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Promising beginnings? Evaluating museum mobile phone apps

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Abstract

Since 2009 museums have started introducing mobile apps in their range of interpretative media and visitor services. As mobile technology continues to develop and permeate all aspects of our life, and the capabilities of smart phones increase while they become more accessible and popular, new possibilities arise for cultural institutions to exploit these tools for communicating in new ways and promoting their exhibitions and programmes. The use of mobile apps opens up new channels of communication between the cultural institution and the user, which extent to his or her personal space and go beyond the boundaries of the museum's walls. The paper presents a survey carried out of mobile apps designed by art or cultural historical museums and analyses the wider issues which are raised by the findings. It discusses, among others, the kind of use these apps were designed to fulfil (e.g. the majority are guided tours to the permanent collections or to temporary exhibitions), the layering of content, and the type of user interaction and involvement they support.

1 Introduction

The last decades have seen museums undergo important changes, moving towards the model of a more democratic cultural organisation which places great emphasis in communicating with different types of audiences in different ways. As Stephen Weil (2007) put it, museums have shifted the balance 'from being about something to being for somebody'. Challenging the unique authority of the curator, they invited visitors to actively create their own meaning from the collections, encouraging existing audiences to interact in new ways with the objects, as well as reaching out to new audiences. In this process, museums have been experimenting with different strategies and practices, exploring, among others, the use of new technologies which were developing very fast, permeating every aspect of social life.

After the earlier introduction of audio tours, in the 1990s museums started experimenting with digital mobile guides (e.g. the Minneapolis Institute of Art in the USA in 1994, and the HIPS/HIPPIE project in Europe in 1997). These allowed visitors to receive related information as they wandered around in the galleries independently and to their own will and developed from simple audio systems to fully-fledged multimedia ones which were location-aware. Several museums were attracted by the idea of allowing visitors to access information related to the particular context and the surrounding space, particularly as these devices evolved, offering an increasing number of options for colour presentation, incorporation of sound and video, memory capacity, long battery life, and wireless communication with a central system controlled by museum staff. The other attractive feature that mobile devices could offer with increasing sophistication and effectiveness

was the ability to personalise the presentation of the content according to the users' needs (Tallon 2008).

The Handscape initiative of CIMI (Computer Interchange of Museum Information) which studied the existing and possible applications of mobile computing in museums, identified in 2002 as possible scenarios of use the role of mobile applications as: virtual guides, electronic maps, guides to the museum's website, communication channels, ways of accessing the museum shop, and personal diaries for recording visitors' impressions (Gay, Spinazze and Stefanone, 2002).

Another of the early projects, the Electronic Guidebook of the Exploratorium in San Francisco, started initially with the idea of creating a pocket travel guide, to which visitors would be able to add personal notes (Semper and Spasojevic, 2002). This initial metaphor was extended to the role of a 'mobile learning companion', aiming to assist in the exploration of the museum exhibits before, during, and after the visit. The possibility to transfer texts, images, sounds and video through the mobile devices was used to offer information about the displays, but also to encourage visitors to extend their relationship with them by participating in taking readings, collecting data and other experiments for the better understanding of the phenomena to which the exhibits referred. The evaluation of the Electronic Guidebook showed that the portable devices were successful in encouraging users to think about the exhibits and to look at them in new ways. Users often combined information that was given in both the real and the virtual environment. On the other hand, it also showed that it gave users a feeling of isolation. It is interesting that the teachers who participated in the evaluation thought that the content of the mobile devices and of the whole network would have been more useful for educational activities before and after the visit to the museum, rather than during (Hsi, 2002).

Since then, several projects have been experimenting with some of these scenarios of use, as well as the potential of museum handheld devices as study guides and tools to assist learning in different forms. In 2005 Nancy Proctor listed 101 handheld and wireless cultural tour projects and the number has rapidly increased since then moving into uses beyond the museum tour to include games, storytelling, and other means of actively engaging visitors.

Since 2009 we also started seeing the release of museum-related applications for mobile phones, known as mobile apps, the large majority of which were designed for Apple's iPhone. Mobile telephony is one of the technologies with the greatest degree of permeation in our every day lives¹. The last few years the technology, as well as the culture related to the use of mobile phones has evolved to such a degree that today the mobile phone, particularly in the case of smartphones, is not just a communication medium, but also a popular tool for social networking (e.g. allowing users to send SMS,

¹ The International Telecommunication Union (ITU) estimated that by the end of 2010 there would be 5.3 billion mobile cellular subscriptions worldwide (more than double the number of subscriptions for 2005), while access to mobile networks is now available to 90% of the world population. In developed countries there were on average 116 subscriptions per 100 inhabitants, and in developing countries 73% at the end of 2010 (ITU 2010).

participate in chat rooms, make use of acquaintance services), as well as a way of accessing information (e.g. news) and services (e.g. financial ones).

The creation of mobile apps with museum content is a rapidly expanding area with several institutions around the world experimenting with their potential, particularly their advanced computing abilities and connectivity. For museums which are continuously exploring new strategies for communicating with current and potential audiences, one of its most attractive features is that it opens the possibility for reaching new audiences through a personal device they have chosen and are familiar with, not only during their museum visit, but also before and after the visit, wherever the user chooses to be. This ability to reach users in conditions and at an environment of their choice opens up new possibilities for the communication of cultural content for life-long learning and edutainment, apart from the potential for cultural marketing. Additionally, the fact that these users are connected in a wide network offers possibilities not only for one-to-one communication between the cultural organisation and the user, but also for social networking and creating communities of users interested in cultural content, incorporating Web 2.0 capabilities. There is steady increase in smartphone sales in the last few years (e.g. the Nielsen Company (2011) reported that at the end of 2010 31% of U.S. mobile phone owners had a smartphone and expected smartphones to become the majority by the end of 2011, while the IDC Worldwide Quarterly Mobile Phone Tracker (2011) reported 74% increase in smartphone sales for 2010 compared to 2009).

The literature (e.g. Tallon & Walker 2008, Proctor 2010, the June 2010 issue of the *Museum Practice*), related conferences (such as the Tate handheld conference, held annually since 2008) and online discussions on the use of mobile apps in museums is growing, but still focuses largely on the technical issues and challenges. But as their use steadily increases in the cultural sector, it is important to also examine their effect on the experience of the museum visit, the visitors' perception of the cultural organisation, and museum and lifelong learning. There is also a need to evaluate the effect these tools have on museum staff and the internal policies and working practices of cultural organisations.

2 Survey of museum mobile apps

2.1 Methodology

In this context, we carried out a survey which recorded the mobile apps related to museum content, focusing more on arts and humanities collections (apart from three applications from a natural history museum which included an application of augmented reality, not yet employed in the apps of the other types of museums). The selection of the sample for the survey was undertaken in November 2010 (did not include any museum apps released later) and was based on internet and bibliographic research (e.g. journal and conference papers, the 2010 Horizon Report: Museum Edition) on the topic, looking for specific case studies. The internet research was based on the following sources:

- Online shops providing applications for smart mobile phones (iTunes, Android Market, Nokia Ovi, Samsung Apps, etc.),

- Museum websites (for a more systematic access to these we used the following portals: Virtual Museum Pages-VImp², MICHAEL Web Portal-Europe³, and the list of accredited museums from the American Association of Museums website⁴)
- Online social media, such as blogs and wikis.

In the survey we only included applications developed by the museums themselves or by the institutions where museums belong according to their organisational structure, as we wanted to investigate how the cultural organisations themselves are directly responding to these technological and social developments.

2.2 Findings

2.2.1 Number of museum mobile apps

We identified 71 museum mobile apps with interactive and multimedia features (not just mobile phone acoustic tours), three of which are not related to a museum of art or culture⁵. Apart from these 71 applications, we identified another seven offering Augmented Reality (AR) features, four of which were using the Layar mobile browser⁶. Six of these seven AR apps were only accessible onsite and were therefore, not included in the survey⁷.

One of the 68 art and social sciences apps with interactive and multimedia features identified was not accessible due to the researchers' lack of related language skills⁸, two were only accessible at the museum premises⁹ that we were not able to visit at this stage

² <http://archives.icom.museum/vlmp/>

³ <http://www.michael-culture.org/>

⁴ <http://www.aam-us.org/museumresources/accred/list.cfm>

⁵ Those of the American Museum of Natural History in New York.

⁶ The browser, first developed in 2009 by a Dutch company, allows users to find various items based upon augmented reality technology. It makes use of an in-built camera, compass, GPS, and accelerometer to identify the user's location and field of view. From the geographical position, the various forms of data are laid over the camera view like additional layers.

⁷ The four apps using the Layar mobile browser are: i) The Layar: Augmented Reality Browsing of Powerhouse Museum around Sydney, Australia (<http://www.powerhousemuseum.com/layar/>), ii) the one offered during the Lowlands Festival in August 2010 by the Stedelijk Museum, Amsterdam, iii) the Urban Augmented Reality Amsterdam by the Netherlands Architecture Institute showing Amsterdam 'as it will be, was, or might have been' (http://en.nai.nl/toolbar/news/item/_pid/kolom2-1/_rp_kolom2-1_elementId/1_834401), and iv) the Layer for Layar Reality Browser of the Andy Warhol Museum, USA. The three non-layar AR apps are: i) the Streetmuseum of the Museum of London, UK superimposing old images and historic photographs of London on parts of the contemporary city (<http://itunes.apple.com/gb/app/museum-london-streetmuseum/id369684330?mt=8>), ii) Walking Through Time, a JISC-funded iPhone app that lets visitors to Edinburgh walk over historical maps provided by Landmark Information Group and the National Library of Scotland (<http://itunes.apple.com/gb/app/walking-through-time-edinburgh/id381528712?mt=8#>), and iii) the Meanderthal, of the Smithsonian National Museum of Natural History, which is the only one accessible online, allowing users to transform their portraits into some form of early human (<http://itunes.apple.com/us/app/meanderthal/id370710977?mt=8>).

⁸ The Incheon Museum app developed by the Incheon Metropolitan City Museum in South Korea available only in Korean.

⁹ The TAP application of the Indianapolis Museum and app of the Guggenheim Museum, Bilbao.

of the research and one was not able to function due to technical problems¹⁰, so the final sample of the apps examined in greater depth was 64.

2.2.2 Year developed

From the 69 mobile apps for which we could collect information about the year of development, the majority (60) were developed in 2010 (or had a latest version released in 2010), with only nine developed in 2009, showing clearly the recent spread of this type of technology and the museums' related interest in investigating its potential.

2.2.3 Countries

The majority of the museum mobile apps we identified were developed by museums in the U.S.A., and in a European context, by museums in France, the U.K. and the Netherlands.

Country	Number of museum mobile apps
USA	27
France	19
United Kingdom	9
Italy	3
The Netherlands	3
South Korea	2
Spain	2
Australia	1
Austria	1
Brazil	1
Canada	1
Colombia	1
Germany	1
Total	71

Table 1: Number of museum mobile apps recorded per country

2.2.4 Distribution platform

The large majority of these applications (63 out of 71) were designed for functioning exclusively on Apple's iPhone smartphone (and its iPod touch and iPad devices). Of the remaining eight, four¹¹ were also designed for mobiles running Google's Android operating system, as well as the Apple devices, and one¹² was designed for both iPhone and Blackberry. Only one¹³ of the 71 applications was designed for most mobile platforms apart from Apple. Two of the apps identified were web-based, operating on the user's mobile web browser (on any type of smartphone) but were also available on the

¹⁰ The Brooklyn Museum Collection app was crashing in iOS4 and was withdrawn from iTunes by the Museum in December 2010 in order to launch a fixed version soon.

¹¹ Two developed by the Brooklyn Museum, one by the Albert Kahn Museum and Gardens in France, and one by the Art Institute of Chicago.

¹² From the Canadian Museum of Civilization.

¹³ The app of the Guggenheim Museum in Bilbao.

museums' website, the app of the Dallas Museum of Art, and that of the Nelson-Atkins Museum of Art in Kansas City¹⁴.

One of the reasons for this preference for iPhone apps might be related to museums' limited finances which lead to the development of apps for only one platform. Although iPhones do not have the largest share of the smartphone market (about 16% worldwide in 2010 according to Gartner (2011), 26% in the U.S.A. according to Nielsen (2011), and 20% in the U.K. according to Stephens (2010b)), they did revolutionize the smartphone and popularise mobile apps, being the first to have a special mobile apps store, which is still the largest and more popular online store of its type (in October 2010, this included about 225.000 apps). Although most art museums typically do not have the in-house expertise, budget and staff to create iPhone apps, there are a lot of developers for iPhone apps that museums can use.

2.2.5 Fee

The majority of the mobile apps examined (56 out of 71) were being distributed for free, indicating that these are considered part of the free provision of visitor services that the cultural organisations are providing. The fee for the remaining 14 apps ranged from 0.79 Euros to 5 dollars (the average fee was approximately 2.5 Euros, 2.7 Pounds and 3.8 dollars for the respective regions).

2.2.6 Notification of availability of mobile app on website

For only a small part of the mobile apps examined (16 apps from 11 related museums), there is a notification and a direct link to a related page from the museum's homepage. For most of the apps examined (52 apps from 42 museums), there is no indication of their existence on the institution's homepage. This raises issues of promotion and marketing of the apps, but also of wider integration in the organisation, particularly its communication and ICT strategy.

2.2.7 Type of application in relation to museum content

From the 64 apps examined in greater depth, we identified the following six categories¹⁵:

Type of application	Number
Presentations – guided tours of permanent exhibitions and the museum in general	29
Presentations – guided tours of temporary exhibitions and practical information about the museum visit	20
Combination of the two above	5
Apps devoted to a single object or artwork from the collection	5
Content creation or manipulation from the user, inspired by artists' work	3
Games based on the exhibits	2
	64

¹⁴ The TAP application of the Indianapolis Museum designed for iPhone and iPod touch can be downloaded onsite and was not included in the in-depth survey as we were not able to visit the Museum at this stage of the research.

¹⁵ The full list of mobile apps under each category can be found in the Appendix.

2.2.7.1 Presentations - guided tours of permanent and temporary exhibitions

Most of the mobile apps examined in greater depth (54 out of 64) take the form of a guided tour to specific exhibitions, collection highlights, or the whole museum through touchscreen icons or/and virtual pads. A different approach in this type of application is followed by Rijkswidget, the app of the Rijksmuseum in Amsterdam (Fig. 1). This presents a different object every day from the museum's permanent collections, with accompanying information about the work, its creator, and the museum, with the possibility to zoom in on its image and to connect with the museum's website for additional material. This encourages repeat visits to view other objects, unlike the other apps which cover a large number of objects but usually offering only basic information.



Fig 1. Rijkswidget, the app of the Rijksmuseum in Amsterdam, showing a different object from the collections every day

2.2.7.2 Apps devoted to a single object or artwork

In this category we identified five apps. Their approach varied from presenting an object from the permanent displays (Tipu's Tiger-V&A) or artwork temporarily on display (How It Is-Tate Modern, Brion Gysin's Dream Machine-New Museum, NY), to a recent acquisition (Urban Light-LACMA), and an electronic publication related to an artwork from the permanent collection (Vincent Van Gogh's Starry Night- MoMA).

MoMA's Van Gogh's Starry Night is an e-book, the short version of a longer printed book published by the museum in 2008¹⁶. In this case, the app is related to the distribution of pre-existent traditional interpretation material through a new digital medium (smartphone) and its release appears more like a marketing decision than a special user engagement programme based on the specific technology.

The remaining apps in this category have a strong promotional and entertaining character, acting as 'teasers' by offering users a taste of the museum content in order to attract them to the whole display onsite. In these cases, the purpose is more to promote the museum's work in an enjoyable way, rather than to engage users in depth with the content itself.

One of the most interesting and promising examples in this section is the app How It Is of Tate Modern (Fig. 2), related to Mirslaw Balka's commissioned work with the same title

¹⁶ It can be purchased with a fee of \$3.99, while the rest in this category are all distributed freely.

which was shown at the Turbine Hall in 2009-10. It is an augmented reality audio tour of the specific artwork with a highly interactive¹⁷ and explorative character. Its approach is more experiential than interpretational, since it is based on the user's personal experience of and 'immersion' in a virtual environment, than a fixed presentation of the artwork. The fact that the app takes the form of an immersive game, quite similar to popular video games, can contribute even more to attracting young visitors to the exhibition. The interactive character of the application, as well as its entertaining features (with a secret game unlocking to users when they open their mobiles when they visit the work in the gallery) can contribute to audience development.

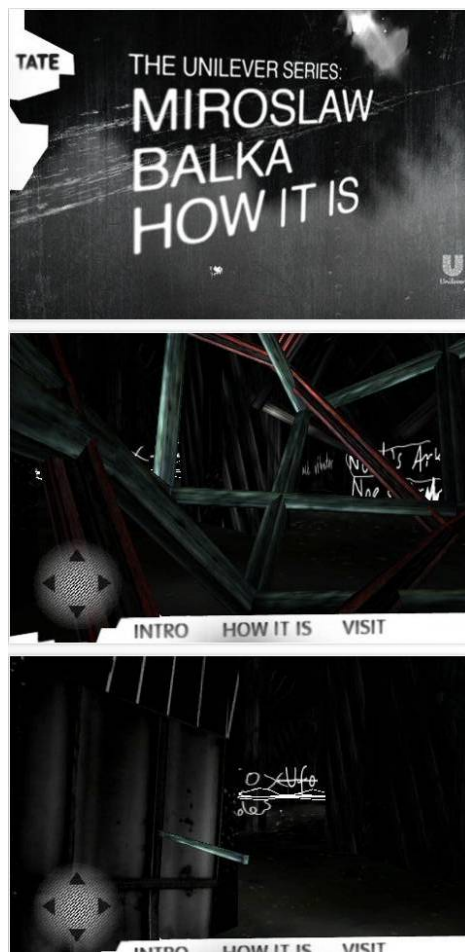


Fig. 2 Tate Modern's How It Is app

2.2.7.3 Content creation or manipulation from the user, inspired by artists' work

Three applications were identified in this category, MUYBRIDGIZER (Tate Britain), In Still-Life 2001-2010 (LACMA), Art-Me (MASP).

Tate Britain's MUYBRIDGIZER (Fig.3) is an app developed for the temporary exhibition on early photographer Eadweard Mybridgizer (08/09/2010-16/01/2011). It gives users the

¹⁷ Based on 3D animation, 3D sound and a virtual joystick.

opportunity to take photographs and then use the app to create images in the style of Muybridge's work, sepia toned 'freeze frames' of moving subjects, which they can store and share through flickr.

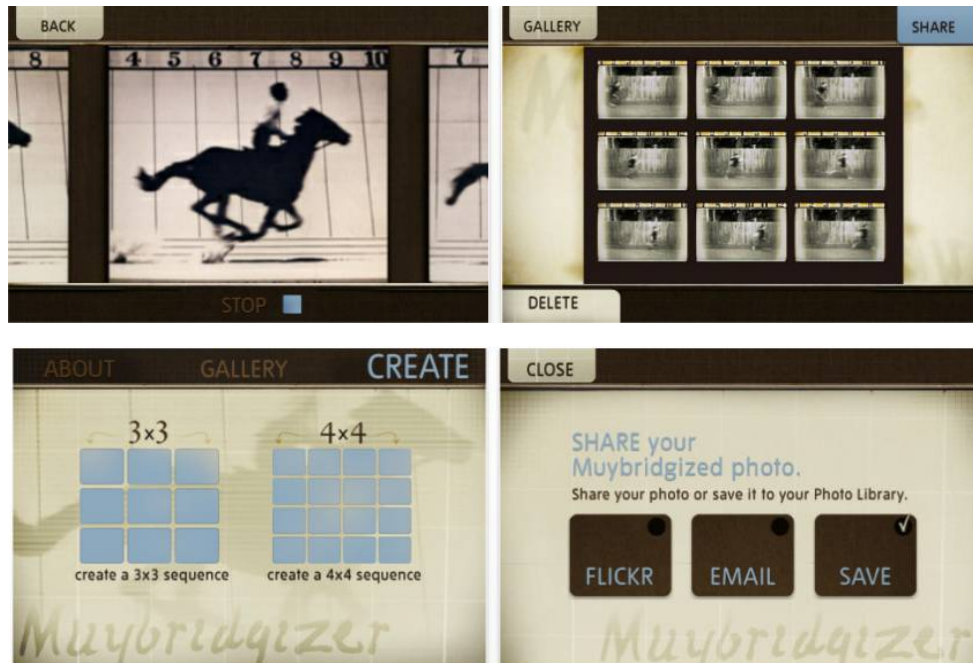


Fig 3 Tate Britain's Muybridgizer app

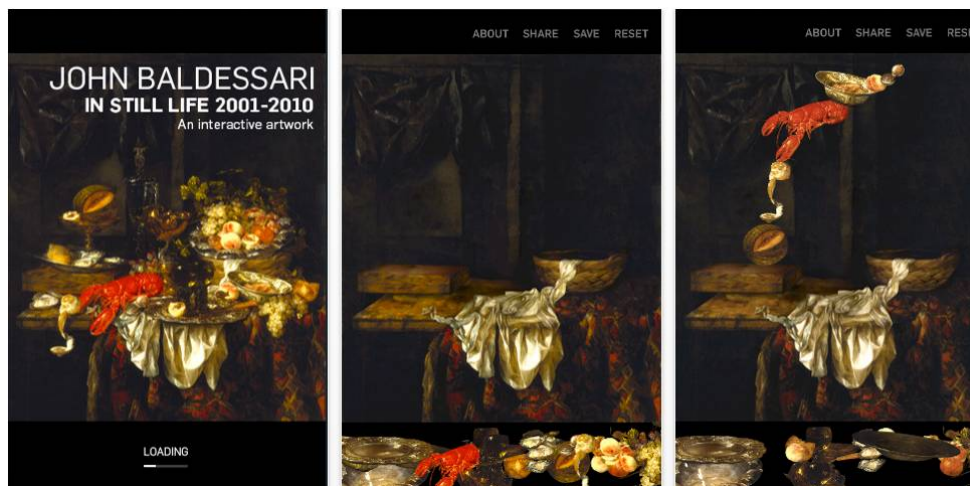


Fig 4. LACMA's app John Baldessari: In Still-Life 2001-2010 where the user can position the elements on the painting

Los Angeles Museum's of County Art app, In Still-Life 2001-2010 (Fig.4), designed by contemporary artist John Baldessari, has a highly interactive character inviting users to re-compose onscreen a Dutch painting of 17th century by arranging through the touch interface the 38 objects in the artwork (each of which has symbolic meaning). Both these apps offer users a more active role, encouraging them to create their own works, inspired by the specific artists. Both apps are quite entertaining (especially Muybridgizer) and

offer opportunities for interaction with the museum content, through experimentation, creation, user's self-expression, and some learning about the history of photography and 17th-century Dutch painting respectively. They are also serving the promotion of museum work since they were launched on the occasion of related temporary exhibitions and their distribution is free.

The Art-Me app of the Museum of Modern Art of Sao Paulo in Columbia allows the transformation of photographs taken by the users to works of art in the style of Rembrandt and Van Gogh. This is a promotional and entertaining app with no extra interpretation material.

Apart from encouraging the creation of personal artworks based on museum work, all three apps store these in the user's own device and allow their sharing through email or social networks¹⁸, thus promoting the feeling of familiarity and ownership of the cultural material and related social interaction.

2.2.7.4 Games based on the exhibits

We identified two applications in this category. The British Museum's Book of the Dead is an interactive knowledge game related to the temporary exhibition 'Journey through the afterlife: ancient Egyptian Book of the Dead' (04/11/2010-6/3/2011). Through this app the users are led to the Underworld by Anubis, the ancient Egyptian god of embalming and are asked questions, which, if answered correctly, will unlock one of the Books of the Dead presented in the exhibition and lead them to the Underworld.

The Tate Trumps (Fig. 5) app of Tate Modern is a game with digital cards during which users explore the exhibits in the museum, 'collect' some of them, and win points. The game can be played by up to three players or groups of players. This application encourages users to explore the works on show and interact socially with their co-participants in the physical environment of the museum.

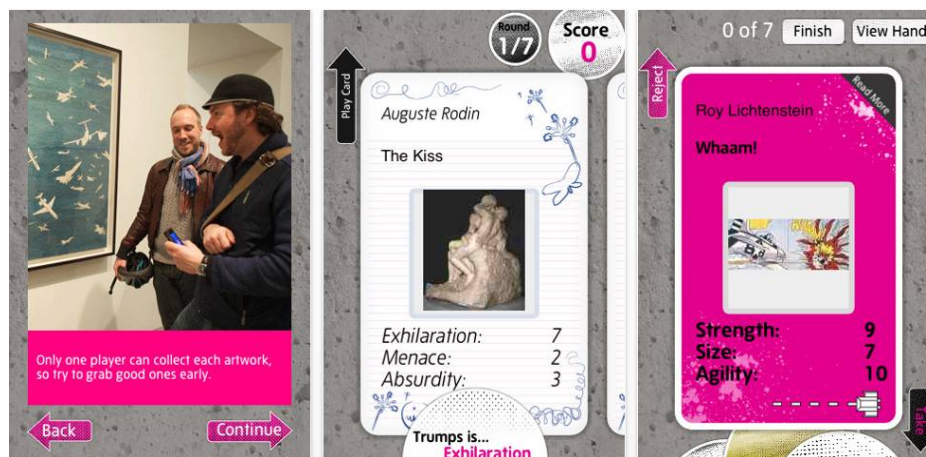


Fig 5. Tate Modern's Trumps app – a digital cards game

¹⁸ Muybridgizer: Flickr, Email; In Still Life 2001-2010: Flickr, Facebook, Twitter, Email; Art-Me: Facebook, Email.

2.2.8 Use of the apps in relation to the museum visit

All the apps, except the ones designed for exclusive use in the museum, can be used before, during, and after the visit to the museum or independently from the visit, enriching and assisting the museum experience but also extending this experience beyond the museum walls. Although there is no obstacle to all these different ways of using the apps, the way of distributing them, their design and content appear to encourage specific type of use.

- **Use before the visit to the museum**

None of the apps studied was designed for exclusive use before the museum visit, but most of them offered practical information which encourages the use of the app for preparing the museum visit, such as opening hours, admissions, access maps, etc. There is potential for exploring this further in the future, particularly for assisting life-long learning, school projects, etc.

- **Use during the museum visit**

Some of the applications can only be downloaded once the user enters the museum space (e.g. the TAP app from the Indianapolis Art Museum) and aim to enrich the experience of the visit. But even in the case of apps which can also be downloaded off-site, the majority are best suited for use during the visit, due to their design and content. These apps have navigation structured according to the spatial arrangement of the exhibits in the museum, include interactive or simple floor plans of the museum's exhibition spaces with the exhibits marked, or offer activities for enriching the museum visit such as Gallery Tag! of Brooklyn Museum. Furthermore, in some cases the use of these apps is encouraged in the museum by orientation services which take advantage of users' location tracking technologies¹⁹, and the incorporation of a keypad for selective access to audio narratives about particular exhibits²⁰. In many apps the whole approach which offers simple visual material (images) with audio narrative, refers to the traditional audio tour.

- **Use after the museum visit**

Even though no app we studied was designed for exclusive use after the visit, a lot of them included features which offer opportunities for studying and processing the museum material in this way (such as the tagging of favourite material and the possibility to store content such as photographs on the user's mobile).

2.2.9 User's interaction with the content

Layering of content is important for applications that are shown on very small screens and are addressing a varied audience with different levels of interest in the collections and the exhibition themes. In the applications examined (which follow the guided tour paradigm), this aspect ranges from minimal, with apps offering cards with images and interpretative text or narration (e.g. the app of the Musée Jacquemart Andre, Paris on 18th

¹⁹ Brooklyn Museum and Explorer-AMNH.

²⁰ SFMoMA; Asian Art Museum; Brooklyn Muse-Brooklyn; De Cordova Sculpture Park and Museum; Houdini; Monet- Grand Pallet; Baba Bling-Musée de Quai de Branly; MdbK Kunst Begleiter-Museum der bildenden kunste Leipzig; Portland Museum; Rubens, Poussin et les peintres du XVIIeme siècle- Musée Jacquemart-Andre; Phillips Collection, USA.

century painters) to adequately layered (e.g. the SFMoMA app with a special “Go Deeper” interface) (Fig 6).

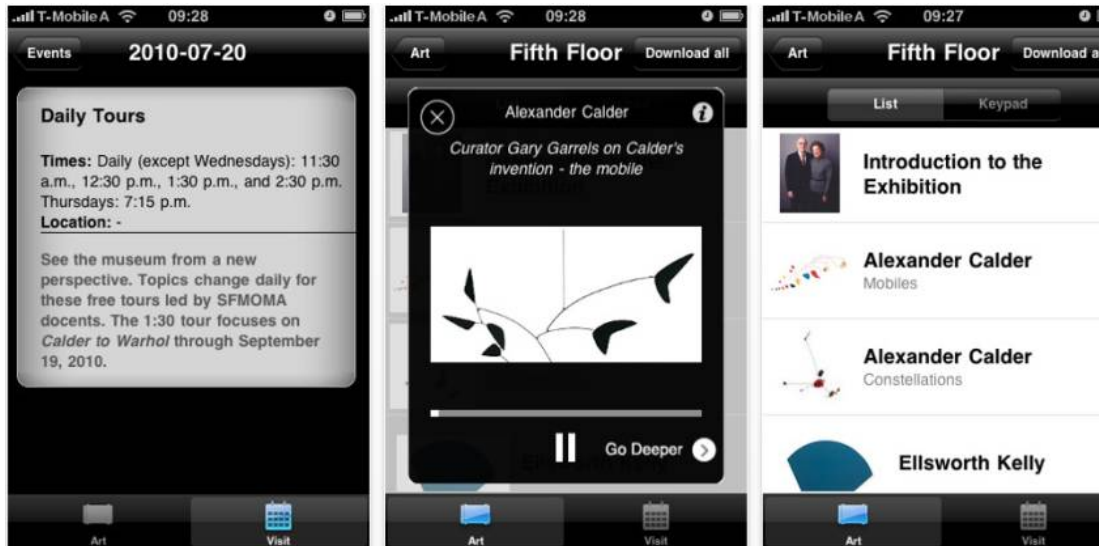


Fig 6. The SFMoMA's app provides a “Go Deeper” button which assists the layering of content

Additional features that also assist in the provision of different layers of information are the various ways of navigating (e.g. spatial, chronological), the availability of images of high resolution and magnification, the linking and correlation of the system's content (e.g. MoMA) and any link to additional online material (e.g. Brooklyn-Wikipedia, MoMA podcasts, MoMA i-Tunes U, related material at the organisation's website).

Almost all the tour type of apps examined take advantage of the capabilities of smart mobile phones for high level of zooming via touch, offering images of high resolution and magnification suitable for examining details of an object. This gives the impression of bringing the works closer to the user, offering views which are often not possible to acquire in other cases. The access to details of the objects gives added value to the apps and enriches the user's experience encouraging personal exploration. We should note here, however, that the magnification capabilities offered vary between the different applications, ranging from small magnification (e.g. Musée National Marc Chagall) to large one (e.g. Uffizi).

Another feature offered to users to assist their interaction with the content is the tagging of material as 'favourite' or the use of bookmarks and the creation of related personal collections. We identified eight apps with related features²¹. The specific feature of the MoMA's Van Gogh's Starry Night app is enriched with the possibility of attaching to the favourite objects, notes by the user, reinforcing in this way users' interaction with the material. These features include several possibilities for enriching the user's experience and for personalised learning through the personal and emotional linking of the user with

²¹ The Asian Art Museum smartour; Brooklyn Museum's Like This !: feature allowing visitors to share favourite exhibits; Vincent Van Gogh's Starry Night-MoMA; Monet-Grand Palais; Houdini-Jewish Museum; Uffizi; Galleria del' Academia; SD2010-Sydney Design-Powerhouse Museum.

the museum material. They also promote the use of the app after the museum visit, offering users the opportunity for further exploration and study of the bookmarked content, e.g. at home, extending the museum experience beyond the museum walls.

The applications MoMA Snaps and Share of the Rooftop Garden-SFMOMA allow users to take photographs in the museum spaces, store them, and distribute them via email. This feature promotes user's active exploration of the museum content and their creative expression, as well as creating a feeling of familiarity and intimacy about the museum visit.

Another feature which allows users to interact with the museum content at the museum spaces is Gallery Tag! of the Brooklyn Museum app. This is an interactive game where users tag museum objects aiming to win points and awards. It is based on exploration and discovery of exhibits which, according to the players, fit to a series of predetermined tags. The game includes roaming services (Roam!), encouraging visitors to find and tag objects from different floors of the museum and rewarding them with additional points, linking to the mobile version of the museum's website (Crossover!), and finally, convergence of the game's tags with the online collection (Covergence!), thus bridging the physical with the virtual collection²². This game app has the potential to contribute to experiential learning and the personal construction of meaning through the active participation of visitors, while strengthening the entertainment potential of the museum visit.

2.2.10 Integration of multiple perspectives

Only a few of the tour type of apps investigated strove to integrate multiple perspectives, apart from the curator's or the official museum view. Seven of the apps attempted this, some to a greater²³ and others to a lesser extent²⁴, incorporating comments from conservators, the artists themselves, directors, family members of the creators, and in one case (SFMOMA's Rooftop Garden), a musical piece inspired by the museum's artwork.

2.2.11 Social interaction

From the 64 mobile apps examined in greater depth, 19 offered features supporting social interaction. Most of these (16) relate to the sharing of museum content, commenting, evaluating and tagging material as 'favourite'. Sharing is related to content of either the app itself (video, images, etc.) or that has been created by the users (photographs, comments, evaluations, lists of favourite material, messages, etc.), or both. Thirteen apps use as sharing platform the online social network websites (facebook, Twitter, Flickr) (MoMA-YouTube) and email²⁵, while three museum mobile apps use 'walls' for posting messages²⁶.

²² The description was based on information from the museum's blog, as access to this part of the application is only possible in the museum:

<http://www.brooklynmuseum.org/community/blogosphere/2010/03/25/gallery-tag/> [15/11/2010]

²³ E.g. Rooftop Garden- SFMOMA; Yours Vincent, The Letters of Vincent Van Gogh-Van Gogh Museum; MoMA's main app; Gauguin: Maker of myth-Tate Modern.

²⁴ E.g. Love Art-London National Gallery; Quilts:1700-2010-V&A Museum

²⁵ Rooftop Garden-SFMOMA; Asian Art Museum Acoustic Smartour; Brooklyn Museum Mobile; Houdini-The Jewish Museum; In Still Life 2001-2010, An Interactive Artwork-LACMA; French Impressionism-Art

Additionally, we found two apps with an interface for connecting the user with the museum's social networks²⁷. We also found one app (Tate Trumps) which supports social interaction through group collaboration, dialogue and social contact²⁸. Finally, another feature of Brooklyn Museum's Gallery Tag!, which allows users' to tag exhibits from the online museum collection, has also possibilities for social tagging of the museum content which should also be studied further in the future.

3 Discussion

Because of the early and experimental stage of integrating these technologies in the museum work, a number of issues have risen related to the content, design and use of these apps, but also of their overall impact on the image of the museum and the whole experience of the visit and/or the use of the cultural material (in the case of remote only access). As with every new technology, also in the case of mobile apps, complex issues emerge about the development and maintenance of a new business model by cultural organisations, especially in this case where the mobile telephone environment changes rapidly. The fragmentation of 'mobile internet', with multiple platforms for access and navigation is feeding a heated discussion about the selection of distribution platforms for mobile apps and is discouraging smaller or less technically-savvy museums from exploring the possibilities of mobile apps.

The new technologies of mobile telephony have the potential for supporting museum communication as a holistic and interactive cultural process. However, our survey showed that this is not always fulfilled. The majority of the apps examined relate to guided tours and presentations of permanent or temporary exhibitions with the following basic characteristics:

- Navigation according to the spatial layout of the exhibits or their chronological or alphabetical order,
- Minimal exploitation of technologies of location tracking and guidance,
- Limited connectivity with the museum's online presence
- Satisfactory layering of content
- Limited effort to incorporate different and interdisciplinary perspectives
- Interaction focused mainly on great magnification of images
- Social interaction almost exclusively through the sharing of content on online social networks and email,
- Use mainly during the museum visit.

Institute of Chicago; Monet-Le Grand Palais; Musée de Quai de Branly; Murybridgizer-Tate Britain; Hunterian Museum; Art Me-Museu de Arte de Sao Paulo; Art Museums in Seoul; SD2010-Powerhouse Museum.

²⁶ Graphic Design Museum-Breda, the Netherlands; Wim Delvoye au Musee Rodin; Sala Parpallo, Valencia, Spain.

²⁷ MOMA-YouTube and Hunterian-Wikipedia.

²⁸ Also, the feature Gallery Tag! of the Brooklyn Museum app mentioned above, even though it supports individual exploration of the museum exhibits, might also support group interaction, but the limited off-site access to its content does now allow us to test this further at this initial stage of the research.

The majority of the museum apps developed so far have the form of enriched audio tours, in some cases following the model of traditional tours (linear exploration, use of reference images of the work with audio commentary). We observe here the transition from the portable audio tour device to the multimedia device (PDA, iPod, tablet, smartphone), with intermediary stage the distribution of audio tours on mobile phones (cell phone acoustic tours), resulting in the emergence of new challenges in the context of the automated museum experience (Smith 2009). Although the technology has changed, the mentality related to the design of the experience appears in many cases to have remained the same to the one which produced the acoustic tours. It is necessary to shift from the approach that the device determines the content, to a new approach, where the device is a medium in the process of creating content, but not the decisive factor (Smith 2009).

One of the reasons there is still scepticism about the use of smartphone apps in museums is that it carries the risk of overshadowing the exhibits and the museum content itself. Because of their strong mobile and multimedia character and the fact that they are usually displayed on the visitors' own, familiar devices, this is often stronger than with other ICT interpretational means (e.g. infokiosks). This risk raises questions of design and content of these systems and their integration with the surrounding space and exhibits, which also need to be further investigated in the future.

As the technology evolves, but also our thinking about its potential in a cultural environment, the discussions about the adoption of mobile devices by museums need to relate less to the technical issues and more to the variety of content and services that these can offer, and particularly the ways in which these apps can encourage multiple and meaningful connections between people, organisations and collections (Johnson et al 2010). As attitudes of both museums and visitors are changing, "people are becoming used to getting information on a museum whenever and wherever they want" (Nancy Proctor quoted in Stephens 2010a). Proctor highlights as very important the changes in the nature of the mobile content and the experiences being designed, which she identifies as far more dialectical than earlier generations of mobile narrowcasting (Stephens 2010a).

A series of further questions which need to be examined relate to the manipulation of content by the user and its integration in the application, the nature of the interaction between user-exhibit which is mediated by the mobile apps, the understanding of the different models of use for constructing different museum experiences²⁹.

²⁹ An interesting example of an app that integrates user-generated content in itself, seems to be the custom-built iPhone app 'Scapes', which we were not able to examine in depth as it is designed to work fully online. This is designed by H. Burgund, a musician and sound artist, specifically for DeCordova Sculpture Park and Museum, Lincoln, USA (<http://www.decordova.org/sites/default/files/Platform3release.pdf> [07/04/2011]). Scapes is based on two-way communication that encourages visitors not only to listen, but to make their own recordings as they wander through the Park, that are then incorporated into the sound-part for everyone to hear. As visitors navigate the Sculpture Park with the phones, they can hear location-specific voices, music, other visitors' thoughts, and sounds that change as they move. In this case, the app has the potential of keeping the visitors' experience sociable, constructive and engaging.

Few of the apps we examined were found to support social interaction, a fundamental aspect of contemporary museum communication but also of cognitive development. Most of these accommodate it through content sharing on online social networks or/and via email. The design and content of most apps supports individual and not group use. This fact supports the fear of museum professionals that the use of these applications can isolate users and degrade the social dimension of the visit. However, this might have to do more with the way these apps have been designed until now and not with the inherent limitations of the technology. It is therefore, imperative to experiment with the design of museum apps for groups, such as families, school parties, etc. investigating the various levels and types of interaction that these systems can support for different visitor groups.

Our study carried out at this first stage of the research an initial mapping of the field, identifying apps by art and cultural historical museums and examining them off-site. Further work is needed involving the analysis of the use of the apps on-site, but also recording the views of both museum staff and users. In order to study the complex set of parameters involved, a wide range of methodological tools would be required, and in some cases, innovative approaches, while taking into account ethical issues (such as the need to respect user's privacy).

The development of these applications by museums is undoubtedly a development in the exploitation of new technologies, with positive results in the promotion and understanding of their collections. However, in our days the discussion about the museological exploitation of these apps, both from the side of museums as well as that of users, includes more questions than answers because of their recent integration in museum practice. Further exploration in different directions, some of which we highlighted here, is necessary for the formulation of a wider interpretative strategy, where these apps would be included in the museum's portfolio of available interpretative media in a constructive way and would be used according to their potential and special characteristics, supporting the museums' mission and enriching the use of cultural material.

Appendix –Museum mobile apps examined listed by type of application

<i>Presentations – guided tours of permanent exhibitions and the museum in general</i>	
<i>AUSTRIA</i>	1. Kunsthistorisches Museum Wien, Austria
<i>CANADA</i>	2. Canadian Museum of Civilization
<i>COLOMBIA</i>	3. AMBO, Museo de Arte Moderno de Bogota
<i>FRANCE</i>	4. Chateau de Versailles, Versailles 5. LaM, Lille Metropole Musée d'Art Moderne, d'Art Contemporain et d'Art Brut 6. Le Grand Palais, Paris 7. Musée Cluny, Musée National du Moyen Age, Paris 8. Musée de Quai de Branly, Paris 9. Musée des Baux Arts de Cambrai, France 10. Musée du Louvre, Paris 11. Musée National Fernand Leger de Biot, France 12. Musée National Marc Chagall, Nice
<i>ITALY</i>	13. The Official Guide, Accademia Gallery, Florence 14. The Official Guide, Uffizi, Florence

<i>KOREA</i>	15. Art Museums in Seoul, Seoul
<i>SPAIN</i>	16. Sala Parpalo, Valencia
<i>THE NETHERLANDS</i>	17. GDM, Graphic Design Museum, Breda, The Netherlands 18. Rijkswidjet iPhone, Rijksmuseum, Amsterdam
<i>UK</i>	19. Hunterian Museum, University of Glasgow 20. Love Art, National Gallery, London
<i>USA</i>	21. Acoustic Smartour, Asian Art Museum, San Fransisco 22. Dallas Museum of Art (<i>web app</i>) 23. De Cordova Sculpture Park and Museum, Lincoln 24. Infinity of Nations, National Museum of American Indian, Smithsonian 25. Fowler Museum, Fowler Museum at UCLA, Los Angeles 26. French Impressionism, Art Institute of Chicago 27. MOAS, Museum of Arts and Science, Daytona Beach 28. Rooftop Garden, MoMA San Francisco 29. The Nelson-Atkins Museum of Art, Kansas City (<i>web app</i>)
<i>Presentations – guided tours to temporary exhibitions and practical information about the museum visit</i>	
<i>AUSTRALIA</i>	1. SD2010, Powerhouse Museum, Sydney, ‘SD2010-Sydney Design 2010’, 13/07/2010 – 15/08/2010
<i>FRANCE</i>	2. Baba Bling, Musée de Quai de Branly, Paris, ‘Baba Bling’, 05/10/2010 – 30/01/2011 3. Bruegel, Memling, Van Eyck, Musée Jacquemart-Andre, Paris: Exposition ‘Bruegel, Memling, Van Eyck’, 11/09/2009 – 11/01/2010 4. Clichés Japonais, Albert Kahn, Musée et Jardins, Boulogne-Billancourt, Clichés Japonais, 09/11/2010 – 28/08/2011 5. L’Or des Incas, Pinacothèque de Paris, ‘L’ Or des Incas’, 10/09/2010 – 06/02/2011 6. Monet, la Visite: expo Grand Palais, Paris, ‘Monet’, 21/09/2010 – 24/01/2011 7. Musée Jacquemart-Andre, ‘Rubens, Poussin et les peintres du XVIIeme siècle’, 24/09/2011 – 24/01/2011# 8. Pinacothèque de Paris, retrospective of all the temporary exhibitions 9. Une ville pour l’ Impressionisme, Musée des Beaux-Arts de Rouen, ‘Une ville pour l’ Impressionisme: Monet, Pissaro et Gauguin a Rouen’, 04/06/2010 – 26/09/2010 10. Une visite comme si vous y etiez, Centre Pompidou-Metz, exhibition: ‘Chefs- d’oeuvres’, until 04/07/2011 11. Wim Delvoe au Musée Rodin, Paris, ‘Wim Delvoe’, 16/04/2010 – 22/08/2010
<i>ITALY</i>	12. Le Scuderie del Quirinale, Rome, ‘Caravaggio Exhibition’, 20/02/2010 -13/06/2010
<i>THE NETHERLANDS</i>	13. Yours Vincent, Van Gogh Museum, Amsterdam, ‘Yours Vincent, The Letters of Vincent Van Gogh’, 09/10/2009 – 03/01/2010
<i>UK</i>	14. Gauguin, TATE Modern, London, ‘Gauguin: Maker of myth’, 30/09/2010 – 16/01/2011 15. Quilts 1700–2010, Victoria and Albert Museum, ‘Quilts 1700–2010: A close-up, stitch-by-stitch look at British quilting’, 20/03/2010 – 07/07/2010
<i>USA</i>	16. Dutch Utopia, Telfair Museums, Savannah, exhibition ‘Dutch Utopia, American Artists in Holland, 1880-1914’, 01/10/2009 - 10/01/2010 17. Houdini, The Jewish Museum, NY, exhibition ‘Houdini: Art and Magic’, 29/10/2010 – 27/03/2011 18. iAfrica, Minneapolis Institute of Arts, exhibition ‘iAfrica: Connecting with Sub-Saharan Art’, 3/10/ 2009 – 18/04/ 2010 19. MoMA San Francisco, exhibition ‘Calder to Warhol: Introducing the Fisher Collection’, 25/06/2010 - 19/09/2010 20. Yves Klein, Hirshhorn Museum and Sculpture Garden, Smithsonian, Washington, D.C., ‘Yves Klein: With the Void, Full Powers’, 20/05/2010-12/09/2010
<i>Combination of the two above</i>	
<i>GERMANY</i>	1. MdbK Kunst Begleiter, Museum der bildenden kunste Leipzig
<i>USA</i>	2. Brooklyn Museum Mobile 3. Phillips Collection, Washington, D.C.

	<ol style="list-style-type: none"> 4. Portland Art Museum 5. MoMA, NY
<i>Apps devoted to a single object or artwork</i>	
<i>UK</i>	<ol style="list-style-type: none"> 1. The How it Is by Polish artist Miroslaw Balka, Unilever Series Commission for Tate's Modern Turbine Hall, 13/10/2009 – 05/04/2010 2. Tipu's iTiger, V&A, London: object from permanent collections, part of exhibition 'Maharaja, The Splendour of India's Royal Courts', 10/10/2009 – 17/01/2010
<i>USA</i>	<ol style="list-style-type: none"> 3. Brion Gysin's Dream Machine inspired by Gysin's artwork Dreamachine (1961), launched on occasion of Gysin retrospective exhibition in New Museum, NY 03/07/2010 – 03/10/2010 4. Urban Light app: developed on occasion of first anniversary of installation of Chris Burden's work Urban Light at LACMA, (February 2008) 5. Vincent Van Gogh's Starry Night-MoMA: based on the museum's homonym book, by the art historian Richard Thomson
<i>Content creation or manipulation from the user, inspired by artists' work</i>	
<i>BRASIL</i>	<ol style="list-style-type: none"> 1. Art-Me, Museu de Arte de Sao Paulo
<i>UK</i>	<ol style="list-style-type: none"> 2. Muybridgizer, Tate Britain, London, exhibition 'Eadweard Muybridge', 08/06/ 2010 – 16/01 2011
<i>USA</i>	<ol style="list-style-type: none"> 3. John Baldessari, In Still-Life 2001-2010, Los Angeles County Museum of Art, exhibition 'Baldessari: Pure Beauty', 27/06/ 2010–12/09/ 2010
<i>Games based on the exhibits</i>	
<i>UK</i>	<ol style="list-style-type: none"> 1. Book of the Dead, British Museum, London, exhibition 'Ancient Egyptian Book of the Dead' 04/11/2010 – 06/03/2011 2. Tate Trumps, Tate Modern, London

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