaction with an exhibit, smartphones support expanded possibilities for involvement while challenging the notion of ‘principal user’. Interaction with an exhibit and documentation of that interaction become activities that are co-produced and inseparable.

Second, we gave an example of the ways that online sharing of video makes museum exhibits accessible to new types of visitors and reshapes the boundaries of the museum. When visitors use their smartphones to record media within exhibitions and then share it online, interactions around their experience continue beyond the walls through online discussion. These discussions may not only expand the reach of a museum experience but also enrich that experience through additional information and perspectives.

Finally, we spoke to ways photography applications on smartphones are used to create multi-layered, aesthetic documents of a museum experience. Using applications that not only support the taking of photographs but also their manipulation and sharing, visitors communicate their experiences of exhibits through both their choices of photo subjects and the ways they choose to manipulate and present them.

Taken together, these topics illustrate a key emerging theme from our work to examine the ways young people use their own mobile technologies in informal learning settings. Rather than limiting interaction between participants, our preliminary results show that technologies such as smartphones support re-configured and expanded interaction both between visitors within exhibitions and with new types of visitors outside. They show that these increased possibilities for activity during visits and ways of communicating those experiences support new forms of engagement that rather than detracting from the richness of museum visits may instead enrich them.
References


Stuedahl, D., Smørdal, O. (2011), Designing for Young Visitors’ Co-compositions of Doubts in