The Remediation of the MUM App:
Reconfiguring the Museum and its Socio-cultural Politics

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Declaration

I certify that this thesis that I have presented for the degree of Doctor of Philosophy in the Department of Sociology at Goldsmiths, University of London is solely my own work. References to the work of others have been cited and indicated throughout.

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Abstract

This research study traces the 'remediation' (Bolter and Grusin, 2000) of a 'digital' display, the McCord Museum's *MTL Urban Museum App,* exploring the role of digital media technologies, among other heterogeneous actors, in 'reconfiguring' (Suchman, 2007) subjects, objects, practices and spaces while inspecting the socio-cultural politics of these processes. Drawing on a theoretical framework that brings together new media studies, actor-network theory, feminist writing in science and technology studies, the sociology of art and spatial studies, this thesis traces how the App was remediated and examines how it is used in practice. The study first investigates how the App was (re)made by looking at the actors involved. The thesis unveils emerging relations between the Museum and commercial organisations, technology platforms, infrastructures, collections and visitors; and the competing social, cultural, economic and political interests among these heterogeneous actors shows a changing set of negotiations in the Museum's display practices. Next the study examines how the App is used in two novel practices: viewing collections in 'augmented reality' and managing the App's display using Google Analytics. In examining how the App is used in practice, the thesis also reveals the App's role, among other (unexpected) actors, in precariously rescripting and/or reclassifying objects, subjects and practices, as well as reordering and rewriting urban spaces. By exploring the role of the App along with these other actors in such practices and processes the thesis also looks to contribute to particular debates on agency.

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List of Abbreviations and Acronyms

2D – two-dimensional

3D – three-dimensional

ANT – actor-network theory

AI – artificial intelligence

App – application

DOR – City of Philadelphia Department of Records

GPS – Global Positioning System

ICOM – International Committee of Museums

IT – information technology

NMC – New Media Consortium

MTL – Montreal

MUM – MTL Urban Museum

STS – science and technology studies

WiFi – also known as 'WLAN' or Wireless Local Area Network

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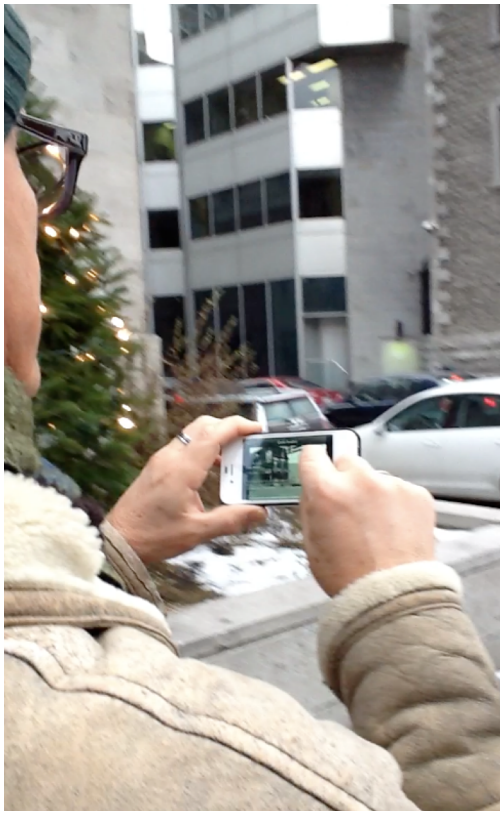
1 Introduction

On the right (in Figure 1.1) is an image of a participant of this research study holding up a smartphone mobile device. He is standing on a cold December's day outside the front entrance of Montreal's McCord Museum[1]. The participant is using the MTL Urban Museum App, an 'augmented reality' application that displays a selection of the Museum's digital collections, i.e. digital images are superimposed onto cityscapes using the device's camera. Unbeknownst to the participant, he is a part of the (sometimes awkward) 'reconfigurations' (Suchman, 2007) of an urban museum. For example, while he views collections with the App on the street, passersby will take him for a 'tourist' rather than a 'museum visitor' – they will stop and wait for him to finish taking a photo or filming or ask him if he would like to have his photo taken. He too will consider himself performing a 'tour' rather than a 'museum visit'. But what role does the App play in such reconfigurations – and what are its politics?

Figure 1.1 Viewing digital collections with the MUM App



Source: Ana-Maria Herman. Screen shot from a video recording made on December 14, 2012

This research study examines the case of the 'remediation' (Bolter and Grusin, 2000) of the McCord Museum's *MTL Urban Museum App* and explores the reconfiguration of subjects, objects, practices and spaces and the socio-cultural politics of these processes. Central to this thesis is the understanding of digital media technologies[2] as 'hybrids' (Latour, 1993), 'actor-networks' (Callon, 1986; Latour, 2005) and

[1] The McCord Museum, which takes its name from its founder David Ross McCord, is a museum of history displaying material and digital collections about the history of Montreal, Quebec and Canada.
[2] See Chapter 2 for a detailed discussion on the way in which this thesis employs the term(s) 'digital media technologies'.

'assemblages' (Latour, 2005) that are refashioned over time through what has been called a process of remediation. Remediations refer not only to physically transformative processes, such as in the emergence of this app, but perhaps more importantly for this study, to the reconfiguration of (related) objects, subjects, practices and spaces – what is described as bringing "together assemblages of stuff and meaning into more and less stable arrangements" (Suchman, 2007: p. 227; see Chapter 3 for a detailed discussion on reconfiguration). This study examines firstly how a remediation occurs by investigating the roles of actors[3] involved in the (re)making of MUM. This analysis pays close attention to the entanglements and negotiations[4] made between heterogeneous actors as well as the emerging socio-cultural politics related to display practices at the Museum. Secondly, the study analyses how the App is used to view collections and, by doing so, examines how museum-related objects, subjects, practices and spaces are reconfigured – that is, how they are reclassified, rescripted, reordered and/or rewritten in practice.

This latter analysis also allows the study to further contribute to debates about the particular role of digital media technologies in reordering and rewriting spaces. On the one hand, spatial theorist have proposed that digital media technologies signal an 'epochal' shift (Thrift and French, 2002) given the increasing intertwining of the biological and computational. In particular, Thrift and French (2002) see the growth of ubiquitous software as increasingly 'directing' space. In a similar vein, Kitchin and Dodge (2011) suggest that software is increasingly involved in the 'automated management' of society, given that spaces are increasingly dependent on software. On the other hand, ANT theorists such as Barry (2001) and Suchman (2007) propose along with Latour (1994) that agency is always a 'relational effect' of an assemblage.

[3] The term 'actor' is used as synonymous to 'agent' and 'actant'. In actor-network theory (ANT) 'actor' refers to *both humans and nonhumans*, since all entities are considered as having agency, and thus 'act'. This has been criticized since, firstly, 'actor' and 'agent' do not reflect the hybridity of entities nor the idea that actors always act in a network (the reason for the hyphen in actor-network theory). Secondly, as Latour (1994) notes, 'actor' and 'agent' are awkward to use in the case of nonhumans. For this reason, Latour (1994) has suggested the use of 'actant' to describe *any entity* that acts. This thesis uses the term 'actor' given its relevance in 'actor-network theory' and, while the term is used as synonymous with 'agent' and 'actant', it is recognized that all of these terms are problematic.

[4] The term 'negotiation' is often used in ANT studies to refer to the mediations that occur between human and nonhuman actors in a network (see Latour, 1987; in museum studies see Macdonald, 1998). As such, the term is considered and employed in this thesis as synonymous to 'mediation'.

Barry (2001) reminds us that there is no opposition between technology on the one hand and the human on the other and Suchman (2007) points to the 'backstage' of technologies, specifically those human labors that afford technologies their 'agency'. This study looks to contribute to this debate by responding to two above-mentioned claims: that digital media technologies 'direct space' and that they allow for the 'automated management' of society. Firstly, the role of the MUM App (and other actors) in two specific processes are examined: in reordering spaces when used as a 'navigational platform' (November et al. 2010) and in rewriting spaces when used as a display platform to view collections in 'augmented reality'. Secondly, the analysis looks at how Museum staff use statistical information that is gathered by the App and presented on Google Analytics dashboards to manage the display.

This case study on the MUM App has been developed in response to the growth in the use of digital media technologies by institutions, and particularly in the practices of displaying, viewing and managing museum collections. In response to this growth, an emerging body of research across diverse disciplines of study, including museum studies, has looked to examine and explain diverse social, cultural and/or political changes related to digital media technology use by museums and their audiences. There is sufficient reason for this attention since, as Henning extols, "[n]ew media is everywhere in museums these days – in the form of hand-held information devices, information kiosks, installation art, display supports and archiving systems" (2011: p. 302). In studies of museums, the increase in the use of digital media technologies has raised questions about how they change the museum, its practices and relationship with audiences. To explain these changes, museum (and critical) theorists have looked to diverse areas of study, including science and technology studies (STS), ANT and new media studies. For example, Parry's (2007) book *Recoding the Museum: Digital Heritage and the Technologies of Change* draws on Kuhn's (1970) work in STS and Manovich (2001) in new media studies to understand how the museum is changing in relation to technologies, while looking to avoid 'deterministic readings' of technologies. Michelle Henning also looks to Manovich's (2001) work while at the same time drawing from new media studies, remarking that we must understand media transformations as 'Bolter and Grusin (2000) type

remediations' (see Henning, 2007; Henning, 2011). Further, theorists examining interaction in museums have drawn directly on ANT as a way to explain how museums experiment with apps (Smørdal et al., 2014). Yet these studies often fall short in their analyses since they either succumb to 'deterministic readings' of technology, fail to fully employ ANT and its implications for changes related to sociotechnical arrangements, or do not fully consider the 'experimental' (as defined by Basu and Macdonald, 2007; see also Yaneva, 2003) aspects of digital media technologies (points that are elaborated on below and in chapters 2 and 7).

This thesis seeks to understand the role of digital media technologies (among other actors) in the reconfigurations of an urban museum by looking at a specific case of remediation while avoiding 'technological deterministic' explanations (which focus on technologies as agents of change) as well as 'social constructivist' approaches (which focus on humans as agents of change) and by recognising the 'experimental' aspects related to the deployment of digital media technologies – that is, that deployments of digital media technologies bring together and 'mobilise' (Latour, 1986) a host of heterogeneous actors with uncertain outcomes. In the first place, technological determinism and constructivist approaches are avoided by employing the ANT 'principle of generalised symmetry' that suggests humans and nonhumans must be analysed on the same terms (Callon, 1986; see also Latour and Woolgar, 1979; Haraway, 1991; Law and Bijker, 1992). By employing this ANT principle, analyses consider both the 'social' and the 'technical' together – and so, actor-networks are here considered as emerging from complex 'sociotechnical' systems (Law, 1991) or networks of 'heterogeneous' actors that bring together "actants of all types and sizes, whether human or nonhuman" (Akrich, 1992 p. 206; see also Latour, 1994; Law and Bijker, 1992; Law, 1999). Secondly, the social, cultural and political implications of these remediations are understood as always being 'relational effects' (hereon also referred to as 'effects') – as consequences of the negotiations between a network's heterogeneous actors (Latour, 2005; Law, 2007; Law, 2008). The 'experimental' aspect of the deployment of digital media technologies in museum practices means that these 'effects' are uncertain – precarious and unpredictable.

Before providing a more detailed theoretical framework (in Chapter 2) and a methodological approach (in Chapter 3) for this study, this introduction will below elaborate on the concept of remediation, discuss the increasing use of digital media technologies in museums and, particularly in the case of the McCord Museum, chart some of the specific animating concerns of this study and outline the key research questions of the study. The following section begins by introducing the remediation concept, explaining old debates in new media studies and the turn to ANT as a way to explain socio-cultural change related to digital media technologies. Next, the chapter discusses the increase in the use of digital media technologies and 'apps' by museums. The subsequent section will then introduce the McCord Museum's MUM App and chart the animating concerns of this study – concerns that may lead us to ask, for example, *why* an 'App' was chosen as a mode of display despite reduced accessibility for particular audiences and *why* only a limited number of images could be displayed on this 'digital' App. While charting these concerns can lead to *why* questions, this thesis reformulates these as *how* questions – in line with ANT studies that treat such consequences as 'relational effects' (Law and Bijker, 1992; Law, 1991; Law, 2008). Lastly, the final section of this chapter maps the contents of the thesis.

The Remediation Concept: Moving Away from Early Debates About 'New' Media

A key concept that has been introduced as central to this study is what Bolter and Grusin (2000) have called 'remediation', a concept that looks to move away from old debates in new media studies by drawing on ANT. In their book *Remediation: Understanding New Media*, the authors propose the concept of remediation as a way to (re)conceptualise 'new media' and how they transform over time. Their work is important because it positions a way of thinking about 'new media' as hybrids or actor-networks that are refashioned over time. To Bolter and Grusin (2000) considering media as such means that 'new media' are never 'new' but rather remediations of 'older' media into 'newer' ones (or vice versa, 'newer' media into 'older' media). This, in turn, has implications for how social and cultural change may be theorised, and particularly, in ways that sideline the perspectives of technological

determinism as well as social constructivism – viewpoints that continue to thrive in new media studies (Lister et al., 2009). In new media studies, the debate related to whether media shape society or society shapes media may be traced back to works by Marshall McLuhan and Raymond Williams.[5] As Lister et al. (2009) explain, McLuhan and Williams were interested in 'new media' forms despite the fact that their work was conducted before present-day 'new media' emerged. But where McLuhan examined the 'cultural effects' of 'new media' forms, Williams "sought to show that there is nothing in a particular technology which guarantees the cultural or social outcomes it will have" (Williams, 1983 in Lister et al. 2009: p. 77).

While disagreements on readings of both McLuhan's and William's works have also provided reason for debate (see Lister et al., 2009) what is of particular significance here is that in new media studies "it is their views and arguments about the issue, filtered through very different routes, that now echo in the debate between those who see new media as revolutionary or as 'business as usual'" with McLuhan being linked to the former claims, while Williams to the latter argument (Lister et al. 2009: p. 77). And, as hinted at above (and is further discussed in Chapter 2), these sets of arguments are also often still used to explain the changes related to the employment of digital media technologies by museums. However, by drawing on ANT, the remediation thesis has offered a way to move beyond these partial viewpoints in order to study both the social and technical together. While drawing on ANT, it was however McLuhan's famous dictum "the 'content' of any medium is always another medium" (McLuhan, 1964 in Bolter and Grusin, 2000: p. 45) that inspired the remediation thesis. For Bolter and Grusin, McLuhan was thinking of a "complex kind of borrowing in which one medium is itself incorporated or represented in another medium" (2000: p. 45). But most important to this study is that the remediation concept is (also) developed on a theoretical framework that is drawn from ANT, drawing on works by Bruno Latour and Donna Haraway (see also Chapter 2).

[5] Both McLuhan and Williams carried out most of their work in the 1960s and 1970s. As Lister et al. explain, while Williams became known as "one of the founding figures of British media and cultural studies" McLuhan developed a following by a range of theorists interested in new media, including Baudrillard and Virilio (2009: p. 78).

For Bolter and Grusin (2000), how 'one medium is incorporated into another' is best explored through the concepts of 'Latourian hybrids or networks'. For the authors, 'new media' or digital technologies must be understood as 'more than just hardware and software' and rather as networks. As Bolter and Grusin explain,

> …media technologies constitute networks or hybrids that can be expressed in physical, social, aesthetic and economic terms. Introducing a new media technology does not mean simply inventing new hardware and software, but rather fashioning (or refashioning) such a network. (2000; p. 19)

As an example Bolter and Grusin present the World Wide Web.

> The World Wide Web is not merely a software protocol and text and data files. It is also the sum of the uses to which this protocol is now being put: for marketing and advertising, scholarship, personal expression, and so on. These uses are as much a part of the technology as the software itself. For this reason, we can say that media technologies are agents in our culture without falling into the trap of technological determinism. New digital media are not external agents that come to disrupt an unsuspecting culture. They emerge from within cultural contexts, and they refashion other media, which are embedded in the same or similar contexts. (2000; p. 19)

The remediation thesis not only suggests how digital media technologies may be understood, but also how we may understand social and cultural change – and given transformations are attributed to actor-networks in this study – we may understand this change without technological determinist or social constructivist viewpoints, a reason for which this thesis suggests the MUM App is '(re)made' rather than 'made'.

Bolter and Grusin's approach to understanding 'new media' as hybrids and networks (and therefore as emerging and refashioning within particular sociotechnical arrangements) has also been echoed in more recent interdisciplinary thinking about digital media technologies. For example, Gillespie et al.'s (2014) *Media Technologies: Essays on Communication, Materiality, and Society* brings together a collection of writing that looks to collate insights from new media studies, media and communication studies, the sociology of technology, ANT and STS. In their introduction, Gillespie et al. (2014) suggest 'media technologies' must be understood "as complex, sociomaterial phenomena" (2014: p. 1). ANT-related conceptions have also been outlined in social studies of digital technologies, for example, in Lupton's

(2015) *Digital Sociology*. As Lupton explains (in a vein similar to Bolter and Grusin's remediation thesis), the ANT "perspective has proven to be an insightful approach in scholarship in digital society" (2015: p. 23); and particularly since the ANT concept of 'assemblage' is a useful way of "understanding the individual's relationship to and use of digital technologies that emphasises that each actor, whether human or non-human, shapes the other in a mutually constitutive relationship" (2015: p. 24). Pointing to ANT[6], Lupton further notes that these assemblages denote not only an intermingling of human and non-humans, but also inseparability between its aggregates. As she explains, exponents of ANT "contend that humans are always imbricated within networks comprised of human and non-human actors and cannot be isolated from these networks" (2015: p. 23) – a claim made by Bolter and Grusin earlier on. Drawing on Latour's work *We Have Never Been Modern*, Bolter and Grusin long before suggested the inseparability of a media network's aggregates. As they proposed, "events of our mediated culture are constituted by combinations of subject, media and objects, which do not exist in their segregated forms" (2000: p. 58). This led the authors to propose one of their central claims, which is that "there is nothing prior to or outside the act of mediation" (2000: p. 58). This thesis returns to the remediation thesis to *empirically* examine the specific case of the MUM App.

The Increase in Museum Apps: The Display of Collections in Augmented Reality

This study has been undertaken in response to the increasing employment of digital media technologies, and examines this in the particular and critical site of a museum. This trend has been documented across museum and heritage reports, whitepapers and academic journals. For museums, and particularly for the McCord Museum, industry reports are highly influential in decision-making processes given that they are produced at a quicker pace than, for example, academic writing. One particular report that is important to this case is the *Horizon Report* (produced by the New

[6] Lupton references Bruno Latour's 2005 work *Reassembling the Social: An introduction to Actor-Network Theory* and his work from 1987, *Science in Action*.

Media Consortium or NMC)[7]. This yearly report is significant as the McCord Museum's staff consults its contents to make decisions about display technologies. Important here are the 2010 and 2011 *Horizon Reports*, published before the MUM App was made. The 2010 *Horizon Report* emphasised that the increasing use of mobile apps began as early as 2008 in relation to the proliferation of "always connected Internet devices" (Johnson et al., 2010). The following year, the 2011 *Horizon Report*, noted mobile apps as having become 'pervasive in everyday life in the developed world'. Further, the NMC advised that in the following 12 months the adoption of apps by museums would provide the "advantage of recent developments in location awareness and GPS"; museums would thus be "able to design mobile experiences tailored to the physical location of their visitors" (Johnson and Witchey, 2011: p. 7). It also advised that 'augmented reality' would be increasingly adopted in the next two to three years by museums, and particularly through apps, which could serve as supplements to physical exhibits or as discrete ways to display digital collections. Specifically, augmented reality technologies were recommended by the NMC to museums because "museum educators arguably have always been in the business of augmenting reality, creating bridges between objects, ideas and visitors" and since "augmented reality technologies are now allowing this to happen more fluidly and easily than ever" (Johnson and Witchey, 2011: p. 7).

The 2011 *Horizon Report* further suggested that augmented reality technology could be used for broad purposes, for example, that it was not just for "children" and "science museums" but could find increasing uses in "historical museums", as a way to extend museums beyond their physical walls:

> While the use of augmented reality is increasingly common in children's and science museums where interacting with exhibits is an expected part of the visitor experience, it has been slower to find applications in art and historical museums where the objects on display are often fragile or very rare. Nonetheless, an application that is finding increasing traction is the use of

[7] The NMC was founded in 1993 through a joint venture that included Adobe Systems Incorporated, Apple Computer, Inc., Sony Electronics Inc., FWB Inc., Macromedia, Prentice Hall, and SuperMac: Technology, Inc. "who realized that the ultimate success of their multimedia-capable products depended upon their widespread acceptance by the higher education community in a way that had never been achieved before." For more information see: http://www.nmc.org/about/history.

> augmented reality to extend the museum and its mission beyond its physical setting. (Johnson and Witchey, 2011: p. 19)

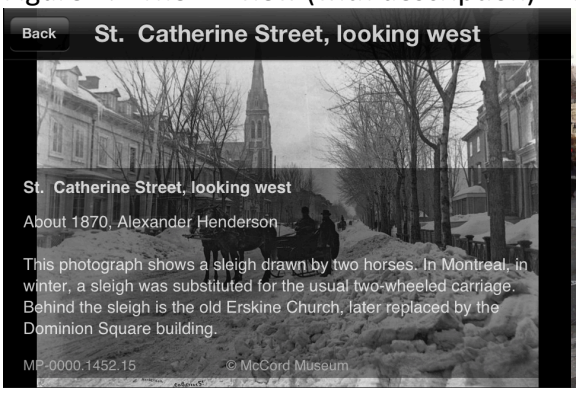
The 2010 and 2011 *Horizon Reports* demonstrated these possibilities by outlining specific examples, such as the *Streetmuseum App,* an augmented reality app released in 2010 for the Museum of London and *PhillyHistory.org,* an augmented reality app that was made in 2010 to display collections from the City of Philadelphia Department of Records (DOR). The Streetmuseum showed that such apps were successfully used by historical museums and a whitepaper (written by Azavea and the DOR, 2011) referenced in the report about *PhillyHistory.org* discussed in great detail precisely how augmented reality technology worked – explaining how a mobile device's sensor technologies combined with geo-locational technology could enable augmented reality.[8] As this thesis shows (in Chapter 4) such whitepapers, industry reports and other media participated in the decision-making process of (re)making MUM. And in this case, the *Horizon Reports,* the Azavea and DOR whitepaper and the Streetmuseum App are considered 'negotiators' (Macdonald, 1998) in the McCord Museum's display practice and the remediation of the MUM App. By tracing such actors, the thesis points to emerging and competing interests in museum practice. For example, in this case, it is found that the NMC is comprised of commercial players (including, Apple Inc.) that can benefit from the development of apps through the related sales of mobile devices, such as smartphones and tablets.

In response to such industry reports (and other mediating actors discussed in Chapter 4) the McCord Museum decided to develop its own augmented reality app. The Museum already had experience with apps as it had previously released the *McCord Museum App* in 2010, which displays information for visitors about the Museum's exhibits and allows visitors to, for example, view museum videos and

[8] According to Azavea and the DOR (2011) augmented reality uses 'sensor technologies' that are built into handheld devices (such as smartphones and tablets), allowing the devices to become location-aware, direction-aware and motion-aware. The device is made location-aware by drawing information from the 'GPS sensor' (which is sometimes amended by WiFi and cell tower location information). The 'compass sensor' allows for the device to be direction-aware and the 'accelerometer sensor' indicates how it is moving through space, providing information related to motion-awareness. Lastly, using the pattern recognition feature of the 'camera sensor' allows digital objects to be superimposed onto real-time camera displays.

create lists of favourite items in the collection. This was to be followed by the augmented reality App – the MUM App – the focus of this study. The MUM App was the first of its kind for a museum in Canada[9], offering a novel way to see the Museum's digitised historical photographic collections by using recent augmented reality technology, and was award winning[10]. Released on Apple's *App Store* in 2011, the App showcases a selection of the Museum's historical photographic images selected from the *Notman Photographic Archives*. The App may be downloaded only through the App Store as it is configured for use only on Apple's devices – the *iPhone,* the *iPad,* and the *iPod Touch* (or *iTouch*).[11] The App is available in English and French and has three main user features. It displays a 'pinned card' (or map view) that shows users where collections may be viewed around the city of Montreal. And from its pinned card, users can choose to view historical photographic images in '2D view' (as two-dimensional images with or without descriptions, available 'anywhere', see Figure 1.2) or in '3D view' (as three-dimensional digital objects displayed in augmented reality in specific geo-located positions across the city, see Figure 1.3). Significantly, the App further gathers an unprecedented amount of data – displayed in statistical form for Museum staff on Google Analytics dashboards (see Chapter 6).

Figure 1.2 The 2D view (with description)



Source: Ana-Maria Herman. Image taken on November 1st, 2012.

Figure 1.3 The 3D view

Source: Ana-Maria Herman. Image taken on October 26, 2012.

[9] See the McCord Museum Press Release of August 30, 2011: "MTL URBAN MUSEUM: a cutting-edge application from the McCord Museum for high-tech discovery of Montreal, past and present!" at: http://www.mccord-museum.qc.ca/pdf/PR/PR_MUM_EN.pdf last retrieved July 11, 2015.

[10] The MUM App won the Gold award in the Multimédi'Art Interactive category at the International Audiovisual Festival on Museums and Heritage held at the 2012 AVICOM Committee conference. See the McCord Museum press release at http://www.musee-mccord.qc.ca/pdf/PR/PR_Premier_prix_MUM_EN.pdf last retrieved July 22, 2015.

[11] The MUM App is downloaded most to the iPhone device (see Figure 6.3 in Chapter 6), a reason for which the app study was conducted on the smartphone and the ensuing analyses focus on this device.

The Implications of the MUM App: On the Animating Concerns of this Study

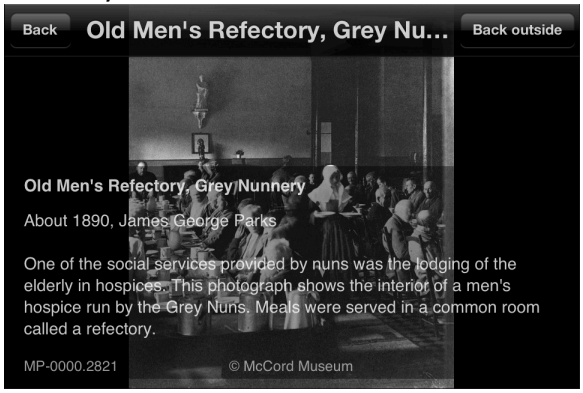
This thesis shows that there are particular social, cultural and political implications related to how the MUM App was (re)made and how it is used in practice. This section begins to discuss some of these implications as a way to highlight the concerns that animate this study and as a lead-in to the research approach taken. To begin, in examining how the MUM App was (re)made (the focus of Chapter 4), it becomes apparent that few historical photographic images from the Museum's vast archive are actually on display. Over time, the Museum's collections have grown to more than 1,440,000 objects, images and manuscripts (from the initial 15,000 objects it was originally founded upon in 1921) that are considered by the Museum as "irreplaceable reflections of the social history and material culture of Montreal, Quebec and Canada".[12] These are organised into six categories.[13] Most important for this study is the Notman Photographic Archive – an extensive archive of images and objects initially acquired in 1956 and documenting the history of Canada. The Archive is the largest collection of artefacts at the McCord Museum and is one of the most extensive of its kind in Canada, consisting of some 1,300,000 artefacts.[14] The Archive's photographic images – of landscapes, people, places and events – provide a visual history of Montreal, the province of Quebec and of Canada as a whole, depicting private and public life, industry, as well as urban and rural landscapes from the 1840s to the present. About 600,000 photographic images (including 200,000 glass negatives) are those taken by William Notman (after whom the Archive is named) or at his studio, over a period of 78 years.[15] The other 700,000 or so are

[12] Source: http://www.mccord-museum.qc.ca/en/keys/collections/ last retrieved August 31, 2012.
[13] The six categories include ethnological and archaeological objects (such as clothing, headgear, baby carriers, hunting and fishing implements that illustrate the history and art of the First Nations); costume and textiles (including women's and men's clothing and accessories, designer garments, samplers, quilts and other textiles); textual archives (including manuscripts, greeting cards, letters and other documents that illustrate the history of Canada from the 18th century onward); paintings, prints and drawings (reflecting Canada from the 18th to the 21st century); decorative arts (such as furniture, dishes and toys from the 19th and 20th centuries); and the Notman Photographic Archives.
[14] Details about the Archives are on the Museum's website: http://www.musee-mccord.qc.ca/scripts/explore.php?Lang=1&tableid=4&tablename=department&elementid=00016__true last retrieved August 29, 2015.
[15] Details about William Notman and his Studio are on the Museum's website: http://www.mccord-museum.qc.ca/scripts/explore.php?Lang=1&tableid=18&tablename=fond&elementid=14__true last retrieved August 29, 2015.

either attributed to other photographers or remain anonymous. A large portion of the Archives has been digitised – about 80,000 images in total. But, out of this large pool of digital images, only 141 images (124 exterior views and 17 interior views) were selected for display when the MUM App was released in 2011. Today the App displays only 150 images (128 exterior and 22 interior views)[16]. Though digital media technologies are often considered as having 'infinite space' readily available, this study shows (in Chapter 4) how limitations can still occur in sociotechnical networks.

Further, during the process of (re)making the MUM App constraints were also placed on what images could be selected and how they could be described. As a result, in this 'new' type of display we still find the existence of 'old' gender politics. Images selected for the display depict women and men in traditional gender roles exposing the politics of the late 19th / early 20th centuries – yet these are left unexplained. And so we find women relegated to 'domestic places' and to 'caretaking roles': they feature on the steps of their households holding their children, as followers in religious institutions, and as dutiful caretakers (of elderly men, see Figure 1.4, and elderly women, see Figure 1.5). They may be educating themselves, but only in the arts, rather than in the male-dominated sciences and medicine (see figures 1.6 and 1.7). The small amount of information presented about the collection of images on display fails to indicate that the gendered representations made are problematic.

Figure 1.4 'Old Men's Refectory, Grey Nunnery'



Source: MUM App. Taken November 1st, 2012.

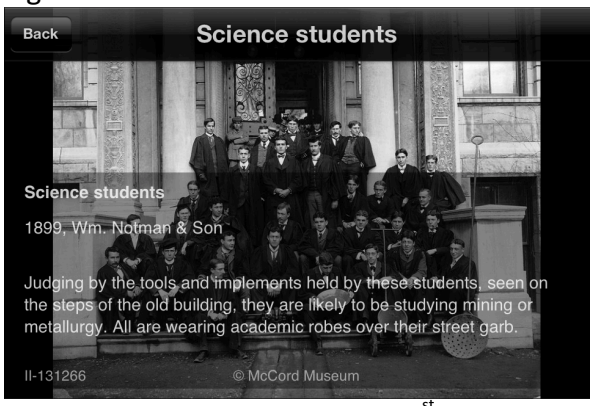
Figure 1.5 'Interior, St. Margaret's Home'

Source: MUM App. Taken March 2nd, 2013.

[16] The MUM App was updated in July of 2015 with 9 additional images. See the McCord Museum press release: http://www.musee-mccord.qc.ca/pdf/PR/PR_Musee-McCord-etend-son-application-Musee-Urbain_EN.pdf last retrieved July 22, 2015.

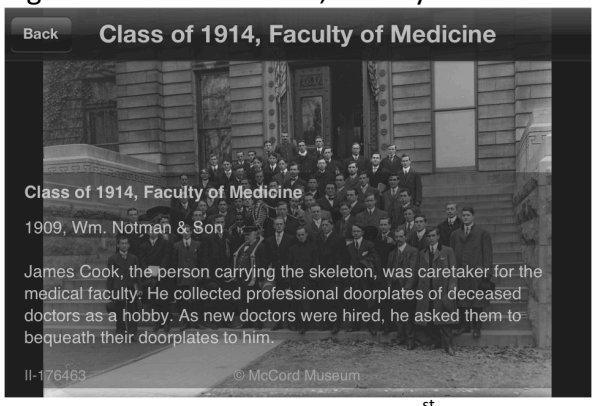
Men, on the other hand, are pictured in academic regalia and robes, inaugurating institutional buildings, as religious leaders, in the impressive uniforms of military institutions, present at international scientific conferences, taking part in competitive activities and sports (which women have little part in), and it is their names by which the majority of buildings are known, including the McCord Museum itself. Only men are graduating in the class of 'Science Students' of 1899 (see Figure 1.6) and men make up the class at the Faculty of Medicine (see Figure 1.7). As Participant 7 in this study exclaimed in disappointment: "It's pathetic!" While digital media technologies are often thought to embody the 'new', in this case MUM appears to project yesterday's politics onto today's urban spaces. But Participant 7 was not the only one disappointed; Participant 4, on the other hand, had hoped to see her neighbourhood represented in the MUM App: "I really wanted there to be more photos in other parts of the city, like Point St Charles or St Laurent, I guess, or like the Plateau." These initially working-class areas are also left out of this display. As will be explained (in Chapter 4) these are considered 'effects' of the negotiations of both human and nonhuman actors involved in how the MUM App got (re)made.

Figure 1.6 'Science students'



Source: MUM App. Taken November 1st, 2012.

Figure 1.7 'Class of 1914, Faculty of Medicine'

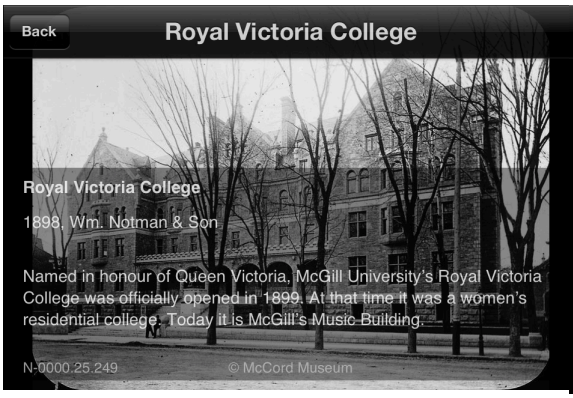


Source: MUM App. Taken November 1st, 2012.

Further, we find the persistence of 'old' cultural politics as other images displayed (that are, yet again, little explained) show a history of the imperial dominance by British society that has left an often bitter mark on generations of the French population of predominantly French-speaking Montreal (or indeed on the First Nations indigenous populations, which are left out of the App entirely). The British

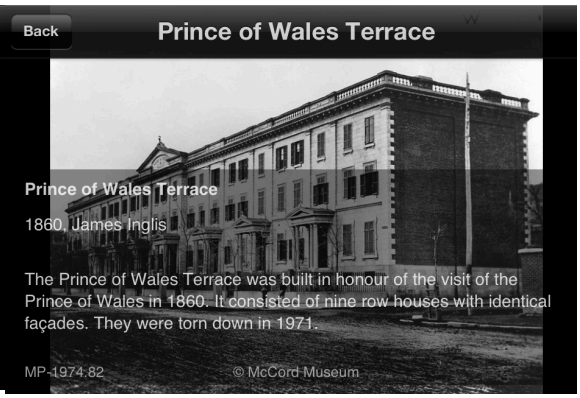
imprint can still be seen in the institutions erected and the nomenclature used, as is evidenced in the images from the late 19th and early 20th centuries, and in the short descriptions on the App. The presence of the British monarchy is written into the name of the 'Royal Victoria College', named in honor of Queen Victoria (see Figure 1.8), and this despite the fact that the building's use has changed from a women's residential college to McGill University's Music Building. There is also the 'Prince of Wales Terrace' built in honor of the visit of the former Prince of Wales in 1860 (see Figure 1.9). Even though the Terrace was torn down in 1971 and a McGill University building now stands in its place, its politics continue to live on, brought back to the current day in augmented reality through its 3D superimposition onto today's cityscape. British dominance is also articulated in the largely British names: 'McCord', 'McGill', 'Redpath', 'Drummond' and 'Molson', to name only a few that feature most prominently. Like in Haraway's study of the African Hall diorama at the Natural History Museum, it would seem here too that the politics of gender and cultural domination is "frozen into the hardware and logics of technology" (Haraway, 1984: p. 52). Thus 'old' politics here continue in the remediation of 'new' displays.

Figure 1.8 'Royal Victoria College'



Source: MUM App. Taken November 1st, 2012.

Figure 1.9 'Prince of Wales Terrace'



Source: MUM App. Taken November 1st, 2012.

While we may expect curators to be involved in making museum displays, on inspecting how the App was (re)made, it is shown that using 'Apps' as a way to display collections means particular, and otherwise unlikely, actors are involved in making digital museum displays. While a project team was formed at the Museum to make the MUM App, none of the Museum staff were actual 'curators'. Furthermore,

since the McCord Museum decided to make an App similar to that of the Museum of London's Streetmuseum App (since, as mentioned above, the Streetmuseum was considered a 'success') the (re)making of this App included a London-based advertising agency (Brothers and Sisters Ltd.) and a Cambridge-based software developer (Thumbspark Ltd.), both initially engaged in making the Streetmuseum for the Museum of London. To save on the customisation costs, the MUM App was made to the design of the Streetmuseum. And sponsors, including McGill University, were found to cover some of the costs of (re)making the App, becoming negotiators in its display. For example, it is one of the reasons for which numerous images of historical sites on McGill University's campus feature on the App. And so, the process of remediating the MUM App meant diverse (unexpected) actors were engaged in (re)making the display. This has had particular implications for the McCord Museum's display practice. It has established particular 'gatekeepers' (Latour, 1987) since further changes to the App cannot be made without the involvement of Brothers and Sisters and Thumbspark. And this has led to a type of 'irreversibility' (Akrich et al., 2002; Callon, 1991) or 'lock-in' effect (David, 1985; Urry, 2004) since engaging these British-based companies on a regular basis assumes substantial costs, making major (and even minor) modifications to the App cost-prohibitive for the Museum on its own. Given such constraints have been placed on the Museum, more recent additions to the App display, which saw only nine images added, were sponsored by a commercial property management company, Ivanhoe Cambridge.

An implication of choosing an 'app' as a mode of display is that it 'discriminates' (Latour, 1992) against devices not made by Apple and their users. When apps are made they are configured to either one or a few platform(s). In this case, the MUM App was configured (like its predecessor, the Streetmuseum) for use on Apple's mobile devices (the iPhone, iPad or iTouch) and thus customised for use on Apple's operating system (iOS). Therefore the App is incompatible with any other platforms or devices – for example, it does not work on the Android operating system or on a Samsung smartphone device. As the App only works on Apple's platform and devices it can be said to discriminate against these other technologies and devices. Since it discriminates in terms of the devices it works on, it also by extension discriminates

against users – in relation to the device they own. Only users of Apple devices may participate in this augmented reality experience. And while it may seem that the 'iPhone' is a popular device in the Western world, not everyone has one. Despite media reports often suggesting immense sales figures related to Apple products – for example, Forbes reported that by the end of 2012, the '300 millionth iPhone was sold', and in 2014 Apple 'sold its 500 millionth iPhone' (Rugowsky, 2014) – industry research shows Apple as having only a small portion of the smartphone world market share. Gartner, for example, recently reported Apple's worldwide smartphone share as 15.4% (in 2014), which had actually declined from 15.5% the year before, while other companies, such as Samsung led smartphone sales at 24.7% (see Table A.1 in Appendix A). But more strikingly, at about the time that the MUM App was being developed a 2010 Gartner report indicated that Apple only had 2.9% of the market share, while Samsung outsold Apple that year with 17.6% of the market share (see Table A.2 in Appendix A). Sales of smartphone devices are linked to the types of operating systems for which apps are developed. The same Gartner reports showed that in 2010 smartphone sales had meant that 22.7% of the market share was using Android, compared to 15.7% on iOS – but by 2014, Android's market share increased to a significant 80.7% compared to a decrease in iOS market share to 15.4% (see Table A.3 and Table A.4 in Appendix A). Which means today more than five times more users have a device that uses Android than iOS. Lastly, the App, also discriminates against users that cannot afford a smartphone device altogether, particularly in countries where data plans are costly, such as Canada[17], as well as those users that are too young or too old or not able to use such a device. Compared to physical exhibit space inside the McCord Museum – where accessibility considerations are made for those of various backgrounds, ages and physical abilities – this type of display, which requires users to view collections in the city, and on their own terms, afforded fewer considerations for suggested (ultimately non) users – what Star (1991) has called a 'politics by other means' (see also Law, 1991).

[17] In Canada, cellular plans that include data often exceed $59.70/month (Sturgeon, 2015).

A second aspect examined by this research study is how the deployment of the MUM App reconfigures things. This aspect explores the role of the App in reclassifying and rescripting objects, subjects and practices, as well as in reordering and rewriting urban spaces, while seeking to unveil the implications of such reconfigurations. Employing ethnographic and digital methods, the analysis first looks at how participants in the study viewed collections with the App. While museum theorists such as Parry (2007) have suggested digital technologies rescript the 'museum visit' by taking it outside its walls, in this case it is found that much more is at play. For example, the 'museum visit' is here rescripted and the 'museum visitor' reclassified on an ongoing basis in relation to a variety of actors. This process is shown to be an awkward experience as some participants felt "strange" and "confused" during the 'museum visit' and despite considering the App "easy to use". This led some participants to consider (that is reclassify) what they were doing as a 'tour'. Passersby too implied through their actions – by waiting for participants to finish taking photographs or filming and asking them if they wanted their photos taken – that they classified users as 'tourists'. Thus, in Chapter 5, the analysis shows that such reconfigurations, which are made *in concert with* innovative digital media technologies, such as the MUM App, mean that a wide range of actors are 'experimentally' enrolled in transforming practices, often with unexpected results. Such reconfigurations of sociotechnical arrangements can also mean that practices and subjects (as well as objects) may be 'multiple' (Mol, 2003). In which case, how things are done becomes a question of 'ontological politics' where options exist between versions of reality, such as "which one to perform?" (Mol, 1999).

This leads the thesis into examining the App's role in reordering and rewriting urban 'heterotopic' (Hetherington, 1996) spaces. By using the App in particular locations throughout the city, spaces are momentarily 'transduced' (Kitchin and Dodge, 2007) into places for viewing the Museum's collections. But such reordering of urban spaces with digital media technologies has more recently concerned spatial theorists who see ubiquitous and 'intelligent' technologies, such as software, (Thrift and French, 2002) as contributing to making cities 'smart' (also called 'smart urbanism', see Kitchin, 2014) and as such increasingly 'directing' urban spaces (Thrift and

French, 2002). The thesis explores this claim in relation to the MUM App and finds that a host of actors participate in such reordering practices and as such that agency is a 'distributed accomplishment' (Latour, 1994); putting into question claims that software can 'direct'. Relatedly, another concern for spatial theorists is that such ubiquitous technologies allow for the management and control of spaces or what Kitchin and Dodge (2007) call the 'automated management' of society. In this case, the study finds that the MUM App collects an unprecedented amount of data – more data than could be manually collected – about its usage across urban spaces. This information is then presented in statistical form for Museum staff through a Google Analytics 'standard' dashboard. Not only can museum staff view statistics about how many people use the App (analogous to statistics collected about the number of visitors to an exhibit), but they also have access to detailed statistics about what objects are most frequently viewed, what areas of the city are most frequented with the App and even detailed information related to the user's device (such as the language of the device and the country in which it is registered). This type of user tracking has not only interested academics but has also raised public concerns over increasing 'surveillance' by museums.[18] But this thesis puts into question this claim, as the study finds that Museum staff actually have difficulty decoding and using this data to manage the display. In this way, the thesis weaves through the socio-cultural politics of the App display, shedding light on where its politics do and do not lie.

The social, cultural and political implications related to the MUM App may prompt 'why' questions to be asked, such as: Why was such a small selection of images displayed from such an extensive pool of digitised images? Why was the App made for Apple's smartphone when other mobile devices, such as Samsung's smartphone, hold larger market shares? Why was an 'app' chosen as a display when it reduces the amount of collections that may be shown and the accessibility to the display? Why were issues related to the political content of the historical images not addressed by the Museum? And why were no curators involved? Further, should we be concerned about digital media technologies: Why are museums collecting increasing amounts

[18] For example, the issue of surveillance by museums was raised in an article provocatively titled "When the Art is Watching You" in The Wall Street Journal (Gamerman, 2014).

of information about users? As will be explained next, to assess these issues and their implications, 'why' questions must be converted to 'how' questions.

Research Questions: Ask 'How' Not 'Why'

Since digital media technologies are here understood as actor-networks and their implications as 'relational effects', this thesis looks to understand 'how', rather than 'why', such 'effects' occur and further looks to uncover where their politics actually lie. Here "the job of the investigator is not to discover final causes, for there are no final causes", but to understand how the 'effects' "of a set of heterogeneous operations, strategies and concatenations" (Law and Bijker, 1992: p. 292) occur. For Law and Bijker, the aim is thus to "unearth [their] schemes and expose their contingency" (1992: p. 292) and "[i]n this approach, 'why' questions are thus converted into 'how' questions" (1992: p. 292). And so to address the concerns posed above, this thesis examines the particular sociotechnical 'actor-network(s)'[19] which produce the specific 'effects' described. By uncovering the relations between particular heterogeneous actors involved in complex sociotechnical networks this thesis looks to avoid technological determinist and social constructivist explanations for these 'effects' – here humans and nonhumans are considered in the same terms.

1. How, by whom and what, was the MUM App (re)made?

One of the central concerns of this thesis is *how* 'remediations' of digital media technologies actually occur. To understand this, the ensuing study examines the heterogeneous actors involved in this particular remediation, specifically in the (re)making of the MUM App. Another concern of this study are the 'relational effects', including the App's socio-cultural politics, resulting from negotiations between sets of actors. Here, the study looks to answer *how* it is that the App was chosen as a mode of display; *how* specific 'gatekeepers' became involved in this

[19] 'Actor-network' is a notion developed by Callon to express a particular 'arrangement of constituent elements or actors in a network' (Callon, 1986; see also Latour, 2005).

Museum's display practice; *how* this remediation led to a type of 'lock-in' effect; and, finally, *how* it is that 'old' politics are remediated into this 'new' display.

2. How is the 'museum visit' rescripted along with the MUM App, and how are subjects, objects and practices reclassified in this changing practice?

A concern of this thesis is how objects, subjects and practices are reconfigured in practice. To examine this, the research study examines *how* participants in this study viewed collections with the App, analysing *how* objects, subjects and practices were reclassified in relation to *how* the 'museum visit' was rescripted on an ongoing basis. Here, the analytical framework does not assume cultural objects (such as 'exhibits') or subjects (such as 'visitors') or practices (such as 'museum visits') are 'ready made'[20] and shows rather that they are always in the 'doing' (Mol, 2003). This analysis addresses *how* it is that the MUM App was considered a 'tour' instead of a 'museum visit' and, relatedly, *how* it is that participants in this study came to be thought of as 'tourists' rather than 'museum visitors'. Thus, the thesis examines *how* the MUM App, once deployed, participates in the unsettling of objects, subjects and practices that are reclassified and rescripted through a re-enactment in practice.

3. How are urban spaces reordered and rewritten along with the MUM App?

A final concern of this thesis is how the software participates in reordering and rewriting 'heterotopic' spaces. This is examined from two angles: on the one hand, the thesis returns to the participant study examining *how* users view collections with the App in practice and, on the other hand, the thesis analyses how Museum staff use Google Analytics dashboards in decision-making practices about the App's urban display. The first angle of the analysis allows the thesis to assess Thrift and French's (2002) claim – that software is increasingly 'directing' spaces – and the second angle allows the thesis to examine Kitchin and Dodge's (2011) claim – that software allows

[20] As Latour suggests, ANT is a way to study 'science and technology in the making' rather than 'ready made science and technology' (1987: p. 4).

for the 'automated management' of society. Underlying this is a debate about the agency (and autonomy) of software, which this thesis looks to contribute to.

To address these three research questions, this thesis draws on fieldwork conducted through a one-year research residency at the McCord Museum, during which period of time a set of mixed-methods – such as interviews and documentary analysis, as well as a participant study that included observation, filming and questionnaires – were employed (further described in the methodological approach in Chapter 3). The next section maps the thesis by describing the chapters that follow.

Mapping the Thesis

The overarching aim of this research study is to examine a process of remediation by way of a case study – the McCord Museum's MUM App – and its particular social, cultural and political implications. Following this introduction, Chapter 2 will provide a literature review and Chapter 3 will outline the research approach and tools employed in the study. In the three subsequent chapters the thesis looks to explore the research questions by investigating the (re)making of the MUM App in Chapter 4, the rescripting of the 'museum visit' and the related reclassification of objects, subjects and practices in Chapter 5, and the reordering and rewriting of urban spaces in Chapter 6. Lastly, Chapter 7 will then bring together the conclusions.

Chapter 2 reviews literature from ANT studies, new media studies, STS, museum studies and feminist writing on technology, as well as spatial studies (among other related fields of study) in order to discuss the key concepts employed and outline the theoretical framework that underpins the research approach, substantive chapters, and conclusions. The chapter is organised into three sections. The first section discusses how this thesis employs the term 'digital media technologies'. The second section reviews literature on making displays, viewing collections and creating museum spaces. And the third section discusses recent debates on the agency of digital technologies. By profiling gaps and debates in existing literature, the chapter also outlines the contributions this research study seeks to make.

Chapter 3 details the research approach and tools used to perform this study. It discusses the setting for this research and the particular fieldwork completed during the one-year research residency at the Museum. The chapter further outlines the mixed-methods selected for this study (including informal interviews, participant observation, video recording, questionnaires, comparative analysis and documentary analysis) and the tools employed (such as online and remote blogging, filming and taking photographs). Finally, the chapter also touches on the opportunities, challenges and limits of studies that employ digital methods. This leads to a discussion on how we may understand the participation of digital media technologies in social studies, and in the production of academic knowledge.

The next three chapters examine the empirical evidence and are organised into three areas of investigation beginning with the remediation of the McCord Museum's MUM App. **Chapter 4** traces the (re)making of the MUM App by drawing on informal interviews with key project staff from the Museum, as well as staff from Brothers and Sisters and Thumbspark. By tracing the actors involved in the (re)making of the App the chapter shows how this remediation reconfigured museum 'curatorial' practices by redistributing and (re)delegating roles and activities related to making a 'digital' display. Further, it is shown that the Museum becomes entangled with external commercial organisations and commercial platforms and that these organisations henceforth act as 'gatekeepers' to any modifications made on the App, which, in turn, 'locks in' the App's design and content. Finally, the chapter ends by discussing how gender and cultural politics arise when the App is used to view historical collections (as outlined earlier in this introduction).

Chapter 5 considers the rescripting of the 'museum visit' practice in relation to the introduction of the MUM App as a way to view collections outside the Museum. The chapter draws here on my use of the App across all display zones in the city and a participant study in which a total of eleven participants were observed and filmed using the App in one zone. The analysis first looks to reveal the App's actor-network in practice, since while some of the actors were established when the App was

(re)made, other actors are engaged when it is employed in practice. Through this analysis, the chapter shows that the 'museum visit' is, in this case, not only precariously rescripted but also reclassified in the process as a 'tour'. But it is not only the 'museum visit' that is reconfigured: the 'museum visitor' too is reclassified as a 'tourist'. Here, the concepts of 'communities of practice' and 'boundary objects' (Star and Greismer, 1989; Bowker and Star, 2000), which suggest that practices and objects stabilise the more practitioners are enrolled in a community, are explored. But as, in this case, the practice and subject exist as two different things, the case also looks at how subjects and practices can be *multiple* – that is, the chapter further draws on recent work that proposes objects may be enacted in different ways and, as such, exist as 'multiple' (Mol, 2003), shown here with practices and subjects too.

Chapter 6 examines how the MUM App participates in reordering and rewriting urban spaces. The analysis draws from the participant study and interviews with Museum staff. Here, the App's pinned card is examined for how it acts as a 'navigational platform' (November et al., 2010) or a 'centre of calculation' (Latour, 1987) in the reordering of urban spaces. This allows the chapter to first explore the claim that digital media technologies, such as software, are increasingly 'directing' space (Thrift and French, 2002). In this case it is found that roles and tasks related to viewing collections with the App are redistributed and (re)delegated across a precarious actor-network that includes both human and non-humans as well as complex infrastructures. Thus agency is found to be a 'distributed accomplishment' (Latour, 1994). The chapter then examines data collected by the App and presented through Google Analytics dashboards, which are intended for Museum staff to use in order to manage the display. By examining this 'automated' feedback process, the thesis explores the claim that digital technologies allow for the 'automated management' of society (Kitchin and Dodge, 2007). It is found that while an unprecedented amount of data is collected about the App's usage, Museum staff have difficulty decoding the cryptic statistical information provided. The dashboards are thus limited in their participation in the management of the App's display spaces.

Chapter 7 presents the conclusions of this thesis. The chapter first reflects on the findings of the study in relation to the research approach taken. The chapter then suggests that the Museum's 'digital' display practices are 'experimental' (Macdonald and Basu, 2007, see Chapter 2), a theme that runs throughout this thesis. In relation to this, the conclusion further suggests that museums (and theorists alike) should move beyond understanding such displays as either 'successes' or 'failures'.

This first chapter has sought to introduce the topic of this thesis – the display of the McCord Museum's digital collections through the remediation of the MUM App – and its aim – to understand the social, cultural and political implications of such remediation(s). It has introduced key concepts of this thesis and has provided an overview of the animating concerns of this study, as well as the research questions. The chapter has further introduced some of the debates regarding the socio-cultural politics of recent digital media technologies, and suggested that an ANT approach allows this thesis to avoid technological determinism and social constructivism as a way to explain recent changes and their implications. The next two chapters will now continue to build a theoretical and analytical framework for the study that follows.

2 Literature Review

In the previous chapter, the thesis introduced the focus of this research study: the remediation of the McCord Museum's MUM App and its subsequent social, cultural and political implications. To examine the remediation of MUM it was suggested that apps must be understood, following ANT, as 'hybrids' or 'actor-networks'. The introduction also suggested that the MUM App's implications be considered 'relational effects' and thus proposed we must understand *how* (rather than *why*) particular 'effects' arise. The present chapter continues to review literature drawing on ANT studies, new media studies, feminist writing in science and technology studies, museum studies and spatial studies (among other related fields) in order to develop a theoretical framework for this particular study. The chapter has been organised into three main sections. The first section discusses the use of the term 'digital media technologies' and outlines specific debates about them (including the issues with using other terms, such as 'new media'). The second section reviews museum and ANT-related studies that have examined diverse museum practices and is organised into three particular subsections – making museum displays, viewing museum collections, and ordering museum spaces. Each of these subsections relate to one of the three research questions outlined in Chapter 1 and also to the three ensuing substantive chapters (chapters 4, 5 and 6). The initial subsection relates to the first research question, i.e. *how (and by whom and what) was the MUM App (re)made?* It considers how previous studies drawing on ANT have analysed the making of museum displays or exhibits. While these previous studies examined 'physical' displays, this thesis seeks to contribute a study of how a 'digital' display was (re)made through a process of remediation. The next subsection relates to the second research question, i.e. *how does the MUM App participate in rescripting the 'museum visit' practice and how are subjects, objects and practices reclassified along with this changing practice?* This subsection begins by critiquing literature from museum studies for their partial explanation of how museum practices are rescripted. It then looks to ANT literature and the notions of 'inscription' and 'de-scription' as an alternative way to explain how practices may be rescripted in

relation to 'technical objects' (Akrich, 1992; Callon, 1991). By understanding the App as a type of 'technical object' this thesis looks to examine the specific role of digital media technologies in rescripting museum practices. The last subsection relates to the third research question, i.e. *how are urban spaces reordered along with the MUM App?* This subsection reviews literature that draws on ANT to explain the reordering and rewriting of diverse museum spaces. While the works discussed have examined the reordering of 'physical' museum spaces, this thesis will look to contribute to how digital media technologies participate in reordering and rewriting city spaces by creating 'digital' museum spaces. This leads into the third and final section of the chapter that discusses literature on the topic of agency. Here, the review focuses on a key debate this thesis looks to contribute to – how we may understand agency in relation to the increasing use of software. While this chapter provides a theoretical framework for the study, it also identifies gaps and debates in literature that point to the particular contributions the thesis looks to make.

On Digital Media Technologies: Definitions, Theories and Debates

Today, many terms are employed to refer to digital media technologies. A few (possibly contentious) examples are worth mentioning before proposing how this study employs the term 'digital media technologies'. In new media studies, digital sociology and other (inter)disciplinary studies, terms such as 'new media', 'digital media', 'media technologies' and 'digital technologies' are often used interchangeably, but their use increasingly provides reason for debate. Most contentious has been the use of 'new media', which has been increasingly critiqued for describing media as 'new', since this often leads to misconceptions about how media emerge and engenders deterministic and teleological frames of technological change (Bolter and Grusin, 2000; see also Lister et al. 2003). As was discussed in the introduction, this thesis conceptualises digital media technologies as actor-networks that transform in processes of remediation. Thus they are not 'new' but rather refashioned over time. This is perhaps a reason for which Bolter and Grusin (2000) prefer the terms 'digital technologies' and 'digital media' in their work (though the title of their book still uses the more popular 'new media'). On the edge of

interdisciplinary studies, Gillespie et al. (2014) have suggested instead using 'media technologies' as a way to join scholarship in the study of media and technology towards a common purpose: "to understand media technologies as complex, sociomaterial phenomena" (2014: p. 1). For Gillespie et al. a compelling study must not only contextualise technologies historically, culturally and technically, but also "explicate the social, material, and temporal dimensions of how technologies are produced, deployed, configured, and used" (Gillespie, Boczkowski, and Foot, 2014: p. 5). In another emerging interdisciplinary field, 'digital sociology', theorists are using 'digital technologies' (see Lupton, 2015; Orton-Johnson and Prior, 2013), placing emphasis on the 'digital' aspects of a 'new digital landscape' (Orton-Johnson and Prior, 2013: p. 1). The next subsections address the use of the term 'digital media technologies' as a way to point to software technologies, have mediating qualities, and that they act as 'technical objects' that bring together a host of actors.

On the 'Digital' Aspects of Digital Media Technologies

'Digital' is here used as a way to point to software (code, programs, applications or operating systems) and sometimes used to modify such terms as 'devices', 'platforms' or 'technologies' in order to point to the hardware devices on which various types of software run. But 'digital' is also a contested notion. Some see digital software as epochal (Thrift and French, 2002), while others argue that it is not (Savage et al., 2010). While 'digital' implies a dematerialisation of technologies, theorists such as Savage et al. (2010) argue that digital technologies are always still deeply embedded in sociomaterial arrangements. Further, as digital media technologies are here considered 'hybrids' that are remediated over time, there is no clear distinction between 'newer' and 'older' forms of technologies. While the term is often used in academic writing to distinguish between 'newer' digital forms and 'older' analog forms of technologies (for example, see Lupton, 2015), this thesis considers the 'digital' as neither 'new' nor 'old', and instead as always incorporating the 'new' and the 'old'. This is because as Bolter and Grusin (2000) explain, a key aspect of the concept of 'remediation' is that newer media may remediate older media, just as older media may remediate newer media. As they explain:

> We are not claiming this as an a priori truth, but rather arguing that at this extended historical moment, all current media function as remediators and that remediation offers us a means of interpreting the work of earlier media as well. Our culture conceives of each medium or constellation of media as it responds to, redeploys, competes with and reforms other media. In the first instance, we may think of something like a historical progression, of newer media remediating older ones and in particular of digital media remediating their predecessors. But ours is a genealogy of affiliations, not a linear history, and in this genealogy, older media can remediate newer ones. (2000, p. 55)

This is important because as Bolter and Grusin (2000) point out, misconceptions about how digital hybrids emerge lead to deterministic readings of social change:

> What remains strong in our culture today is the conviction that technology itself progresses through reform: that technology reforms itself. In our terms, new technologies of representation proceed by reforming or remediating earlier ones, while earlier technologies are struggling to maintain their legitimacy by remediating new ones. The cyberenthusiasts argue that in remediating older media the new media are accomplishing social change. (2000, p. 61)

Thus, the authors warn, remediation, while a type of 'reform', can also be wrongly conflated with the belief that such reform is 'improving on a predecessor' - as effecting social change or some type of 'progress'.[21] This thesis does not, however, consider digital media technologies as 'progressive' in this sense, but does recognise that they often emerge accompanied by such discourses or 'myths'.

Feminist studies of technology have long suggested that technology may often involve "myths and various models of reality" (Franklin, 1999: p. 2). Unveiling these myths – often tied to 'progress' or a desired social, cultural and political transformation – has been one aim of feminist studies and debates on technology (Wajcman, 1991). For example, one such debate on progress, began in the 1970s by

[21] As Bolter and Grusin suggest, remediation can be misread to imply "reform in a social or political sense" (2000: p. 60). As the authors note, it is often a "peculiarly, if not exclusively, American" belief that "digital media can reform and even save society" – a belief that is related to a "promise that has been made for technologies throughout much of the twentieth century" (Bolter and Grusin, 2000: p. 60). As the authors explain, while since the French Revolution and throughout the 20th century "salvation in Europe has been defined in political terms", in American culture it is technology that has offered collective (or even personal) salvation, "rather than through political or even religious action" (Bolter and Grusin, 2000: p.61). While they suggest that contemporary American culture may claim to have lost this 'naïve confidence in technology', they go on to suggest that "[w]hat remains strong in [American] culture today is the conviction that technology itself progresses through reform: that technology reforms itself" (Bolter and Grusin, 2000: p. 61).

Joann Venek on the question of whether domestic technologies introduced throughout the 20th century reduced domestic work for non-employed women. In her classic argument in *Scientific American* in 1974 she announced that the time non-employed women spent on housework in the USA had not declined as a result of 50 years of technology, a debate that has continued into the 21st century.[22] Even in this case on the MUM App, the myth of technological progress is exemplified in discourses found in the *Horizon Reports* (mentioned in Chapter 1, see also analysis in Chapter 4) which suggest augmented reality apps, such as the Streetmuseum, improve upon how museums "create bridges between objects, ideas and visitors" (Johnson and Witchey, 2011: p. 7) and as 'successful' despite their issues. However, 'progress' myths not only feature in industry discourse, but (as will be explained later on, in Chapter 4) further act as negotiators in the continued development and spread of digital media technologies and their infrastructures. To sum up, the use of the term 'digital' does not indicate something distinctly 'new' or 'progressive' but is used to point to types of software or hardware technologies as particular actors.

On the 'Media' Aspects of Digital Media Technologies

Media denotes mediating qualities. For Latour, all hybrids are mediators that "transform translate, distort, and modify the meaning or the elements they are supposed to carry" (2005: p. 39). Thus, all hybrids are understood as 'mediaries', rather than 'intermediaries' (Latour, 1993; 2005). As Latour explains,

> An intermediary… is what transports meaning or force without transformation: defining its inputs is enough to define its outputs. For all practical purposes, an intermediary can be taken not only as a black box, but also as a black box counting for one, even if it is internally made of many parts. Mediators, on the other hand, cannot be counted as just one; they might count for one, for

[22] As Bittman et al. note, other feminist writers such as Cowan (1985) and Wajcman (1991) further developed these ideas "arguing that rising standards of cleanliness, greater output, fewer servants, the extra transport involved in consuming substitutes and the addition of new tasks had all combined to neutralize any time savings delivered by the new domestic machines" (Bittman et al. 2004: p. 402). But Vanek's conclusions were also famously rebutted by Gershuny and Robinson (1988) who argued that technologies do save time. In response, Bittman et al. (2004) more recently reconsidered this same issue using a national survey of time use patterns collected in 1997 by the Australian Bureau of Statistics. In their analysis, the authors conclude that "owning domestic technology rarely reduces unpaid household work" and further "in some cases owning appliances marginally increases the time spent on the relevant tasks" (Bittman et al. 2004: p. 412).

> nothing, for several, or for infinity. Their input is never a good predictor of their output; their specificity has to be taken into account every time. (2005: p. 39)

As digital media technologies are considered assemblages of actors, and given the inseparability of a network's aggregates, Bolter and Grusin conclude, "there is nothing prior to or outside the act of mediation" (2000: p. 58). Drawing on Latour, Bolter and Grusin see the world as constructed through a 'culture of mediations' whereby "the events of our mediated culture are constituted by combinations of subject, media and objects, which do not exist in their segregated forms" (2000: p. 57-58)[23]. Ultimately, for Bolter and Grusin "*all* mediation is remediation" (2000, p.55).

Bolter and Grusin's remediation thesis also draws on Donna Haraway's figuration of the cyborg[24] in her classic treatise, *A Manifesto for Cyborgs: Science, Technology and Socialist Feminism in the 1980s*. Haraway (1990) drew attention to the co-constitution of life by humans and nonhumans at a time that saw the early increase in micro-computing. For Haraway (1990) the figuration of the cyborg provides a device for dismantling the ontological and categorical boundaries installed between the biological and the technological. Haraway (1990) thus looks to reveal the 'fictional boundaries between the animal and the human, between animal-humans (organisms) and machines, and between the physical and the non-physical'. The cyborg reveals these 'fictions' by showing that the "communication sciences and biology are constructions of natural-technical objects of knowledge" and that "the difference between machine and organism is thoroughly blurred; mind, body, and tool are on very intimate terms" (Haraway 1990, p: 207). And it is only in addressing these boundaries that Haraway sees the eventual possibilities for reconfiguring social and political life: "if we learn how to read these webs of power and social life, we might learn new couplings, new coalitions" (Haraway 1990, p: 212). But to analyse our relationship with various technologies, Haraway (1990) suggests we

[23] This is also suggested in van Dijck's concept of a 'culture of connectivity' (van Dijck, 2011; 2012; 2012a; 2013).

[24] Haraway describes the cyborg as "a hybrid machine and organism, a creature of social reality as well as a creature of fiction" (1990: p. 191). As Haraway (1990) explains the cyborg acts as a political figure from which to situate a standpoint of political perspective and social introspective in a world that is 'caught up in boundary wars between the biological and technological'.

must appreciate the close-knit relationship between the biological and the technological.

To examine our hybrid relationship with digital media technologies, Bolter and Grusin look to Bruno Latour's *We Have Never Been Modern*.

> For Latour, the phenomena of contemporary technoscience consists of intersections or 'hybrids' of the human subject, language, and the external world of things, and these hybrids are as real as their constituents—in fact, in some sense they are more real because no constituent (subject, language, object) ever appears in its pure form, segregated from their constituents. (Bolter and Grusin, 2000: p. 57-58)

Therefore, for Bolter and Grusin,

> Media function as objects within the world—within systems of linguistic, cultural, social and economic exchange. Media are hybrids in Latour's sense and are therefore real for the cultures that create and use them. Photography is real—not just as pieces of paper that result from the photographic process, but as a network of artifacts, images, and cultural agreements about what these special images mean and do. (2000: p. 58)

For Bolter and Grusin, how we experience media is the main concern of remediation. As they explain,

> …just as there is nothing prior to the act of mediation, there is also a sense in which all mediation remediates the real. Mediation is the remediation of reality because media themselves are real and because the experience of media is the subject of remediation. (Bolter and Grusin, 2000: p. 59)

Thus in this thesis, 'media' indicates the mediating qualities of digital technologies. The interest here is in how these hybrids mediate relations, as is explained next.

On the 'Technology' Aspects of Digital Media Technologies

The 'technology' aspect of digital media technologies denotes their role as 'technical objects' (Akrich, 1992; Callon, 1991). To Akrich, "technical objects participate in building heterogeneous networks that bring together actants of all types and sizes, whether human or nonhuman" (1992: p. 206). Key to a study of technology is thus an understanding of the role that they play in these networks to "build, maintain, and stabilize a structure of links between diverse actants" (1992: p. 206). As Callon

also explains, "a technical object may be treated as *a program of action coordinating a network of roles*" played by both non-humans and humans (1991: p. 136, original emphasis). To understand the coordination between actors in a network, Akrich and Latour (1992) suggest reading their 'programs of actions' (and their 'anti-programs'). 'Programs of actions' (and 'anti-programs') are part of a vocabulary developed by Akrich and Latour (1992) for undertaking a symmetrical sociotechnical analysis. As an example, Latour discusses the case of the 'hotel room key'. A hotel manager (who Latour calls an 'enunciator' of a 'statement')[25] is looking to instill a program of action: that customers leave the hotel key at the front desk before leaving the hotel. As Latour explains, the hotel manager may simply utter the statement to customers (representing for Latour a first 'load' to suggest a particular action), but few customers may listen. A second action the manager may choose is to also inscribe the program on a sign (a second 'load'), but still only few more may listen. Finally, the manager may also put a heavy-weighted key chain on the key (a third 'load'), thereby 'displacing' "the inscription by introducing a large metal weight" no longer having to rely on the customer sense of obligation" (Latour, 1991: p. 104).[26] By loading his statement in these different ways, the manager may ensure more customers follow a particular 'program of action' (and, in turn, anti-programs, such as leaving the hotel with the keys are diminished). This thesis seeks to understand programs of action or scripts associated with the MUM App. What types of scripts are inscribed into the App and what kind of displacements result from them?

Since this study understands technical objects, such as digital media technologies, as emerging from and bringing together a network or assemblage of heterogeneous actors, neither a determinist reading of, nor a social constructivist approach to, technology is appropriate. As Akrich explains,

> …technological determinism pays no attention to what is brought together, and ultimately replaced, by the structural effects of a network. By contrast social

[25] A 'statement' is described by Latour (1991) as "anything that is thrown, sent or debated by an enunciator" which, as will be exemplified, may refer to a word, sentence, object, apparatus or institution.

[26] Therefore, in this example, the 'statement' is both referring to the "sentence uttered by the hotel manager – but it also refers to a material apparatus which forces customers to leave their keys at the front desk" (Latour 1991: p. 106).

> constructivism denies the obduracy of objects and assumes that only people can have the status of actors. The problem is not one of deciding whether a technology should be seen as an instrument of progress or a new method for subjugating people. It is rather to find a way of studying the conditions and mechanisms under which the relations that define both our society and our knowledge of that society are susceptible to partial reconstruction (1992: p. 206).

Put another way, Law and Bijker suggest, "all relations should be seen as both social and technical" and as such, social constructivism or technological determinism are flawed "because neither the (purely) social nor the (exclusively) technical is determinant in the last instance" (1992: p. 290). Instead of thinking of technologies as 'purely' technological (see also Latour, 1993, on the 'purification' of hybrids), Bijker and Law suggest them to be heterogeneous. By this they mean that

> …artifacts embody trade-offs and compromises. In particular, they embody social, political, psychological, economic, and professional commitments, skills, prejudices, possibilities and constraints. (1992: p. 7).

This thesis explores how digital media technologies emerge out of negotiations by heterogeneous actors, asking first, what actors are involved in these processes? Further, this thesis examines how diverse actors participate in stabilising (Bijker and Law, 1992) or destabilising objects, subjects and practices in relation to the App.

But 'stabilisation' can also refer to how a 'new' digital media technology may be integrated into everyday practice, studied under the rubric of 'domestication'. In particular, domestication studies have developed a framework for understanding the process by which technologies move from novel and thus 'wild' undomesticated objects to 'tamed' and thereby taken-for-granted aspects of everyday life.[27] In their introduction to the edited volume, *Domestication of Media and Technology*, Berker et al. explain that 'domestication' theory "represented a shift away from models which assumed the adoption of new innovations to be rational, linear, monocausal and technologically determined" (2006: p.1). Rather the theory provided "a

[27] As Berker et al. explain in their introduction, domestication "in the traditional sense, refers to the taming of a wild animal" (2006: p. 2). Domestication has thus been metaphorically used to denote a "domestication process when users, in a variety of environments, are confronted with new technologies. These 'strange' and 'wild' technologies have to be 'house-trained'; they have to be integrated into the structures, daily routines and values of users and their environments" (2006, p.2). See also Sørensen (2006) in the same volume edited by Berker et al.

theoretical framework and research approach, which considered the complexity of everyday life and technology's place within its dynamics, rituals, rules, routines and patterns" (2006: p.1). But there are critiques of domestication theory. Early domestication research took place inside the home (a reason for the concept's name) and though domestication theory has been extended more recently beyond the home, it remains one reason the concept of domestication has been problematic - since it maintains a distinction between the 'inside' and 'outside' (between inside home and the outside world). As Silverstone admits, " the household is still there as a starting point and as the ground base for an understanding of the social dynamics of media change" (2006: p. 242). Furthermore, though domestication theory looked to move away from understanding adoption as linear – a type of technological determinism – by suggesting that technologies can in fact be 'domesticated' it still implies a level of determinism, of predictability or control. As such, domestication theory, given its supposition that technologies may in fact be 'domesticated' seems antithetical to ANT studies, which sees things as only temporarily 'stabilised'.

At the same time, Sørensen (2006) notes one strand of domestication theory has looked to incorporate an ANT approach to the study of technology adoption. As Sørensen (2006) explains, there have been two particular approaches to the study of domestication, one that developed in 'media studies' and the other that drew from 'technology studies'. Those theorists drawing on 'technology studies' have looked to ANT to explain domestication. For Sørensen (2006) ANT has allowed domestication theory to move beyond the household and extend it into the 'construction of a wider everyday life'.

> From this endeavor came above all some new concepts that helped analysis of technological artefacts as embodiments of designers' ideas about the ways users were supposed to apply their designs. Design was seen to 'define actors with specific tastes, competences, motives, aspirations, political prejudices and the rest', based on the assumption 'that morality, technology, science, and economy will evolve in particular ways'. (Sørensen, 2006: p. 45)

This strand of domestication draws again on the ANT notion of inscription, which sees "designers inscribe their visions of the world in the technical content of the new object" (Sørensen, 2006; see Akrich, 1992). And scripts are considered here as often

contested by users, as in the conscious attempts of overriding inscriptions (Sørensen, 2006) by what Akrich (1992) calls 'description' (see also the next section).

> Latour (1992) suggested that the actual use of an artefact could be understood as a dynamic conflict between designers' programmes of action, inscribed in artefacts, and users' anti-programmes that countered or circumvented these inscriptions. (Sørensen, 2006: p. 45)

Since the outcomes of such (anti)programmes cannot be predicted, Sørensen (2006) suggests research studies must necessarily involve empirical research. To Sørensen (2006), this approach to domestication theory focuses on three generic sets of features: the construction of practices (for example, in routines or as part of an institution) related to an artefact, the construction of meaning of the artefact and the cognitive processes related to learning the practice and meaning of an artefact. In this sense, "domestication becomes a multi-sited process that transcends the household space, and in which the sites interact" where, for example, the uptake of media technologies in sites like the household "involve the extensive production of a wide variety of institutions and standards at a national level" (Sørensen, 2006: p. 47). Thus, ANT extends domestication theory in two ways:

> First, the 'taming' of an artefact may be understood as a process where a script or a programme is translated or re-scripted through the way users read, interpret and act. Second, domestication may be seen as the process through which an artefact becomes associated with practices, meanings, people and other artefacts in the construction of intersecting large and small networks (Sørensen, 1994). Only rarely do we domesticate things in isolation. Using a slightly different vocabulary, the domestication of artefacts may be understood as the complex movement of objects into and within existing socio-technical arrangements (Sørensen, 2006: p.47).

Sørensen (2006) sees these objects as mutable and as changing through movement. He draws on De Laet and Mol's (2000) study on the Zimbabwe Bush Pump whose "example, a kind of water pump, may be particularly open to reconfiguration, due to the lack of sharp and solid boundaries, the potential for collective and shifting 'authorship' with regard to the technology, and the absence of precise criteria for what may be considered successful functioning" (Sørensen, 2006: p. 48). But while some constructive links have been made between domestication theory and ANT, the question that remains is: why not use ANT rather than domestication theory as a

theoretical framework? As ANT posits technological stabilisation as precarious and contingent (Latour, 1993a), how can it be controlled, let alone 'domesticated'?

And then there are the critiques regarding the non-user. As Sally Wyatt's study of Internet use (or rather *non*-use) reminds us, informed people may choose *not* to use technologies such as the Internet. She argues that most academic literature (including ANT-related studies) that focus on the acceptance of new technology, resistance and barriers to adoption "assumes access to technology is necessarily desirable, and the question becomes one of how to increase access. Informed, voluntary rejection of technology is not mentioned" (Wyatt, 1999). To Wyatt "this invisibility reflects the continued dominance of the virtues of technological progress, not only amongst policy-makers but also amongst the STS academic community, who would probably reject such a change" (Wyatt, 1999). As such, she questions the ANT dictum "follow the actors" in circumstances where those actors remain invisible. Further, dropouts are left as a transient issue (who may always return to the 'fold'). Either way, non-users still exist today, of whom little is known.[28] Wyatt's interest in Internet non-use closely aligns with her interest in investigating whether the 'cyberworld' will come to dominate the 'real world', similar to how the car dominates and affects our lives in terms of access, speed, mobility, status, health and even our choices. Extensive infrastructure is built to support the car – and the more users, the more extensive the infrastructure. The Internet is similarly built on an extensive and growing infrastructure. Using the car and its industry as an example, Wyatt warns against the totalising effects of past social science research where "the car industry became the symbol of industrial society, and much effort was expended in understanding the dynamics of that industry" resulting in a "social theory focus on questions of alienation and massification, extending them, not always appropriately, to other areas of social life" (Wyatt, 1999). According to Wyatt,

[28] Wyatt finds that few studies examine non-users of technology, with only some examples located mainly in mobile non-use. But the existing "This work on mobile phones isn't very surprising - people don't use mobile phones if they have alternatives, think they're intrusive and/or expensive", which she finds leads to assumptions that some people do not use, for example, the internet "because they have alternative sources of information and forms of communication which are appropriate for their needs, or because they think it is cumbersome and expensive" (Wyatt, 1999). But as we will see in this study (and particularly in Chapter 5) technologies may also discriminate against possible users.

there is a similarity with Internet research today. Supported by nations promoting information and communication technologies to encourage their production and adoption, many studies are focused on the 'socio-technical divide'. The danger in this research focus are the totalising effects – making information and communication technology and particularly Internet use "as the norm and non-use as a deficiency to be remedied" (Wyatt, 1999). To avoid effects of directed research is to take "seriously non-users and former users as relevant social groups, as actors who might influence the shape of the world" (Wyatt, 1999). Wyatt's work helps approach issues of use/non-use but at the same time complicates it. How may we discuss issues of non-use of digital media technologies without suggesting their use as the desired norm? While the answer to this question remains open, this study looks to examine another issue related to non-use, on that is tied to access. Discussed under the rubric of 'discrimination' (in chapters 5 and 7), the thesis examines the popular myth that digital media technologies increase access to resources given, they are available 24 hours a day and seven days a week on personal devices. So non-use becomes not only an issue of unexamined populations and totalising discourses, but also an issue of mythologising and discrimination.

As technical objects, digital media technologies may also be considered 'black-boxes' (Latour, 1987; see also Callon, 1986) since, if and when stabilised, the large set of heterogeneous actors that helped build the technical object can fall into the background of everyday activities. Thus, hybrids become black-boxes when those heterogeneous actors they are made up of become taken for granted. One bad assumption that often follows the black-boxing of digital media technologies is that digital media technologies work on their own – despite the fact that they are embedded in complex 'information infrastructures' (Bowker et al. 2010; Bowker and Star, 2000; see also Star and Ruhleder, 1996; Star, 1999). This is partly because their infrastructure, and its maintenance, is often performed precisely in the background – it is invisible work that is often taken for granted (Star and Ruhleder, 1996; Star, 1999). To Bowker et al. information infrastructure has often been taken-for-granted, usually "perceived as something 'just there,' ready-at-hand, completely transparent, something upon which something else 'runs' or 'operates'" (2010: p. 99). Given

information infrastructure is taken-for-granted STS often "speaks of invisible work, complex problems, and the challenges of alignment in the face of breakdowns" (Bowker et al. 2010: p. 99).

> Understanding the nature of infrastructural work involves unfolding the political, ethical, and social choices that have been made throughout its development. Analytically, this exercise consists in 'going backstage' (Goffman, 1956; Star, 1999), looking for the infrastructure in the making and practices 'infrastructural inversion' (Bowker, 1994) that is shift in the emphasis from change in infrastructural components to changes in infrastructural relations. Infrastructure is indeed a fundamentally relational concept; it emerges for people in practice, connected to activities and structures. (Bowker et al. 2010: p. 99)

To Bowker et al. infrastructures are changing along with digital media technologies. As the authors suggest: 'informational infrastructures' (such as that of the Internet) are bringing "new forms of sociality" (2010: p. 105). These changes thus encompass "the ontological dimension of the new infrastructure" (2010: p. 105). This thesis considers the actors involved in the 'information infrastructures' that the MUM App emerges from (in Chapter 4) and becomes embedded in (in Chapter 5 and 6) and the implications, for example, related to what collections may be displayed, how museum staff manage the App and what this means for users and the public.

In sum, this thesis uses the term 'digital media technologies' as a way to denote the particular aspects of the hybrid that this study seeks to investigate: the MUM App. The term is used in relation to the conceptual and theoretical underpinnings of the central notion of this thesis, that of remediation, which understands digital media technologies as hybrids or actor-networks. This section has explained that while 'digital' denotes aspects of these hybrids, such as software, it is not to be understood as signaling the 'new' or 'improved' or 'progressive' or 'accessible'. While the 'digital' is still a contested term, the use of it here denotes that digital media technologies may also have specific social, cultural and political implications, since particular actors can make up the actor-networks of 'digital' museum displays which may not customarily be involved in making 'physical' displays (see Chapter 4). Further, 'media' is used to suggest that digital media technologies act as a mediaries rather than intermediaries. Given this, we must consider how these hybrids co-constitute

the museum's objects, subjects, practices, and spaces. Lastly, 'technology' is used to point to these hybrids as 'technical objects' that bring together a host of actors. They may also be considered black boxes embedded in large infrastructures. Following this, the next section provides a literature review of previous research on making museum displays, viewing digital collections, and ordering (museum) spaces.

Making Displays, Viewing Collections and Ordering Spaces

Since the 1980s, museums have increasingly introduced various types of digital media technologies (Hooper-Greenhill, 1992). In response, museum and cultural studies have looked to understand how collections, museum visitors and museum practices are transforming in relation to a variety of technologies, drawing their theoretical frameworks from new media studies, cultural studies and STS. This section begins by reviewing the work of two particular theorists: Michelle Henning and Ross Parry. Their work has been selected not only because of their focus on technologies used by museums but also since their work is expressly aimed at avoiding deterministic readings of technology (a stated aim of this study). Yet, as will be explained below, both of their analyses ultimately succumb to determinist readings of technology for one of two reasons: 1) a failure to conceptualise digital media technologies as actor-networks despite looking to STS (as is the case in Parry's analysis) and 2) despite understanding digital media technologies as remediations, a failure to follow through with an ANT-based analytical framework (as is the case in Henning's work). As this thesis attempts to build on the current understanding of how 'digital' displays are (re)made and their role in museum practice, such as in rescripting the 'museum visit' and in reordering museum-related spaces, the work of these two theorists is briefly discussed below. This will also lead to a literature review organised on – making displays, viewing collections and ordering spaces.

To begin, in Parry's work, *Recoding the Museum,* he expressly seeks to "not slide into deterministic readings of technology" (2007: p.4) by employing a 'constructionist approach'. He briefly draws on STS, pointing to Kuhn's (1970) work, which states that the use of technology is always constructed and contested by those that use it,

though he does not draw on works that developed Kuhn's early observations, such as ANT. Instead his analytical framework draws on new media studies. Inspired by Marshall McLuhan and his adage the 'medium is the message', Parry makes the case for viewing museums (and their displays) as 'mediums'. He further extrapolates that since the museum is a medium that contains other mediums – referring here to McLuhan's 'the content of one medium is always another medium' – they may be examined using media analysis (a point made also by Henning, 2007: 2011). And so, for his analytical framework, Parry draws on Manovich's (2001) *The Language of New Media,* a work that looks to unlock the internal logic 'inherent' in new media by "identifying the differentiating and articulating the qualities of new media" (Parry, 2007: p. 12). According to Manovich's schema, 'new media are *numerical*, *modular*, *automated*, *variable* and *transcoded'* (Parry, 2007: p. 12).[29] While a critique of Manovich's work is not the aim here, Parry's own approach becomes problematic since he makes the 'museum' his unit or object of analysis, and juxtaposes it against new media. Thus he suggests that the museum, as a whole, has been transcoded by 'new media'. As such, his approach leads him to succumb to the 'deterministic reading' he attempts to evade. This is evidenced not only in the subtitle of Parry's book, 'digital heritage and the technologies of change', but also in his conflicting conclusion about how computers have changed museums:

> *It would be an exaggeration* to suggest that the computer has been the cause of the recent 'reimagining', 'rethinking', 'reshaping' and 'reframing' of the museum. However, from the evidence we have seen, the new digital technologies appear *always to have been at the heart of this change*. (2007: p. 140; my emphases)

[29] As Parry explains, Manovich proposal suggests "New media are *numerical* in that they reduce our corporeal, four-dimensional world to a string of 1s and 0s… New media, however, are also *modular* in that they are composed of discrete logical 'objects' with separate identities. These inherently independent and interchangeable blocks of content can then be assembled into 'media elements'. New media are *automated* in that, unlike some other media, they process data and can undertake certain assigned actions. In other words, new media have an inherent functionality and operational quality – the discipline is active, it does things. *Variability* means that, again, unlike many other media, new media have a mutable and 'liquid' quality… Manovich's last 'principle' is perhaps the most opaquely termed and most challenging of the five to grasp. Simply put, new media are involved in a process of *transcoding* in the way in which computers are shaped by society, and elements of society are shaped by the presence of computers. Like all technology, computers are a construct, historically and culturally contingent. They are, therefore, as part of culture coded (given meaning, referents, significance) by the cultures that use them. And, likewise, the values, actions, and meanings within these same cultures can themselves be coded by the presence and usage of computers. Each has the capacity to code the other – hence *trans-coding*." (Parry, 2007: p. 12-13)

This thesis looks to avoid conclusions that suggest technological determinism by instead inspecting the various heterogeneous actors involved in transformations related to the remediation of digital media technologies. It looks at how these transformations occur as a result of the negotiations of multiple actors. While this thesis will return to aspects of Parry's work, Henning's writing is discussed next.

Henning (2011) has also focused her work on the increasing use of 'new media' by museums. Like Parry, she also draws on new media studies, using Manovich's work to describe new media as "computer-based or digital media, it is the product of the convergence of mass-media practices and technologies with data-processing technologies" (Manovich in Henning, 2011: p. 302). But Henning's work ends up making generalisations that over-estimating the 'digital':

> New media involves the translation of older practices and representation into digital form. Media production, circulation, and consumption *all become computer based*. (2011: p. 302; my emphasis)

For Henning, as for Parry, 'new media' have a deterministic relationship in relation to the museum, as well as its practices and audiences: "[i]n the context of the museum, *[new media] introduces changes* in display, working practices, and in the museum's relationship to its audience" (2011: p. 302; my emphasis). But while she states that 'new media introduce change' her work also ironically points to Bolter and Grusin's 'remediation' thesis, proposing that "[t]his means not just the emergence of new cultural technologies and practices, but the *transformation of existing ones* in a process that has been termed '*remediation*'" (2011: p. 302, my emphasis; and see also Henning, 2007). While it is the case that Henning's (2007, 2011) work repeatedly points to 'remediation', she neither explicates the ANT concepts behind remediation, nor follows through with an ANT approach as a way to analyse the changes in museums related to digital media technologies. For example, Henning rather focuses on the ways in which 'new media' always entail 'transformative power' (Henning, 2007: p. 303), implying that change is a given and as such inevitable. And this despite the remediation thesis, which draws on ANT, implies change is contingent and precarious. This thesis suggests that by taking an

ANT approach, transformations related to digital media technologies may be understood as situated, particular and not a given. To develop a theoretical framework for how digital media technologies may be examined in a way that avoids deterministic readings and social constructivist approaches the next subsections therefore draw mainly on ANT-related literature. This literature looks at studies of how museum displays are made, collections viewed and spaces reordered – further outlining a theoretical framework for the analyses presented in chapters 4, 5, or 6.

Making Museum Displays: On the Politics of Exhibitionary Practices

Exhibiting collections is central to the remit of most if not all museums, and it is done most often by creating displays (Hooper-Greenhill, 1992). It has been previously shown that displaying physical collections involves negotiations made between many heterogeneous actors (including museum staff, artefacts, technologies, government programs, funding, spaces, and so on) and their competing interests (Macdonald, 1998). Thus examining how actors negotiate the display of objects is an area of concern for critical studies such as Haraway's (1984) classic study at New York's Natural History Museum *Teddy Bear Patriarchy: Taxidermy in the Garden of Eden, New York City, 1908-1936,* as well as Macdonald's (2000) study at London's Science Museum, *Behind the Scenes at the Science Museum.* More recently Yaneva, (2003) has examined the negotiations of heterogeneous actors in her ANT-based study *When a Bus Met a Museum: To Follow Artists, Curators and Workers in Art Installation*. While how physical displays are made has been an area of concern for critical and ANT studies, this study focuses on how a 'digital' display was (re)made. Few ANT-related studies have analysed how 'digital' displays get (re)made, let alone with regards to 'apps' (an exception is Smørdal et al. 2014 whose study, however, takes a different approach from the one taken here).[30] Hence, the review focuses on the aforementioned studies, a body of work that this thesis looks to extend.

[30] Smørdal et al.'s (2014) study, *Experimental zones: two cases of exploring frames of participation in a dialogic museum,* looks to understand the use of mobile devices in creating 'experimental' interactional schemas between the Norwegian Museum of Science and Technology and the public. While the term 'experimental' is employed the ultimate aim of the project and the study is to find ways of integrating digital media in the museum 'successfully'. As the authors explain, the developers

Haraway's (1984) study, *Teddy Bear Patriarchy*, examines the making of the African Hall at the Natural History Museum in New York. The study analyses the socio-cultural politics of making the African Hall as 'a visual technology', which to Haraway (1984) represents the instantiation of a history of social, cultural, gendered and racial domination. In her analysis, she finds the technologies of display – including the practices of taxidermy, the diorama in the African Hall and the objects organised to represent 'Nature' in the exhibit – to be the 'meaning-machines' through which power relations are exemplified and re-produced. As she explains,

> Obviously, this essay is premised on the inversion of a causal relation of technology to the social relations of domination: the social relations of domination, I am arguing, are frozen into the hardware and logics of technology. Nature is, in "fact," constructed as a technology through social praxis. And dioramas are meaning-machines. Machines are time slices into the social organisms that made them. Machines are maps of power, arrested moments of social relations that in turn threaten to govern the living. The owners of the great machines of monopoly capital-the so-called means of production-were, with excellent reason, at the forefront of nature work-because it was one of the means of production of race, gender and class. (Haraway, 1984; p. 52).

To Haraway (1984) the exhibit, as a visual technology, together with the technologies used in its displays, reproduce particular socio-cultural politics. Haraway's study is relevant not only for its critical approach, which focuses on the social, cultural and political implications of museum displays, but also for its methodological approach. As will be explained later in the methodology chapter (Chapter 3), Haraway reconstructs the making of the exhibit through artifacts – for example by examining documentation and photographs taken from expeditions to Africa – and this thesis will likewise reconstruct the (re)making of the MUM App.

Macdonald's (2002) ethnography in *Behind the Scenes at the Science Museum* on the making of the *Food For Thought – Sainsbury Wing* exhibition at the Science Museum in London examines the actors and practices involved in exhibition and display

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of these experimental zones looked to find "appropriate ways of integrating social media and digital technologies into dialogues with visitors" (2014: p. 224). See also Chapter 7 on 'experiments'.

making. Macdonald's (2002) ethnographic study takes an ANT approach by including both humans and non-humans as the possible types of 'actors' involved in exhibition making. By 'following the actors'[31] Macdonald looks to specifically understand "their concerns and their ways of seeing and doing" (2000: p.7). Macdonald's (2002) study focuses both on the 'makers' of the Food exhibit and its reception by visitors to the exhibition, a two-pronged approach this thesis also employs. For Macdonald (2002), this approach unveils unexpected actors in the making of exhibits. For example, she suggests that visitors too are implicated in 'making' the exhibit – not only since visitors actively produce meanings about what they see in an exhibition, but also because, in this case, an 'imagined public' played a part in the production of the exhibit, such as in the decisions about what objects to display. As Macdonald (2002) notes, the latter was a result of shifts in museum practices at the time, which meant, for the Science Museum at least, a (political) shift in focus away from collection-oriented exhibits to visitor-oriented displays. Overall, by widening the theoretical and analytical framework of her study, to include both humans and nonhumans, Macdonald not only observes a larger set of actors, but also demonstrates a complex set of negotiations between multiple actors that are entangled over space and time. Further, as commercially interested players sponsor the exhibit, she shows exhibition making as a practice that is intertwined with politics both inside and outside the museum. Macdonald's study provides not only deep insights into how the Food for Thought exhibit was accomplished but further establishes the use of ANT to understanding this process. ANT is used in the present thesis to examine the actors and negotiations involved in how the MUM App was (re)made (in Chapter 4).

In her ethnographic study of 'how a bus met a museum', Yaneva (2003) also employs the ANT dictum 'follow the actors' to examine the production of a contemporary art installation. Her stated aim is to avoid seeing the museum from the outside, as 'instrumental' (an approach often applied in museum studies)[32], nor from the inside,

[31] Understood as the ANT dictum, after Latour's (1987) work *Science in Action*.

[32] According to Yaneva, museum studies "does not treat the museum as an institution that is simply concerned, in a neutral way, with classification, collection and conservation activities" rather it is "according to this perspective, a tool available to a society to find and to demarcate its identity; its role is to visualize cultures" (Yaneva, 2003: p. 116). Thus, in such studies "the museum is reduced to a

seen for its 'internal principles' (a view suggested as held by anthropologists of material cultural)[33]. Rather, Yaneva (2003) aims to examine the museum both from the outside and the inside, and as a 'quasi-technical network'. For Yaneva, "Institutional theories and material culture studies have rarely addressed the fact that the museum before the opening ceremony of the show, is a strange messy world composed heterogeneous actors with a variable ontology" (2003: p. 117). Thus Yaneva looks to "explore the dynamic process of negotiations around different material rearrangements" (Yaneva, 2003: p. 117), by following the installation of an object and its rendering as 'art'. By doing so, her analysis aims to render visible "how a multitude of tiny infinitesimal operations bring the museum into existence" (Yaneva, 2003: p. 117). As a result, Yaneva sees the museum less as 'a stable milieu', and more as something constituted by a 'hybrid collective'. In this case, Yaneva suggests,

> The objects profusions hold the museum together. They occur in situation – always as elements from the experienced and non-stabilised world. What this study has tried to show is that it is impossible to isolate interaction from structure, exterior from interior, street from museum… The point is an ontological as well as an epistemological one. (Yaneva, 2003: p. 126)

Yaneva's (2003) study finds objects, subjects and practices are contingently and precariously held together by actor-networks to become an art installation. These insights are helpful to the analysis in Chapter 5, which examines how objects, subjects and practices are done and undone in practice – for example how viewing collections can be in one case a 'museum visit' and in another case a 'tour'.

While the set of studies outlined above examined the actors, practices, processes and politics involved in making 'physical' displays for museum exhibits, this thesis examines the actors, practices and process, as well as the socio-cultural politics of (re)making and using a 'digital' display. As the MUM App may be considered novel (recall from Chapter 1 that the MUM App was the first augmented reality App to be

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'facade' of social differences and becomes a representation of dominant ideological interests" (Yaneva, 2003: p. 116).

[33] As Yaneva notes that while anthropologists of material culture are concerned with the specificities of internal practices, "the daily process of installing museum objects and negotiating their display in concrete situations is not often described" (2003: p. 117).

released by a Canadian museum) it may also be considered 'innovative' (Latour, 2005; see also Akrich et al., 2002, 2002a). As Latour (2005) suggests, studying 'innovations' in particular sites, such as laboratories, researchers may best trace how objects emerge from a set of heterogeneous actors. As Yaneva (2003) and other theorists (see also Bennett, 2006; Macdonald and Basu, 2007) have proposed the museum offers itself as a site similar to that of a laboratory – a place where multiple actors may be deployed and examined, as in all 'experimentation'. For Latour,

> In these sites objects live a clearly multiple and complex life through meetings, plans, sketches, regulations, and trials. Here they appear fully mixed with other more traditional social agencies. It is only once in place that they disappear from view. This is why the study of innovations and controversies has been one of the first privileged places where objects can be maintained longer as visible, distributed, accounted mediators before becoming invisible, asocial intermediaries. (2005: p. 80)

Chapter 4 thus traces the actors, negotiations, practices, processes and decisions that were involved in making an innovative app like MUM, seeking to fill particular research gaps including: What actors are involved in (re)making 'digital' displays? Who or what is involved in decision-making processes related to 'digital' displays? What kinds of negotiations are made and what politics arise in relation to these actors, practices and processes? Next, this literature review turns to works that have explored changes to the traditional 'museum visit' practice in relation to digital media technologies – a review that connects to the analysis performed in Chapter 5.

Viewing Museum Collections: On Rescripting the 'Museum Visit'

In museum studies, Parry (2007) has looked to understand how computing and specifically the Internet has 'rescripted' the 'museum visit' as part of a broader investigation into how the museum is being transformed (or 'transcoded'). The traditional 'museum visit' here generally refers to the practice of viewing collections inside the museum. This practice was established with the formation of the 'modern museum' – a type of museum formed after the French Revolution in the late 18th century (Hooper-Greenhill, 1992) and in relation to a variety of institutions that arose in the 19th and 20th centuries, including arcades and world fairs (see also

Bennett, 1995). For Parry the introduction of the Web has changed the traditional 'museum visit' in several ways:

> 'Visiting' had [initially] meant *being there*. A museum's business had been to attract visitors to its physical galleries. Visiting a museum's Web site was, therefore, thought by some to be a poor substitute, with any value given to a Web site 'visit' (compared to a *real* visit) merely an accident of language within the parlance of the new Web medium. Moreover, the traditional visit event involved the visitor (along with other visitors) congregating in the museum – having a social experience with the physical collections and sensations of the tangible exhibit. These were the spatial architectonics that had made museums what they were. Disruptively, the notion of a Web 'visit' turned this dynamic on its head. The museum would no longer be a centralized venue, with a threshold distinguishing its special liminal space from the outside world, but would instead be a broadcaster and publisher distributing packages of content to myriad localised and varied contexts. It would, in other words, be the museum that was doing the visiting. (2007: p. 94; original emphases)

While Parry notes that collections had been also increasingly viewed outside museums through a variety of other practices and technologies established[34], he suggests that the introduction of the Web acted as the most substantial change not only in terms of museum practice but for the museum as a whole (Parry, 2007).

Parry (2007) suggests that technologies such as the Web became seen as a way not only to develop new ways of communicating with audiences, but also to offer visitors "a new space, time and mode of experience" (Parry, 2007: p. 98). Despite some of its limitations[35], the Web allowed museums to 'overcome boundaries of physical space', as well as to 'remove cultural and social boundaries' that would in some cases preclude a visit even by a local community. It also provided a 'new mode of address' or a 'new way to create experiences that were not possible in physical settings'. Parry (2007) points to the 'modularity' (Manovich, 2001) of digital media as having

[34] As Parry explains, "[i]f museums looked hard enough at their histories, they could see that there had, in fact, been other cultures and other forms of practice that had – before the advent of the Web – already begun to disrupt the singularity of the circumscribed on-site museum" (2007: p. 96). For example, Parry (2007) points to how loan schemes, object boxes in schools, catalogues and multi-site museums as ways in which the museum had reached outside of the physical museum.

[35] Parry (2007) notes at least three limitations. Firstly, it was not something that could be used to reach out to everyone in the community. Secondly, the Web was "only as good as the technology that is driving it – the software that is coding it, the hardware that allows us to use it, and the connections that permit us to download it" (Parry, 2007: p. 98). Thirdly, he notes that museums became aware that not everyone uses technology, and particularly the Web, in the same way, and are rather more culturally specific as well as constantly changing.

allowed for the museum visit to be 'rescripted'. For Parry (2007), the Web allowed the museum to move beyond a physical space and become a 'multi-channel museum'. The

> ...Web became just another of the multiple channels that museums were already building. Computing and the Web synchronized with these types of audience relationships, these patterns of work, and these visions of what a museum could be. New media became part of a wider rescripting of the traditional visit 'event', where a museum experience could not only happen at a distance, but could also perhaps be fleeting or unexpected. (2007: p. 97)

"What was once unthinkable (a de-centered space, with distant visitors and atomized distributed collections) is now becoming what the 'multi-channel museum' aspires to be" (Parry, 2007: p. 101). 'New media' "became part of a wider rescripting of the traditional visit 'event'" (2007: p. 97) and therefore challenged not only when and how a 'museum visit' could occur but also what a 'museum visit' even was.

But not only does Parry again juxtapose technologies with the museum, in which the former changes the latter, but also leaves gaps in his analysis – in particular, the roles of other actors in rescripting practices. If digital media technologies are to be considered actor-networks, then how other actors may also play a part in such a 'rescription' must also be considered. To do so, this thesis looks to the ANT notions of 'inscription' and 'description' (Akrich, 1992; Akrich and Latour, 1992).[36] For Akrich, innovators 'inscribe' their visions of "the world in the technical content of the new object" which she refers to as a 'script' or 'scenario' (1992: p. 208).

> The technical realization of the innovator's beliefs about the relationships between an object and its surrounding actors is thus an attempt to predetermine the settings that users are asked to imagine for a particular piece of technology and the pre-scriptions (notices, contracts, advice, etc.) that accompany it. To be sure, it may be that no actors will come forward to play the roles envisaged by the designer. Or users may define quite different roles of their own. If this happens, the objects remain a chimera, for it is in the confrontation between technical objects and their users that the latter are rendered real or unreal. Thus, like a film script, technical objects define a

[36] Akrich (1992) explains 'inscription' as the process by which innovators design technical objects with particular visions of how they may be used and of the environment they are deployed in. 'De-scription' is the "the inventory and analysis of he mechanisms that allow the relation between a form and a meaning constituted by and constitutive of the technical object to come into being" (Akrich, 1992: p. 209).

> framework of action together with the actors and the space in which they are supposed to act. (1992: p. 208)

While simple technologies may suggest a particular description based on their form – for example, Akrich points to the 'laborer's stake, with its single point, which can only be driven by two people presupposing a collective user' – she proposes that this type of reading of technologies using 'content analysis' (often applied to texts) has little relevance for complex technologies or projects "because it ignores the wide range of uses to which objects may be put" (1992: p. 208). For Akrich "It is obvious that it cannot possibly explain the wide variety of fates experienced by technological projects – fates that range from complete success or total failure" (1992: p. 208).

Rather, Akrich suggests following "the negotiations between the innovator and potential users and to study the way in which the results of such negotiations are translated into technological form" (1992: p. 208). As she states,

> Thus, if we are interested in technical objects and not in chimerae, we cannot be satisfied methodologically with the designer's or user's point of view alone. Instead we have to go back and forth continually between the designer and the user, between the designer's projected user and the real user, between *the world inscribed in the object* and *the world described by its displacement*. For it is in this incessant variation that we obtain access to the crucial relationships: the user's reactions that give body to the designer's projects, and the way in which the user's real environment is in part specified by the introduction of a new piece of equipment. (Akrich, 1992: p. 208-209; original emphases)

Thus, Akrich proposes that we must study the "conditions and mechanisms under which the relations that define both our society and our knowledge of that society are susceptible to partial reconstruction" (Akrich, 1992: p. 206). A sociotechnical study of a technical object is a movement between the technical and the social.

> We also have to move between the inside and the outside of technical objects. The first has to do with the extent to which the composition of a technical object constrains actants in the way they relate both to the object and to one another. The second concerns the character of these actants and their links, the extent to which they are able to reshape the object, and the various ways in which the object may be used. Once considered in this way, the boundary between the inside and the outside of an object comes to be seen as a *consequence* of such interaction rather than something that determines it. The boundary is turned into a line of demarcation traced, within a geography of delegation, between

> what is assumed by the technical object and the competences of other actants (Akrich, 1992: p. 206; original emphasis)

Akrich also points to how 'delegations' are made in relation to 'technical objects' as a matter of concern for sociotechnical studies. As she states "If most of the choices made by designers take the form of decisions about what should be delegated to whom or what, this means that technical objects contain and produce a specific geography of responsibilities, or more generally, of causes" (1992: p. 207). How responsibilities are delegated across actors in relation to technical objects is a concern of this research study in Chapters 5 and 6. Chapter 5, looks to examine how the 'museum visit' is rescripted along with MUM and other actors in practice. This analysis will begin by first asking: what other actors are involved in the reconfigured 'museum visit'? And as the 'museum visit' is being rescripted can it still be considered a 'museum visit', or is it something else, in this case perhaps a 'tour'? If it is a 'tour' then is the 'museum visit' rescripted or is something else happening? And if we are no longer discussing a 'museum visit', can the user still be considered a 'museum visitor'? Or the MUM App a type of 'exhibit' for that matter? This will also lead into how spaces may be considered, particularly as the 'museum visit' is taken in this case outside the Museum. Next, the review turns to works that have explored how the same (museum) space may be multiple – a review connecting to Chapter 6.

Reordering Museum Spaces: On Writing Spaces

Museums have been discussed as having always been involved in reordering spaces through the practices of reclassifying and reorganising heterogeneous objects (Hetherington, 1999; see also Hooper-Greenhill, 1992; Bennett, 1995; 2006)[37]. In Europe, various practices related to, for example, the early cabinets of curiosity in the Renaissance, the societies that emerged in the classical age and the modern museum that was formed after the French Revolution (Hooper-Greenhill, 1992)

[37]In this way the museum has also been likened to a laboratory. As Bennett suggests "museum are able to fabricate new entities as a result of the distinctive procedures (of abstraction, purification, transcription, and mediation) through which they work on and with the gatherings of heterogeneous objects that they assemble", referring to Latour and Woolgar's (1979) Laboratory Life (2006: p. 523).

transformed over time in relation to social, cultural, economic and political changes. Of these the modern museum was early on involved in "the arrangement and ordering of material heterogeneity" in an attempt "to achieve some form of homogeneous order" (Hetherington, 1999: p. 51). As Hetherington explains,

> Such homogeneity can be organized through classificatory, aesthetic, narrative, and auratic means. In effect, the museum display performs some kind of a homogeneous relation between things on display through an ordering of material elements and their semiotic effects. (1991: p. 51)

As Hetherington suggests, in examining how the museum achieves order, we see it does so in two ways: "not only its changing mode of ordering the heterogeneous but also changing conceptualizations of heterogeneity as well" (1991: p. 51-52).

> We can think of the contemporary museum as an exhibitionary space in which heterogeneous effects and uncertainty are subject to controlling and ordering processes. In other words, heterogeneity should not be there. (Hetherington, 1991: p. 52)

Thus, one of the modern museum's aims is to make objects less heterogeneous, something that can be controlled within the walls of the museum 'space'. But what if that space was outside the 'bounded region' (Goffman, 1959) of the museum?

This is the focus of another analysis by Hetherington (1996) in which he examines the multiple uses of a 'museum without walls' – Stonehenge. In this analysis, Hetherington shows that while the museum has often shaped a utopic vision of the ordering of the social (the 'classical' museum), 'museums without walls', like Stonehenge, can have many 'utopics', or can in other words be 'heterotopic' (1996: p. 153). To Hetherington, 'heterotopic spaces' are "uncertain, ambivalent and ultimately not representable in any unified way" (Hetherington, 1996: p. 153). As a particular example, Hetherington (1999) points to Stonehenge, which has been constituted (and contested) in at least these multiple ways: as an important archeological site, a Druidic Temple, an ancient astronomical instrument, a tourist attraction, a symbol of ancient Britain, a New Age site of worship, part of England's cultural heritage, a place for UFO sighting and the site of festivals thus making the site a contested one.

> That contestation is focused principally on the issue of modes of social ordering. More specifically, conflict has been focused on how modes of ordering are represented within this particular site, notably expressed through attempts to show what the site means and what it should be used for. (Hetherington, 1999: p. 157)

For Hetherington, the many actors that (re)constitute the site – such as the managers of the site, archeologists, travellers, pagans, land owners, and so on – are "all, in effect, 'visitors' to this museum without walls and whether they choose to be or not, their practices become a part of the social context that makes this site meaningful" (Hetherington, 1999: p. 157). Thus for Hetherington both the actors and practices related to a site constitute how it is reordered and in a sense rewritten. These insights are particularly important to this analysis, which in Chapter 6 looks at how the MUM App participates in reordering or rewriting city spaces. This thesis will look to build on Hetherington's work by examining the role of digital media technologies in reordering and rewriting urban city spaces as places to see museum collections. But to understand how digital media technologies participate, along with other actors, in these processes, this thesis suggests we look to debates on agency.

Key Debates About Agency in Relation to Digital Media Technologies

Some theorists posit digital media technologies as not only *participating* in the processes of reordering and rewriting spaces but also *intensifying mediation processes* in such a way that they begin to *act autonomously* or even *direct space*. This (re)opens questions about the agency of technologies in relation to digital media technologies, and particularly those considered 'smart' or 'intelligent'. Since this thesis takes an actor-network approach, we may look at what ANT theorists state about agency first. In ANT studies, action has been suggested to be a result of a network of heterogeneous actors or 'actants' (Latour, 2005). As Latour asserts: action "is simply not a property of humans but of an association of actants" (1994: p. 35). For Latour, "any course of action will rarely consist of human-to-human connections… or of object-object connections, but will probably zigzag from one to the other" (2005: p.75). Action to Latour is therefore also a 'technical mediation'

whenever “actants are in the process of exchanging competences, offering one another new possibilities, new goals, new functions” (Latour, 1994; see also Latour, 2005). But can digital media technologies be considered in the same manner as other types of technologies? The section examines the debates related to this question by first reviewing literature in media and communication studies that suggest ‘new media’ as producing different effects from other types of technologies, specifically an ‘intensification of mediation’. Second, literature in spatial studies is discussed for its suggestion that software must be considered differently from other types of technologies since it can act autonomously. Thirdly, this section returns to ANT literature, which insists that agency is a ‘relational effect’ of an assemblage.

In media and communication studies, Kember and Zylinska (2012) propose that ‘new media’ are different from other technologies, not only in form but also in terms of their implications. They point to the work of Bernard Stiegler who stated that since as far back as the Industrial Revolution, the speed of technological development has changed—in fact, increased exponentially along with changes in other areas of life, including social, cultural, spiritual, legal, and so on (Kember and Zylinska, 2012). The acceleration of use of digital media technologies is suggested to have serious implications: “Even though we have always been technological, a radical change has taken place over the last century, with the speed of technological transformation and intensity of technical production constantly increasing and getting ahead of the development of other spheres of life” (Kember and Zylinska, 2012: p. 16). Also working in media and communication studies, Couldry and Hepp (2013) have connoted a similar intensification of mediation by ‘new media’ through the concept of ‘mediatisation’. Though the term ‘mediatisation’ has been criticised for evoking deterministic views, there is also strong agreement among these theorists that there is an acceleration and increase related to how ‘new media’ intensify mediation.

But it is not only cultural theorists in media and communication studies that are drawing attention to ‘new media’ as having ‘intensifying effects’ on everyday life. Spatial theorists, for example, are also sketching the contours of a ‘new epoch’ (Thrift and French, 2002). For Thrift and French (2002) ‘intelligent technologies’ now

hold unprecedented participative and animated qualities. In their view, technologies are taking on more 'active' and 'adaptive' features, as objects are loaded up with elements that, for example, "allow them to communicate directly with other objects, read interactions, react recursively and provide various prostheses… [such as] means to additional calculation or memory" (Thrift, 2004 in Thrift, 2005: 469). They see ubiquitous software computing as layered and intertwined into the biological and technological in such a way that they blur instituted dichotomies. Drawing on Haraway's cyborg figuration, Thrift and French (2002) see the former categories—of human / non-human, inside / outside, public / private—as increasingly permeable. But for these theorists, the invisible micro-worlds we now build, layer and embed call for a need not only to reclassify the world around us, but also its conduct (Thrift and French, 2002; Thrift, 2005). For these theorists, the 'new epoch' we find ourselves in brings a new set of knowledge relations, as well as a new set of politics.

Thrift and French (2002) suggest that software code and digital information now infiltrate almost every part of the urban space – they have become ubiquitous. For Thrift this means we can look to this new layer of active object environments as constituting "an *informed materiality* in which the activity of the world will be continuously mediated, threaded together and communicated at a very large range of scales and at the same time have added to it a new kind of theoretically charged vitality" (Thrift, 2005: 471; original emphasis). In time, Thrift suggests this will bring about a new form of 'augmented rationality' where 'technology is a constant accompaniment to biology and vice versa' (Thrift, 2005: 471), with the result being an increase in the 'mediation' of things[38]. Everyday spaces will become "saturated with computational capacities, thereby transforming more and more spaces into computationally active environments able to communicate within and with each other" (Thrift and French, 2002: 315). Ubiquitous and increasingly pervasive computational systems are already "distributed through the environment in a whole range of devices, 'a physical world invisibly interwoven with sensors, actuators,

[38] Thrift suggests that this active mediation can be looked at in the Latourian sense, a place of messy and circuitous conjunctions which appear smooth given the large amount of black-boxed work that happens in the background (Thrift, 2005: p. 472).

displays and computational elements, embedded seamlessly in the everyday objects of our lives and connected through a continuous network'" (Weiser et al. 1999, 2-3 in Thrift and French, 2002: 315). As this phenomenon becomes more pervasive, "it means that a whole set of appliances (which 'compute') will, through a process of cultural absorption into practices, sink down from the representational into the non-representational world so becoming a part of a taken-for-granted set of passions and skills (Thrift 2000)" (Thrift and French, 2002: 318). Ultimately, these theorists argue that these technologies stand for a new set of 'effectivities', and so a new set of politics. For example, Thrift and French discuss how software intervenes across several dimensions that even allow for it to become the practice of government[39]. For Thrift and French (2002) software is also increasingly involved in 'writing space', and as a result they see software as increasingly 'directing' spaces (Thrift and French, 2002). In a similar vein, Kitchin and Dodge (2011) suggest that software is increasingly involved in the 'automated management' of society. For Kitchin and Dodge, automated management, or the increasing regulation of people and objects through software technologies is happening by way of "processes that are *automated* (technologically enacted), *automatic* (the technology performs the regulation without prompting or direction) and *autonomous* (regulation, discipline and outcomes are enacted without human oversight) in nature" (2011: p. 85, original emphases). Kitchin and Dodge (2011) see this as a result of inculcating software technologies with control mechanisms that enact a 'culture of control'. But can software direct spaces? Do digital media technologies increasingly control societies?

While theorists such as Thrift and French, as well as Kitchin and Dodge, suggest digital media technologies are springing forth a 'new epoch', for other theorists, such

[39] As Thrift and French explain, "It has changed characteristic forms of visibility by informationalizing space, so producing new objects of analysis. It has changed ways of thinking and questioning by producing new analytic procedures. It has changed the nature of expertise by producing new templates for decision-making and it is changing the nature of human subjects by producing enhanced capabilities and by questioning not just what techniques of the self consist of, but whether the self is a meaningful governmental category. Software is now, therefore, a key technology of government for both the state and commerce. But it is more than just a potent juridical intermediary. Increasingly, software is becoming the practice of government. What were corporeal routines that could be questioned have seemingly become incorporeal routines that lie below the level of explicit discourse, that are no longer disclosed." (Thrift and French, 2002: 325)

as Barry and Suchman, agency is always to be considered as a relational effect of an assemblage. Barry looks to move away from "the imagined existence of space contaminated by technology" (2001: p. 8); since, as he reminds us again, the human, its capacities and its social institutions are constituted precisely by *both* humans and nonhumans.

> …[T]here is no straightforward opposition between technology, on the one hand, and human and social capacities, on the other; nor is there such an opposition between the realm of technology, and the realm of politics. In part this is because technology plays a formative part in making up what we are as humans, and what we take to be social institutions. Social institutions have to be made, and technology is a key element in their make-up. (Barry, 2001: p. 8)

In his work, Barry (2001) distinguishes between a 'technical device' (a material or immaterial artefact) and a 'technology' (as referring not only to devices but also to knowledge, skills, diagrams, calculations and energy which make the use of the device possible). He again places emphasis on the requirement of humans for 'technical devices' to work.

> The idea that a non-human device or instrument can somehow work autonomously of its multiple connections with other (human and non-human) elements (language, bodies, minds, desire, practical skills, traditions of use) is a fantasy. Many have argued that it is possible for machines to be intelligent. But the intelligence attributed to machines hinges on the cultural invisibility of the human skills which accompany them. It is only by making the human invisible that it might be possible to make machines seem intelligent or creative. (Barry, 2001: p. 9)

To Barry "[t]echnology is not reducible to politics", rather "techniques and devices can become political… in the sense that technical designs and devices are bound up with the constitution of the human and the social" (Barry, 2001: p. 9).

In Suchman's studies of artificial intelligence (AI), she looks to shift the frame of reference away from autonomous individuals (or technologies) "to arrangements that produce effective forms of agency within ramifying networks of social and material relations" (2007: p. 242). She further looks to demystify the 'smart' machine by analysing the conceptions and interactions that suggest artificial intelligence.

> My approach has been to slow down discourses of the 'smart' machine to attend closely to the practices through which purportedly intelligent and interactive artifacts are realized, including just what conceptions of intelligence and interaction are in play. The result of this is an enduring skepticism regarding the rhetorics of machine intelligence and an interest in demystifying the specific technologies and practices about which these discourses make their claims. (Suchman, 2007: p. 242-243)

One of her studies examines an 'intelligent machine' in the form of a robot named Cog that consists of a head and torso built with a perceptual system (computer vision) and basic motor skills (moveable arms and hands). While Cog is portrayed as having AI Suchman points to the aspects not immediately visible in its media portrayals, those that give it its 'intelligent' effect. Sitting on a heavy cabinet that holds up Cog's torso, the machine is connected to cables running to a "ceiling-high bank of processors that provide the computational power required to bring Cog to life" (2007: p. 246). Having access to this 'backstage' view provides "an opportunity to see as well the extended network of human labors and affiliated technologies that afford Cog its agency, rendered invisible in its typical media staging as Rod Brook's singular creation and as an autonomous entity" (Suchman, 2007: p.246). For Suchman (2007), empirical studies have shown that 'contrary to the foundations of the Enlightenment' and 'its preoccupations with the individual actor living in a world separate from things', "human agency is always inextricably tied to the specific sociomaterial arrangements of which we are part" (Suchman, 2005). Suchman thus suggests examining the "relational character of our capacities for action; the constructed nature of subjects and objects, resemblances and differences; and the corporeal grounds of knowing and action" (Suchman, 2005). But while Barry and Suchman suggest, like Latour, that agency is to be considered an 'effect', other theorists discussed above suggest that changes related to digital media technologies are perhaps not yet fully understood. They propose instead that digital media technologies are a pressing concern, particularly as they become more ubiquitous. This thesis looks to contribute to these debates by examining first how the MUM App was (re)made, second what its role is (among with other heterogeneous actors) in rescripting museum- and urban- related practices and reclassifying subjects, objects and practices, as well as in reordering and rewriting urban spaces.

Conclusions

This chapter has sought to develop a theoretical framework for this research study while also identifying gaps in existing literature and as such outlining the particular contributions that this thesis seeks to make. To begin, the first section outlined how we may understand digital media technologies in the context of the thesis. The section also outlined why other terms used to refer to digital media technologies such as 'new media' can be problematic – particularly since they imply a linear development (from 'old' to 'new'), whereas understanding digital media technologies as actor- networks means they always reincorporate the 'old'. Further, the section outlined that these technologies must be seen as having mediating qualities, specifically as 'mediaries' rather than 'intermediaries'. Lastly, it was suggested that digital media technologies must also be considered as 'technical objects', that is as emerging from and bringing together heterogeneous actors. The second section then reviewed literature organised under three topics – making museum displays, viewing museum collections and ordering museum spaces (each related to one of three research questions outlined in Chapter 1) – while also pointing to the gaps and questions remaining in the existing body of work. In particular, while critical and ANT-based studies have looked at how 'physical' exhibits have been made before, they have not examined the how, who and what involved in (re)making 'digital' displays? While in museum studies, theorists have looked to explain how the 'museum visit' changes, they have not done so by examining all the actors (both human and nonhuman) involved. Further, while theorists have examined how spaces outside the museum may be rewritten to serve different purposes, such as in the case of Stonehenge, this has not been examined in relation to how this is done with 'digital' displays. And in relation to the last point, this literature review discussed recent debates about the agency of digital media technologies in relation to reordering and rewriting spaces. While some theorists have suggested software brings about a new epoch in which such technologies have increasing autonomy and thus increasingly direct society, others maintain that agency remains an effect of an assemblage. This thesis seeks to address this debate

and shed light on how we may understand agency in a society increasingly mediated by digital media technologies, and particularly software. To do this, the following methodology chapter will next provide details on the research approach, methods and tools employed in this study.

3 Methodology – Research Approach, Methods and Tools

This chapter discusses the research approach and outlines the methods and tools employed in this study. As was mentioned in Chapter 1, the study looks to avoid technological determinism and constructivist approaches to understanding social, cultural and political changes related to digital media technologies by employing the ANT 'principle of generalised symmetry' that suggests humans and nonhumans must be analysed on the same terms (Callon, 1986; see also Latour and Woolgar, 1979; Haraway, 1991; Law and Bijker, 1992). By employing this ANT principle, analyses consider both the 'social' and the 'technical' together – and so, actor-networks are here considered as emerging from complex 'sociotechnical' systems (Law, 1991). Thus the social, cultural and political implications of these remediations are understood as always being 'relational effects' – as consequences of the negotiations between a network's heterogeneous actors (Latour, 2005; Law, 2007; Law, 2008). Hence, the research approach draws on diverse ANT-based studies. It also draws on feminist approaches to studying science and technology, and particularly those related to making the 'invisible' visible, such as labours displaced across actor-networks. The chapter is organised into three sections. The first section begins by discussing how 'figurations' (Haraway, 1997), as well as 'configurations' and 'reconfigurations' (Suchman, 2007; 2012), are understood and what approaches are used to examine such processes in this study. Next, the section outlines the rationale behind taking an empirical approach and discusses the appropriateness of the museum as a setting for critical research studies. The second section discusses the selection of the McCord Museum and the MUM App as a specific case study and describes the fieldwork accomplished during in a one-year residency at the Museum. This section begins by outlining the research terms established with the Director and senior management team of the Museum. This is followed by a description of the two main investigations undertaken: 1) how the MUM App was remediated, an analysis that 'reconstructs' (Rubio, 2012) how the MUM App was (re)made by way of interviews and documentary analysis, and 2) how the App is used in practice, an analysis that includes a participant study in which eleven participants were filmed

while using the App and asked to fill out a questionnaire about their experience. Along with discussing the methods and tools employed, this section also outlines some of the challenges encountered, such as in filming participants. Lastly, the section discusses how other types of displays at the Museum were examined to provide context and understand alternative ways in which the Museum displays its digital photographic collections. The third section considers how the 'digital' tools employed in this research study actively mediated the production of knowledge.

An ANT Study of Humans and Nonhumans: On Sociotechnical Approaches

The aim of this research study is to examine the remediation of the MUM App, its role (among other actors) in reconfiguring museum- and urban- related subjects, objects, practices and spaces, and the implications of these processes. ANT provides a way to study such complex changes by tracing the patterns made by both humans and nonhumans (Latour, 2005). In this view, humans and nonhumans together form sociotechnical 'assemblages' regarded as social actors or 'actants' that can have agency (Latour, 1994; Latour, 2005; see also Suchman, 2008). Thus both humans and nonhumans are considered relevant to this social analysis. As discussed in Chapter 2, the recent proliferation of digital media technologies, and particularly software, have established new grounds for research, given that they may have an increasing role in how sociotechnical assemblages are reconfigured. While some may say this is not an entirely new problem – recall that feminist writers noted as early as the 1980s that micro-computing was a necessary research concern (see Haraway's famous 'cyborg manifesto', 1990; and more generally, Wajcman, 1991) – there is, however, an increasing urgency to return to the question of agency given the proliferation of software, its increasing mediation of social interaction and, further, since, as Haraway (1990) noted, micro-computing is invisible (embedded in software systems) and everywhere (it is politial). Thus for feminist critical writers it has been important to understand more about "the constitutive power of tools, techniques and objects to materialise social, political and economics arrangements" (Wajcman, 2010: p. 150-151). The next subsections seek to elaborate on the research approach by: firstly, discussing what 'reconfigurations' are and how they are examined here;

secondly, discussing the museum as a critical site of study; and, thirdly, outlining ANT approaches that are drawn from ethnomethodological studies.

Reconfigurations: How (and Why) Are They Examined?

This study takes a particular interest in how objects, subjects, practices and spaces are 'reconfigured'. This section therefore looks to outline how the terms 'figure', 'configure' and 'reconfigure' may be understood for the purposes of this study. Understanding how objects are figured (and reconfigured) is important to this study as "[t]echnologies… are forms of *materialized figuration*; that is, they bring together assemblages of stuff and meaning into more and less stable arrangements" (Suchman, 2007: p. 227, original emphasis) and, as this study will show, technologies often reconfigure "stuff" in relation to processes of remediation. For Suchman, to "figure is to assign shape, designate what is to be made noticeable and consequential, to be taken as identifying" (2012: p. 49). Following Law (1994), Suchman also understands figure as "a mode of ordering things in relation to one another" (Suchman, 2012: p. 49). Therefore, "[f]iguration is an action that holds the material and semiotic together in ways that become naturalized over time, and in turn requires 'unpacking' to recover its constituent elements" (Suchman, 2012: p. 49). To unpack figurations Suchman offers up 'configuration' as not only a way of bringing together "an assemblage of stuff" but also as a device with two broad uses:

> First, as an aid to delineating the composition and bounds of an object of analysis, in part through the acknowledgement that doing so is integral not only to the study of technologies, but to their very existence as objects. And second, in drawing our analytic attention to the ways in which technologies materialize cultural imaginaries, just as imaginaries narrate the significance of technical artefacts. (2012: p. 48)

Configuration acts as "a device for studying technologies with particular attention to the imaginaries and materialities that they *join together*, an orientation that resonates as well with the term's common usage to refer to the conjoining of diverse elements in practices of systems design and engineering" (Suchman, 2012: p. 48). This study employs the *re*configuration to depict changes. But not only changes over

time related to how "stuff" (i.e. different assemblages brought together) but to *ongoing processes* (i.e. how "stuff" is configured in each act). So, for example, the 'museum visit' is not only considered changed by different assemblages related to using the App, but is also considered rescripted by actors each time it is performed. When reconfiguration is used as a device in this research study it allows a way to uncover what has changed: how practices may be *rescripted*, how subjects, objects, practices may be *reclassified* and how spaces may be *reordered* and *rewritten*. For example, in this case, some of the participants thought what they were performing was less a 'museum visit' and more a 'tour'. But the term reconfiguration also includes an appreciation for the way in which social scientists, and their toolkits, may also contribute to how such reconfigurations are assessed, i.e. methods and tools may be implicated in the findings of a study (this issue is also discussed in the last section below). To mitigate this issue, the analyses herein use empirical evidence in the form of direct quotes from participants to support the arguments made.

But why study reconfigurations to begin with? In short, because they have political 'effects'. As Suchman notes, the "effects of figuration are political in the sense that the specific discourses, images, and normativities that inform practices of figuration can work either to reinscribe existing social orderings or to change them" (2007: p. 227-228). For example, as was hinted at in Chapter 1, the MUM App's display of historical photographs in some senses reinscribes gender- cultural- and class -based orders (as the display fails to explain the gender- and culture- related issues in the images displayed and leaves out collections depicting working class neighbourhoods, see also Chapter 4). In order to examine the politics arising from how "stuff" gets reconfigured, this study uses a two-pronged approach. Firstly, as mentioned above, the study pays close attention to how practices are rescripted, how subjects, objects and practices are reclassified and how spaces are reordered and rewritten when the App is employed. Secondly, the study takes notice of what political 'effects' arise. These may be, for example, in relation to the content of what is on display (as in the example above) or to issues of access (such as who can participate in the MUM App experience, discussed under the rubric of 'discrimination' in Chapter 5). Though it also pays attention to how politics may *not* arise in some cases: for example,

examining the App's use in practice shows agency to be a 'distributed accomplishment', hence the App is not seen as 'directing space' (see Chapter 6).

An Empirical Approach: Agency and the Museum as Critical Site of Study

As this study draws on ANT, it takes an empirical (and feminist) approach to studying agency. ANT studies have addressed the relation between humans and nonhumans through empirical studies – especially in examining questions of agency. For feminist writers, empirical studies allow for the nature of agency to be revealed as an 'effect', since "human agency is always inextricably tied to the specific sociomaterial arrangements of which we are part" (Suchman, 2005: p. 3). Feminist approaches complement ANT studies in that they emphasise the "relational character of our capacities for action; the constructed nature of subjects and objects, resemblances and differences; and the corporeal grounds of knowing and action" (Suchman, 2005: p. 3). For Suchman feminist research orients analysis away from more traditional ways of knowing, displacing attention towards labours and the politics of difference:

> First, feminist research displaces traditional preoccupations with abstracted and decontextualized forms of knowledge in favor of particular, specifically situated practices of knowing in action. Second, feminism directs attention always to the labors (particularly those previously ignored) that are an essential and ongoing aspect of sociotechnical assemblages and the capacities for action that they enable. And finally, feminist research orients us not only to relations and symmetries among persons and things, but also to the politics of difference. The boundaries that constitute things as separate and different are treated not as pre-given, but as enacted, and practices of boundary-making and the enactment of difference are inevitably political. (Suchman, 2005: p. 6)

By drawing on feminist ANT approaches, this research examines 'invisible' labors (both human and nonhuman) at work in distributed action, while also paying close attention to the politics of how boundaries are drawn between things.

ANT theorists, and particularly feminist writers, have examined sociotechnical arrangements in science and technology institutions, considered as 'critical sites' of knowledge formation. Classic examples include Latour and Woolgar's (1979) study in

Laboratory Life, which looks at the construction of science in a laboratory, while another is Suchman's (2007) *Human-Machine Reconfigurations: Plans and Situated Actions,* which examines human-machine interaction at a technology company. But feminist studies (which employ ANT) have noted other critical sites of knowledge formation, including and importantly for this study, the museum. As mentioned in Chapter 2, examples include Haraway's classic (1984) study on the construction of the African Hall exhibit at the Natural History Museum in New York and Macdonald's (2002) study of the Food for Thought exhibit at the Science Museum in London. This thesis also explores the 'museum' as a critical site of study. As Hooper-Greenhill (1992) has pointed out, museums have long been involved in shaping knowledge and our conceptions of the world. On the one hand, central to the museum have been the acts of classifying and ordering collections. As Hooper-Greenhill states "classification in the museum [has taken] place within an ethos of obviousness" (1992: p. 5). But in the museum, particular subjects (such as 'curators' and 'museum visitors') and objects (such as 'physical collections' and 'digital collections') also emerge through institutionalised sociomaterial practices (such as 'curating an exhibit' or performing the 'museum visit'). And these roles, as particular conceptions of the world, have often been accepted as a given, as 'natural'. The aim of this study is to understand the implications of both how collections were (re)presented through the remediation of the MUM App display and how museum- and urban-related objects, subjects, practices and spaces are relatedly reconfigured.

Ethnomethodological Approaches: On Accountability and Being the Stranger

Important to this study too is that ANT studies often employ research techniques drawn from ethnomethodology to make the 'familiar unfamiliar' as a way to make the 'invisible visible' and the 'taken-for-granted accountable'. Ethnomethodological approaches were developed in part by Henry Garfinkel, whose "...central recommendation is that the activities whereby members produce and manage settings of organised everyday affairs are identical with member's procedures for making those settings 'account-able'" (Garfinkel, 1967: p. 1). In her studies of

human-machine interaction, Suchman (2007) employs ethnomethodology to make 'situated actions' accountable.

> That term underscores the view that every course of action depends in essential ways on its material and social circumstances… The basic premise is twofold: first, that what traditional behavioral sciences take to be cognitive phenomena have a necessary relationship to a publicly available, collaboratively organized world of artifacts and actions and, second, that the significance of artifacts and actions, and the methods by which their significance is conveyed, have an essential relationship to their particular, concrete circumstance. (Suchman, 2007: p. 70)

Ethnomethodology proposes, "that it is only through their everyday enactment and reiteration that institutions are reproduced and rules of conduct realized" (Suchman 2007: p. 16). Methods derived from ethnomethodological research are relevant to this social study that analyses how situated practices are performed, and 'breached' (Garfinkel, 1967). This research study takes an interest in the 'standardised or standardising' features of the social and how the MUM App may contribute to or disrupt the 'stability' of social re-enactments. For example, the thesis examines this sort of disruption by analysing the 'effects' on museum subjects when 'museum visitors' are moved outside of the museum by employing the App (see Chapter 5).

One way of seeing the invisible background features of social action is suggested in ethnomethodologist accounts that take the approach of the 'stranger'. As Suchman (2007) suggests, this approach provides one way to uncover the taken-for-granted activities that organise social interactions in everyday life. To account for how social order is managed (or, in some cases, disrupted) Suchman (2007) suggests that we first understand practices as situated actions. In order for standardised or standardising background features to come into view "one must either be a *stranger* to the 'life as usual' character of everyday scenes or become *estranged* by them" (Garfinkel, 1967: p. 37, my emphasis). The 'stranger' approach is often discussed in ANT studies in terms of insider/outside characteristics of the observer in analyses such as those performed in *Laboratory Life: The Construction of Scientific Facts* (Latour and Woolgar, 1979) and *the body multiple: ontology in medical practice* (Mol, 2002). In *Laboratory Life*, a study of practices in a scientific laboratory, Latour

expresses himself as a partial stranger to the field of study: while "the observer shares the same broad cultural knowledge as scientists, he has never seen a laboratory before and has no knowledge of the particular field within which laboratory members are working." (Latour and Woolgar, 1979: p.45). Similarly, in *the body multiple*, an empirical study set in a Dutch hospital, Mol expresses herself as a partial stranger: "as both insider and outsider, having received basic training in medical school as well as extensive training in philosophy" (Mol, 2002: p. 1). These techniques allow researchers to defamiliarise the research setting in order to inspect what can otherwise be taken-for-granted, such as the invisible labour of things.

This partial stranger approach has also been employed in studies set in museums by anthropologists that draw on ANT. For example, prior to conducting her study at the Science Museum, Macdonald (2002) states, "the Science Museum was already both familiar and unfamiliar" (Macdonald, 2002: p.9). As she goes on to explain,

> …when I began the research, the Museum was already in some senses familiar to me as a place which I had visited, and more broadly as part of a genre, of museums, which were part of my own cultural landscape. It was also, however, deeply unfamiliar both in the sense that there was much – especially about its workings – that I had never encountered before, and also in that it remained an exotic and even magical place for me. (Macdonald, 2002: p. 9-10)

Macdonald strategically looks to "defamiliarise the familiar" and overcome "working in a relatively unexotic setting" (Macdonald, 2002: p. 7) as a technique for seeing beyond pre-existing categories and examining the negotiations made by both humans and nonhumans in museum display practices. As she explains,

> Trying to overcome my own original presuppositions about agency, and the discreteness of the social and the technical, was a useful defamiliarising strategy which helped me to see, or frame, things in new ways… In terms of primary actors, this led me to pay particular day-to-day attention to a group of Museum staff charged with the task of creating the exhibition; but beyond this I attempted to follow a myriad of different kinds of actors who came to be involved as the exhibition was negotiated into being. (Macdonald, 2002: p. 7)

In the present research study, I also approached the Museum as something both familiar and unfamiliar and as insider and outsider – as a partial stranger. I was

familiar with the McCord Museum since I had visited it twice before this research study was proposed and begun. But while I had a general understanding of *what* this and other museums do – particularly the 'front stage' – I had little understanding about *how* museums do what they do – the 'backstage'. So I was both familiar and unfamiliar with the activities at the Museum. Once the research study began, I was provided with a security badge that allowed me to move freely in and out of the Museum, as well as a desk where I could be stationed while at the Museum. I was also introduced to staff, particularly in the Marketing and Communications Group. Having an access badge and a desk to work at, I felt an 'insider' at times, but being selectively invited only to certain staff meetings, events and casual lunches also provided ample reminders that I was still an 'outsider'. Thus I maintained a 'partial stranger' position, which did indeed lead to many fruitful observations. For example, after going 'back stage' at the Museum to investigate the (re)making of MUM, I found that curatorial work is an accomplishment beyond the generally assumed practice of the single 'curator' – the role was here actually extended to an intern, staff at external advertising agencies and programmers (some of these based outside the country), as well as to a vast array of nonhumans (see Chapter 4). The 'partial stranger' approach was also employed in regards to the digital media technologies examined. This was not too difficult as 'augmented reality' apps were novel to me and I had not used the MUM App or any other app like it before. This meant that, like the participants in this study, I also had to experiment and learn how to use the App. In doing so, I found myself amidst novel experiences in which I felt 'estranged'. For example, Chapter 4 describes unexpected (and awkward) exchanges between the participants, myself and passersby (who could not tell that participants were viewing collections with MUM). While this made participants (and myself) uncomfortable, it also made for interesting findings, especially in relation to how reclassifications are made in sociotechnical assemblages (see Chapter 5).

To summarise, ANT-based studies and feminist critical writing have shown that 'social' analysis must take both humans and nonhumans into consideration. Feminist writing has in addition often looked to examine not only the 'effects' of particular sociotechnical (or sociomaterial) configurations but also (and particularly) their

politics. Museums have here been shown as critical sites of study as they have participated in producing knowledge by reclassifying objects, subjects and practices as well as reordering rewriting spaces. This section has looked to outline aspects of the research approach showing the appropriateness of an empirical approach (which informs the types of methods and tools used in the fieldwork, see below), the research setting (the museum) and its applications to examine the research questions outlined in chapter 1: *How, by whom and what, was the MUM App (re)made? How is the 'museum visit' rescripted along with the MUM App and how are objects, subjects and practices reclassified in this changing practice? And how are urban spaces reordered and rewritten along with the MUM App?* The next section describes the fieldwork undertaken, focusing on the methods and tools employed and the challenges faced during the study. The main case study, on the MUM App, will be described followed by a short description of how I also explored alternative ways that the Museum displays its digital collections for purposes of context.

The McCord Museum Residency: Methods and Tools Employed in Fieldwork

The Director of the Museum, along with the Head of IT and the Director of Marketing and Communications, approved my one-year doctoral research residency at the McCord Museum after a short presentation of my research project in July of 2011. They considered this project a great opportunity for the Museum to learn about how it uses its digital media technologies and I offered to fully disclose my research outputs to the Museum. The Museum also has a history as a research museum, (i.e. it initially opened as a 'university museum') so this project fit within the Museum's mission. The residency terms allowed me to enter the Museum during normal working days (e.g. Monday to Friday) and observe the operations of the Museum (including staff meetings and visitors to the Museum) as well as conduct participant studies and interviews. It was understood upfront that this research study was being undertaken for the purposes of writing a PhD thesis, and it was agreed that the research findings could be used for academic publishing (e.g. in journals or books) and this included permission to take and use pictures of the Museum. The Museum

does not hold any rights of censorship. Throughout this study, only 'working titles' are used to refer to the Museum's employees (as well as staff working at Brothers and Sisters and Thumbspark). The Museum did not require identities of Museum Staff to be concealed, however, employees reporting to the senior management team were not asked for their consent to be part of the study. Thus, I considered it appropriate not to use proper names. Using 'working titles' also gives readers a sense of the roles held by specific staff involved in particular museum practices. Ultimately, however, this only partially conceals the identity of individuals whose names and corresponding titles are disclosed on the Museum's website. Still, as this research took place several years ago, between August 2012 and August 2013, some staff have left or been temporarily replaced, providing enough anonymity.

The MUM App Case Study: Research Methods and Tools

When the research residency was approved and began at the Museum, there was no initial plan to research the MUM App specifically. The proposal had more generally suggested that the focus of this sociological study was the Museum's digital media technologies. The first two months of the residency were hence spent exploring what technologies the Museum used and what could be of particular research interest. While the Museum uses a host of social media technologies (such as Twitter, Facebook, Instagram, Foursquare and Flickr), a variety of devices in its exhibition rooms (including an interesting and amusing booth through which visitors leave filmed messages about their experience) and a dynamic website (with educational tools, exhibits and archived material), the MUM App was chosen for its 'innovativeness'. This section outlines the methods and tools employed in relation to the two main analyses undertaken: examining the (re)making of the App and analysing how participants in the study used it in practice. As mentioned above, the methods employed included observation, interviews, questionnaires, documentary analysis and filming. The tools used to collect, record, and share research data and information are also discussed. These include devices (such as a camera, a tablet and a smartphone), social media (such as Blogger and Skype) and another App (Blogger).

Reconstructing How the MUM App was (Re)Made

When the research residency commenced, it was already a year after the MUM App had been developed and released. As such the (re)making of the MUM App was reconstructed using interviews and documentary analysis. Even if I had been there before the Museum had begun to develop MUM, it would have been impossible to be *everywhere*. Firstly, there would have been spatial challenges – i.e. being in more than one place at the same time. In this case, the MUM App was developed with team members located in two countries (Canada and the United Kingdom) and in three cities (Montreal where the Museum is located, London where the advertising agency Brothers and Sisters is situated and Cambridge, home to the developer Thumbspark). As a result, the 'action' could have been happening simultaneously in more than one location at any time, making it impractical (if not impossible) for an ethnographic study by one researcher. Furthermore, there are temporal challenges – i.e. it is impossible to go back in time. As has been introduced in Chapter 1, while digital media technologies are sometimes referred to as 'new' media, they are never truly 'new'. Rather, as discussed in previous chapters they emerge through Bolter and Grusin (2000) type 'remediations' the refashioning of older actor-networks. In this case, the MUM App was (re)made using the design, plan and code of the Museum of London's Streetmuseum App released a year earlier (a reason for which the App is said to be '(re)made'). The study, then, was limited to reconstructing only a particular stage – the refashioning of the MUM App as an actor-network. Thus spatial and temporal issues limit how studies may examine remediations. As such, the (re)making of the MUM App was 'reconstructed' based on interviews with staff at the Museum, Brothers and Sisters and Thumbspark, and documentary analysis.

Such a 'reconstruction' has previously been employed by Rubio (2012) in his research of the making of the 'Spiral Jetty' – an ANT-driven study located in the sociology of art. For Rubio, an "alternative route to study culture in the making is to undertake a reconstruction of the process of artistic production, that is, to opt for a morphogentic approach which focuses on reconstructing, step-by-step, the process through which aesthetic forms unfold and come into being" (Rubio, 2012: p. 146).

Rubio's study relies entirely "on a variety of documentary sources, including the accounts of the different actors involved in the construction process of this sculpture as well as other relevant materials such as contracts, sketches, drafts or photographs that were produced throughout the production process" (Rubio, 2012: p. 146). For Rubio, "the advantage of following this route is that it enables us to open the black box of artistic production without having to observe it *in situ* or to engage with it personally, thereby expanding the cases which are susceptible of sociological analysis" (Rubio, 2012: p. 146). Alternative methods to observation (such as interviews and documentary analysis) have often been used to supplement the lack of observability of (all) action in ANT studies (see Latour and Woolgar, 1979; Latour, 1987; Mol, 2002). Macdonald (2002) for her part had a host of strategies to help supplement her ethnographic study at the Science Museum; for example, she not only conducted a variety of interviews but also attended staff meetings at the Science Museum, visited other museums, attended conferences organised around issues related to museums and took courses regarding museum practice. As she explains "this gave me an understanding of some of the likely background knowledge of those with whom I was dealing (many museum staff making visits to other museums in order to develop their ideas about exhibition) as well as both alternative ways of doing things, plus the web of institutions and concerns within which the exhibition was likely to be interpreted" (Macdonald, 2002: p. 15).

To 'reconstruct' how the MUM App was (re)made (the focus of Chapter 4), I employed semi-structured interviews at the McCord Museum, including with the Head of IT and the Project Manager of Web and Multimedia and Marketing-Communications Officers. There were also informal discussions and communications with these staff members over email and in-person, which were recorded (by archiving emails or taking notes) based on their relevance for the study. Two unstructured-interviews were held with the Head of IT, the first was more general (about his role and the types of technologies used by the Museum) and the second more specific to the App. After each interview, he provided several documents that were important to understanding how the idea of the App came about (including the Horizon Reports and the Azavea report on the PhillyHistory.org augmented reality

App, described in Chapter 1). He also provided the screen shots of six Google Analytics dashboards showing statistical information collected through the App (from August 17, 2011 – September 20, 2012) used in the analysis of Chapter 6. Two formal interviews were also held with the Project Manager of Web and Multimedia. These were key to understanding how the App was (re)made as she had a primary role in its development. She also provided me with documentation, including material used in testing the App and photographs depicting different stages of the process used to make the App (shown in Chapter 4). Formal interviews were also held with two Marketing-Communications Officers from the Marketing and Communications group. They were interviewed based on their involvement in communicating to the public through diverse press releases, social media (such as Facebook and Twitter) and in engaging 'guinea pigs' through social media to test the App. I took notes during the first interviews, which provided a good way to jot down points made so that I could later recall information discussed when writing up. But ultimately I found taking notes an inefficient method of recording information, particularly since it was impossible to write down everything said in interviews without interrupting the flow of discussion with long pauses. As such I decided to record subsequent interviews using my iPad, and used this method upon returning to London in 2013, when I interviewed the Digital Producer at Brothers and Sisters (in London) and one of the developers from Thumbspark (via Skype as he is based in Cambridge) about their roles in the design, production and release of MUM (and its precursor, the Museum of London's Streetmuseum). These were also semi-structured interviews, like those performed at the Museum. The Digital Producer provided additional documentation, such as an example of a spreadsheet used to communicate and transmit data about the App between all parties. The developer from Thumbspark provided more technical insights into how the MUM App was (re)made (based on the Streetmuseum App). Lastly, I tried the Streetmuseum App and took some screenshots of how its display while in use. I also reviewed documents related to the release of the Streetmuseum. By recording the interviews, I felt I had less gaps when writing up the findings and I could use direct quotes, but while having more information provided more accurate details from interviews, not all information recorded was used in this thesis. This is true in relation to all the

methods used to accomplish this research study. Given I spent an entire year at the Museum, I collected much more information than could be used in this thesis, and this indicates to me how entangled the writing up process is with the methods employed, the tools used to collect data, the type of data collected, the particular interests I had, the questions formulated for the study and the theories selected. Together all of these elements of this research study were in 'effect' actors that participated in shaping the research questions asked and how they were answered.

Examining How the MUM App is Used in Practice

There were two ways in which the MUM App was examined in practice: 1) I myself employed the App to view collections across the city and 2) participants were engaged to use the App while I filmed them. Prior to conducting the participant study I first tried out the App myself. For this, the App was downloaded to my personal smartphone device, an 'iPhone 4' (the same device would also later be used by nine of the eleven participants in the study). During this first phase of research, I went to all six zones of Montreal where photographic images were displayed on the App – viewing and taking screenshots of more than 50% of the images available. The screenshots were taken using an image capture or 'screenshot' feature that is provided on the device. This allowed for screenshots to be taken in augmented reality, which became important to the study since this feature could not be used while the participants themselves were using the App (as will be discussed below, a challenge during the participant study was how to observe many things at once – the participants, the MUM App's display, the environment – while filming participants using the tablet). Hence, by using the MUM App myself, I collected data and screen shots otherwise not possible to obtain during the participant study. The data collected was then posted on a private[40] research blog made for the purpose of collating findings in this first stage of the study. A Blogger App was also downloaded to the smartphone to allow for remote updates to the blog. As such, the researcher's account of using the App, initially started as a 'trial', collected a wealth of data and

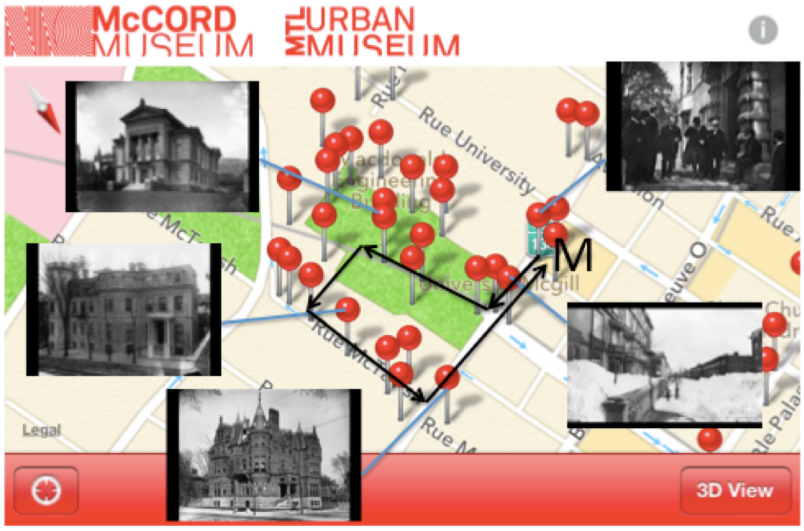
[40] Access to the blog was limited to me and, for supervisory purposes, to my PhD supervisor.

became a primary resource for this study (details of which are used in the analysis in Chapter 5). By trying on the App myself, I also experimented with the App. As Rubio has noted 'active engagement' or 'experimentation' in research is one strategy in dealing with the limits of *in situ* participant observation, and as a way to gain 'inner-insight' (2012: p. 145). In particular, this 'experimentation' included using the App in different locations across the city (as will be discussed below, participants all visited one zone for safety-related and practical reasons). These 'experiments' provided insights into not only how the App works (for example, how it works in relation to its environment, such as architecture, and other technologies around or on the device) but also when it does not (for example, at night or as a result of technical glitches). While some of my experiences were similar to those of participants, others (such as technical issues) were not – a reason this study looks to avoid over-generalisations – including whether the MUM App is a 'success' or a 'failure' (see Chapter 7).

By employing the App myself, it informed some of the considerations made for the participant study, such as how to structure the participant study in a way that is practical and ensures the safety of participants. Firstly, since the photographic images are displayed across the city and it takes time to walk between each display, a practical decision was needed in terms of how long each participant session would be. This consideration also took into account how long a participant could be expected to be engaged with the App in one session and the length of time required to make the experience meaningful for the study. Trying on the App also brought attention to various limitations in the technology (for example, GPS signals were weaker in downtown areas of the city where tall buildings interfere with telecommunication signals). Some other 'technical issues' that would interfere with the participant study were easily controlled and avoided – such as charging the smartphone devices before each session – though some issues were difficult to predict, avoid or fix – such as when the App repeatedly failed on a sunny day. While trying on the App, weather was also found to be a consideration for the study, particularly since it was held in December, a time when Montreal can experience extremely cold weather conditions. Manipulating the smartphone for 30-45 minutes with bare hands in cold weather (as two participants would eventually endure) was

an uncomfortable (if not excruciating) experience. The use of the App in cold weather did, however, reinforce specific findings related to the App – for example, that weather too participates in how certain practices are performed (see Chapters 5 and 6). Lastly, while employing the App, I did encounter various types of interruptions (for example, from passersby asking questions) and distractions (such as text messages interrupting research sessions). Conversely, the App too was a distraction from the hustle and bustle of the city streets, often taking attention away from important activities such as crossing busy intersections. This resulted in safety considerations. Given these diverse matters, I decided that one route would be selected for all participants to follow (see Figure 3.1). The route would take a participant about 30-40 minutes to complete. This route began at the Museum, crossed Sherbrooke Street and then wound through the McGill University campus before returning to the Museum. The route provided sufficient collections on display and therefore provided plenty of photographic images for participants to view. It was also safer to view images on campus as McGill University limits in some areas (and prohibits in others) traffic. Upon returning to the Museum, benches inside the building could be used by the participants to complete the questionnaires in up to about 15 minutes.

Figure 3.1 The participant route



Source: Screen shot of the MUM App pinned card with a diagram showing the route taken in the participant study as well as examples of images that can be viewed in along the path.

To recruit participants to the study, the Museum posted advertisements on their social media sites, Facebook and Twitter (for an example see Figure 3.2). However, while I was excited about having the Museum advertise the research study through its social media profiles (on which the Museum seemed to have much interaction

with the public), it disappointingly only attracted two responses – one from a PhD student located in Montreal who was interested in what this project was about (but in the end could not find time to participate) and another student who was familiar with the Museum's photographic archives and did ultimately participate in the study.

Figure 3.2 Twitter post advertising the research study

Source: Twitter screen shot taken November 30, 2015

As such this study was also advertised to work acquaintances of family and friends by email. In the end, ten participants were recruited in this fashion. In total eleven participants – seven individuals and two couples – were recruited. The participants were of diverse ages and professional backgrounds (see Table 3.1). While I had been acquainted before with seven of the eleven participants that took part in the study, we did not have a personal relationship of any sort (i.e. these were not 'friends'). In return for their participation, each participant received two free tickets to the Museum and an original photographic print from the Museum's Notman Photographic Archives – generously provided by the Museum.

Each participant was asked to meet the researcher at the Museum during its opening hours. There, the terms of the study would be first explained and participants would be asked to read a consent form that explained what the research study entailed (in particular, filming their use of the App and completing a short questionnaire about their experience) and agree to allow for the information collected to be disseminated for publication. All participants agreed to the terms by signing this form. The consent form outlined that their identity would be protected.[41] Upon signing the form, the researcher then explained the general route that they could take (as in Figure 3.1 above). Before and during the sessions with participants, I asked them to vocalise their experience, by making comments while using the App. I

[41] However, participants agreed for images to be shown of them using the App if it still concealed their identity. Thus images that show participants are taken from behind and their names are not used.

suggested to simply express at any moment what they were seeing (for example, in regards to the content displayed), how they felt about using the App and to generally talk through their 'visit'. Their 'visits' lasted 30-40 minutes and all participants generally followed the suggested path (from the McCord Museum to McGill University, around the campus and back to the Museum) though a few participants did go 'off course' (see Chapter 5). All participants were able to open the App to the pinned card display and view images in 3D View or 'augmented reality'. The two couples that visited together (Participants 5 and 6, and Participants 10 and 11) shared the smartphone device. I filmed each participant session using a tablet, i.e. an iPad. Video-based recording has been used before to analyse social interaction (see, Lehn 2006; Lehn and Heath, 2006), 'responses' to artwork in museums (Lehn and Heath, 2008), as well as in analyses of how maps are used on mobile devices (Brown et al. 2013). Video-based recording has also been used in ANT studies that look at human and machine interaction (for example, Suchman, 2007). It has been suggested that video-based recordings provide more coverage and detail than traditional observational methods employed to study mobile use (though note the challenges to video-recording also below).[42] As was mentioned above, after each session the participant would return to the Museum and complete a questionnaire. The participant questionnaire was designed to collect demographic data about the participant as well as information about their experience[43]. Upon completing the

[42] As Brown et al. explain "As we can see, the predominant methods in studying mobile device use have been either *post-hoc* interviews, diary, logging or experience sampling based. While these methods have considerable strengths they face two immediate challenges. The first is a lack of coverage. Interviews take place after use, diary reports are made just after use, and experience sampling depends upon sampling situations of use. These reports are not likely to capture every situation of use. Respondents prioritise certain incidents over others, or simply forget brief uses. This issue is compounded by the lack of detail. Again, post-hoc interviews offer only outlines of usage, filtered again through what an interviewee may consider relevant or important. While diaries can be used to ask detailed questions, there are limits to what can be practically asked of an informant." (2013: p. 1032-1033)

[43] The participant questionnaire asked participants demographic information (age range, profession, language spoken), questions about their visit (what language they selected; how familiar they were with the McCord Museum/ MUM App/ Notman Photographic Archive/ history of Montreal and its sites; whether they experienced technical difficulties), questions about the content of the MUM App (what they thought it was about; whether they felt they knew more about the Notman Photographic Archive/ Montreal and its sites after their visit; if the labels for each image generally coincided with what they knew already about particular sites; if they consulted 2D descriptions about each image or site and if those were informative), and about the visit experience (did it inspire them to want to know more about the McCord Museum, Montreal and its sites or the Notman Photographic Archive; was it easy to interact with the MUM App; did they experience any technical difficulties; did they

questionnaire, participants received the free admission tickets to the Museum and the original print that they could choose from a selection provided.

Table 3.1 – Participants in the study

Part.	Gender	Age Group	Profession	Downloaded /Used the MUM App Before?	Visits to the McCord Museum?
1	Female	18-25	Lawyer	No/No	Less than once a year
2	Male	26-35	University Admin	No/No	Less than once a year
3	Male	46-55	Paralegal	No/No	Never
4	Female	18-25	Student	Yes/Yes (but only in living room)	One to two times a year
5	Male	26-35	Research Nurse	No/No	Less than once a year
6	Female	26-35	Community Worker	No/No	Less than once a year
7	Female	26-35	Student	Yes/No	Never
8	Male	26-35	Teacher	No/No	Never
9	Male	56-65	Chaplain Social Worker	No/No	Less than once a year
10	Female	26-35	Clothing Buyer	No/No	Less than once a year
11	Male	26-35	Lawyer	No/No	Less than once a year

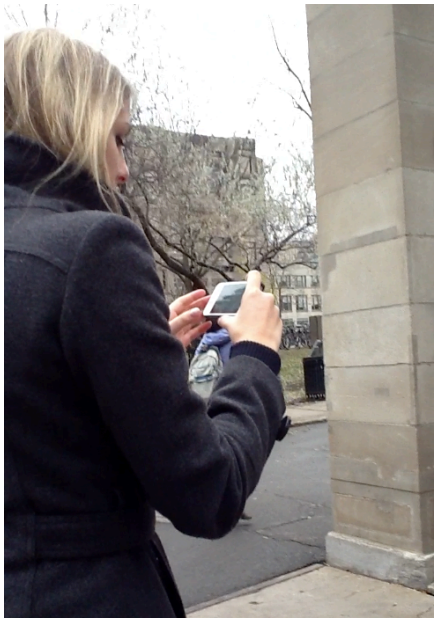
Challenges to Video Recording: How to Capture it All?

One challenge to filming, mentioned above, was in observing the actions of participants while also seeing what was displayed on the iPhone screen. This has been addressed before with wearable cameras (Brown et al. 2013); however, even in those scenarios, the cameras are not always pointed at the screen. Without additional funding to examine various options for capturing video through wearable cameras, I opted to use a personal tablet, an iPad, to film participants myself and relied on verbal descriptions by participants. During their sessions, participants

want to interact with the MUM App in other ways, e.g leave comments; if the MUM App lessens the importance of the Museum).

would often voluntarily state what they were looking at (for example, at images through the iPhone or beyond at the view around), comment on images or text, or state how they were using the iPhone (whether they were using the map or seeing images in 3D View). But, in many cases and instances, I had to prompt them at times by asking 'What do you see?'

Figure 3.3 Using the Map View



Source: Ana-Maria Herman. Image from film recording taken on December 3, 2012

Figure 3.4 Looking at an Exhibit

Source: Ana-Maria Herman. Image from film recording taken on December 3, 2012

The questionnaire filled out by participants after using the App to view collections also provided an opportunity to capture data not recorded or spoken during the study. For example, it was difficult to observe the smartphone while filming participants and so I could not determine at all times what the participants were viewing or even if they were actually using the MUM App at all. The questionnaire helped fill some of the gaps in observations that could not otherwise be made. For example, Participant 3 confirmed in the questionnaire that he did not use the 'map' view at all. Instead he had stayed in 3D View for the majority of his visit (aside from when he had technical issues). I also had to rely on visual cues to understand what participants were viewing or doing at any particular point in time. Subtle differences could be observed between, for example, using the map view while walking by

holding the iPhone at a lowered position (see Participant 1 in Figure 3.4) or looking at photographic images in 2D or 3D View by holding the iPhone up higher (see Figure 3.5). Answers from the questionnaire also helped to collect information about the participant's familiarity with the digital media technologies studied. For example, the questionnaire confirmed that all but two participants had never before downloaded or used the App (as in Table 3.1). While Participant 4 and Participant 7 had downloaded the App to their personal iPhones Participant 7 had never opened or used it, and though Participant 4 had opened it once it was while at home in her living room. And so, the 'visit' was a novel experience for all participants.

There were also some unexpected experiences that produced not only awkward situations but also challenges to recording what was happening. For example, while filming Participants 5 and Participant 6 during the study, a passerby came up to us and began taking photographs with his own mobile device (he assumed we were taking photographs):

> Passerby: I took pictures of you guys, taking pictures. I thought this was a good one because there's a statue.
>
> Participant 5: So you took pictures of us with your iPhone, while we were on this phone, and she's taking video, she's watching us interact on this phone also. We're trying on the App.

Even with the explanation (or 'translation') provided by Participant 5, the passerby had no clear idea as to what we were doing. Wrapped up in his own pursuits, the individual then went on, making sense of it through a cinematic metaphor:

> Passerby: It's like Inception[44], with cameras, a layer upon a layer…

Surprised by the scenario, I was rather unsure whether to keep the camera 'rolling' or deal with the situation. In choosing the former, I did not know where to point the tablet's camera – at the participants or the passerby intruding on the study - the issue being that they did not all fit in the frame of the camera. In the end, I moved

[44] Inception is a science fiction action film released in 2010 in which experimental technologies are used to perform the act of 'inception' that is to plant an idea in the subconscious of someone else during a false awakening – or 'dreaming within a dream' – hence the 'layer upon a layer' analogy.

the tablet back and forth from the participants to the intruding passerby. One thing was for sure, awkward 'intrusions' like these felt very much like Garfinkel's (1967) classic 'breaches'.[45] In this case, the coherence of the situation was made unstable by this passerby's breach. It also brings to mind Goffman's insights on situations where 'intruders' happen upon a particular 'performance'. "When audience segregation fails and an outsider happens upon a performance that was not meant for him, difficult problems in impression management arise" (Goffman, 1959: p. 139).[46] Goffman sees 'performers' as taking one of two possible approaches to handling such situations: either they shift to a performance suitable to the intruder, or they welcome the intruder as someone who should have been there all along. But Goffman (1959) also suggests that neither of these ever really work, as the situation always results in confusion. Here, Participant 5 provided a friendly response, but while he managed an exchange, in the end we soon ignored the intruding passerby and went ahead with the 'visit' (and 'research study'). But humans were not the only 'intruders' challenging the use of video recording. On one occasion construction on the McGill campus meant loud drilling noise muffled the voices of the participants and prevented the tablet's speaker from recording what the participants had to say about their experience. In playing back the video recordings, the drilling sound is all that can be heard. The weather too played a factor as temperature dropped well below zero degrees Celsius – and both the participants and I had trouble manipulating the smartphone and tabled devices. Lastly, I dropped the tablet before recording the fourth participant of this study. Luckily, in this case I could still use it,

[45] In his book *Studies in Ethnomethodology*, Harold Garfinkel explores how 'the stable features of everyday activities' can be made visible through studies of familiar settings. Garfinkel finds: "Common sense knowledge of the facts of social life for the members of the society is institutionalized knowledge of the real world. Not only does common sense knowledge portray a real society for members but in the manner of a self fulfilling prophecy the features of the real society are produced by persons' motivated compliance with the set background expectancies. Hence the stability of concerted actions should vary directly with whatsoever are the real conditions of social organization that guarantee persons' motivated compliance with this background texture of relevances as a legitimate order of beliefs about life in society seen "from within" the society. Seen from the person's point of view, his commitments to motivated compliance consist of his grasp of and subscription to the "natural facts of life in society" (1967: p. 53-54).

[46] In these situations Goffman states "The performers will find themselves temporarily torn between two possible realities, and until signals can be given and received members of the team may have no guide as to what line they are to follow. Embarrassment is almost certain to result. Under such circumstances it is understandable that the intruder may be accorded neither of the accommodative treatments mentioned but rather treated as if he were not there at all or quite unceremoniously asked to stay out" (1959: p.140)

cracked as the glass was, to record the rest of the participants engaged in the study. Such equipment is expensive not only to purchase but also to have fixed.

Exploring the Museum's Alternative Modes of Display

Examining other modes used by the Museum to display its photographic collections (from the Notman Photographic Archive), and particularly those images that have been 'digitised', enriched this case study by providing much-needed context. The alternative modes of display examined provided better understanding of the multiple ways of presenting photographic collections. This method was also employed in Macdonald's (2002) study of the making of the *Food for Thought* exhibit at the Science Museum. This section discusses how alternative modes of displaying the Museum's photographic collections were explored. Three different ways in which the Museum displays its collections were examined: the 'physical' and 'digital' displays in the Museum's permanent exhibit *Montreal – Points of View,* the social media sites employed such as profiles on HistoryPin and Flickr, as well as two seasonal displays outside the Museum that included fixed panel exhibits (in particular, the show on *Living Landscapes* in 2012 and the exhibit *Honoring Memory* in 2013) and an entertainment space called *The Urban Forest*. I have included discussions on, and examples of, how this portion of the study provided context for this research project. In particular, the information collected on these alternative ways of presenting photographic collections helped illuminate, for example, the limits and possibilities of diverse modes of digital display (see Chapter 4), and the differences between physical and digital displays and their politics (see Chapter 6). The sections below also outline the methods employed to examine these displays, including interviewing, taking notes, photography and documentary analysis.

The Permanent Exhibit: Montreal – Points of View

During the research residency at the Museum, on multiple occasions I observed museumgoers as they visited the permanent exhibit. The permanent exhibit displays images from the photographic collections both as a backdrop to its 'ten zones' and in

display cases (see Appendix B for details on the exhibit). The exhibit itself is important to the study since the MUM App was released in time for the exhibit's reopening, thus the App was not only a 'display' but also a 'public relations tool'.[47] Two interviews were held with Museum staff about the exhibit. One interview was held with the Project Manager who had initially worked on the exhibit and was now the Curator of Ethnology and Archaeology. She provided a wealth of information about the redesign of the Montreal – Points of View exhibit (opened on September 16, 2011 when the MUM App was also released) and subsequently modified in December 2012. As a result of this interview, I was provided with detailed floor plans of the exhibit, display designs and documents on the changes made. Understanding how the permanent exhibit was designed enriched this study because I found that the curatorial toolkit employed to redesign this 'physical' exhibit, such as defining themed 'zones' on floor plans to decide how space was to be used, was reemployed in selecting objects from the Notman Photographic Archive for the App's 'digital' display. For the App, a map was used to decide what 'zones' of the city would display digital collections and organised by theme (see Chapter 4). Another interview was held with the accountant at the Museum. She discussed details about how statistics on the Museum's exhibits are collected and provided spreadsheets with detailed statistical information about how many museum goers visit the Museum each month. This information helped to examine claims about museum management practices. In particular, it provided a way to assess the Kitchin and Dodge's claim about 'automating management' (Kitchin and Dodge, 2011) discussed in Chapter 6.

Before leaving the museum, close to the completion of the residency, a participant study was undertaken in relation to the redesigned permanent exhibition *Montreal – Points of View*. The participants were all approached *in situ*, either before or after they had visited the permanent exhibit. In total, thirteen visitors to the exhibition agreed to answer a questionnaire. In return for participation in the study, each

[47] This was uncovered in an interview with the Digital Producer at Brothers and Sisters who explained that the MUM App's predecessor, the Streetmuseum, had been developed as a way to promote the reopening of the Museum of London's permanent exhibit, *Galleries of London*, and similarly the release of the MUM App too marked and promoted the McCord Museum's permanent exhibit, Montreal-Points of View.

respondent received a Notman photographic print (provided by the Museum) and a McCord Museum pin (purchased in advance by the researcher). The participants completed the questionnaire after finishing their visits by taking a seat on one of two benches located in the middle of the permanent exhibit (allowing them to recall their visit to the various zones).[48] To participate in the study each participant had to read the consent form (that explained what the research study entailed) and agree to allow for the information collected to be disseminated for academic publication (by signing the form). Each participant agreed and signed the form. The questionnaire took about 20-30 minutes to complete. After each participant completed the questionnaire, they were provided with the print and pin. This collected material extended the researcher's understanding of how visitors to an exhibit view collections. For example, each visitor had a different way of doing the 'museum visit', some viewed the collections in chronological order, others viewed the exhibit in reverse order and some randomly poked in and out of displays.

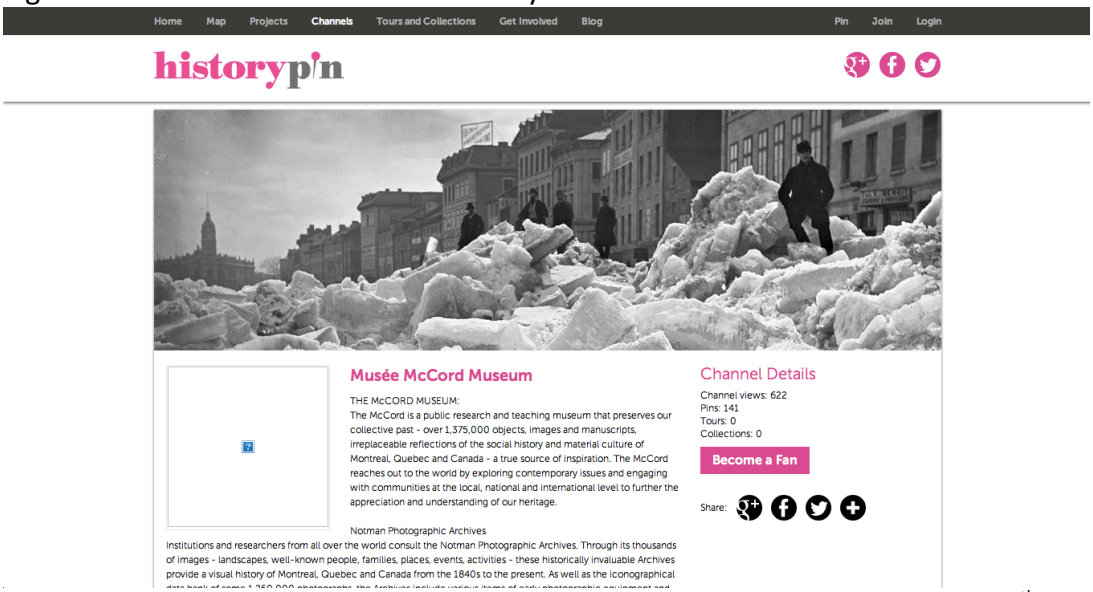
Social Networking Sites: HistoryPin and Flickr

Other analyses of the alternative ways in which the Museum displays digital photographic collections focused on HistoryPin and Flickr. HistoryPin is a social media site that allows the public (both individuals and institutions) to create 'channels' (a similar concept to 'albums') that display historical photographs. The images are 'pinned' using geo-locational metadata resulting in a shared world map of historical images. Once the images are pinned on the map, they can be viewed in two-dimensional views or in 'augmented reality', as HistoryPin uses Google's 'Street View' capability to superimpose historical images onto streetscapes. The McCord Museum's channel on HistoryPin is a customised profile (see Figure 3.6), which displays the same images that are on display through the MUM App. In interviews with Museum staff, such as the Head of IT and the Project Manager of Web and

[48] The questionnaire asked participants questions about demographic information (such as age range, profession, language spoken); how individuals visited the exhibition (for example, in what direction, as some visitors often viewed collections in reverse chronological order); as well as their thoughts on the ways in which the collections were displayed, the content presented, and their experience.

Multimedia, we discussed the limitations and potential of HistoryPin for exhibiting the Museum's digital photographic collections to a wider public.

Figure 3.5 The McCord Museum's HistoryPin Channel



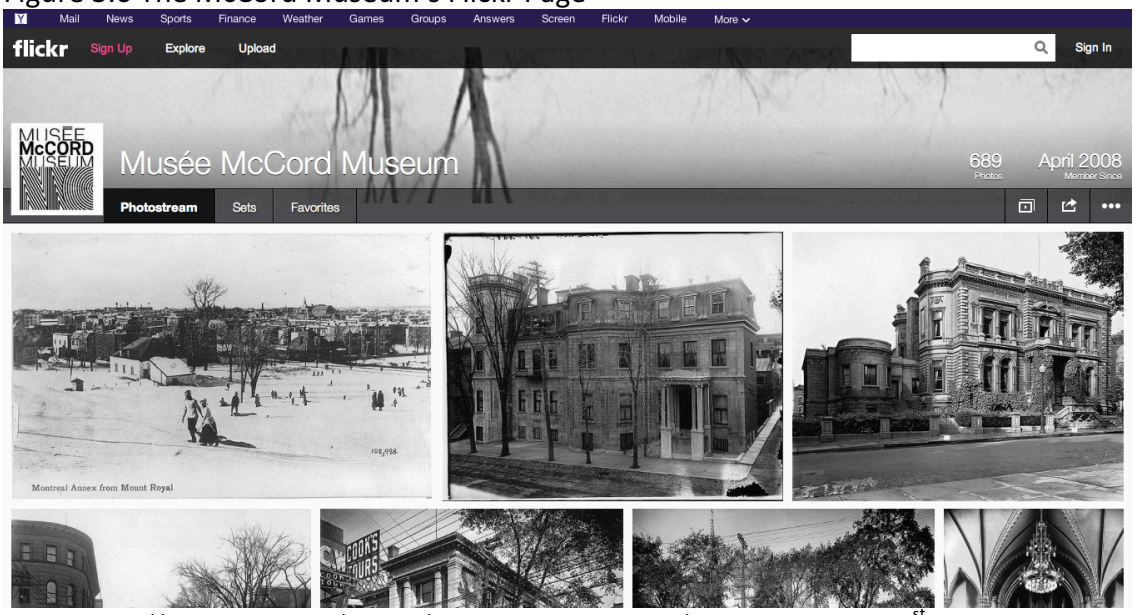
Source: http://www.historypin.com/channels/view/32521/#!photos/list/ taken on February 1st, 2014

While in residency at the Museum the Head of IT also asked me to represent the Museum while attending a seminar organised by HistoryPin. The seminar provided a tutorial on HistoryPin for local museums, heritage institutions and libraries, describing how to use the site and providing tips on how to upload digital images and map them. This opportunity helped provide me with a more in-depth understanding about alternative ways to display collections in augmented reality (here using Google's Street View). Subsequent to this seminar, I also interviewed the Strategic Director at HistoryPin, and later in London the CEO of Shift (the company that created HistoryPin). Findings related to this analysis (collected through interviews) were recorded using notebooks and online screenshots.

Flickr is a social networking site through which individuals and institutions can define a profile in order to create digital albums as a way to share digital photographic images with others. The Museum has a customised profile on Flickr, which it uses to display its digital collections by way of several albums. One of the Museum's albums displays the same selection of images as is displayed through the MUM App (see

Figure 3.7). Like the Museum's channel on HistoryPin, the Flickr profile is open to the public, which made it easy for me to access and analyse the content displayed. Examining these alternative ways to display the same collections that are also displayed in the MUM App allowed for unique observations to be made. For example, it was found that the public participated on these sites in ways not available to the MUM App (see Chapter 4).

Figure 3.6 The McCord Museum's Flickr Page



Source: http://www.flickr.com/photos/museemccordmuseum/ taken on February 1st, 2014

Both HistoryPin and Flickr provided the public with ample participatory opportunities since they provide spaces for commenting on photographs displayed on the Museum's channels and albums. Further, the Museum displayed more images on Flickr than on HistoryPin, or even the MUM App, most likely because the resources required to collect and input geo-locational metadata for those latter two displays can preclude institutions from posting images on them. And so, as this thesis will show, and in this particular case, it does matter what digital media technologies are selected to display the Museum's historical photographic collections.

Photographic Displays: The Urban Forest and Fixed Panels

The Museum's collections also featured in other creative 'physical' displays, such as the 'Urban Forest', an entertainment space organised on Victoria Street next to the

Museum, and through fixed panel displays on nearby McGill College Avenue (see also Chapter 6, Figures 6.1 and 6.2). Installed on an annual seasonal basis, these displays have featured variously themed photographic exhibitions that have drawn from historical images in the Museum's Notman Photographic Archives. The Urban Forest is set up annualy to coincide with the city's warmer months. Different themes are used each year to 'rewrite' Victoria Street from a 'street' into an 'entertainment space'. The fixed panels are also installed seasonally and during the city's warmer months. These large panels line McGill College Avenue, a main traffic artery in downtown Montreal. While in residency, I would occasionally walk to these sites to observe how passersby engaged with objects in the spaces. Data was collected by taking photographs of the sites and their displays (on several occasions in 2012 and 2013) and by taking notes. These analyses allowed me to understand, for example, how many images could be displayed using the fixed panels (i.e. about 25), versus how many images could be displayed using online modes of exhibition such as HistoryPin, Flickr, or MUM. These latter 'digital' types of platforms or displays are often considered 'limitless' in terms of what they can store and show – a common assumption that is shown later to be a 'myth' (as discussed in chapters 1, 2 and 4).

Digital Tools and Social Research

Today, while researchers are increasingly faced with understanding the expanding 'digital landscape' (Gillespie et al., 2014) they must also contend with understanding a commensurate rise in 'digital tools' available for and employed in research studies. Thus, social studies now not only have novel objects of study but also innovative methods and instruments for cultivating their understanding of these 'digital landscapes', thus presenting new opportunities and challenges in social studies. As Back suggests,

> Researchers face the challenge of 'newly coordinated social reality' in which social relations and interconnections exist across time and space. However, this challenge co-exists with an unprecedented opportunity to use digital multimedia to reimagine social research…. Digital culture offers researchers the opportunity to develop new methodological devices. (2012: p. 18)

Within this 'new' sociology, or 'digital sociology' (Orton-Johnson and Prior, 2013, Lupton 2016), the digitisation of social life cannot be ignored as "social life can no longer be understood apart from its technological mediations" (Back, 2012: p. 22). For Marres, the 'redistribution of social research' in this digital landscape has a number of implications: a reinforcement of the idea that the self-sufficient academy has always been a myth (as it can only ever be a collective undertaking) and a revealing of 'method' as a mediator of divisions of labour in social research, in which "divergent approaches propose to grant more initiative to research subjects (particularly when qualitative methods are used) or to rely on more standardised tools of data collection (when more quantitative methods are used)" (2012a: p. 148). As a consequence, it is suggested that digital media technologies act not only as 'objects' and 'instruments' of research, but also as 'subjects' (Marres, 2012; 2012a). Marres (2012a) thus proposes social research as a 'redistributed accomplishment' between a range of actors that include not only researchers but also the researched subjects and objects, and the digital tools used to undertake research.[49]

This chapter has discussed a variety of digital media technologies that have participated in this study including devices (such as smartphones, tablets, and cameras) and platforms (such as Blogger) employed to both perform the study and collect data. Each of these brought possibilities and constraints to the study, but most importantly contributed to how the research was accomplished and what was found. Mobile devices, for example, allowed events to not only be recorded but also played back and observed multiple times. These also allowed for field notes to be recorded remotely during study performances using the same device, though they allowed only for short amounts of text to be input since it is not practical to stand on location and type long entries and given Montreal's cold climate makes if even more challenging to do so. Photographs taken by the Museum prior to the research residency helped illustrate events such as the process of (re)making the MUM App for the researcher. But this also provided insights into how 'digital' practices are still very much 'material', in this case involving devices whose batteries need to be

[49] For a wonderfully illustrated account showing how humans and nonhumans are engaged in processes of ordering and disordering in the process of producing social data see Michael's (2004) 'disastrous interview episode'.

charged (see Chapter 4). On the other hand, digital tools could also act as a source of distraction, for example, when texts or calls were received on the smartphone (see Chapter 5). The devices and the Apps also 'misbehaved' (like the actor's in Michael's, 2004, 'disastrous interview episode') as a result of weak GPS, radio tower and cellular signals or when the App experienced technical issues as a result of its code, network or environment. Using the tablet to video-record participants and the smartphone device camera to take photographs also meant the focus was often on what was happening inside the frame (through the eye of the device's camera) rather than outside the frame. However, these possibilities and limitations ultimately drew attention to the main point - that digital tools and methods *were* participating in this 'social' study. They participated not only in what observations *could be* made, but also in what findings *were* made. As such, digital media technologies were not only the 'objects' and 'instruments' of this particular study, but also its 'subjects'.

Conclusions

This chapter has outlined the research approach, including the methods and tools employed in the study. Drawing on ANT studies and feminist critical writing, the first section of this chapter proposed that since both humans and nonhumans co-constitute social worlds, both must be considered in this social analysis. Further, the section outlined particular ANT and feminist sociotechnical studies that help inform the approach, selection of the setting and methods employed. In particular, this study takes an empirical approach as a way to study agency since, as Suchman (2005) explains, action is always tied to sociomaterial arrangements and is relational. Feminist research also informs this study's attention to invisible labours (human and nonhuman) – studied here by paying attention to work that may be taken-for-granted. Ethnomethodology provides a method for making action and hidden labour accountable by positioning oneself as a 'stranger' to a setting. Drawing on critical studies, the museum was proposed as a 'critical site' of study. The studies used to inform the research approach and setting also informed the methods employed which include observation, interviews, questionnaires, document analysis and filming. And some of the challenges of using these methods, such as filming, were

outlined. The second section of the chapter discussed my residency at the McCord Museum, including the terms and conditions under which it was formed. It also discussed the fieldwork undertaken during this residency. This included an in-depth discussion of the methods and tools employed in the MUM App case study: during the reconstruction of how the App was (re)made and the filming of its use in practice. The section also outlined analyses of alternative ways of displaying collections at the Museum. Lastly, the chapter discussed the changing landscape of social research, which not only has digital media technologies as objects and instruments of study but also participating as subjects. The approach outlined and the methods and tools described herein were employed to respond to the research questions (outlined in Chapter 1) as will be discussed in the next three chapters.

4 The Remediation of a Museum App: How MUM was (Re)Made

This chapter 'reconstructs' how the MUM App was remediated in order to answer the first research question – *How, and by whom and what, was the MUM App (re)made?* Studies of how technologies emerge are often entangled with debates about the ways in which they may be understood. To avoid linear, teleological or asymmetric frames of technology development, it was proposed in chapters 1 and 2 that the MUM App must be understood as a Latourian 'hybrid' or one of Callon's 'actor-networks' and thus be considered as having emerged through a process of what Bolter and Grusin (2000) call 'remediation', that is, by the refashioning of an actor-network. It was also proposed that rather than use the term 'new media' (which implies a linear, teleological frame of development), apps must be considered digital media technologies, and thus be considered as 'technical objects' bringing together an assemblage of actors. Lastly, the App was chosen for this study given it is 'innovative' - it was the first 'augmented reality' app to be deployed by a Canadian museum. As was discussed in previous chapters (chapters 2 and 3), analyses of 'innovations' allow for studies to examine the heterogeneous actors involved in the remediation of technical objects – since if/when they later stabilise they often fall into the background of everyday life, a process that results in the 'black boxing' of these technical objects (Latour, 1987; 2005; see also Akrich et al., 2002; 2002a).

By reconstructing how MUM was (re)made, this chapter examines the actors, negotiations, and entanglements involved in its (re)making, and their politics. The chapter begins by drawing on interviews and analysing industry reports that brought the idea of introducing an augmented reality app to the attention of key McCord Museum staff, including the Head of IT. Taking a sociotechnical approach, the analysis renders visible a particular (and unexpected) set of heterogeneous actors. Not only were Museum staff, an advertising agency and app developers involved in (re)making the MUM App, but so too were a host of *nonhuman* actors, including industry reports, funding, multiple platforms, standards, the Museum's photographic collections, the smartphone and tablet devices, the predecessor app (the

Streetmuseum), and even buildings in the city (to name a few). While retracing the roles of these actors in the remediation of the MUM App, the analysis also unveils aspects of extensive infrastructure(s) from which the App emerges and in which the App becomes embedded. This leads to the second aim of this chapter: charting the social, cultural and political 'effects' based on how the MUM App was (re)made. For example, in examining the App's implications the chapter finds that particular actors that participated in the design and production of MUM (such as the advertising agency) also became 'gatekeepers' (Latour, 1987) to any further changes to the App following its release. Since changes to the App's display must be made through these gatekeepers, such changes are rendered cost-prohibitive and thus must yield to a type of sociotechnical 'irreversibility' (Callon, 1991) or a 'lock in' effect (Kitchin, 2014; Urry, 2004; see also David, 1985). To circumvent this persisting situation the McCord Museum has recently had to engage more commercial organisations in order to sponsor additional content updates to the App. This, as well as the way in which the MUM App was (re)made, has an 'effect' on what collections were initially (and are today) put on display – a segue into the final aim of this chapter, which is to examine the content displayed through the App. By inspecting the historical photographic images selected, as well as the labels and descriptions made for the App display, the chapter lastly brings to the fore the gender and cultural politics of MUM's content, an 'effect' of material constraints on how the App was (re)made.

Reconstructing How MUM Got (Re)Made

The reconstruction of the (re)making, of the MUM App described in this analysis is drawn from interviews with two managers at the McCord Museum, the Head of IT and the Project Manager of Web and Multimedia.[50] It also examines the industry reports (particularly, the 'Horizon Reports' introduced in Chapter 1) read by such staff members. The Horizon Reports are examined here because, on the one hand, they provide an overview of the technology trends in the culture, heritage and

[50] When this study was conducted, the Head of IT was responsible for information technology projects and the Project Manager was responsible for projects that deal with the Museum's website, digital media projects, and, importantly for this study, the production of the MUM App.

museum industry around the time a decision was made to (re)make the MUM App. On the other hand, the Horizon Reports also acted as negotiators in the (re)making of the MUM App. More specifically, the reports played a part not only in *how* the idea of making the MUM App arose but also in *how* and by whom its design and production would be later negotiated (i.e. in a fashion similar to the Museum of London's Streetmuseum App). This analysis then leads into an examination of the actors and negotiations involved in the MUM App's design and development. The latter analysis draws further on additional interviews with the Digital Producer from Brothers and Sisters and a developer from Thumbspark, both of whom were involved in (re)making the MUM App and the Streetmuseum App as well. The analysis highlights how remediations involve the negotiation of decisions across a broad set of heterogeneous actors that include not humans and nonhumans.

Industry Reports as Negotiators in Making MUM

In one of the first interviews with the Head of IT, he mentioned reading industry reports. As he explained, these reports provided the Museum with information about trends in technologies used in the culture, heritage and museum industry. These reports were apparently important to the Head of IT and I asked if he could share them. The reports he subsequently provided included what are known as the 'Horizon Reports' and also a whitepaper on the first augmented reality apps made for the City of Philadelphia Department of Records.[51] The Horizon reports are important to this analysis as they made a case for why all museums must consider developing apps and thereby acted as negotiators. Both the 2010 and 2011 editions of the NMC's *Horizon Reports* suggested a rise in the use of apps by the culture, heritage and museum industry. The reports stated that as early as 2008, institutions across Europe and North America began to develop app technologies as a way to display information about, for example, the institution, its opening times and its exhibitions and to show some of their 'digital' collections. In particular, (and as was mentioned in Chapter 1) the *2010 Horizon Report* highlighted a rise in the number of

[51] See Azavea and DOR (2011), "Implementing Mobile Augmented Reality Technology for Viewing Historic Images", Available online at www.go.nmc.org/efhqb last retrieved August 6, 2015.

apps owing to the proliferation of mobile technologies, namely smartphones, and their increasing use as a way to connect to the Internet (Johnson et al., 2010); only a year later, the *2011 Horizon Report*, noted that apps had become pervasive in everyday life in the developed world (Johnson and Witchey, 2011). This latter report further suggested that in the following 12 months the adoption of apps would provide museums with the "advantage of recent developments in location awareness and GPS"; museums would thus be "able to design mobile experiences tailored to the physical location of their visitors" (Johnson and Witchey, 2011: p. 7). Both reports also mentioned 'augmented reality', with the *2011 Horizon Report* suggesting it would be adopted in the near future – in two to three years time.

If the *2010 Horizon Report* had not created a sense of urgency related to using apps, the *2011 Horizon Report* certainly made a more substantial case for museums to consider apps as part of their educational tools and exhibition practice by pointing to, for example, augmented reality apps like the Streetmuseum App. The *2011 Horizon Report* highlighted that one of the first museums to release an augmented reality app was the Museum of London with the debut of the *Museum of London: Streetmuseum™ App*, a compendium to its new permanent exhibit, *Galleries of Modern London*[52]. The Streetmuseum was released through Apple's App Store in May 2010. Through a search on the Internet, I further found that the Streetmuseum was reported to have been downloaded 65,000 times in the first four weeks after its release; well surpassing the Museum of London's goal of only 5,000 downloads.[53] In short, it was deemed a 'success' for the Museum and therefore received a significant amount of attention from the media and the culture, heritage and museum community, including from the McCord Museum. The McCord Museum could draw parallels between itself and the Museum of London. Both are city museums depicting local history with a large portion of digitised photographic images in their collections (the McCord Museum having the extensive Notman Photographic

[52] See the Museum of London press release from June 2010. The article link is: http://www.museumoflondon.org.uk/Corporate/Press-media/Press-releases/Streetmuseum-hits-the-streets-of-London.htm last retrieved March 8, 2013.
[53] Creative Cooperation in Cultural Heritage http://chief.uc.pt/blog/index.php/streetmuseum-a-successful-partnership-between-technology-and-cultural-heritage/ last retrieved January 9, 2012.

Archives, as was mentioned in Chapter 1). Furthermore, like the Museum of London, which had just revamped its permanent exhibit, *Galleries of London*, the McCord Museum was also overhauling its own permanent exhibit, later to be called *Montreal - Points of View,* that the Museum planned to reopen in 2011. The Streetmuseum App had been used as a 'public relations tool' to promote the Museum of London's revamped permanent exhibit, and the McCord Museum considered that given the success of the App, it too could benefit from using such an app to promote its own reopening of its permanent exhibit, *Montreal – Points of View*. Interested in making such an 'augmented reality' display (and particularly one that would be considered "a Canadian museum first"[54]), in December 2010 the McCord Museum contacted London-based Brothers and Sisters[55] with a view to develop the MUM App.

As such, the *Horizon Reports* are here considered key actors in the decision to (re)make the MUM App. Not only did the reports suggest that augmented reality apps would be increasingly adopted by museums, thereby suggesting that most museums consider these types of apps, but they also pointed to the Museum of London's Streetmuseum App as a successful example. The Streetmuseum was considered a triumph as it delivered innovative augmented reality technology and had garnered a substantial amount of attention from the media (particularly industry blogs) and interest from the public – well beyond what the Museum of London had initially expected. By distributing information across the industry these reports acted not only as mediators – between museums, the technology industry and advertising companies – but more importantly as negotiators in the decisions about what 'digital' displays get made and, more specifically, *how the MUM App would be (re)made*. The Horizon Reports not only provided information about apps in general but also prompted the McCord Museum to seek out and engage Brothers and Sisters to (re)make an augmented reality app like the Streetmuseum.

[54] The McCord Museum's press release on August 30, 2011 suggested, the MUM App was the first of its kind in Canada http://www.mccord-museum.qc.ca/pdf/PR/PR_MUM_EN.pdf last retrieved July 5, 2012.

[55] The Brothers and Sisters website can be found here: http://www.brothersandsisters.co.uk last retrieved August 19, 2014.

It may be said that the *Horizon Reports* provide an important service to the culture, heritage and museum industry since the information they present requires time, resources and expenses to be gathered, put together and distributed – and these resources are scarce particularly for institutions like the McCord Museum. Thus we may ask who can invest the time, resources and expenses to make such reports? A closer look reveals that the *Horizon Reports* are developed by the New Media Consortium (NMC). The NMC was founded in 1993 through a joint venture that included Apple Computers, Adobe, Macromedia and Sony, "who realized that the ultimate success of their multimedia-capable products depended upon their widespread acceptance by the higher education community in a way that had never been achieved before."[56] Thus, any recommendations made by the NMC should be cautiously considered – since the commercial organisations that make up the NMC and recommend technologies also have an interest in their sales. And so, we find in this case that the recommendation of technologies to the culture, heritage and museum industry is done by the very same companies – such as Apple Computers whose devices and platforms develop, run and sell these apps – most interested in their sales. As such, the Horizon Reports also collaborate to entangle the museum, culture and heritage industry, technology organisations, infrastructures and products, and the public in unprecedented socio-cultural and economic ways.

The Streetmuseum as a Negotiator in MUM's Design

The McCord Museum contracted London-based advertising agency Brothers and Sisters who, in turn, subcontracted Cambridge-based developers at Thumbspark, to (re)make the MUM app based on the Streetmuseum. Thus, Brothers and Sisters, as well as Thumbspark – two unlikely British-based actors – came to be involved in developing a Canadian museum display. As a result, the MUM App would incorporate (that is, 'remediate') parts of the Streetmuseum's makeup. And as such many decisions made about the design of the MUM App would have been those already made in the making of the Streetmuseum. This was only partially a result of

[56] The New Media Consortium website: www.nmc.org/about/nmc-history/ last retrieved July 4, 2014.

engaging staff from Brothers and Sisters, as well as Thumbspark, who had initially been involved in making the Streetmuseum: humans were not the only actors playing roles in the process of making MUM. Nonhumans, such as the existing design and code of the original app, as well as funding, also played a part. As will be discussed, the interplay between human and nonhuman actors allowed for some negotiations to MUM's makeup, while rendering certain changes non-negotiable.

Since the Streetmuseum App was remediated into the MUM App, a large part of its design and code were reincorporated into MUM. Though changes to the original design of the Streetmuseum were possible, large modifications became non-negotiable. This is evidenced in how the MUM App shares the same user flow and aesthetics (such as graphics, fonts, and buttons) as the Streetmuseum. In comparing the two Apps, they have more in common than not. Both Apps showcase 'historical' images. Both showcase these images across cityscapes (the former in London and the latter in Montreal). And the user experience for both the Apps is practically identical. From the initial interface (compare Figures 4.1 and 4.2), the user is presented with a 'pinned card' or map view (compare Figures 4.3 and 4.4), which is used to navigate around the city in order to find the location of the 'digital' objects to view. By selecting 'pins' on the pinned card users can also view 'digital' images in 2D View (compare Figures 4.5 and 4.6)[57]. By tapping on the 2D images, the titles and descriptions of the images would be displayed in both cases. Users can also select the 3D View button, in which case they see 'digital' objects in augmented reality, presenting the 'digital' image as an object superimposed on a camera view. The only significant differences or customisations in the making of the MUM App were those that were necessary, such as branding (compare Figures 4.1 and 4.2, as well as the header on Figures 4.3 and 4.4) and the fact that MUM provides French and English language options, which ensures local language requirements are met according to

[57] It may be worth noting that there was a temporary glitch in the Streetmuseum App (in Figure 4.5) as the title of the photographic image was displayed in 2D View. This was later fixed in other releases.

regional linguistic laws[58]. The apps both showcase each museum's collections, though the Streetmuseum displays sketches and paintings, as well as photographs.

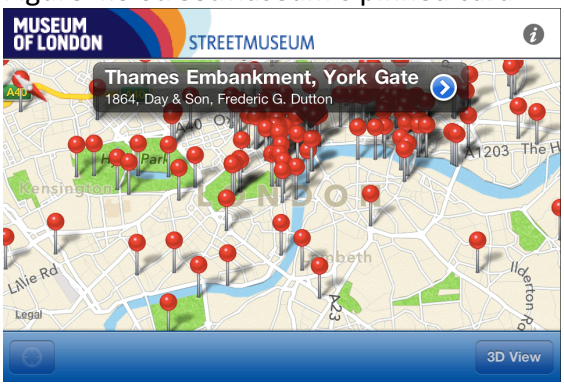
Figure 4.1 The Streetmuseum App

Source: The Streetmuseum App. Image taken on February 15, 2013.

Figure 4.2 The MUM App

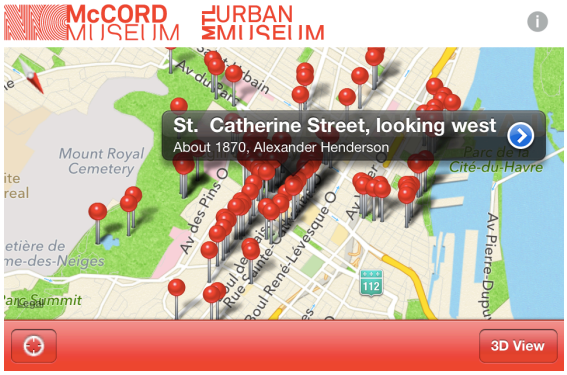
Source: The MUM App. Image taken on November 1st, 2012.

Figure 4.3 Streetmuseum's pinned card



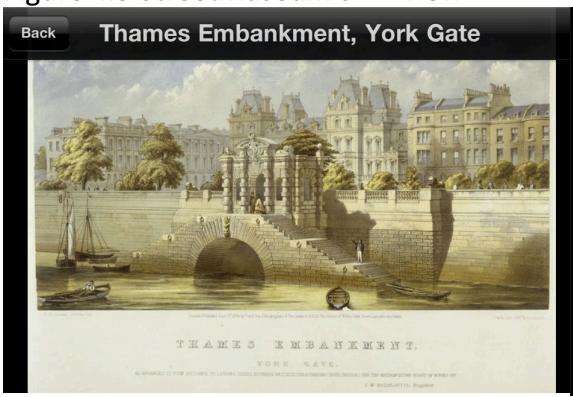
Source: The Streetmuseum App. Screen shot taken February 15, 2013.

Figure 4.4 MUM's pinned card



Source: The MUM App. Screen shot taken February 15, 2013.

Figure 4.5 Streetmuseum's 2D view



Source: The Streetmuseum App. Screen shot taken February 15, 2013.

Figure 4.6 MUM's 2D view

Source: The MUM App. Screen shot taken November 1st, 2012.

[58] The provincial law in Quebec governs language rights, regulations and obligations, ensuring that all commercial signs, documents, websites etc. are presented in both French and English.

In this case, the Streetmuseum App could be remediated into the MUM App because Brothers and Sisters (rather than the Museum of London) holds the copyright for the Streetmuseum. Entities, such as copyright laws, can act in such a way to either make way for or bar such apps from being remediated into other similar ones. Thumbspark, having been hired again by Brothers and Sisters, could reuse the design and code developed for the Streetmuseum once again. Even though the McCord Museum hired Brothers and Sisters to make MUM, it could be argued that the Museum could have still made something significantly different from the Streetmuseum App. Here funding played a significant role in what could be negotiated in terms of customisations for the MUM App. As a medium-sized Canadian museum, the McCord Museum has limited funding for its 'technology projects'. And for the McCord Museum, limited funding meant keeping the Streetmuseum's design for the MUM App. While being quick-to-market was also important, resource constraints meant almost no changes could be made.

Generally speaking, the Museum of London has more funds to draw from than the McCord Museum[59]. This has allowed the Museum of London to not only design and develop a novel app, the Streetmuseum, but to also release it in two versions: for the iPhone as well as for the Android, thus making it more accessible to larger populations. Configuring the MUM App only for Apple devices has meant there has been a level of device 'discrimination' (Latour, 1992) which in turn has meant limited access to the App.[60] So while the Museum of London's App reaches wider audiences, the MUM App is limited in its reach to a smaller population consisting (only) of Apple

[59] The difference in income between the two museums is significant: in the 2010/2011 fiscal year the Museum of London reported £32,053,000 (GBP) in income, whereas the McCord Museum in 2011 announced about a tenth in earnings, $5,366,228 (CDN), as shown in their annual reports.

[60] As noted in Chapter 1, the MUM App is only available for iOS, limiting the number of users that can have access to the App. This is because operating systems, for which apps are developed, are linked to the type of smartphone they can be used on. In 2010, when the MUM App was made Apple only had 2.9% of the market share, while Samsung outsold Apple that year by capturing 17.6% of the market share (see Appendix A, Table A.2). While in 2010 the smartphone sales figures meant that 22.7% of the market share were using Android (compared to 15.7% using iOS) by 2014 these figures drastically changed as Android's market share increased to an astounding 80.7% (compared to a decrease in iOS' market share to 15.4%). As such, the device 'discriminates' against users not using Apple devices such as iPhones, iPads and the iTouch (see Chapter 5).

device users, such as the iPhone, iPad and iTouch. The Streetmuseum App has also more recently featured special temporary exhibitions, including an augmented reality display made as a compendium for (or promotion of) the *Cheapside Hoard* exhibition in 2013. Further still, the Museum of London has been able to release another augmented reality app called the *Streetmuseum™ Londinium App*. The Londinium App is even more dynamic than the original Streetmuseum, incorporating a wider range of media[61]. As the description on the App Store proclaims:

> The new app directs users to locations from Roman London where you can 'excavate' finds, using your fingers to dig and gradually reveal ancient artefacts where they were originally found. iPhone users can remove dirt by blowing into their microphone. Key Roman London sites, such as the amphitheatre and Temple of Mithras, have been brought to life through augmented reality video (iPhone only) – produced by HISTORY™ – showing scenes of Roman London, overlaid onto the view today. A soundscape to the Roman capital is also included, so you can listen to the hustle and bustle of the forum or the clamour of the Boudican rebellion. In addition, a map of Roman London, compiled and produced by Museum of London Archaeology, has been superimposed on a modern map of London. Use the slider to see how the city has changed over the last 2,000 years.[62]

But such innovations have been rendered cost-prohibitive for the McCord Museum, a reason for which the Museum has looked to sponsorships in order to modify the MUM App – recently adding nine (arguably dull) images as a result of a sponsorship by a commercial property management organisation named Ivanhoe Cambridge. [63]

As apps are made to fit particular platforms, complex infrastructures also participate not only in what and how apps are made (discussed below) but also in how and if they work (discussed in Chapter 5). The choice of platform on which to build an app

[61] See the Museum of London's website: http://www.museumoflondon.org.uk/Resources/app/Streetmuseum-Londinium/home.html last retrieved August 20, 2014.

[62] https://itunes.apple.com/us/app/streetmuseum-londinium/id449426452?mt=8 last retrieved September 21, 2015.

[63] I am aware of the McCord Museum having made only one significant update to the MUM App when it added four outdoor images of Place Ville Marie, 1000 de la Gauchetière, the Centre de commerce mondial and Fairmont The Queen Elizabeth as well as five indoor images in Place Montréal Trust, Complexe Les Ailes, Place Ville Marie, Centre CDP Capital, and 1000 de la Gauchetière as a result of a partnership formed with Ivanhoé Cambridge. See the McCord Museum press release: http://www.musee-mccord.qc.ca/pdf/PR/PR_Musee-McCord-etend-son-application-Musee-Urbain_EN.pdf last retrieved July 22, 2015.

is one of the first technical decisions to be made before coding it. While other mobile device platforms exist for creating apps (such as the Android, for which the Streetmuseum was also configured), the MUM App was only configured for iOS. Hence, the MUM App was made to fit Apple's platform, which also required employing a variety of technologies developed specifically by Apple. Put another way, Apple's platform(s) – for developing, running and selling apps – as well as its vast infrastructure, were actors that participated in the design of the MUM App – and therefore its production. To say that Apple's platforms were involved in the making of the MUM App is to include a plethora of other actors that make up that platform, i.e. platforms are 'black boxes' themselves (see Chapter 2). They require apps to be written in particular languages (such as Objective-C), to use standard frameworks (such as the Map Kit Framework)[64] provided by Apple, and are 'bundled' using Apple's development and compiling software[65]. Further, the software code developed for an app must meet the standards of iOS and the iPhone's, iPad's or iTouch's features and physical displays. And the aesthetics for Apps (including graphics and fonts) reflect those that have been Apple-approved for its devices. As such, Apple standards also acted as negotiators in the aesthetic and functional designs of the MUM App. The aesthetic qualities, technical abilities and concept of an app must be formally approved by Apple before it can be 'sold'[66] (even as a free app) through the App Store. This means that Apple's network, including its platform (its technologies, standards and employees) acted as negotiators in the making of the Streetmuseum and in (re)making MUM. Given that Apple must approve Apps before they are sold on the App Store, its employees may also be considered 'gatekeepers' (Latour and Woolgar, 1979; Latour 1987). Without their approval, an App simply would not be released on their marketplace. Furthermore, only those that subscribe to Apple as 'registered sellers' (often developers) may submit an app

[64] The 'Map Kit Framework' can be used to embed geo-locational map interfaces into Apps, which can then be annotated with custom images, text and other content.
[65] See Apple developer site for iOS Apps at https://developer.apple.com/library/ios/#referencelibrary/GettingStarted/RoadMapiOS/chapters/Introduction.html last retrieved February 15, 2013.
[66] See the Apple developer guide at https://developer.apple.com/appstore/guidelines.html last retrieved February 28, 2013.

for Apple's formal approval. Since Thumbspark is the seller of these Apps[67], and since Brothers and Sisters acted as the mediator between the developers and the museums, any modifications to the MUM App must involve both companies. And so changes to the App are rendered cost-prohibitive for the McCord Museum. As is discussed later, this has engendered a type of 'irreversibility' or 'lock-in effect'.

Unexpected Negotiators in 'Curating' MUM's Photographic Displays

While it may now be accepted that the makers of the Streetmuseum App, having been employed by the McCord Museum to make MUM, were and are negotiators in what gets displayed through the MUM App, there were also unexpected actors that played key roles in 'curating' MUM's content. Upon establishing a partnership with Brothers and Sisters, one of the next tasks for the McCord Museum was to determine what staff would work on the project. In this case, since the display was to be developed as an app it was considered a 'technology project' as opposed to an 'exhibition'. As a result, the project was assigned to the Project Manager of Web and Multimedia, rather than a 'curator'. Also involved were a Project Manager for the *Montreal - Points of View* exhibit (as explained, the MUM App was planned as a promotional tool) and, since the augmented reality app would showcase historical images from the Notman Photographic Archives, a Senior Cataloger specialising in the collection was also involved. At the time, the Project Manager of Web and Multimedia was working on multiple projects and tasks (as were the other two staff members), and so they all had limited amounts of time to dedicate to the project. There was also a keen interest to complete the project within a relatively short period of time (before the reopening of *Montreal – Points of View*). However, limited funding prohibited the Museum from hiring more staff to work on the project. Ultimately, an intern was tasked with selecting and preparing content for the exhibit, releasing the Project Managers and Senior Cataloger from heavier involvement with the MUM App. While the activities of the intern would be overseen by all the staff members and approved by the Project Manager, a curator (normally involved in

[67] See the App Store at https://itunes.apple.com/ca/app/museeurbain/id459710538?mt=8&ign-mpt=uo%3D4. While Thumbspark is the seller, the McCord Museum owns copyright to MUM.

making displays) was not involved in making this display. And so what is usually the role of a curator became an intern's task. Or, in other words, categorising the work for this display as a 'technology project' meant, in this case, existing 'curatorial practices' were redistributed to other roles at the Museum. One difference we can therefore note here between making 'physical' displays and 'digital' displays is that it displaced roles and practices across the Museum's organisation.

Figure 4.7 Mapping images

Source: Courtesy of the McCord Museum

Figure 4.8 Selecting images

Source: Courtesy of the McCord Museum

But to say that curating the MUM display 'became an intern's task' would be only a partial story, and not only because at least three other staff at the Museum were involved, but because the selection of the photographic images and the development of the content for the App involved material processes with a much wider range of unexpected actors. For example, the intern selected photographic images from the collection only from a range that had already been digitised (a limited number, given the funding constraints discussed above). Therefore the material form (or in this example, the 'digital' form) of images in the collection acted as a negotiator in the selection of images for display. Upon selecting 'digital' objects that could potentially be displayed, the images were printed and laid out across a large paper map in order to make more decisions about what could be displayed (see Figures 4.7 and 4.8). The map was used to select a variety of images and determine their location, which

were ultimately limited to six particular zones in Montreal: Sherbrooke St. West, Sherbrooke St. East, St Catherine St., McGill University campus, Mont Royal and Old Montreal. In this way, physical location also became a negotiator in what MUM would display. It is perhaps interesting to note the extent to which the process of making a 'digital' display is in practice 'material'. Aside from printing all the 'digital' artefacts and using paper maps, the team used 'sticky notes' to tag locations across a map, notebooks to outline plans and pens to write them. All this happened in rooms where things could be laid out on tables so that the team could work together – rather than 'online'. This is not uncommon in museum practice, and in this way, making this 'digital' display was similar to the practice of making a 'physical' exhibit.

This practice of using a geographical framework is also used for 'physical' displays such as the *Montreal – Points of View* permanent exhibit (see Appendix A), in which 'zones' were also employed to demarcate exhibit spaces and select objects from the collections. For the MUM App, it was considered that central zones of the city had most of the historical sites of interest – and were also more often depicted in historical photographs. Further, these areas were often visited not only by locals, but also by tourists, a particular consideration. Tourists are an important type of visitor to the Museum and were considered as a potential type of audience for the App. Thus, like in Macdonald's (2002) study on the Food for Thought exhibition at the Science Museum, the 'imagined audience' also became a negotiator in making the exhibition. Imagined audiences acted as negotiators in the development of concepts not only about where objects would be best displayed but also what would be aesthetically pleasing or interesting to view. In considering what tourists and other potential users of the display would find interesting, themes were developed for selecting images from the larger collection. For example, it was decided that 'natural disasters' as a theme would be interesting to see in the display (see Figure 4.9, as an example). Given that photographs of natural disasters were abundant on one of the main zones selected for the display – specifically, in and around the area of Old Montreal – many historical photographic images depicting natural disasters (such as floods, fires and icy conditions) were chosen for MUM. Further, funding also became implicated in decisions about what images would be chosen for the display. This is

because half the cost of making the MUM App was provided by McGill University (using part of the University's budget for its 190th Anniversary celebration).[68] The University and its funding can thus also be considered negotiators in the decisions about what MUM would display. In this case, it meant images of particular historical sites on the McGill campus would feature prominently in the App, such as the Redpath Museum (Figure 4.23) and old class pictures (Figure 4.24).

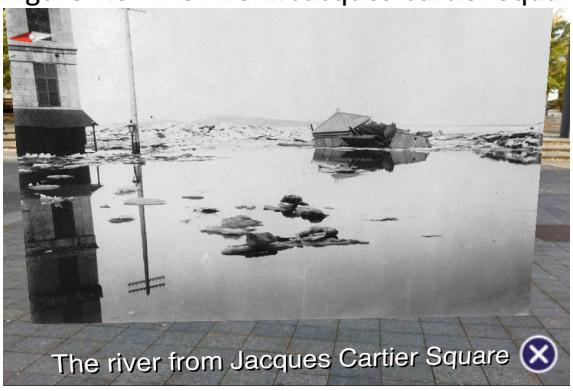
The images that could be selected for display were also in part constrained by the digital media technologies used – such as the use of augmented reality technology that includes the devices and the networked infrastructure needed to support such technology. In order for augmented reality to 'work', a vast network of actors are needed to perform at the right time and in just the right place. This extensive network includes the mobile device's sensors [69], satellites and other technologies used in conjunction with GPS, WiFi provided by service providers, cell tower receivers, and so on. Augmented reality displays also require that objects in the 'digital' images have similar characteristics to the particular physical sites onto which they are superimposed. This is because to superimpose 'digital' objects on camera views, the device uses pattern-recognition technology, which must detect similar architectural details in the 'digital' object as in the real sites on view – i.e. there must be physical markers that cue the technology to align objects. This could be a whole or part of a structure or building, such as the balustrade that helps align the superimposition of the photographic image of "Ms Grant à la balustrade" (see Figure 4.10). As such, some photographs could not be selected for display. As the Project Manager of Web and Multimedia explained in an interview, when buildings and

[68] There may have been other organisations that funded or played some part in making MUM. In particular, when we look at the branding of the MUM App (in Figure 4.3) it indicates the App was made in collaboration with 'Historia', and displays the 'Telus' (a telecommunications company) trademark logo. I cannot confirm this since when I did ask the Project Manager of Web and Multimedia whether these organisations funded the App, I did not receive an answer. I could sense that she was uncomfortable speaking about funding and so I dropped this line of questioning.

[69] 'Sensor technology' allows the device to be location-aware through its GPS sensor (which is sometimes amended by WiFi and cell tower location information). The compass sensor allows for the device to be direction-aware and the accelerometer sensor indicates when the device is in motion, making it motion-aware. Camera technology allows developers to add graphics or other media, such as 2D images or 3D objects, as an overlay on its real-time displays, by using pattern recognition for object placement. (Azavea and City of Philadelphia Department of Records; 2011).

structures in Montreal are demolished, photographic images may be more difficult to superimpose and so at times excluded from display. So the physical landscape of the city acted as negotiator in the selection of photographic images.

Figure 4.9 'The river… Jacques Cartier Square'



Source: Screen shot taken Oct 29, 2012.

Figure 4.10 'Ms Grant à la balustrade'

Source: Screen shot taken November 16, 2012.

While physical space and display cases may act as negotiators in making exhibits inside the Museum (such as floor space limitations and glass cases), one might assume that the possibilities for display are endless for a 'digital' display. Not so. As we have seen here material space (geographic zones and architecture) still acts as a negotiator, defining some of the possibilities and constraints of 'digital' displays. But there were still other negotiators in what photographic images could be selected. In particular, the 'digital' photographic objects were packaged directly into the App instead of being dynamically retrieved from an external repository. This meant that the Museum would have to limit the number of images it could display in order to contain the size of the downloadable App. In the end, a total of 141 historical 'digital' images were initially selected from the Museum's archives of about 80,000 'digital' photographs.[70] Of the 141 selected, 124 were exterior views (which could be superimposed as 3D objects or displayed in 2D), while 17 were interior views (displayable only as 2D images). Another consideration were the bodies of visitors. Only those photographic images could be selected that could be viewed by visitors re-positioning their bodies in the same position as the photographer who had taken the original image. Photographic images had to have been taken from an

[70] Though, as explained above, the MUM App has been more recently updated with nine additional images (four additional exterior views and five indoor views).

angle, perspective and location wherein a visitor to the exhibit could position their body – in order to support the alignment of the exhibit displays. So the body also acted as a negotiator in the selection of images for display. For the safety of the visitor this would preferably be on a sidewalk and away from automobile traffic. As such, no photographic images that were selected had been originally taken from, for example, an elevated position, as they had to have been taken from a street level view, which could be repeated by a visitor. Furthermore, the Streetmuseum had also been coded in such a way that constrained the number of images that could be exhibited through the MUM App. And so possible positions of bodies and 'digital' space on technologies were entangled in the selection of collections for display and in conceptions of what would work, and of whom the imagined audiences would be.

Bodies also worked in concert with specialised cameras in order to encode each 'digital' image with relevant metadata. In particular, the augmented reality technology used for the MUM App requires geo-locational and geo-spatial information for the display of 'digital' objects on pinned cards and in 3D View. The geo-locational data (longitude and latitude) allows the technology to place 'pins' across the pinned card and, when combined with the geo-spatial data (cardinal direction), provides the coordinates for 'pinning' the 'digital' object in 3D View. To encode this information, the Museum used a Sony DSC-HX5V camera, which comes outfitted with a GPS receiver and compass that collect and encode the coordinates for 'digital' objects.[71] While 'automated' technologies are found to have played a role in these processes, the practices performed still involved bodies too (see also Chapter 6). In this case, they involved Museum staff, such as the intern, walking to each location and positioning her body in relation to the camera in order for the required information to be captured. In the case of the Streetmuseum, the Digital Producer at Brothers and Sisters explained they had a significantly wider area to cover, so it required "ten runners" using London's "Boris bikes" (the colloquial name for the city's cycle hire system) to get around the sprawling city of London and

[71] The Sony HX5V has both a built-in GPS receiver and compass that allows it to tag images with the location and direction of the camera. Tag information is used by the iPhone's software to display images on a map by location. Information on the Sony DSC-HX5V camera can be found at http://www.imaging-resource.com/PRODS/HX5V/HX5VA.HTM last retrieved March 28, 2013

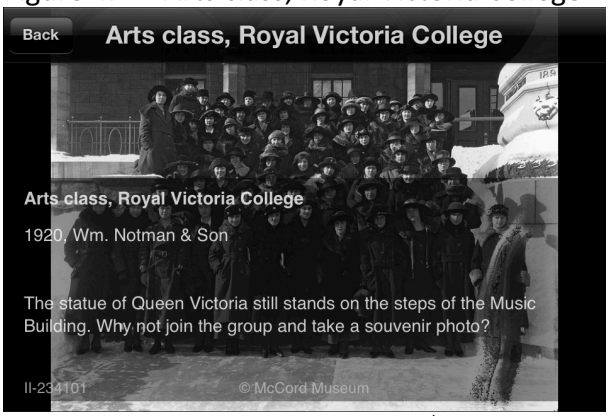
collect information. Thus both humans and nonhumans are involved in selecting collections for such app displays. In the end, I have provided here only a sample of actors involved in the negotiations of the selection of photographic images for the MUM App exhibit. Yet the analysis demonstrates that neither the intern nor the team alone curated the selection of the photographic images for the MUM App. Rather, the evidence presented shows *nonhuman* negotiators – including funding, city architecture, collections, a special camera, themes – were also involved. At the same time, the analysis has shown that the making of a 'digital' display can still be a very material process – involving maps, boardrooms, buildings and bodies.

Negotiators in Writing MUM's Labels and Descriptions

Along with selecting photographic images from the McCord Museum's Notman Photographic Archives, another task asked of the Museum's intern was to procure information about each photographic image selected from the Archive. The intern was to retrieve the information and, where there was an insufficient description, combine it with commentary about each photograph. This was then used to compose titles and descriptive texts for each photographic image. For example, for 2D displays, the intern collected information about the date the original photograph was taken, the photographer's name (if available, as some are anonymous) as well as the archival code for each photograph (for examples, see Figures 4.21 and 4.22). For 3D displays, only a title label would be displayed with the accompanying photographic image. But there were other actors that negotiated the way in which these descriptions could be composed. As I suggested above, the MUM App's software code was (re)built upon the Streetmuseum's existing code and therefore, MUM inherited the Streetmuseum's design. The size and amount of text displayed had been established in relation to the iPhone device (more so than the iPad since the design had to ensure the display would work on the smaller device) and without the need to scroll in order to see the text. And so, it can be said that the Streetmuseum's design and code, as well as the iPhone device itself, acted as negotiators in the process of writing labels and descriptive texts for MUM. More specifically, these actors placed character length constraints on the titles and

descriptive texts. The maximum characters allocated by the App's display of the title was 60 characters, though according to the Project Manager, shorter 45-50 character titles were aesthetically ideal, for a better fit on the iPhone display. Given this, the titles would often seem cursory and simplistic, such as "Roman Catholic nuns" or "Science students". Even the more 'detailed' descriptions about photographic images often seemed all too short. The App software allowed for a maximum of 240 characters for descriptions. While some of the information was garnered from the archive, other text was constructed based on the mode of exhibition and ideas about who would visit the exhibit. For example, some descriptions incorporated tourist-oriented remarks, such as "Why not join the group and take a souvenir photo?" (see Figure 4.11) or "Even today, the lookout is still one of Montrealers' favourite places to be photographed. Come and have your picture taken with the Group!" (see Figure 4.12) These remarks were written into the texts because the iPhone has a feature that can be used to take snapshots.

Figure 4.11 'Arts class, Royal Victoria College'



Source: Screen shot taken November 1st, 2012.

Figure 4.12 'Miss Grant sitting on the balustrade'

Source: Screen shot taken November 1st, 2012.

And so the iPhone device, its physical size and the capabilities it affords (through its various functions provided by a combination of software, hardware and broader infrastructure) also acted as negotiators in the making of the MUM App. Since these actors (along with others listed above) placed not only limitations on the amount of historical details that could be displayed, but also the types of information that would replace such historical information, it also entailed display politics – in relation to what historical knowledge would prevail – a point discussed further below.

MUM's Test Build App

Once the photographic images were selected, their geo-locational and geo-spatial information set, and their accompanying texts written, this would all be sent to Brothers and Sisters, who, in turn, would forward the items to Thumbspark in order to code the App. Using these materials, Thumbspark could develop 'test build apps' for the McCord Museum to perform trial runs. The test build app would then be used by Museum staff to test if images could be displayed in practice. In this case, the Test Build App would also participate in determining what worked or did not. The App would provide a green 'Good' score for images that positioned well on screen (see Figure 4.13) and a purple 'Poor' score when images were poorly positioned (note how multiple images overcrowd the user screen view in Figure 4.14) resulting in a poor augmented reality experience. The test build app was made with a 'smart feedback system' that sent automatic emails directly back to Thumbspark with the results. An initial test build app was sent to the McCord Museum in March 2011. In May 2011, the McCord Museum would provide Brothers and Sisters with further display materials and by the end of June 2011, Thumbspark developed a more robust test build app in order to pilot MUM. This test build app was sent to the Museum along with a representative from Brothers and Sisters. While the test build app could have been e-mailed, the representative was sent not only to assist with the trial runs but, as the Project Manager of Web and Multimedia remarked in an interview, to "lower the expectations of the Museum upon seeing it function". The Museum would soon learn from trying on the test build app that the GPS system was still not precise enough to determine the exact location of devices, causing 3D objects to appear inaccurately placed. This could be a result of signal issues caused by, for example, interferences from tall buildings in downtown locations or by the weather. The representative was sent to allay any major concerns regarding the release of the App to the public later on. It is interesting to note the need in this respect of a physical escort to 'carry' as it were the test build app to the Museum. Again, as with the physicality of the 'curatorial' process described above, we here see activities related to digital media technologies couched in sociomaterial

practices. Any additional modifications made by the Museum (for example, to the text displayed) were then sent to Brothers and Sisters in July 2011, followed by a final set of changes in August. Thumbspark would incorporate these into a 'final' version of the MUM App that would be released in September 2011.

Figure 4.13 Good superimposition

Source: Courtesy of the McCord Museum

Figure 4.14 Poor superimposition

Source: Courtesy of the McCord Museum

The MUM App was released as a free download on the App Store on 12 September 2011. As the Project Manager explained, the MUM App exhibit took ten months to develop, from the point of initial contact with Brothers and Sisters to its release. To 'release an App' meant to not only have had it approved by the McCord Museum, but also by Apple. Only with Apple's approval can an app be uploaded to the App Store to make it available to the public for downloading. As I mentioned above, the 'seller' (which is often a developer) submits the app to the App Store, the reason for which in this case, the MUM App is attributed to Thumbspark Limited. But since the platform design of the App Store, requires only 'one author' to upload Apps, it inadvertently reinforces the cultural belief of the single author (and often the 'genius'- or 'geek' tech-innovator in the case of digital media technology). Before undertaking this study I was also not, however, immune to the myth of the tech-innovator. In initial meetings with the Head of IT, we spoke of Thumbspark as if here were an individual working alone. But, not only is Thumbspark a company of at least two developers, but, as evidenced in this case, a myriad of other human and nonhuman actors participated in the design coding and overall production of MUM.

(Re)Making 'Digital' Displays Instead of 'Physical' Exhibits

The way in which MUM was (re)made – as an augmented reality app for Apple's devices – had implications for the display as well as its management. The Project Manager, for example, mentioned that it is difficult to make significant modifications to the MUM App as they must then be done through Thumbspark via Brothers and Sisters and that this requires a significant cost (that is almost two-fold considering the current foreign exchange between the Canadian Dollar and the British Pound Sterling). For the Museum, these constraints in modifying the exhibit differ from modifying a 'physical' exhibit or another type of digital media technology, such as the Museum's website, because the Museum already has established practices (with the skills needed) and resources (such as budgets for maintaining exhibitions) to modify such exhibits. At the McCord Museum, collections in its permanent exhibit are rotated and updates are regularly made to the online website. On the other hand any (non-critical) changes, such as adding photographic images to display through the MUM App, are cost prohibitive – a reason for which the Museum has had to partner with companies, such as Ivanhoe Cambridge in 2014, when making (even minor) modifications. This makes it challenging to keep visitors interested in the MUM App display, as visitors may not be interested in seeing the same collection of photographs multiple times. On the other hand, the Museum of London has been able to procure more resources to not only modify the look of its App, but also extend the number of images on display and even showcase special exhibits, such as that of the *Cheapside Hoard Exhibition*. As such, the Museum of London may use its App to promote new exhibits, which it surely hopes will reignite visitors' interest in both the Museum and the App itself. But in the case of the McCord Museum, and the MUM App, such options are rendered non-negotiable or, in effect, 'locked-in'.

In ANT studies this has been referred to as 'irreversibility' (Akrich et al. 2002, Callon, 1991). Akrich et al, (2002) suggest 'irreversibility' in the analogy of the successive passes on a Scrabble that saturate the board. In regards to the stabilisation of relations of actors in a network Callon discusses 'irreversibility' as "the longevity of these connections and the extent to which they are predetermined" (1991: p. 133).

Other theorists have suggested the term 'lock-in' effect, whereby an infrastructural design leads to the locking of standards over time as a result of network stabilisation, and given the material resources required to modify it, change itself becomes cost prohibitive. One example is the persistent use of the 'QWERTY keyboard' (David, 1985). Another example is the 'steel and petroleum car' as mode of transportation (Urry, 2004).[72] Urry states that examples of lock-in show that institutions matter a great deal in how systems develop, and that social institutions "can have the effect of producing a long-term irreversibility" that is both predictable and difficult to reverse (2004: p. 32). More recently, Kitchin (2014) has used 'lock-in' in relation to the corporatisation of 'smart city governance' suggesting the digital infrastructure of cities as increasingly shaped by corporate interests. Kitchin suggests that 'smart city' solutions are being 'pushed' by vendors creating "a technological lock-in that beholden cities to particular technological platforms and vendors over a long period of time" (2014: p. 10). In this case, we see an example of a 'pull' as the McCord Museum desired to be on a standardising platform. On the one hand, a lock-in effect of a museum's 'digital' display does not seem as problematic as, say, the environmental issues caused by petrol-based cars.[73] But together with other non-negotiable actors, such as gatekeepers and funding, this lock-in effect can, for one, act to suppress the histories that may be told using Apps, as will be explained next.

Remediation Politics: MUM's Display of Photographic Collections

It has been found before, in the case of 'physical' exhibits, that museums may not provide their audiences with the social and political contexts of collections. For example, in science and technology museums, Macdonald found that "exhibitions rarely seek to explain their contents in terms of a broader social and political context; and this may be something which even those involved in making exhibitions

[72] David's example discusses the use of the QWERTY keyboard over the more efficient DVORAK design, given a "standardization *on the wrong system*" (1985: p. 336). In Urry's example, the steel and petroleum car, reached 'lock-in' given its related "systems of provision and categories of things are 'materialized' in a stable form" (Slater in Urry, 2004: p. 26).

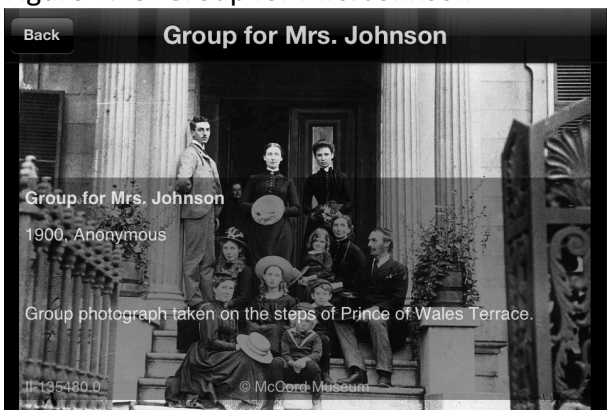
[73] Though it becomes more serious when considering the way in which it stabilises the use of smartphones and other mobile devices, which have been shown to be as big of an environmental issue as a result of technology dumping in Africa, called the 'Digital Dump'. See for example the Basel Action Network report: http://ban.org/films/TheDigitalDump.html last retrieved July 9, 2015

tend to overlook as they concentrate upon the intellectual, aesthetic and practical details of the task at hand" (1998; p. 2). As such, Macdonald suggests "we need to look analytically at the contents of exhibitions in relation to their production, contexts and reception" (1998; p. 2). This section takes a closer look at the content of the MUM App, its context and its reception, as well as its politics. In examining the historical photographic images selected and the texts used to describe them, it is found that this 'digital' display (re)presents the gender, cultural and institutional biases of Montreal's past. This is problematic when the social, cultural and political topics underlying the historical images are left largely unexplained. It is further found that the Museum's descriptions of the images focus more on the content of the images, rather than the world outside upon which the 'digital' objects are superimposed in practice. This also becomes problematic for a display that navigates its visitors outside the Museum's walls. Unlike a 'physical' exhibit whereby supplementary information is provided on pillars, glass displays and through the use of museum guides, the App relies mainly on its onscreen displays. Lastly, while some aspects of the city's history are featured in the collections shown through the App, others are not – an unintentional act related to how the App was (re)made.

In examining the App's photographic images and their content it is found that the collection portrays (perhaps necessarily) the particular institutions, conventions and practices that were normative in the time period when the collection was created, namely the late 19th and early 20th centuries. As would be expected, images of women and men reflect the gendered roles of their time. Women feature on the steps of homes holding their children (see Figure 4.15), as religious followers (see Figure 4.16), as dutiful caretakers of elderly men and women (see Figure 1.4 and Figure 1.5 in Chapter 1), in the 'Arts Class' at a female college (see Figure 4.13), and trailing behind schools of graduating men in ceremonial gowns (see Figure 4.17). On the other hand, men are inaugurating institutional buildings (see Figure 4.18), shown as religious leaders (Figure 4.19), in the uniforms of military institutions (see Figure 4.20), present at international scientific conferences, such as the British Association for the Advancement of Sciences (see Figure 4.21), taking part in competitive activities and sports (see Figure 4.22), and it is their names that frame the majority

of buildings and institutions shown (see Figure 4.23). Only men are present in the 'Science Students' of 1899 and as part of the 'Class of 1914, Faculty of Medicine' (see Figure 1.6 and Figure 1.7 in Chapter 1). As Participant 7 commented on the Science students "there's not a single woman in it, and there's no comment about it—it's pretty pathetic". It is only in a class picture taken of the Faculty of Medicine in 1921 that a woman appears (see Figure 4.24) in a science or medicine-related picture though her posture is slouched as she gazes at the ground. We can only speculate if she is the wife of the man resting his hands on a child, who she stands next to.

Figure 4.15 'Group for Mrs. Johnson'

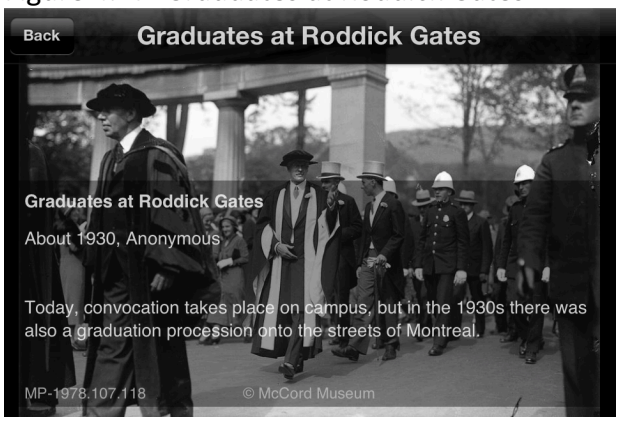


Source: Image taken on March 2nd, 2013.

Figure 4.16 'Roman Catholic nuns'

Source: Image taken on November 1st, 2012.

Figure 4.17 'Graduates at Roddick Gates'

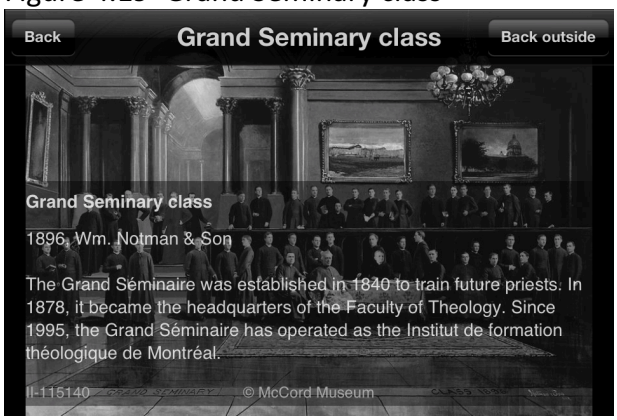


Source: Image taken on November 1st, 2012.

Figure 4.18 'Opening of the Student Union…'

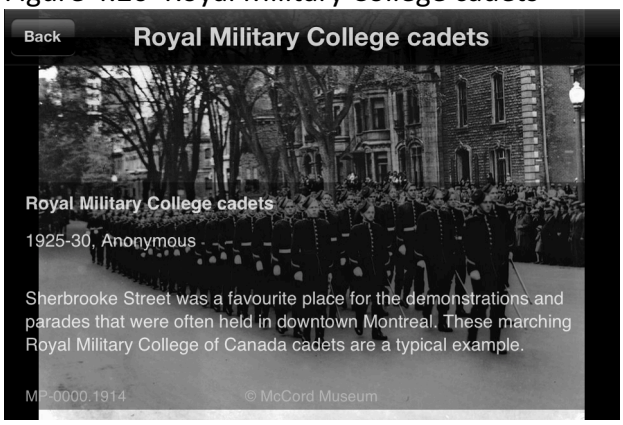
Source: Image taken on March 2nd, 2013.

Figure 4.19 'Grand Seminary class'



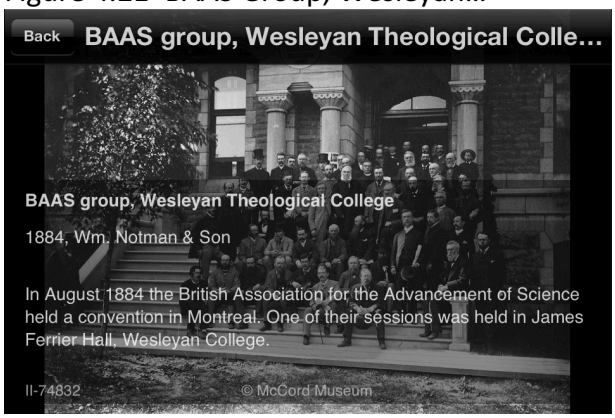
Source: Image taken on March 2rd, 2013.

Figure 4.20 'Royal Military College cadets'



Source: Image taken on November 1st, 2012.

Figure 4.21 'BAAS Group, Wesleyan…'



Source: Image taken on November 1st, 2012.

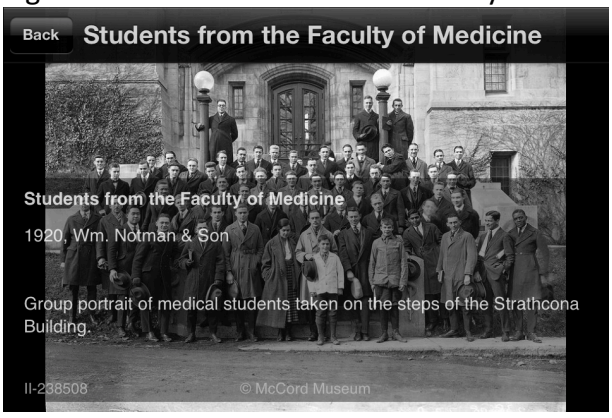
Figure 4.22 'Football game at McGill University'

Source: Image taken on March 2rd, 2013.

Figure 4.23 'Redpath Museum'

Source: Image taken on November 1st, 2012.

Figure 4.24 'Students from the Faculty…'



Source: Image taken on November 1st, 2012.

Religious, educational and commercial institutions, as well as particular institutional buildings, feature prominently in the selected photographic images, yet these also lack contextual descriptions that explain how they emerged, why they persisted and,

in some cases, why they no longer exist. The remediation of the collection also leaves unexplained the dominance of Anglophone society that has left a lasting (and sometimes bitter) mark on the Francophone, or 'Québécois' society, in Montreal and across Canada (not to mention the indigenous First Nations communities). The British imprint can still be seen in the institutions erected and the nomenclature used, as is evidenced by the images selected, and that persist today despite a French-speaking majority in the province of Quebec. The presence of the British monarchy is written into the name of the 'Royal Victoria College', named in honor of Queen Victoria and the 'Prince of Wales Terrace' built in honor of his visit in 1860 (see Figure 1.6 and Figure 1.7 in Chapter 1). The Royal Victoria College, initially a women's residential college and now McGill's Music Building, has maintained its name. Even though the Prince of Wales Terrace structure was torn down in 1971 and an (unnamed) McGill University building now stands in its place, its redisplay brings Anglophone dominance back to present-day consciousness by its 3D superimposition in augmented reality. British, and particularly male, dominance is articulated in the largely Anglophone names of the men that erected the buildings and institutions: 'McCord', 'McGill', 'Redpath', Drummond' and 'Molson', to name only a few. What made these men prominent is not explained in the MUM App – as one curious participant remarked:

> Participant 5: Who are these people that have all this money to throw around and put their names on things?

Given the constraints placed on what could be displayed, other histories have also been omitted, erased from this augmented reality view or left silent without description. The slightly unsavory industries of the liquor and tobacco trades that contributed significantly to the wealth and economic strength of public institutions are not explained. Further, the working classes that often lived in impoverished conditions on the outer fringes of the wealthier central geographic areas depicted in the MUM App have been left out of the fold, despite interest in them from the participants in the study (recall in Chapter 1 that Participant 4 was interested in seeing images in her neighbourhood outside the center of Montreal – an area that had initially been a working class area). Through this case we are perhaps reminded

of how museum exhibits can orchestrate 'conceptions of truth' (Macdonald, 1999) in their representations of what the public ought to know about particular histories. But by (re)displaying photographic images through the App display, users do not have the option to voice their opinions (or versions of their histories) on a public platform and in relation to the Museum's collections since the App does not allow for user-generated comments. By contrast, platforms such as HistoryPin and Flickr provide more ways for audiences to express views about what they are seeing to other users and the Museum. As can be discerned, even from a brief example, the act of displaying historical photographic images with less dynamic platforms becomes political as these App display can (re)present 'old' gendered and cultural politics without the possibility of critique or even comment. As such 'old' politics have become fixed and unaccounted for through the remediation of the MUM app.

Conclusions

This chapter has looked to answer the question of how the MUM App was remediated. As we have seen in this 'reconstruction' of the (re)making of MUM, the exhibit was (re)made by and through the negotiations of a myriad of actors that were both human and nonhuman – including industry reports, collections, funding, technologies, platforms, bodies, and so on. This process has also meant a (re)delegation of what would normally count as 'curatorial' tasks both inside and outside the Museum. For example, the project was assigned to the Museum's *IT department* (instead of its Exhibitions department), an *intern* selected and labeled collections for the display (instead of a curator) and an *advertising agency* coordinated the App's development (a task often managed by *Project Managers at the Museum*). Nonhumans were involved in this remediation too. The concept for this form of display – an augmented reality app – came to the Museum through industry reports prepared by a consortium of technology companies, the NMC (which includes Apple Computers), who undoubtedly have an interest in distributing information related to such digital media technologies. By choosing to (re)make the MUM App, the Museum has entangled this display of its collections with multiple actors outside the Museum, including the technologies, platforms and

infrastructures related to the same companies that form the NMC (and particularly, Apple Computers, given the App works only on its mobile devices). Further, the decision to hire Brothers and Sisters and Thumbspark to coordinate and develop the App, meant it would retain a similar design to its predecessor (the Streetmuseum App) initially developed by the same companies. Using the British-based companies has made changes to the display very expensive while at the same time established them as 'gatekeepers'. This has all had implications for what collections were (and could be) displayed through the App as well as how each photographic image was (and could be) described – the 'effects' of which are the gender and cultural politics of its current content. It has also meant that modifications to the App (such as adding collections on display) may be cost-prohibitive unless more funds can be obtained (as indeed occurred when a commercial property management company, Ivanhoe Cambridge, sponsored nine images to be added). As such, the App continues to mediate the Museum's further entanglement with commercial organisations.

While this empirical study has shown that, as Bolter and Grusin suggest, digital media technologies are 'remediated' through a refashioning of an actor-network, the study also highlights the overall complexity of how this has played out in practice for the McCord Museum's MUM App display. In particular, I am referring to the entanglements between this museum and commercial institutions (in the (re)making of the App), and their competing social, cultural, economic and political interests. These entanglements perhaps reflect the shift in the Museum's mission from a focus on 'education' and 'research' in the past (Young, 2000) to one that seeks to produce more 'contemporary, interactive and immersive experiences' today[74]. This case has also brought to attention the challenges and benefits of tracing these processes with an understanding of digital media technologies as actor-networks. It is challenging to trace *all* the actors involved and I have here, for practical reasons, only traced a portion of the actors involved in the remediation. But importantly, this 'symmetrical' analysis which has examined both human and nonhuman actors has revealed the complex entanglements that can be made in (re)making 'digital' displays. These

[74] For the McCord Museum's mission statements see the Museum's website: http://www.mccord-museum.qc.ca/en/mission/ last retrieved February 21, 2016.

unveilings could have only been made based on an understanding of the App as an actor-network – without such an understanding the negotiations and entanglements involved in the (re)making of the App would likely not have been discerned. This analysis has also shown that the 'digital' is always embedded in the 'material'. This was evidenced, for example, in the process of selecting and arranging the display of 'digital' images (which was done in a material and tactile way by printing out images and laying them out on a map placed on a table) and in the process of collecting geo-locational information for the display (for which Museum staff utilised their bodies to obtain the correct positioning of the camera device employed to capture this information). Thus while digital media technologies appear to exist, at times, in a dematerialised form, they are necessarily always embedded in sociomaterial arrangements. The next chapters will seek to examine the implications of this remediation by analysing the MUM App's role (among other actors) in reconfiguring things in practice, that is, in rescripting and reclassifying objects, subjects and practices (Chapter 5) and reordering and rewriting spaces (Chapter 6).

5 (Un)Doing the 'Museum Visit': Reconfiguring Objects, Subjects and Practices

This chapter examines the practice of viewing the McCord Museum's collections with the MUM App, seeking to address the second research question – *how is the 'museum visit' rescripted along with the MUM App, and how are subjects, objects and practices reclassified along with this changing practice?* The first section of this chapter seeks to unveil the MUM App's actor-network in practice. Though the previous chapter investigated some of the actors, negotiations and entanglements involved in the App's (re)making, this chapter shows that other heterogeneous actors are involved in how the App works in practice, and in how this 'museum visit' actually happens. To examine this, the analysis commences at the point where the App was released on the App Store and continues on with an explanation of how the App is downloaded to a device in preparation for its use, outlining aspects of the infrastructures within which MUM is embedded. Next, the analysis proceeds with a 'walk through' of six short diarised accounts that, on the one hand, outline what it is like to view the Museum's collections along with the App (in all six display zones in the city) and, on the other hand, further reveal in step-by-step fashion not only unexpected actors involved in this 'museum visit' but further aspects about infrastructures – from electricity grids to telecommunications service providers to military-run satellites in space – engaged when the App is used in practice. The large number of actors involved in this practice demonstrates the precarious nature of this performance. In relation to these accounts (as well as the participant accounts that follow), this chapter further reveals that the remediation of MUM involves not only an 'experimental' redistribution of collections, technologies and bodies outside the museum, but the displacement of many tasks, skills and responsibilities, normally required of or performed by Museum staff, across this set of actors. For users, this means they have to do more to ensure this 'museum visit' happens, as they must in this case perform tasks, skills, and responsibilities previously performed by curatorial, technical and security staff, such as ensuring collections are displayed in the best light, fixing any arising technical issues and protecting the equipment.

The second section examines how things are reconfigured in practice – in particular, it analyses how the 'museum visit' is rescripted and museum objects, subjects and practices are reclassified. To do this, the analysis turns to the participant study to examine how MUM is used in practice to view collections. These accounts show that while the App was 'inscribed' with a program of action when it was (re)made – to navigate the city using the pinned card in order to view the display – participants viewed the collections in diverse ways – for example, while some used the pinned card to navigate the display of collections others did not – thereby 'de-scribing' and 're-inscribing' (Akrich, 1992; Akrich and Latour, 1992) the App on an ongoing basis. But performing this 'museum visit' outside the Museum is found to be rather awkward – a process that leaves participants feeling "strange" and "weird" and considering what they are doing as more of a 'tour' than a 'museum visit'. And passersby are confused by what participants are doing, taking them for 'tourists'. In relation to these observations, the analysis explores the explanatory power of the concepts of 'communities of practice' (Star and Griesmer, 1989; Bowker and Star, 2000) and 'boundary objects' (Star and Griesmer, 1989; Bowker and Star, 2000; Haraway, 1997; see also Douglas, 1959), which state that objects and practices stabilise through the enrollment of actors in communities of practice. But as, in this case, the practice and subject exist as two different things, the case also looks at how subjects and practices can be *multiple* – that is, the chapter further draws on recent work that proposes that objects may be enacted in different ways and, as such, exist as 'multiple' (Mol, 2003). Here practices and subjects are multiple too. The third section examines the politics of viewing collections outside the museum using apps. It is found that the app 'discriminates', via the mobile device (against non iPhone-users, among others), while reconfiguring those users that do employ it.

How MUM Works: Tracing Aspects of MUM's Actor-Network and Infrastructures

This section looks to reveal the MUM App's actor-network and infrastructure, and therefore aspects of how the App works in practice. The first subsection begins by analysing the infrastructure(s) the App is embedded in (including the platform for

which it is configured, GPS technology, service providers and the device[75] on which it is downloaded and used). This analysis draws on documentary analysis and interviews with Museum staff. The next subsection begins to describe the App's actor-network – or how the App works in practice – by drawing on my experiences with the App. As was explained in Chapter 3, this information gathered during my use of the MUM App is important because it provides information about the App displays that could not be collected during the participant study (i.e. screenshots on the device could not be taken while at the same time filming participants in the study). These first analyses begin to reveal the complex actor-network of the App in practice and the immense infrastructures in which it is embedded. We also find here unexpected actors involved in making MUM work. But given the extensiveness of any actor-network and infrastructure this analysis cannot point to *all* of the actors involved. The aim here is to rather point to the complexity of the App's sociomaterial arrangement as well as the precariousness of this 'museum visit' performance.

How MUM Works, Part 1 – The Network and Infrastructures

This analysis picks up from Chapter 4 at the point when the MUM App was released on the App Store. The release meant the MUM App would be placed within a retail network (and infrastructure) supported by a variety of actors related to the App Store – including Apple employees, technologies, policies and so on – and also a wider networked organisation of actors and infrastructures that support such retail exchanges – including banks, transactional systems and copyright laws, to name a few. When the App is subsequently downloaded from the App Store to an Apple device, such as the iPhone, it is further embedded in Apple's device networks and additional infrastructures that extend beyond the company. For example, to download the MUM App, users must first ensure that their device is 'powered up'. This means hooking up the device to a power source, which in Montreal would be provided by Hydro-Quebec – a vast networked infrastructure that includes hydro facilities, company employees, electrical cables, outlets, and so on. Furthermore, to

[75] As described in Chapter 3, though the App is configured to work on three devices – the iPhone, the iPad and the iPod Touch – this analysis focuses only on the smartphone device, or iPhone.

download the App the user's device must either have access to Wi-Fi (a local wireless computing network), which can often place limits on mobility and location, or subscribe to a plan provided by a telecommunications service provider. In Montreal that may mean Bell or Rogers: large companies embedded in other vast networks and infrastructures (including some of the same infrastructures noted above, such as Hydro-Quebec). Thus, it may be said that for the MUM App to be downloaded on a device – vast infrastructures must be involved and engaged on an ongoing basis.

Once the App is successfully downloaded on the user's mobile device, the user may then choose to engage with it. Navigating through the device's screens, the user's finger (thumb or knuckle, or a substitute tool) swipes and taps until the App is opened – and so the user's body is put to work. At the same time the device's operating system (iOS) is also put to work, responding to the swipes and taps of the user. Once the App is opened, its commands, rules, images and other lines of code begin to work in relation to the user's body and aspects of the device. The user must continue manipulating the device's screen (in one way or another) – responding to digital objects displayed from one screen to another. For example, upon opening the App the user must select a preferred language by tapping the screen. In return the device and App must each respond. The device informs the App of the request to show the next screen – the map view (or pinned card) – but before the App can show this screen, it asks the device to first engage other actors to help configure the complex pinned card. And here the work of displaying objects begins to extend to the App's and device's wider actor-networks and vast infrastructures. The device calls on the preferred telecommunications service provider (which provides a way to communicate wirelessly), GPS (a geo-locationing system maintained by the US military that includes satellites orbiting the earth), and radio towers (providing signals between these actors), to name a few. The device's hardware, including its sensors[76], are at work here to, determining the location of the device. It takes these

[76] 'Sensor technology' allows the device to be location-aware through its GPS sensor (which is sometimes amended by WiFi and cell tower location information). The compass sensor allows for the device to be direction-aware and the accelerometer sensor indicates when the device is in motion, making it motion-aware. Camera technology allows developers to add graphics or other media, such

and many more actors for the App to present the user with its map view. And as the user begins to move their body through the city, the map view is continuously updated – by engaging with these complex actors and vast infrastructures. Further, to display photographic collections in 'augmented reality' or 3D View these actors and infrastructures are again yoked into action. As the user moves throughout the city, these other actors are continuously engaging with each other - communicating, responding and working. Thus, for the 'museum visit' to occur, the user's body (that touches the screen and moves the device to different locations), the App (including its application code and images), the device (including its operating system and sensors) and many other actors and networked infrastructures involved must work together in order for users to view collections across the city with MUM. But there are still more actors involved in how the App works, as the next analysis shows.

How MUM Works, Part 2 – Viewing Collections in the City

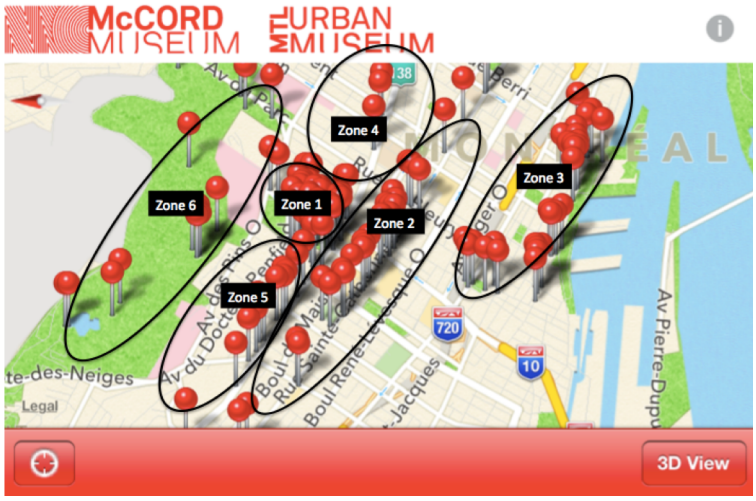
This section continues to explore what actors are involved in the practice of viewing collections with the MUM App and provides an opportunity for readers of this thesis to join me in revisiting what the practice of viewing collections with the App outside the Museum is like. These short narratives are based on my field (blog) notes. As was explained in Chapter 3, I downloaded the MUM App to my iPhone device in order to acquaint myself with the application and examine how it works in practice prior to performing the participant study. Over a period of about a month (from late October to mid-November 2012), I visited all six zones[77] where collections are displayed across Montreal (see Figure 5.1), documenting each visit in two ways: through onsite remote blogging using the Blogger App and also posting on Blogger after each visit. These accounts provide information that could not otherwise be collected during the participant study (such as screenshots of images displayed on the device's screen), and also details about particular zones (outside of zone 1 which all participants

as 2D images or 3D objects, as an overlay on its real-time displays, by using pattern recognition for object placement. (Azavea and City of Philadelphia DOR; 2011).

[77] These visits occurred on six different occasions which are referred to here as 'Day 1', 'Day 2' and so on, in a similar fashion to how they were diarised on Blogger). On each day, one zone of the city was visited and on the first three days, the App was used in 'English', while on the other three in 'French'.

visited). Finally, these accounts also provide details about experiences that the participants either may not have had or may not have verbalised – such as 'glitches' while using the App – insights that help show what it is like to use MUM in practice.

Figure 5.1 Zones visited

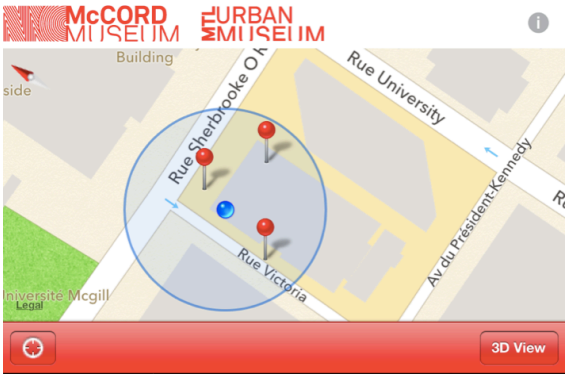


Source: The image is a screenshot of the pinned card displayed by the MUM App, atop of which I have outlined the six zones of Montreal for which photographic images were selected for display.

On Day 1 I 'visited' zone 1, beginning just outside the McCord Museum. Holding the iPhone in my left hand, I pressed the start up button on the device. I then swiped and tapped the screen several times until I opened the MUM App. I chose English as my language preference by tapping "English". This displayed the map view. I zoomed in to the map by manipulating the device's screen in ways the iPhone recognises - for example, 'tapping' to select objects or functions, 'swiping' across to move the map in a particular direction, and 'pinching' to make the map smaller, or the reverse to make it bigger. The map view displayed a blue dot to indicate my location and red 'pins' to mark the locations of photographic images. I noticed the lack of precision in determining my location, which the Museum had explained was related to 'GPS signal issues'. Instead of indicating my location (I was on the street corner of Sherbrooke St. and Victoria St.) outside the Museum, the blue dot indicated that I was inside the Museum (see Figure 5.2). Next, I touched the bright red 3D View button located in the lower right hand corner of the screen, which started up the augmented reality function. I brought the device up to shoulder height in front of me, and scanned left and right with the iPhone. 3D images came into view, overlapping and intersecting with one another, some appearing backwards (see Figure 5.3). I found myself stepping back and forth and sideways as I tried to align the images – by moving my own body – to get the iPhone to superimpose the photographic images perfectly on top of the camera view. My attention was focused on simply trying to

make it work, rather than on the collections displayed, at which I sort of succeeded. Eventually I moved on hoping to find a better spot to view collections. After moving some distance towards the McGill University campus I looked at the map view again, and began to view a few more images. For example, I saw 'McGill College Avenue', which superimposed very well (see Figure 5.4). Next I moved towards the McGill University campus, but realised that though it has only been about 10-15 minutes into the visit, the October weather in Montreal was 'acting up': my hands were cold and it was increasingly unpleasant to manipulate the iPhone. The weather was quickly becoming an unexpected actor in this 'museum visit' – one that was perhaps less of a consideration when making the Streetmuseum for London's milder climate. I viewed a few more images on campus, such as the Macdonald Chemistry Building (see Figure 5.5). But with hands too cold, I soon decided to head somewhere warm.

Figure 5.2 Looking at the map view on 'Day 1'



Source: Screenshot of the MUM App display. Image taken on October 24, 2012.

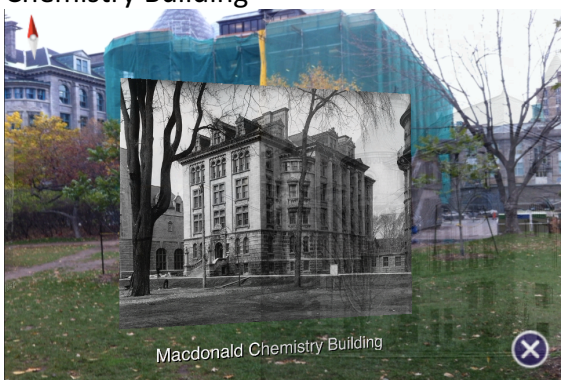
Figure 5.3 Looking at the Student Union Building

Source: Screenshot of the MUM App display. Image taken on October 24, 2012.

Figure 5.4 Looking south on McGill College Ave

Source: Screenshot of the MUM App display. Image taken on October 24, 2012.

Figure 5.5 Looking at the Macdonald Chemistry Building



Source: Screenshot of the MUM App display. Image taken on October 24, 2012.

On Day 2 I went to St Catherine St (zone 2). This is Montreal's fashion and shopping district. It is a busy area of Montreal and the car traffic makes it noisy. As soon as I got there I noticed that the streets were crowded with pedestrians. Still I opened the App and made my way through the crowds using the map view to find a location where collections were displayed. Arriving at a location, I pressed the 3D View and the App superimposed too may images, one on top of the other (see Figure 5.6). And the crowds made it difficult to use the App: to navigate into position (to move my body and the iPhone around pedestrians) and to align the photographic images (to superimpose them on the camera view). I became focused on avoiding pedestrians, so as to not stand in their way. Instead of standing in the middle of the sidewalk, I stood by telephone booths or on edges of sidewalks. This resulted in superimpositions that were not quite right – like the image of Capitol Theatre, which was oddly superimposed on the building behind (see Figure 5.7). It was another cold day...

Figure 5.6 Looking west on Saint Catherine Street

Source: Screenshot of the MUM App display. Image taken on October 26, 2012.

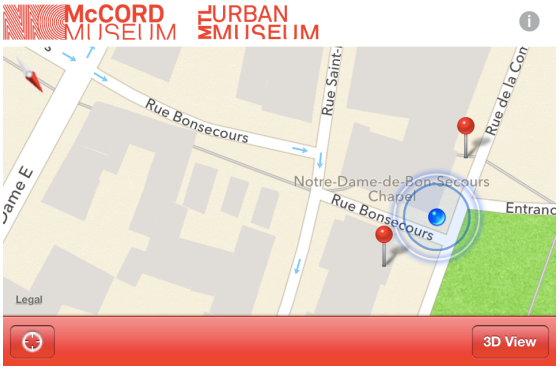
Figure 5.7 Looking at the 'Capitol Theatre'

Source: Screenshot of the MUM App display. Image taken on October 26, 2012.

On Day 3 I 'visited' Old Montreal (zone 3) arriving around Bonsecours market. It was a Monday and – unlike my previous experience in the St Catherine shopping district – there were few people or moving cars in view. I started up my iPhone and opened the MUM App. Looking at the map view, I noticed the pins were well distanced from each other (see Figure 5.8) leading to less overlaps of images. In fact, the images I looked at using the 3D View superimposed relatively well (see Figure 5.9). I moved on to visit

other areas around Bonsecours market. But while this area was free of people, cars and noise, I soon began to experience a series of other issues. On one occasion the photographic image appeared but the camera shutter would not open (see Figure 5.10). When I tried to view the same image again, the exit button (marked by an 'X' on the lower right hand corner of the screen) did not appear (see Figure 5.11).[78]

Figure 5.8 Looking at the map view on 'Day 3'



Source: Screenshot of the MUM App display. Image taken on October 29, 2012.

Figure 5.9 Looking at the 'Bonsecours Market'

Source: Screenshot of the MUM App display. Image taken on October 29, 2012.

Figure 5.10 Closed shutter issue

Source: Screenshot of the MUM App display. Image taken on October 29, 2012.

Figure 5.11 No exit button issue

Source: Screenshot of the MUM App display. Image taken on October 29, 2012.

But, as I was in the city – far removed from the museum - there was no one to report the issue to or ask about how it may be fixed. I walked around for about another 10-15 minutes viewing images of 'natural disasters' and other early 20th century superimpositions until I was notified by a flashing red-coloured indicator on the device that the battery had run very low. This could only happen with a digital

[78] None of the participants in the study experienced these issues, though they did have other issues that I did not experience (for example, Participant 3 experienced 'black screens' and Participant 4 experienced 'green squares').

display, I thought. It made me rush, though, like I had reached the closing hours of a museum - hastily viewing a few more images with what battery life was left.

Day 4 began on Sherbrooke St., just east of the McCord Museum (zone 4). Ironically, the first image I looked at while using the 'French version' of the MUM App displayed the title in English (see Figure 5.12). I moved further down the street. Standing on the edge of a sidewalk (to not impede pedestrians), I shifted the iPhone left and right to superimpose an image titled "Promotions de la Faculté des Arts". While I did this, a man approached me from behind and – to my surprise – asked whether I wanted my picture taken. I wanted to answer that I was in the middle of viewing a museum display for a research project, but decided it may be too complicated to explain given that I apparently looked like I was taking pictures. Instead, I declined politely. But he was not finished; he began to make small talk about how great he thought iPhones are. I nodded in agreement hoping to return to what I was doing. But he still was not finished. To my second surprise, he then asked me if I had any spare change. I had not expected this turn, after all I thought I was in the middle of viewing a museum display! The situation was uncomfortable: I had barely noticed the man come up from behind and it made me feel vulnerable and unsecure even though I was on a busy street. I gave him some change. We happened to both be crossing the street, and as I followed behind him, I became more involved in watching him make his way instead of doing the 'museum visit'. I saw him check for money at a parking meter and I took a screen shot of him as he checked the meter for change (see Figure 5.13). My heart was beating fast. I was no longer within the protective walls of the Museum. Looking around, I became aware of the roaring engines and blaring stereos of cars passing by. Buses barreled through intersections. I was again paying more attention to what was around me then to what was on display. I slowly picked up from where I left off - continuing while less at ease. Now across the street, I took another look at the same image again, "Promotions de la Faculté des Arts", and noticed this time that its description suggested 'taking a photo with the class'. Too late, I thought, I already declined the stranger's offer! I wondered who they thought should take the photo. I returned to the map view by tapping on the device screen, and decided to find the house where William Notman – after whom the Museum's

collection is named – lived. By the time I arrived (see the map view in Figure 5.14) it had become dark outside, and colder, and the images no longer superimposed well (see Figure 5.15). While the display is available '7 days a week' and '24 hours a day', it does not work that way in practice. MUM is reliant even on the time of day.

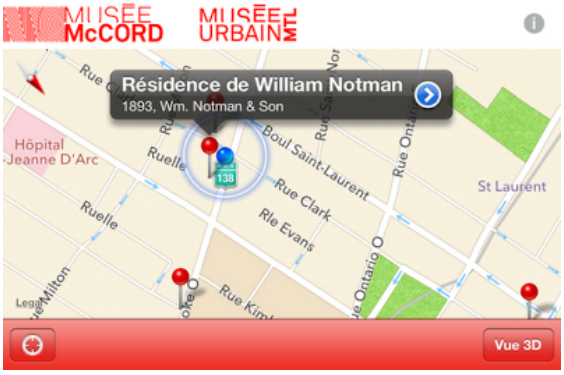
Figure 5.12 Wrong language displayed

Source: Screenshot of the MUM App display. Image taken on November 15, 2012.

Figure 5.13 Man checking for coins

Source: Screenshot of the MUM App display. Image taken on November 15, 2012.

Figure 5.14 Looking at the map view on 'Day 4'



Source: Screenshot of the MUM App display. Image taken on November 15, 2012.

Figure 5.15 Looking at the 'Residence de William Notman'

Source: Screenshot of the MUM App display. Image taken on November 15, 2012.

On Day 5 I opened MUM in French in zone 5, where Sherbrooke St. meets Stanley St. Though the blue dot indicated that I was standing next to a pinned object, I could not find a landmark to confirm that I was in the right spot. The area was so built up with tall office buildings and hotels that the image of a stately stone house was far removed from this contemporary cityscape. While trying to figure out in which direction to point the device, I became distracted by a personal text that popped up on my iPhone – displayed on a thin bar at the top of the screen. Surprised, as I had

not seen this happen before, I hesitated for a moment, but then made a move to tap the message on the screen. It was too late, however. Instead I tapped the App on the upper right hand corner which displayed an instructional page for how to use the MUM App appeared. Voila – I thought! This was how I found the instructions for the App (the App should come with a user guide outlining how to find this instruction in the first place, I thought). I moved on. Close to the intersection of Sherbrooke St. and Drummond St., I came upon the site where I viewed 'Cadets du Collège militaire royal' (see Figure 5.16). While looking at this image, which was well superimposed I might add, I felt a shiver run up my spine. Perhaps because the cadets looked to me like yesterday's ghosts lost amidst the city of today, or because I found military marches overwhelming, or maybe it was just getting chilly outside again. Whatever it was, I was momentarily engrossed in the display. Eventually, I moved further west towards De la Montagne St. looking for the 'Construction des Appartements Château', but "I" couldn't make the display work (see Figure 5.17)…

Figure 5.16 Looking at the cadets

Source: Screenshot of the MUM App display. Image taken on November 16, 2012.

Figure 5.17 Superimposition Error

Source: Screenshot of the MUM App display. Image taken on November 16, 2012.

…or was it the device that had difficulty superimposing the image? Or was it both of 'us' together that made this difficult? Or was it the design: perhaps too many images (or pins) close together caused this issue? Or was it the GPS technology? Was it the downtown location that interrupted the GPS signal? Was it my impatience? The cold weather? After unsuccessfully trying to see the image superimpose on the 'real view', I went back to the map view to move on. As I did, the shops across the street caught my eye. I sighed – this was no museum space. It was the world outside filled

with distractions. While the city (its shops, buildings and parks) are used as a backdrop for this display, they also compete with the Museum's MUM App display.

On the last day, Day 6, I went to view photographic images on Mont Royal (zone 6). Mont Royal is famous for its hilltop terrace vistas and urban park. It provides a 'mountain-like' backdrop to the city's downtown skyline and is encircled by its neighborhoods. As picturesque as it may be, to get there is a bit of a hike. I first walked up steeply inclined uphill roads – and then came the endless climb up the stairs. I began with one set of steep stairs, which only led to a similar set of stairs (see Figure 5.18). It required a tremendous physical effort to visit this museum display. When I did arrive at the summit, I was out of breath and quite light-headed. I wondered who could make such a journey? What audiences would be left out? Once I reached the summit, I opened the MUM App in French. Though the images did not display as they should I saw a forest outfitted with historical photographs as if hanging in thin air – a bio-digital exhibition of photographic art (see Figure 5.19). The photographic images that were previously thought of as 'digital objects' now seemed more like true 'hybrids' — half technological (digital images displayed through a host of technologies) yet half biological (made possible by my holding up the display, the natural light of the sun and the environment in which the exhibition is set). Nature was here at 'work' too,

Figure 5.18 The second set of stairs

Source: Screenshot of the MUM App display. Image taken on November 16, 2012.

Figure 5.19 Looking across Mount Royal

Source: Screenshot of the MUM App display. Image taken on November 16, 2012.

making possible the show on display, as much as the technology (the MUM App and the iPhone device) and the many elements of its infrastructures (satellites, radio towers, and so on). I began to move around the summit, viewing different photographic images such as 'Le Belvédère', 'Le salon de thé', and 'M. Diggle à la balustrade'. The last photographic image I looked at was that of Ms Grant (see Figure 4.12 in chapter 4) with the sun softly glowing through her image. It was here that I felt – though rather exhausted – that this 'museum visit' was working well.

This section has provided not only a view into what it is like to visit the MUM App exhibit but also continued to show the many actors that contribute to how the MUM App works in practice. As these accounts demonstrate, the App requires not only many technologies to work together for this 'museum visit' to happen, including the device's sensors, MUM's application code, radio towers, telecommunication service providers, GPS signals and so on, but also a host of other actors, such as the user, the weather, and the vast infrastructures that support the App and device. But for this 'museum visit' to happen, the user must do much more work than ever before. The user must take on not only the task of the 'museum visitor', but also those tasks normally accomplished by technicians, curators and other specialists (including security!) inside the museum. Users must first download and learn to use the MUM App, in a sense, configuring the museum display that they will then 'visit'. They must then use the App to find the images on display. They must further hold up the device to see the display, and move their body around to find the best way to superimpose the images on their device's camera view. They must resolve technical issues that arise. And they must ensure their own safety by looking out for oncoming cars while crossing the street and protecting their own property. There are also many things that the user must learn to ignore – distractions on the device, such as texts, calls and emails – and other activities made available in the city, such as shopping. To sum it all up, while the remediation of the MUM App has meant a redistribution of collections, technologies and bodies outside the Museum, it has also entailed a 'displacement' (Akrich, 1992; Latour, 1994) of museum tasks and responsibilities as well as skills required, which are in turn redistributed across this heterogeneous actor-network and its vast infrastructures. For users, this means they have more to

do to ensure the App works, as they must, in this case, perform tasks, skills, and responsibilities previously performed by museum curatorial, technical and security staff. For example, they must ensure collections are displayed in the best light, fix any arising technical issues and protect the equipment used. This is also evidenced in the participant accounts that will be discussed next, helping to also explain, here and later on (in Chapter 6), why participants called for 'more direction'.

Viewing Collections with MUM: Reconfiguring Subjects, Objects and Practices

Having recounted my own experiences with MUM, I have showed some aspects about how the App works in practice – specifically, in concert with an extensive set of heterogeneous actors that includes the device, body, city architecture, the weather, and so on. But as the visit to the museum is being reconfigured outside the museum, can it still be said to be a 'museum visit'? And is the user still a 'museum visitor'? This section begins by inspecting how objects, subjects and practices are (re)classified along with the transforming practice. To examine this the analysis draws from observations made while filming 11 participants – seven individuals and two couples – as well as a questionnaire answered by each participant, and explores the explanatory power of two concepts – 'communities of practice' and 'boundary objects' – as a way to analyse and explain how communities stabilise objects in sociomaterial practices. Here, 'museum visitors' may be considered as forming part of a 'community of practice' (Star and Greismer, 1989; Bowker and Star, 2000). To Bowker and Star (2000), each community of practice (or 'social world') is established through routine activities in relation to particular sociomaterial practices and to particular objects.[79] The 'museum visitor' is here understood as part of a community of practice that involves viewing collections in a physical museum. This case provides a view into what happens when 'museum visitors', as members of a community of practice, are redistributed outside the familiar arrangements that pertain to a

[79] The concepts of 'object' and 'community of practice' may be defined using Bowker and Star's definitions. According to the authors, 'objects' are those things, tools, artifacts, techniques and so on, that are consequential to the members of a community of practice (2000: p. 298). The community of practice is itself defined "according to the co-use of such objects since all practice is so mediated" (2000: p. 298).

physical museum (to use Goffman's (1959) term, a 'bounded region'), which may include a building in which collections are housed and viewed, display cases, docents, and so one, that provided a sociomaterial setting for stabilised (or stabilising, because as will be shown it is an ongoing process) practices. In these next accounts the iPhone device, through which the MUM App is necessarily used, will be considered as a 'boundary object'. As will be explained, as the 'museum visit' is taken outside the museum, the practice will slowly show itself as becoming a 'boundary practice' and the 'museum visitor' as becoming a 'boundary subject', in which case, the 'museum visit' and the 'museum visitor' both become contestable. The aim of the following accounts then is to show then how subjects and practices, as well as objects, are reconfigured together in the *doing* of the 'museum visit'.

I want to preface the following analysis by also noting that despite participants had not used the App in practice (see Table 3.1 in Chapter 3) they found the App 'easy to use'[80]. Further, most participants had visited the McCord Museum before[81] and were also at least 'somewhat familiar'[82] with the city. As was explained in Chapter 3 each participant was also given an explanation on how to use the App. Despite all this, the city 'museum visit' made some participants feel uneasy about viewing collections. Firstly, although participants had been prepped on how to use the App, they were still not quite sure how to 'visit' the collections. For example, here is the first question Participant 1 asked once she opened the App:

> Participant 1: So while I am walking with the App, am I supposed to look just at the dot? Or should I… it would show I guess 3D images as I am walking?

[80] Question 36 of the questionnaire asked, 'Was it *easy* to interact with the MTL Urban Museum App?' Eight participants selected 'yes'. Of those that did not, Participant 2 wrote in 'yes and no' (yes because it was 'clear to use', no because it was 'not easy to flip between 2D and 3D' and 'hard to walk in the city while looking @ phone'). Participant 9 wrote in 'inbetween' (citing it was 'a bit tricky') and Participant 11 selected 'no' (he wrote in that he needed 'more practice with touchscreens and iPhones generally', 'the GPS positioning is not as accurate', he was 'fighting with the device at times', 'the process began to feel somewhat exhausting rather than relaxing', and 'the cold weather (fingers) and bright sun (screen) resulted in some limitations to [his] enjoyment of the experience').

[81] Question 11 of the questionnaire asked, 'How often do you visit the McCord Museum? Only participants 3, 7, and 8 selected 'never' which makes me feel comfortable that most understood what at least the McCord Museum is about, including, what a 'museum visit' is like.

[82] Question 16 of the questionnaire asked, 'How familiar are you with Montreal?'. Six selected 'very familiar, four selected 'familiar' and one selected 'somewhat familiar'.

Researcher: It's up to you, how do you think you should use it?

Participant 1: I think if I look just at the dots, I miss all the outside. I miss the point.

After walking a little further, and viewing some more images, she began to strategise out loud about how she was going to use the App to visit the rest of the exhibit:

Participant 1: So I guess my strategy will be that I'm going to use this mode—pin mode [she pointed to the map view on MUM App] to get to the pin points and then once I get close, I'll put the 3D view pictures.

Some participants felt they had "never done anything like this" before. They found the experience not only uneasy but also "strange" and surmised that other people would find it "weird" also. Here is what two participants had to say:

Participant 2: …I've never done *anything* like this, so it's *strange*…

Participant 4: …And if someone were doing this around me, I'd probably feel a bit *weird*… (my emphases added)

They worried others would not understand what they are doing. They thought passersby would think they were filming or taking photographs of them:

Participant 1: I feel like people think I am filming them.

Participant 2: I don't want people to think I am filming them.

Participant 4: I think everyone is thinking I'm taking a photo of them.

Noticeably, passersby did not understand what the participants were doing. They began to wait for participants to finish 'taking photographs' or to 'duck out of the way' of the camera shot while walking past the device held out by participants. This only made participants more nervous, repeating how uncomfortable they felt.

Participant 1: People really think I'm filming.

Participant 4: I kind of get nervous that people think I am taking a photo of them or something…

Participants eventually had to address passersby:

Participant 2: I'm not filming you.

Participant 7: No. I'm not filming you, that's okay.

Participant 9: No. C'est correct, je ne suis pas en train de filmer. [Translation: No. That's fine, I'm not filming.]

Participant 10: "No, no, no… go ahead."

On one occasion, a passerby even asked a participant and myself whether we wanted our picture taken together!

Passerby: Did you want me to take a photo of you?

Recall also from my own accounts at the beginning of this chapter that I too had a similar experience with a man who had asked if I wanted my picture taken. I was about to decline this most recent offer too, but Participant 2 jumped in to respond before I could – feeling compelled to explain (or 'translate', Callon, 1999) what he was doing, he said:

> Participant 9: No. Actually I'm doing a *tour* museum type thing... 3D type thing… (my emphasis added)

In this moment Participant 9 "established himself as a spokesman" (Callon, 1999: p. 81) for the transforming 'museum visit' which he is now offering up as a 'tour'.

The iPhone device, here, also plays a pivotal role. Since it pertains to many different communities of practice, the device may be considered a 'boundary object' (Star & Griesmer, 1989; Bowker and Star, 2000; Haraway, 1997).[83] As Bowker and Star explain, "the creation and management of boundary objects is a key process in developing and maintaining coherence across intersecting communities" (2000: p. 297).[84]

> Boundary objects arise over time from durable cooperation among communities of practice. They are working arrangements that resolve anomalies of naturalization without imposing a naturalization of categories from one community or from an outside source of standardization… sets of

[83] As a smartphone device, the iPhone cues others to the particular practices the user may be doing. For example, the iPhone is known to be a 'phone' (when it is held to the ear or spoken into) but also: a camera (when it is held up and the screen is tapped); a texting device (when tapping the screen, often with thumbs); a music listening device (commonly when earphones are used); a gaming device (commonly when held horizontally); a device for finding directions (when held in hand while walking and looking up and down at the device), and a computing device for accessing the Internet or using various applications (when tapping on or keyboarding on the screen but generally sitting or standing in one place). These practices with smartphone devices, in turn, form communities of practice, as well as overlap with other communities of practice (for more on this see below).

[84] This also reflects Goffman's (1959) use of the term 'props' to depict a way in which things are used to manage impressions in his classic analysis in *The Presentation of Self in Everyday Life*.

> boundary objects arise directly from the problematics created when two or more differently naturalized classification systems collide. (Bowker and Star, 2000: p. 297)

Thus for Bowker and Star (2000) when boundary objects emerge, this sort of 'cultural maintenance work' must be undertaken.[85] And in this process, they see tools and material arrangements as always mediating activities.[86] As they note "people never act in a vacuum or some sort of hypothetical pure universe of doing but always with respect to arrangements, tools, and material objects" (Bowker and Star, 2000: p. 298). But subjects too can become marginalised, taking on what has been called in anthropological studies a 'marginal state' (Douglas, 1966). And, in this case, the practice too has altogether become marginalised. So when Participant 9 was explaining to the passerby that he was "doing a *tour* museum type thing... 3D type thing" he was also translating or managing a boundary object, the iPhone device, as well as a boundary subject, himself, and a boundary practice, the 'tour', across communities of practice. He did this by translating to others how the object was being used by him in a specific practice and for a particular purpose.

Marginality is not permanent. To Bowker and Star, "Something actually *becomes* an object only in the context of action and use; it then becomes as well something that has force to mediate subsequent action" (2000: p. 298). As Greismer and Star (1989) note, boundary objects are managed so that multiple communities of practice could exist and cohere. In some cases boundary objects do 'stabilise' but only the more the same practices are done. As the authors explain, each object has a 'trajectory of naturalization' in a community.

> Naturalization means stripping away the contingencies of an object's creation and its situated nature. A naturalised object has lost its anthropological strangeness. It is in that narrow sense desituated—members have forgotten the local nature of the object's meaning or the actions that go into maintaining and recreating its meaning. (Bowker and Star, 1999: p. 299)

[85] Haraway (1997) also notes the 'work' of maintaining boundaries. She states that in the case of scientists, "boundary maintenance, as well as splicing and joining, requires work, including, but not limited to, the semiotic, logical, and rhetorical work of convincing people who are both like and different from oneself; such labor is practice and culture in action" (1997: p. 67).
[86] As Goffman (1959) has also suggested, situations gain coherence not only through 'teams' but also with 'props'.

But whether an object will become naturalised is contingent:

> It is not predetermined whether an object will ever become naturalised, or how long it will remain so; rather, practice-activity is required to make it so and keep it so. The more naturalised an object becomes, the more unquestioning the relationship of the community to it; the more invisible the contingent and historical circumstances of its birth, the more it sinks into the community's routinely forgotten memory. (Bowker and Star, 1999: p. 299)

It is also contingent on the ongoing maintenance work of culture. For any boundary object to stabilise, Bowker and Star (2000) suggest more members must be enrolled in the forming community of practice. As they explain, members of a community of practice learn its categories, objects and practices.

> Learning the ropes and rules of practice in any given community entails a series of encounters with the objects involved in the practice: tools, furniture, texts, and symbols, among others. It also means managing encounters with other people and with classes of action. Membership in a community of practice has as its sine qua non an increasing familiarity with the categories that apply to all of these. As the familiarity deepens, so does one's perception of the object as strange or of the category itself as something new and different. Anthropologists call this the *naturalization* of categories or objects. The more at home you are in a community of practice, the more you forget the strange and contingent nature of its categories seen from the outside (Bowker and Star, 2000: p. 294-295, original emphasis)

Bowker and Star leave some uncertainty about this overall process by stating that membership in a community of practice "is a complex process, varying in speed and ease, with how optional it is and how permanent it may be" (2000: p. 294).

But this does not account for how, in this case, the more actors (including the participants) that were enrolled in the 'museum visit', both the practice and the subjects (the 'museum visitors') seem to become undone and to exist as something else. In other words, they become 'multiple' (Mol, 2003). Rather than considering what they are doing as a 'museum visit', participants understand this practice as a type of 'tour'. This, despite it is suggested that 'communities of practice' may extend beyond formalised institutions – such as the museum. As Bowker and Star explain, "A community of practice… is a unit of analysis that cuts across formal organizations,

institutions like family and church, and other forms of association such as social movements… These activities with their stuff, their routines, and exceptions are what constitute the community structure" (2000: p. 294). While communities of practice emerge, stabilise and exist by 'enrolling' members into their practices, in this case they are undone in the same way. This is evidenced by how passersby implied that what participants were doing was more related to tourism than museums. And it is also exemplified in how Participant 9 translated what he was doing as a 'tour'. Here are further accounts in which participants considered what they were doing was a 'tour'. In these exchanges, I had asked participants if they would use the MUM App again, and here is how they responded:

> Researcher: Would you use the App again?
>
> Participant 9: Definitely, *with tours*, new people coming to the area… (my emphasis added)

Here is what Participant 4 said when I asked her if she would use the App again:

> Participant 4: I figure it would be cool to do like a *tour* of Montreal, kind of following this. *A walking tour*. (my emphasis added)
>
> Researcher: … By yourself or with other people?
>
> Participant 4: Yeah, maybe by myself or with one other person.

So what is happening here? I think it is helpful to look at Mol's (2000) work, *The Body Multiple,* a study of lower-limb atherosclerosis in a Dutch university hospital. In her work, Mol (2003) explores the practices of 'doing' atherosclerosis in four locations of the hospital and, as Law explains,

> …what she find is that since the practices in each of these locations is each different, so too are the realities that these enact. In theory the disease is one (this is assumed if you read a textbook), but in practice it is not. Hence the oxymoronic title of her book, The Body Multiple. In practice the disease is more than one but less than many. The proposal, then, is that the world is not simply epistemologically complex. It is ontologically multiple too. Or to put it differently, the heterotopic lies within (2008: p. 636).

Mol's study shows us that 'objects' may be multiple. The case of the MUM App, however, exemplifies how 'subjects' and 'practices' can be multiple too. In this case not only are practices multiple – here the viewing of museum collections, or the 'museum visit', now taken outside the Museum, is considered a 'tour' – but subjects are multiple too – that is the 'museum visitors' is considered a 'tourist' outside the museum. As Bowker and Star explain, boundary objects are also associated with the location in which related practices are performed:

> It is in that narrow sense desituated—members have forgotten the local nature of the object's meaning or the actions that go into maintaining and recreating its meaning. (Bowker and Star, 1999: p. 299)

This is also exemplified in how the MUM App (and the Streetmuseum) may also be considered multiple. When the Streetmuseum was initially envisioned by Brothers and Sisters, it was as a 'public relations tool'. It was a way to promote the Museum of London's opening of the Galleries of London permanent exhibit. The MUM App too was also considered a 'public relations tool' at the McCord Museum, since they also timed the release of the App for the reopening of their own permanent exhibit, *Montreal – Points of View*. In this way we may say that objects, subjects and practices may be reconfigured (and reenacted) in multiple ways to form different realities – here location has played an important part. These reconfigurations are done on an ongoing basis. And so not only may contested objects, subjects and practices emerge but it also opens the possibility for them being 'otherwise'. In relation to the existence of 'a multiple reality' Mol proposes that "ontology is not given in the order of things, but that, instead, ontologies are brought into being, sustained, or allowed to wither away in common, day-to-day, sociomaterial practices" (2002; p. 6). Put another way, Mol suggests that "reality doesn't precede practices but is a part of them" (2002; p. 6). These realities "may be played off against one another", because importantly, "some will be preferable to others" (Law, 2008, p. 637). Realities and their reconfigurations (including their rescripting and reclassification) are thus done on an ongoing basis. This case also shows us how some realities gain prominence over others in particular circumstances, since the MUM App was not revealed as a 'public relations tool' to the public – not in the case

of the Streetmuseum, nor in the case of the MUM App – despite Brothers and Sisters, along with the Museum of London, and later the McCord Museum intended these two apps to serve that very purpose – to promote the museum's exhibits.

Rescripting the 'Museum Visit': How it Happens in Practice

In this case, not all participants used the App or viewed the collections in the same way. And this despite I had given the same general instructions to all participants before they employed the app – including a short explanation of how the App works and a recommendation of what path to take.[87] Firstly, there was a difference between how single participants viewed the collections with the App in comparison to couples. Couples (participants 5 and 6, and participants 10 and 11) had to share the device, so they either took turns or peeked over each others' shoulders as their partner held and manipulated the mobile device. Secondly, while all participants were able to similarly open the App and swipe and tap their way to the map view, from there participants viewed the collections in quite different manners. Some would switch back and forth from the map view to the 3D View while others, such as Participant 3, only stayed in 3D View. Some tapped images displayed in 3D View, which then displayed images in 2D View while others remained in 3D View the entire time. Participants 'experimented', pointing the device in all directions and sometimes viewing images in reverse as they got ahead of the spots where images were to be viewed. They tapped different parts of the screen to see if there were additional features. Some participants (2 and 7, for example) found that if you tapped the image while in augmented reality, the 2D View of the images would be displayed with a detailed description (which is available also by touching pins on the pinned card). But not all participants found this feature. Thirdly, not all participants performed this 'visit' / 'tour' in the same way. This is not an outcome of using digital media technologies to display and view collections. Even in 'physical' exhibits, museum visitors may choose diverse ways to visit an exhibit, as I found out while

[87] Recall from Chapter 3 that for practical reasons, including the amount of time expected of participants to engage in the study and considerations about the safety of participants, I suggested to each participant to follow a path from the McCord Museum to McGill University, around the campus and back to the Museum.

observing how visitors to the McCord Museum visited the permanent exhibit – Montreal – Points of View. Though the exhibit is set out in zones that are in chronological order, museum visitors often come in through the opposite end of the hall and see the exhibit 'backwards'.[88] Macdonald (2002) also found in her study of the Food For Thought exhibit at the Science Museum that visitors often saw the exhibit in their own way – slowly reading the information panels or speeding through the exhibit. This does not mean that the scripting of the 'museum visit' / 'tour' is done in the same way by each user every time either. Each participant examined the images on display in different ways, at times paying attention to their aesthetic qualities, and at other times, tapping the images to read the details about them.

But it is not only the users that vary in the ways they visit collections with the App, rather a wider set of heterogeneous actors also play a part in this ongoing rescripting process. For the 'museum visit' / 'tour' to even happen many actors – satellites, signals, architecture, code, bodies, mobile devices and so on – must work in concert. In some cases, actors may disrupt the practice or prohibit it from happening. Distractions were many as technologies, like mobile devices, rang or buzzed, drawing my own and participants' attention away from the App, as well as disrupting the research study. This was perhaps the most frequent (and most forgivable) disruption because the practice (and the study itself) involved the very same technology. The multiple functions of the iPhone device would often inhibit these performances, given that the device has been recast in so many ways – it is a 'phone', it is a 'messaging' device, it is a 'camera'. The weather too can either support or disrupt the rescripting of the 'museum visit' / 'tour' – making it either too cold to see the display since it takes place outside the Museum and since mobile devices must be constantly manipulated. Thus it may be the case that if this performance does stabilise to some extent, it may likely do so only as an activity for warmer months. Sunlight also supports or disrupts the rescripting of the 'museum visit' / 'tour' – the display must be seen during daytime, when its superimposition technologies work,

[88] As explained in Chapter 3, I asked 13 visitors to respond to a short questionnaire after visiting the Montreal-Points of View exhibit. Question 20 of the questionnaire asked participants: Did you visit the exhibit clockwise or counter-clockwise? Nine responded said that they visited it clock-wise, two counter clock-wise and two said both.

but if the sun is shining too brightly the App will not work, as was the case experienced by Participant 3. He had technical problems on a particularly sunny day, in which the camera display often showed a blank/black screen. Perhaps the best way to elucidate how intertwined this process is – between for example, the body, technologies, sun, weather – is to share Participant 11's telling description of his experience: "the cold weather (fingers) and bright sun (screen) resulted in some limitations to my enjoyment of the experience". This case shows that the rescripting of the 'museum visit' / 'tour' is done on an ongoing basis. But the way in which the performance is done varies from user to user and use to use, making its stabilisation that much more challenging, particularly as it also involves other actors too.

This performance of the 'museum visit' / 'tour' requires 'controlled' behavior of the user, but in some cases participants were totally 'out of control'. On one occasion a couple participating together, participants 5 and 6, were overtaken by their capriciousness and spontaneously started running in an unexpected direction taking them well off the suggested path of the study. Their surprising behavior came out of nowhere and required me to (awkwardly) race after them not knowing what they were up to (while trying to film the incident with my iPad). They found it amusing to disrupt the study and took several photographs of themselves using my iPhone (see Figure 5.20 and 5.21)! But this sort of erratic behavior on the part of users of this App is not limited to viewing collections with 'digital displays', it can also happen when museum visitors visit physical displays. As Macdonald (2002) has pointed out, in her study of the *Food for Thought* exhibition, museum visitors are 'active' rather than 'passive': they act in ways unanticipated by a museum, as well as understand a display in different ways[89] (this we also saw in Chapter 4 where some users of this App found the images and information presented political, whereas others did not).

[89] For example, Macdonald found that visitors to the Food for Thought exhibition at times damaged displays and when it came to understanding it they "constructively appropriate[d] the exhibition into their own cultural lists, and discuss[ed] it in relation to their own lives and interests" (Macdonald, 2002: p. 239).

Figure 5.20 Taking over the study

Source: Photograph taken by Participant 5 of Participant 6 using Ana-Maria Herman's iPhone. Image taken on December 7, 2012.

Figure 5.21 And proud of it!

Source: Photograph taken by Participant 5 of Participant 6 using Ana-Maria Herman's iPhone. Image taken on December 7, 2012.

Another participant landed this 'museum visit' / 'tour' in a completely different museum. While Participant 9 was viewing collections on the McGill campus, he came face to face with a historical image of the Redpath Museum[90] shown in augmented reality, as well as the actual Redpath Museum building standing behind the augmented reality projection. He immediately recalled visiting this Museum as a child, which incited him ask if he could go see if the dinosaur remains were still on display:

> Participant 9: Now I probably can't sneak in to look at the dinosaur, can I?

What was I to do - stand between this man and the dinosaur bones he remembered from the Redpath Museum? I told him to go ahead.

> Researcher: You can. Yeah, go for it.
>
> Participant 9: I can! I didn't know if that was… so is this the actual entrance?
>
> Researcher : Yeah, let's see if it's open. Usually it is and it's, ah, you can just walk right in. How long has it been since you've been here?
>
> Participant 9: Let's say I was 10 years old. So we're talking 50 years.
> …
> Participant 9: I remember a huge dinosaur.

[90] The Redpath Museum is a university museum on McGill's campus, which houses displays of fossils, animal skeletons and ancient artifacts in old-fashioned displays.

We proceeded into the Redpath Museum.

> Participant 9: This was the… Oh, look at that doorway… can I, can I take my camera out to take pictures?
>
> Researcher: Yeah, of course.

He continued up to the upper floor of the Museum (see Figure 5.22), into the main hall, and walked around the corner to see the dinosaur.

> Participant 9: Here it is.
>
> Researcher: There it is.
>
> Participant 9: This is what I remember. 50 years ago and it hasn't changed.

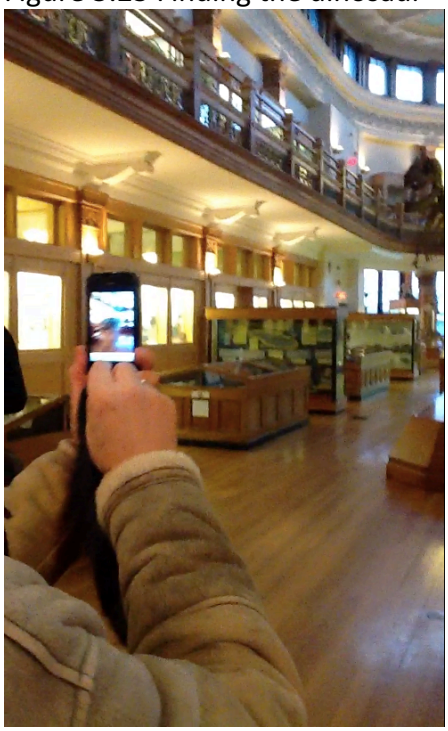
He then proceeded to take a picture of the dinosaur with his personal iPhone (see Figure 5.23) before becoming very emotional and tearing up.

> Participant 9: I'm a big sentimental type of guy.

Figure 5.22 At the Redpath Museum

Source: Ana-Maria Herman. Image video recording taken on December 14, 2012.

Figure 5.23 Finding the dinosaur



Source: Ana-Maria Herman. Image taken from video recording on December 14, 2012.

How interesting that this 'museum visit' / 'tour' made by one museum, the McCord, landed this performance in another museum entirely – the Redpath Museum! This is not an outcome that would be expected while performing a traditional 'museum visit'. No, this crossing of borders was made possible by reconfiguring the practice.

MUM's User Politics: Discriminating Devices

Various technologies have been shown to discriminate in practice. For example, it has been found that McDonald's restaurant discriminates against customers who have allergies to onions (Star, 1991) and that even door-closers discriminate against the elderly and the young, and even class-based practices, i.e. they discriminate against those that have low-paying jobs, such as delivery persons or movers (Latour, 1992). While the 'free' MUM App may be available to everyone, not everyone gets to try it out since it is only available for Apple device owners/users. In other words, the App discriminates against what devices it can be used on, but, in turn, the device discriminates against non-iPhone users, since not everyone can own or use these particular devices. As was described in Chapter 1, only a small percentage of mobile device owners have these specific devices and can therefore access the MUM App display. It also involves a level of socio-economic discrimination – as not everyone can afford the expensive Apple devices nor the pricey Canadian data plans, and so excludes those audiences that cannot pay for such plans. Another way in which the device discriminates is against those too young or too old or who have a disability that bars them from walking about the city. For disabled audiences a hike up 'Mont Royal' is impossible and even maneuvering around the park is far from ideal. A physical exhibition space in a museum, on the other hand, often accommodates for the accessibility needs of wider audiences. For example, the Museum provide 'lifts' (referred to as 'elevators' in Canada) for those unable to climb flights of stairs and ensures that spaces are clear for easy mobility. The McCord Museum also organises educational programs that bring schools of young children into the museum for inclusive activities and outreach programs with seniors' homes that engage the

elderly.[91] Such considerations that aim to include more audiences did not come up in interviews about the App, and, ultimately, did not deter the Museum (nor the Museum of London before it) from making these types of 'digital' displays. In part, this can perhaps be attributed to museums' belief in the common and taken-for-granted myth that digital media technologies make things more accessible for all.

While barring some users from its use, the mobile device, on the other hand, can participate in configuring its users. Here I want to draw from van Oost's (2003) study in which she examined how gender may be 'configured' through sociomaterial practices in a study on shavers. She found that shavers help to 'configure' users' femininity or masculinity as a result of how they are scripted (e.g. pink shapely shavers are for 'women' and dark rugged shavers are for 'men'). In a similar way, mobile devices can also be said to be scripted and help configure their users. This case shows that users may be reconfigured as 'professional' or 'not professional' based on the type of mobile device they use, as is exemplified in the next account. Participant 1 (who at the time was a lawyer working at a medium-sized law firm) was viewing collections on my iPhone device, when she asked me if the MUM App cost anything to download, and I responded that it was free. To which she stated:

> Participant 1: It's only for iPhones though, doesn't work for *professionals*.
>
> Researcher: Do *professionals* tend to use other…?
>
> Participant 1: Well, lawyers its mostly Blackberries, it's not really a choice.

Being an iPhone owner (and using it for this research study), I momentarily questioned whether she thought I was professional or not. In any case, this configuration of the user, however, is not fixed – it can be changed. As the next exchange with Participant 1 confirms, law firms may soon adopt the iPhone...

> Participant 1: *Although it looks like firms are really moving towards the iPhone...* (emphasis added)

[91] At the McCord Museum, they have a dedicated staff member, the Head, Education programs, that designs such educational and out-reach programs. For example, one program involves 'memory boxes' in which elderly individuals are coupled with students in a 'memory' sharing program triggered by the manipulation of the Museum's material collections.

So we see here that devices mediate how subjects are reconfigured in relation to objects they use on an ongoing basis – it is not fixed and so it can be otherwise. As Participant 1 indicated, interventions can be made through, in this case, institutional changes. But it is important here to note that this analysis does not suggest 'use is the desired norm' (as Wyatt 1999 also warns; see Chapter 2). Rather it points to how reconfigurations are political. This case demonstrates that mobile devices are political in two ways: in the way that they discriminate against particular non-users and the way in which they may participate in reconfiguring subjects, their users.

Conclusions

This chapter examined how the MUM App participates (among other actors) in the reconfigurations made possible by its deployment. The case analysed the roles of diverse actors in how the 'museum visit' was in this case rescripted and how objects, subjects and practices were then reclassified. To begin, the first section examined the actors, negotiations and entanglements involved in making the App work in practice. This analysis revealed the vast infrastructures – from the city's electrical grids to telecommunications service providers to US military satellites in space – in which the App is embedded and thus the precariousness of performing museum practices with digital media technologies that act along with such extensive infrastructures. By further inviting you, the reader, to revisit with me six short diarised accounts the analysis next outlined what it is like to view the Museum's collections with the App – particularly outside the Museum and across the six zones of the city where digital images are on display. These accounts further unveiled, step-by-step, the heterogeneous actors involved in making this practice work – including software code, bodies, mobile devices, architecture, historical images and so on – as well as a host of unexpected actors, such as the weather and the sun. The analysis also showed that the remediation of MUM involved not only an 'experimental' redistribution of collections, technologies and bodies outside the museum, but also a 'displacement' of museum tasks, skills required and responsibilities across the App's extensive actor-network and vast infrastructures.

For users, this means that they have more to do in practice to ensure that this 'museum visit' / 'tour' happens. In particular, they must in this case perform tasks normally performed by museum curatorial, technical and security staff - such as ensure collections are displayed in an appropriate light, fix any arising technical issues, and protect the equipment that is being utilised in this practice.

The second section then turned to how things are reconfigured in practice – that is, how the 'museum visit' is rescripted and museum-related objects, subjects and practices reclassified. Here, the analysis drew on the participant study. The analysis first showed that while the App may be inscribed with a 'program of action' at the time of its (re)making, participants viewed the collections in different ways thereby rescripting the 'museum visit' in various ways and on an ongoing basis. For example, some flipped back and forth from the pinned card to the 3D View, mapping their routes along the way, while others remained in 3D View waiting to be delighted by what could appear along their path. The analysis then turned to the issue of reclassification – examining why participants considered the 'museum visit' a 'tour' and why passersby confused participants with 'tourists'. In relation to these findings, the analysis explored two concepts for their explanatory power – communities of practice and boundary objects – explaining how practices and objects stabilise in relation to the enrollment of more actors. But this study also showed that practices and subjects, as well as objects exist as multiple (Mol, 2003). In this case, while the practice of viewing collections exists as a 'museum visit' inside the Museum it exists also as a 'tour' when performed in the city. And the 'museum visitor' that views collections inside the Museum is here also a 'tourist' when viewing collections outside the Museum's wall. Further, the MUM App too can be said to be multiple – configured initially as a 'public relations tool' (developed to promote permanent exhibitions at museums), but also marketed to the public at large as a novel display. As reconfigurations are ongoing, the way in which these subjects, objects and practices will be "enacted, enacted and enacted yet again" (Law, 2008; see also Mol, 2003) in the future remains uncertain. Lastly, the third section examined the politics of displaying and viewing collections outside the museum using apps. It is found that the app discriminates, via the mobile device, against non-users (including those that

are too young or too old or too poor) and, at the same time, participates in reconfiguring those that do use the App (in this case, as 'professional' or not).

Overall, this case shows reconfigurations are made as, Suchman (2007) points out, on an ongoing basis, and that the outcomes of these processes are always uncertain. The observations made above thus have implications for particular theories. Firstly, while domestication theory (discussed in Chapter 2) implies that technologies may in fact be 'domesticated', presuming, as such, that they may be controlled, this case challenges that notion. The App has a complex actor-network and relies on a vast infrastructure to work. And so it is challenging to even imagine how such complex sociotechnical arrangement may be controlled, let alone domesticated. It is amazing that the App even works as it does – with all its issues and glitches. Furthermore, given reality has been here shown to be multiple rather than singular this means that we must pay attention to what Mol (1999) calls 'ontological politics', which, on the one hand, is to say that more attention must be placed on the politics of how particular objects, subjects and practices are reconfigured in multiple ways so as to uncover how we may 'interfere' in these politics (Mol, 1999). But, on the other hand, we may also say that since objects, subjects and practices are not only *performed* in multiple ways but also *exist* as multiple, the 'domestication' of digital media technologies becomes an even more complicated and problematised notion. This is even more the case as spaces too may be considered 'heterotopic' (see Chapter 2) – which leads in to the next chapter that analyses how spaces are reconfigured.

6 Navigating and Managing the Display: On Reordering and Rewriting Spaces

The present chapter looks to respond to the third research question: *how are urban spaces reordered and rewritten along with the MUM App?* This chapter builds on the analyses of the previous two chapters. Chapter 4 examined *how, and by whom and what, was the MUM App (re)made?* The analysis uncovered aspects of the App's actor-network and the infrastructures it is embedded in by 'reconstructing' the (re)making of the App, tracing how it emerged through a process of remediation. Chapter 5 examined *how the 'museum visit' is rescripted along with the MUM App and how are subjects, objects and practices reclassified along with this changing practice.* The analysis revealed additional aspects of the App's actor-network and infrastructures post-deployment, i.e. when the App is used in practice, and thereby pointed to how a vast number of heterogeneous actors participate in the ongoing reconfigurations of subjects, objects and practices. Furthermore, these chapters have explained that the deployment of MUM and its use in practice has meant not only an 'experimental' redistribution of collections, technologies and bodies outside the museum but also a 'displacement' of tasks, skills required and responsibilities across the actor-network and infrastructures. Following this, we may now ask: how are *spaces* reconfigured and what role does the MUM App play in this process?

This chapter responds to this question by analysing how the actors uncovered in previous analyses (among others) participate in two processes: 1) the reordering and rewriting of urban spaces – such as parks, streets and a university campus – as places to view the Museum's collections and 2) the management of the App and its display spaces using a feedback process established with Google Analytics dashboards. The first section of this chapter begins to examine how urban spaces are reordered and rewritten as places to view Museum collections by focusing on two distinct practices made possible with the App – 'navigation' using the pinned card (or map view) and the 'display' of collections using the 3D View (or in augmented reality). In considering the App's navigational aspects the analysis also assesses the claim that digital media technologies are increasingly 'directing' urban spaces (Thrift and

French, 2002; see also Chapter 2). The study shows that the App does participate in reordering and rewriting spaces as places to view collections. On this note, apps are shown as increasing the possibilities for how spaces may become 'heterotopic' (Hetherington, 1999) – rewritten with the use of digital media technologies. But the case also shows that the App, while *participating* in reordering and rewriting space, does not *direct* that space since it cannot direct all actors involved, in particular the users who often asked for *more* guidance and *more* direction. The second section of this chapter examines the management of the App and its display by Museum staff through a feedback process established using Google Analytics dashboards. Here, the claim that software allows for the 'automated management' of society (Kitchin and Dodge, 2011) is explored. The analysis shows that this feedback process, while providing Museum staff with an unprecedented amount of data, is at the same time difficult to make meaningful because reports remain cryptic. As such staff cannot act upon the data collected, and the dashboards are rendered 'ineffectual' for decision-making processes related to the App. The analysis further reminds us that even if the data could be made more meaningful the under-resourced Museum would still be challenged to act upon the information without additional funding opportunities.

Reordering and Rewriting the City: Navigating and Viewing the Display

This section examines how spaces are reordered and rewritten along with the MUM App (among other actors) drawing on observations made during the participant study. The first subsection focuses on how spaces are *reordered* by analysing a specific aspect of the MUM App: the pinned card (or its map view). Here, it is suggested that the pinned card must be considered as what November et al. (2010) call a 'navigational platform'. Understanding the pinned card as a navigational platform allows the analysis to explore claims made by spatial theorists, such as Thrift and French (2002), that digital media technologies are increasingly directing urban spaces (see also Chapter 2). Following this, the second subsection explores how spaces are *rewritten* along with MUM – what spatial theorists call the 'transduction' of space or a 'code/space' (Kitchin and Dodge, 2011) – by inspecting the 3D View (or augmented reality) feature of the App. It is suggested that by

displaying collections in augmented reality the App participates in rewriting spaces as places to view collections. This shows how digital media technologies, and particularly apps, may increase the possibilities for how spaces may be reimagined.

Using the App as a Navigational Platform: Reordering Spaces with MUM

As was explained in Chapter 1, one of the MUM App's main features is the pinned card. The pinned card displays 'pins' on a dynamic map image to indicate where the user is located in relation to where collections may be displayed. It may then be employed by users to navigate to specific locations across the city. For November et al. (2010), such 'digital maps' have changed the mapping experience.

> While in precomputer times ('BC', as geeks say) a map was a certain amount of folded paper you could look at from above or pinned down on some wall, today the experience we have of engaging with mapping is to log into some databank, which gathers information in real time through some interface (usually a computer). Printing has become optional. The paper map, which was so central to the mapping experience, is now just one of the many outputs that the digital banks may provide, something we can switch on or off for convenience – just as we do with our printer – but that no longer defines the whole enterprise. (November et al., 2010 p. 583)

While a 'digital map' still offers some similarities with the paper map, they can also present unexpected information, such as advertisements and moving images that, while these could have been available in 'BC maps', would have been printed separately or added as a separate medium. The difference is that "[n]ow, because of the digital compatibility of all those heterogeneous forms of media, they can be entered in similar types of databanks and be made available according to your queries and recalculated every time in real time" with the added bonus of users adding personal information to the databanks (November et al., 2010 p. 583). Thus, "digital technologies have reconfigured the mapping experience into something else": a 'navigational platform' (November et al. 2010: p. 583). These navigational platforms are characterised by the presence of: databanks, an interface (for data retrieval, handling or calculation), a dashboard for users and many outputs customised for diverse users (with one output being a paper printout). So looking at a map means 'logging into a navigational platform' (November et al. 2010: p. 584).

But, thinking through 'digital mapping' provides an occasion to also "realize how much the older BC mapping was *already providing its users with all the benefits of a navigational platform*" (November et al. 2010 p. 584; original emphasis). For November et al., maps have always been navigational platforms since they were always "a rather complex and variegated *interface of calculation* for navigational purposes" (2010 p. 584; my emphasis), what can also be considered a 'center of calculation' (Latour, 1987). As such, the mapping impulse has always had six essential features – including acquisition of data, data management, recalculation of data, printout, signposts and navigational usage. The difference for November et al., however, is that 'digital' navigational platforms have accelerated these moves where the "net result is to have made more salient the presence of this long chain of production that existed already in the past" (November et al., 2010 p. 584).

> In other words, if you could easily forget the masses of institutions, skills, conventions, and instruments that went into the making of beautifully printed atlases it is much more difficult to do so now that we are constantly reminded of the number of satellites presiding over our GPS, of the sudden disappearance of network coverage, of the variations in data quality, of the irruption of censorship, of the inputs of final users in sending data back and so on. As usual, far from increasing the feeling of dematerialization, digital techniques have *rematerialized* the whole chain of production. (November et al., 2010: p. 584; original emphases)

It is thus rather impossible to ignore today the "long and costly chain of production that requires people, skills, energy, software, and institutions and on which the constantly changing quality of data always depends" (November et al., 2010: p. 584).

By outlining how the pinned card meets November et al.'s (2010) list of essential features for the 'mapping impulse' we may see not only that the pinned card is a form of 'digital map', which is to say a navigational platform, but also serves to unveil its 'long and costly chain of production'. One characteristic of 'digital maps', or in this case the pinned card, is that they 'acquire data' – and the pinned card does so by drawing data that is not only written into the App's code but also collected and transmitted through the device and the vast inter-connected infrastructures that it communicates with, such as GPS, radio towers, telecom service providers, device

sensors and so on (see Chapter 5). A second characteristic is the 'management of data'. In this case, data is moved by the App and the device's operating system (iOS) as needed or can be stored when necessary directly onto the device. The data collected by the App (as will be discussed below) can also be communicated to other platforms, such as Google Analytics, for management purposes. A third characteristic is the 'recalculation of data'. Here, for example, data about the device's location (its geo-locational positioning) is calculated in order to display the location of the user in relation to that of the collections. A fourth characteristic is the 'printout'. Though a printout is not made directly available through the device, some do allow for screen shots (which may be emailed and printed using other devices). A fifth characteristic are the 'signposts'. These may be, for example, street names written onto the elements displayed on the pinned card that may correspond to those that are displayed around the city. The final characteristic is the actual 'navigational usage' of the pinned card, and here, of course, the pinned card is provided so that users may navigate to specific sites of the display. But how does the pinned card (along with these other actors) participate in the reordering (and rewriting) of urban spaces?

When the pinned card is engaged by users as a 'navigational platform' the App participates in the reordering of spaces by redistributing bodies (such as the users), objects (including the digitised collections), devices (such as the iPhone as a display) and other technologies (such as the application code of the MUM App), as well as practices (the viewing of collections) across the city (see also Chapter 5). This process of redistribution may also be explained as a 'mobilisation' (Latour, 1986). Through this redistribution or mobilisation of actors, city spaces may be reordered, albeit, contingently and precariously. This reordering of space is contingent in the first place on users already having or acquiring a suitable device (an iPhone, iPad or iTouch) and a data plan. It is also contingent on the device, as the battery of the iPhone, for example, must by charged. Furthermore, it is contingent on the information received from GPS and the calculations made by the app, which must have a good level of accuracy if a user is to navigate across the city by 'aligning several successive signposts along a trajectory' (November et al., 2010). There is no guarantee they will necessarily come to view all or any of the collections. This is because, on the one

hand, the collections are spread out across a large city centre and users must at times transport themselves to hard-to-reach places, like hiking up Mont Royal. They must also avoid distractions such as other activities (for example, other museums) and other device features (for example, incoming calls, emails and texts). It is precarious because as was explained in Chapter 5, many more actors must work to make this 'museum visit' / 'tour' happen (see Chapter 5). Further any technical glitches must be fixed by the user – be they caused by the sun or by GPS – and they will need to decipher what to do on their own. The experience may also be hampered, even stopped, if the weather does not collaborate, for example, if it is too cold. But, even if all these issues are avoided and the pinned card works as it should this practice, as in a 'physical' museum, still relies most on the user – who, by rescripting the practice on an ongoing basis, employs the App in different ways.

Recall from Chapter 5 that participants formed 'strategies' on how to use the App. Participant 1 stated hers explicitly:

> Participant 1: So I guess my strategy will be that I'm going to use this mode [pointing to the pinned card]—pin mode—to get to the pin points and then once I get close, I'll put the 3D view—pictures.

Further, while most participants did use the pinned card as a way to navigate to city locations where collections could be displayed, some did not. For example, once Participant 3 went into 3D View, he did not return to the pinned card until the very end of his 'museum visit' / 'tour'. Instead, he seemed to rely on the directions that I had given him in advance, i.e. to walk from the Museum to the McGill campus before coming back to the Museum. Without looking at the pinned card while he was walking about, Participant 3 instead pointed the device in all directions waiting for images to pop up into view and beckon him over for a closer look. Overall, the study thus suggests that while the App's pinned card, as a navigational platform, participates in reordering spaces, it is only one of many other actors that *negotiate* the practice to happen. Here, it is only in concert with other heterogeneous actors, and particularly the user, that spaces are reordered. When spaces are reordered in such ways, places may also be said to be rewritten. The next subsection examines

this process further by analysing how the MUM App (along with its actor-network and infrastructures) participates in co-producing 'code/space' or rewriting spaces.

Using the App as a Display Platform: Rewriting Places with MUM

This section is concerned with how the MUM App participates in rewriting space, what Kitchin and Dodge (2011) call the 'transduction' of space into a 'code/space'. To examine this process, this section focuses on another aspect of the App – its 3D View feature, which allows for collections to be displayed in augmented reality. To understand how spaces may be rewritten the App must also be understood as a 'display platform'. Recall (from chapters 1, 4 and 5) that when users select the 3D View button on the lower right hand corner of the pinned card, the App displays photographic images in augmented reality – as superimpositions onto 'real views' using the device's camera. When users view collections in this way we can say they are employing the App as a 'display platform'. It is in this act that the thesis suggests spaces are rewritten into places for viewing collections, and also 'transduced'[92] as 'code/space'. For Kitchin and Dodge, "[c]ode/space occurs when software and the spatiality of everyday life become mutually constituted, that is, produced through one another" (2011: p. 16). For example, McGill University's 'campus' – considered as a space where one can expect to see students walking to academic buildings or picnicking on the green spaces provided – is, in this case, transduced through the use of the MUM App as a place to also view museum collections. For Kitchin and Dodge (2011), spaces that are co-written by software in this way must be understood as firstly, a 'coded assemblage' and, secondly, as what they also call a 'code/space'. A 'coded assemblage' occurs "where several different coded infrastructures converge, working together – in nested systems or in parallel, some using coded processes and

[92] Kitchin and Dodge explain the process of 'transduction' in the following way: "Software… alternatively modulates how space comes into being through a process of transduction (the constant making anew of a domain in reiterative and transformative practices). Space from this perspective is an event or a doing—a set of unfolding practices that lack a secure ontology—rather than a container or a plane or a predetermined social production that is ontologically fixed. In turn society consists of collectives that are hybrid assemblages of humans and many kinds of nonhumans (Latour 1993), wherein the relationship between people, material technology, time and space is contingent, relational, productive and dynamic." (2011: p. 16)

others not – and become integral to one another over time in producing particular environments" (Kitchin and Dodge, 2011: p. 7). For Kitchin and Dodge, "any space that is dependent on software-driven technologies to function as intended constitutes a code/space" (2011: p. 17). Kitchin and Dodge (2011) illustrate the process of transduction through 'code/space' by pointing to the example of the supermarket that depends on automated purchasing systems. If the purchasing system stops working for such a supermarket, it can no longer sell its products and thus cannot function as a 'supermarket'. According to Kitchin and Dodge (2011), some 'code/spaces' are *territorialized* (such as in the case of the supermarket) or *deterritorialised* (such as in the use of mobile devices which, while having some restrictions, are used almost anywhere, such as at home or on train).

So when the MUM App is used as a display platform, we can say, along with Kitchin and Dodge, that city spaces outside the Museum – such as streets, parks and a campus – are *rewritten* into 'code/spaces', that is 'transduced' as places to view museum collections. When spaces are rewritten with the App, it does not entail a *reclassification* of these spaces – for example, the McGill campus does not here become a museum.[93] This is in part because of, as Participant 3 remarked, the 'ephemeral' aspect of this practice. Even in Hetherington's (1996) example of 'Stonehenge' as a 'heterotopia' it retains its name whether it is visited as a museum or for a festival. So when spaces are rewritten, they are not always necessarily renamed. Here, the 'code/space' produced is in one sense *deterritorialised* because while being a museum-related activity it occurs outside the Museum.[94] Each time the 3D View is used to view images, a code/space is produced – a place for viewing collections. This 'code/space' relies on the App (as well as its actor-network and infrastructures) for spaces to be 'transduced'. If the App, its actor-network or infrastructures fail, these spaces – streets, parks and a campus – cannot be used for the additional practice of viewing collections. Thus transduction does not mean a

[93] In other words, in this case, there is no evidence of the 'museumification' of the campus spaces (see Gendreau, 2009).

[94] Though, in a sense, it is also 'reterritorialised' since collections may be viewed only in specific places based on specific geo-locational and geo-spatial information encoded in the App.

deterministic relationship between software and space. As Kitchin and Dodge explain, the

> …relationship between software and space is neither determinist (that is, code determines in absolute, nonnegotiable means the production of space and the sociospatial interactions that occur within them) nor universal (that such determinations occur in all such spaces and at all times in a simple cause-and-effect manner). Rather, how code/space emerges through practice is contingent, relational, and context dependent. Code/space unfolds in multifarious and imperfect ways, embodied thought the performance and often unpredictable interactions of the people within the space (between people and between people and code). Code/space is thus inconsistently transduced; it is never manufactured and experienced in the same way (2011: p. 18).

This inconsistency and unpredictability can be observed in practice by examining how different users employ, and are sometimes frustrated by the App.

As suggested above, the transduction of city spaces has its challenges. This is because the process of reordering and rewriting space does not only involve an extensive network of actors, vast and complex infrastructures, and the redistribution of actors, but also the displacement and (re)delegation of tasks. To explicate this process, it helps to first provide an analogy between a 'physical' museum exhibit space and a 'code/space' accomplished along with the MUM App. In a 'physical' museum exhibit, 'physical' objects are traditionally, and still often today, installed and exhibited in fixed display cases (including 'digital' objects that may be presented in affixed devices). 'Physical' (or 'digital') objects in such a 'physical' exhibit space will have been carefully laid out. For example, curators may have chosen where to display particular objects and lighting technicians may have decided the type of lighting required to illuminate the objects on display. If there is a technical issue – for example, if a device needs to be replaced, a technician will be called. Thus, we can say that actors involved in making 'physical' displays each have particular roles or tasks delegated to them. When a museum visitor enters the space of a 'physical' exhibit, the visitor does not need to arrange how the objects must be viewed (as the curator has already done so), nor establish optimal lighting (as the lighting technician has completed this task), nor fix any devices that may have broken down (as a device technician takes care of this too). But all these tasks which are often accomplished

'behind the scenes' are, in this case, (re)delegated to other objects, bodies and technologies and so displaced across the App's actor-network and infrastructures.

In the case of viewing collections with the App it is found, firstly, that users are delegated tasks previously done, in the case of 'physical' exhibits, by other *human* actors. The user must here not only act as a 'museum visitor' / 'tourist', but also as a 'curator' and a 'technician'. For example, users act as curators when they must find the best position in which to view 'digital' objects. Because users hold up the display, they act not only as curators but also as technicians. As Participant 3 remarked on his visit, "I think the sun is affecting the program, in the shadow it works quicker". As such, participants often stood in one spot shifting the mobile device up and down, and from left to right, adjusting the lighting and sometimes diagnosing technical issues. Tasked with such roles, some of the participants sooner or later became frustrated while attempting to superimpose the objects on display. They circled around particular locations, moved the device up and down, left and right – all in an attempt to get the objects to superimpose properly. As Participant 1 stated while looking at a 3D object: "Now I have the James McGill monument, and I'm probably not in the right place to see the picture, because the monument is here [indicating with left hand] and I am looking this way [pointing ahead]". When answering the questionnaire, Participant 11 let his frustration be known in his telling comment, "I felt like I was fighting with the device at times". This is because users must know (or learn) how to use not only the App but also, in some cases, the iPhone. As Participant 11 remarked while viewing collections, "We're not only learning the App, we're also learning the phone!" Viewing collections in just the 'right place' is further challenged by the inaccuracy of the App's location-awareness technology in urban centers. This is because *human* curatorial and technical tasks have also been displaced and thus (re)delegated to *nonhumans* – to the device and App, as well as aspects of the infrastructures they are embedded in (see also below).

We find, secondly, that the user must also perform the roles that *nonhuman* actors perform in 'physical' exhibitions. For example, in this case, users are required to hold the device up, a task often performed by a 'physical' stand in an exhibit. Thus roles in

this case have been displaced and (re)delegated not only from *humans* to *humans* but also from *nonhumans* to *humans*. One participant (9) seemed surprised that she would need to hold up the device to see the collections. When she first began to use the App, she asked me: "I don't have to have the camera up, do I? For it to show things?" *Yes* – I thought – *indeed you do*! In order for the App to display the photographic images in augmented reality, the user must hold up the device. Thus, we can see in this case that as actors are redistributed by innovative technologies, tasks are also displaced and thereby (re)delegated across heterogeneous actors who must (learn to) perform tasks previously performed by other actors – in this case, often the 'invisible' back-stage work of the curators, technicians and security at the Museum. Tasked with so many things to do, some participants were often confused and even at a loss as to how to perform the visit. This is perhaps another reason why (or rather *how*) participants felt 'confused', as if doing something 'strange'.

Nonhumans may also take on tasks that were previously delegated to other *nonhumans*. For example, since the display of collections happens outside the museum and in the city, the viewing of collections depends not only on the device's use of artificial lighting but also on natural light – thereby (re)delegating lighting tasks to the sun. Further, the task of encasing objects, usually performed by a 'display case', is also here displaced, (re)delegated to the mobile device. These types of displacements often resulted in an inconsistent experience that also made the entire practice rather precarious. Diverse actors are here involved in displaying collections and if one fails to work 'just so', the entire experience is impoverished. For example, GPS coordinates, tasked here with providing information about where the devices are located and where collections are on display, often fell short (as I described in my own account in Chapter 5 when the blue pin on the pinned card showed me inside the Museum instead of outside the Museum where I was standing, see Figure 5.2). Inaccurate geo-locational readings also meant that images displayed in augmented reality misaligned, making for a poor 3D View navigational experience. And pins on the pinned card at times 'fluttered' making for a poor map reading. The device, tasked here with acting as a sort of display case, could also malfunction, and it did. For example, recall in Chapter 5 that when I used the iPhone,

the ‘digital shutter’ on the camera failed to open and in another case the ‘exit’ button on the display screen failed to appear, locking the screen in augmented reality mode (see Figure 5.10 and 5.11). Participant 4 said she saw a ‘green square’ on the screen twice while using the App. Though Museum staff did try to find the culprits behind these glitches, these issues are here suggested to be ‘relational effects’ produced not only by the ‘failings’ of one particular actor, such as the App, or the user, or any other actor in the App’s network, but rather by another ‘effect’ of the negotiations of actors, in a practice that has redistributed bodies, objects and devices and, as such, displaced tasks across a vast set of heterogeneous actors.

Is the MUM App Directing Space or Not?

This section assesses the claim that software is ‘directing’ space. In their paper entitled *The Automatic Production of Space*, Thrift and French (2002) argue that software consists of a series of ‘writing acts’ whose “voice is increasingly heard in everyday life as software achieves presence as ‘local intelligence’” and as it is increasingly responding to human characteristics (p. 310-311). Yet it also has the quality of ‘absent presence’ and so, despite its ubiquity in urban spaces, has gone almost unrecorded for four reasons:

> First, software takes up little in the way of visible physical space. It generally occupies micro-spaces. Second, software is deferred. It expresses the co-presence of different times, the time of its production and its subsequent dictation of future moments. So the practical politics of the decisions about production are built into the software and rarely recur at a later date. Third, software is therefore a space that is constantly in-between, a mass-produced series of instructions that lie in the interstices of everyday life, pocket dictators that are constantly expressing themselves. Fourth, we are schooled in ignoring software, just as we are schooled in ignoring standards and classifications (Bowker and Star 1999). Software very rapidly takes on the status of background and therefore is rarely considered anew. (Thrift and French, 2002, p. 311)

Further, the authors point out that “software is more like a kind of traffic between beings, wherein one sees, so to speak, the *effects* of the relationship” (Thrift and French, 2002, p. 311, original emphasis). Following Thrift and French, other spatial

theorists, such as Kitchin and Dodge (2011), suggest that to understand the implications of software researchers must look at its relationship with space.

In *Code/Space: Software and Everyday Life*, Kitchin and Dodge (2011) argue that over the last thirty years or so software[95] has increasingly infiltrated objects, processes and spaces, having a profound influence on everyday life. As the authors point out, while software has executable properties that do not provide it sentience or consciousness, they do allow it "to exhibit some of the characteristics of being alive" (Kitchin and Dodge, 2011: p.5). They point to Thrift and French who also describe software (in the form of ubiquitous computing) as "somewhere between the artificial and a new kind of natural, the dead and a new kind of living" (Thrift and French 2002 in Kitchin and Dodge, 2011: p. 5). For Kitchin and Dodge, these properties mean that "code can make things do work in the world in an *autonomous fashion*—that is, it can receive capta and process information, evaluate situations, make decisions, and, most significant, act without human oversight or authorization" (2011: p.5, my emphasis), what they note as 'secondary agency' (the term is Mackenzie's in Kitchin and Dodge, 2011: p. 5). They agree that as software is invisibly embedded into everyday life[96], this 'technological unconscious' often goes unnoticed until something performs incorrectly or fails (Thrift 2004 in Kitchin and Dodge 2011: p. 5). Considered in this way, Kitchin and Dodge (2011), like Thrift and French (2002), suggest that code is not only 'infiltrating' and therefore 'co-constituting space' but also increasingly mediating life. "Taken together, coded objects, infrastructures,

[95] For Kitchin and Dodge software "is diverse in nature, varying from abstract machine code and assembly language to more formal programming languages, applications, user-created macros, and scripts" (2011: p. 4).

[96] Kitchin and Dodge see "software as embedded in everyday life at four levels of activity, producing *coded objects, coded infrastructures, coded processes* and *coded assemblages*. *Coded object*s are objects that rely on software to perform as designed" which can be divided into further classes as coded machine-readable objects such as DVDs and coded objects that rely on software embedded within to perform, such as networked vending machines. (2011: p. 5) "*Coded infrastructures* are both networks that link coded objects together and infrastructures that are monitored and regulated, fully or in part, by software" such as computing networks, utility networks or financial networks. (2011: p. 6) "*Coded processes* consist of the transactions and flows of digital capta across coded infrastructure. Here the traffic is more than rudimentary instructions to regulate coded objects within an infrastructure; rather, the flows are structured capta and processed information" (2011: p. 6). "*Coded assemblages* occur where several different coded infrastructures converge working together—in nested systems or in parallel, some using coded processes and other not—and become integral to one another over time in producing particular environments, such as automated warehouses, hospitals, transport systems and supermarkets" (2011: p. 7).

processes, and assemblages mediate, supplement, augment, monitor, regulate, facilitate, and ultimately produce collective life" (Kitchin and Dodge, 2011: p. 9).

Thus, Kitchin and Dodge place emphasis on the importance of considering space when attempting to understand how ubiquitous computing contributes to the 'social-material production of everyday life' (2011: p. 13). To the authors,

> Space is not simply a container in which things happen; rather, spaces are subtly evolving layers of context and practices that fold together people and things and actively shape social relations. Software and the work it does are the products of people and things in time and space, and it has consequences for people and things in time and space. Software is thus bound up in, and contributes to complex discursive and material practices, relating to both living and non living which work across geographic scales and times to produce complex spatialities. From this perspective, society, space, and time are co-constitutive—processes that are at once social, spatial, and temporal in nature and produce diverse spatialities. (Kitchin and Dodge, 2011: p. 13)

Thus, "[s]oftware matters because it alters the conditions through which society, space, and thus spatiality, are produced" (Kitchin and Dodge, 2011: p. 13). While Kitchin and Dodge, do not see software as determining spaces (see also below) they agree with Thrift and French (2002) that since software is increasingly involved in 'writing space', it is as a result increasingly 'directing' these spaces (Thrift and French, 2002). This is suggested by Kitchin and Dodge (2011) when the say that software is increasingly involved in the 'automated management' of society. But can software direct spaces? Do digital media technologies increasingly control societies?

The case of the MUM App would suggest not. While this study has shown that the App (along with actors in its network and its related infrastructures) participates in reordering and rewriting urban space – there are also many unexpected actors, such as the sun (sunlight) and weather (extreme cold) that also participate in either co-constituting such 'code/space' or hindering it from happening. Further, the experience of navigating and viewing collections with the App leaves the user with much to do. As was explained in Chapter 5, participants often *looked to me* for more direction on how to use the MUM App. Such as in the case of Participant 1:

> Participant 1: "So while I am walking with the App, am I supposed to look just at the dots? Or should I… it would show I guess 3D images as I am walking?"

Participant 1 wanted *more direction* in terms of when to use the navigational platform versus the display platform. The App also demands that the user be constantly interacting with the App. Instead of the App making the display work for the user, *users felt it was their job to make the App work*. Here is what Participant 2 had to say:

> Participant 2: I find it's hard. I am trying to line things up, and just looking too much at the camera, and not looking at the buildings around, which—there's a distance—you don't experience what's *here* [indicating to the surrounding buildings], you experience it all through *this* [indicating the iPhone].

To make matters more problematic, *Participant 2 felt he was stuck with* the job of making it work.

> Participant 2: Well, I guess I'm *stuck* with this, and really interacting with the phone more than what's out here.

Participants often suggested the experience needed to be more guided. Participant 1 noted that the App was missing a "suggested path" (such as those that Google Maps provides) while Participant 2 proposed the experience was missing a "tour guide". Here's an example of a participant complaining about not having direction about how to move his body with the App:

> Participant 2: I think that I enjoy interacting on the 3D more, but would still *want a guide around to tell me how to twist, to tell me what to do with it.* When you do it on your own, you just end up a little more jumbled.

So while the MUM App may *suggest* locations for the participants to visit by way of the pinned card*,* this study showed that it did not provide *enough* direction - including how to use the body and the device, and how to navigate with the App and view the collections. Thus rather than understand software as necessarily 'directing' space, this study suggests it may be more productive to understand software's specific role, among others, in redistributing bodies, objects and devices and in displacing and therefore (re)delegating tasks, skills required and responsibilities. It is *less about software acting autonomously* and *more about how agency is distributed*.

In analysing actors involved in the process of reordering and rewriting spaces, we may also ask: what, if anything, is different between rewriting a 'physical' space

versus a 'digital' one? The MUM App is not the only way in which the McCord Museum has repurposed urban spaces. Let us look at two examples. During the warmer months of the year, the Museum transforms Montreal streets and sidewalks in two ways: as a place of *entertainment* and as a *gallery* space. Firstly, each summer, the Museum transforms its side street into an entertainment space called the 'Urban Forest'. By blocking access to cars that normally drive and park on Victoria Street, the Museum repurposes the space into a place for people to sit and relax, as well as to enjoy live entertainment. In the summer of 2012, Victoria Street was outfitted with wire trees decorated by lavender and pink ribbons, purple turf and pink picnic tables (see Figure 6.1). And passersby were invited to sit, relax and listen to musical performances. Artists-in-situ were invited to create public artwork, intertwining photographic images from the McCord Museum collections with objects in the 'Urban Forest'. Secondly, each summer the Museum also adorns McGill College Avenue, a main downtown artery, with fixed panel displays, thereby turning the sidewalk into a gallery space. The fixed panels display various exhibits that showcase the photographic images from the Museum's collections (and specifically, the Notman Photographic Archive). So in the summer of 2012, the Museum showed the 'Living Landscapes' exhibit of Alexander Henderson work (see Figure 6.2).

Figure 6.1 The 'Urban Forest' installation

Source: Image taken on Aug 24, 2012 Victoria Street

Figure 6.2 The 'Living Landscapes' exhibit

Source: Image taken on July 18, 2012 on Avenue McGill College

Passersby can stop and view the displays on their way to work, schools or while shopping. By outfitting outdoor spaces with the Museum's collections and performances, users can engage in practices otherwise done within the Museum. However, by redistributing some roles, bodies, collections and practices and not

others, such as security guards (who ensure objects are handled in a particular way) and display cases (which suggest how objects must be handled), users often did not engage with the objects in these outdoor spaces as was originally intended. So while the Museum may reorganise and repurpose or *write* outdoor spaces, users can also *rewrite* how the spaces are used by subsequently repurposing objects and spaces in unintended and unexpected ways. In particular, on several occasions I observed children using wire igloos placed in the Urban Forest as a 'playground' and professionals using the picnic tables for 'business lunch meetings' –co-writing the use of this 'heterotopic' place. It can thus be said that in the case of 'physical' spaces the public may choose to 'co-write' (use the space as intended by the Museum) or 'rewrite' (use the space in ways unexpected by the Museum) how places are used and understood. But this is no different from using the App. Recall from Chapter 5 that participants 5 and 6 ran off with the device and proceeded to take photographs of themselves, deviating from the 'museum visit' / 'tour'. So 'physical' spaces and 'code/spaces' may be reordered and rewritten in unanticipated, 'experimental' ways.

This case has shown that the reordering and rewriting of space with MUM is a contingent and precarious act. It requires not only the App's software to work, but also a host of other actors, particularly since the App redistributes bodies, technologies and collections outside the Museum and, as such, (re)delegates particular roles, skills and responsibilities previously performed inside the Museum to humans and nonhumans outside its walls. What obfuscates this process is that, on the one hand technical mediation "designates a very specific type of delegation, of movement, of shifting, that crosses over with entities that have different timing, different properties, different ontologies, and that are made to share the same destiny, thus creating a new actant" (Latour 1994: p. 44). In this case, the emerging actant extends beyond the 'MUM App' to a variety of *both* human and nonhuman actors that together work at reordering and rewriting 'code/space'. On the other hand, human labour is often rendered invisible. While Thrift and French (2002) have argued that software is 'intelligent' for Barry "the intelligence attributed to machines hinges on the cultural invisibility of the human skills which accompany them" (Barry

2001: p.9). Suchman (2007) has also shown how human labors may be rendered invisible, such as in the case of Cog the robot (see Chapter 2). Further, while Kitchin and Dodge (2011) have suggested that software can act 'autonomously', this case has shown that users help it work. Though 'code/spaces' may be 'transduced' with the use of software, it is only with the help of humans that it can all work.

Automated Management: Using Google Analytics' Dashboards

This section explores the management of the MUM App and its display spaces by McCord Museum staff in relation to the automated feedback processes established using dashboards on Google Analytics. This particular analysis draws on interviews with Museum staff and documentary analysis. Here, the claim by Kitchin and Dodge (2011) that software allows for the 'automated management' of society is further explored. To do this, this section begins by outlining how the Museum has collected information about visitors in the past. Generally speaking, the traditional methods and tools employed provide limited information about visitors. For example, the Museum has counted bodies that come into a Museum using hand-held 'clicker counters' or by adding up ticket sales (manually or through software applications). The Museum has also observed visitors and/or used surveys (paper-based or email) to find out more about what visitors thought about the museum or an exhibit. But in the case of 'digital' displays, such as the MUM App, these more traditional surveying methods do not work since the 'museum visit' takes place outside the Museum. Instead, it may be said that aspects of these 'older' methods of surveying have been redistributed to some different actors, by reconfiguring a 'new' feedback process. In this case, the App collects data on usage activities, which it then sends to Google Analytics. Google Analytics stores the data and calculates statistical information for display on standardised dashboards. *There is an unprecedented amount of statistical information presented on these dashboards.* Not only do the dashboards show how many users have used the App (or in 'old' terms, 'visited' the display), but they also display detailed information about, for example, how many times a particular object has been viewed, what types of devices were used by museum visitors and even the country of origin of the user's device. Thus the dashboard is meant to provide

Museum staff with an understanding not only of its use but also about how to change the display. For example, by tracking which images are viewed most, the Museum may add or remove 'digital' objects based on high or low traffic. In this way, the dashboard can be considered another example of a 'centre of calculation' (Latour, 1987), an interface for making decisions and a way to thus 'mobilise' actors (through the decisions made). But while aspects of these feedback processes seem to have been rendered 'automatic', can we consider these management processes 'automated'? And does software then allow for the 'automated management' not only of display practices but also of particular spaces or society at large?

To Kitchin and Dodge "automated management is the regulation of people and objects through processes that are *automated* (technologically enacted), *automatic* (the technology performs the regulation without prompting or direction) and *autonomous* (regulation, discipline and outcomes are enacted without human oversight) in nature" (2011: p. 85, original emphasis). But if we closely inspect the 'automated' feedback process in this case, we find that the above characterisations engender asymmetrical conceptions of such a process, because humans and their labour are categorically left out. While aspects of the Museum's surveying practices, outlined above, have been *redistributed* to nonhuman actors, such as the MUM App (which collects data), the mobile device (which transmits data) and the Google Analytics dashboards (which uses the data to calculate and present statistical information), humans are involved in the entire chain of production. Humans are involved in, for example, the design, production and support of the App, as well as the mobile device and Google Analytics dashboards. Further, not only is the App embedded in vast infrastructures, but so are Apple devices and Google Analytics. These infrastructures need regular maintenance by, for example, programmers and technicians (Bowker et al. 2010; see Chapter 2). Thus it is proposed that using the notion 'automated management' is problematic in that it characterises assemblages (of humans and nonhumans) as 'automated' or 'automatic', notions that are shown here as contestable given that human labour is often rendered invisible. And despite Kitchin and Dodge's suggestion of automated management being 'autonomous' this case shows that agency is always an 'effect' resulting form the negotiations of

heterogeneous actors. Thus, to avoid deterministic readings of technologies, this thesis has taken into account the work of both nonhumans *and humans*.

Further, while software may seem to 'accelerate' feedback processes (a notion offered by theorists such as Kember and Zylinska, 2012 and Couldry and Hepp, 2013; see Chapter 2) this thesis shows how it leaves such processes at the same time more open to failure, and disruption. In logging into Google Analytics dashboards, feedback processes may, at first glance, seem to be made faster, more robust and more accessible. Firstly, the feedback processes seem faster because the statistical information on the *dashboards is up-to-date and quickly retrievable*. Secondly, the statistical information seems to be robust since (as will also be discussed in the next section) an *unprecedented amount of data is collected* about the user and about how the users employed the App. Thirdly, information seems more accessible since Google Analytics dashboard *can be accessed using almost any computing device* (desktops, laptops, mobile devices and so on) so long as they have an Internet connection. But these processes are also (more) open to failure – if there is, for example, an electrical outage or a device breakdown – the feedback process is disrupted and, given the complexity of such hybrids, may be harder to fix and get working again. Still, the gathering of such unprecedented amounts of information has given theorists reasons for concern. For example, Kitchin and Dodge (2011) suggest that the vast amounts of information being collected about users have given rise to automated surveillance as part of a wider 'culture of control'. For Kitchin and Dodge "software is ideally suited to monitoring, managing, and processing capta about people, objects, and their interaction, and is leading to a new mode of governmentality that [they] term automated management" (2011: p. 85).[97] The next

[97] Kitchin and Dodge (2011) explain that the notion of 'culture of control' draws on Foucault's theory of 'governmentality'. Foucault has suggested that changes resulting from the Enlightenment, which saw a shift in social order from feudal to a modern system, also entailed a shift in the systems of governance in most Western capitalist nations – a form of 'disciplinary governance' that has dominated the last two centuries. The new systems of governance required new apparatuses of surveillance and policing to capture, classify and catalog people, and facilitated universal regulations that also instilled self-discipline. For example, in institutions, such as factories, there was an increase in systems designed to monitor and manage workers to ensure maximization of profits while reducing risk and crime. Kitchin and Dodge suggest these systems of governance continue today, in such forms as file formats and copyrights (2011: p. 24), which point to our "culture of control" (2011: p. 84).

subsection explores these concerns by, firstly, looking at the types of data collected and statistical information presented on Google Analytics and, secondly, exploring how Museum staff can employ this information to manage the App display. By examining how decisions are made by staff, the analysis also further assesses the claim that software increasingly allows for the 'automated management' of society.

The Google Analytics Dashboard – What Does it Say?

As mentioned above, the MUM App allows for the collection of more data and more statistical information than the McCord Museum may otherwise collect for its 'physical' exhibits. A short explanation of how the Museum collects and uses information about 'physical' exhibits helps elucidate this. To understand more about the roles, practices and processes related to 'physical' exhibits, an interview was conducted with the Museum's accountant who was responsible for collecting statistics on museum visitors for reporting purposes at the Museum. In regards to established museum practices, the accountant often used a standard spreadsheet to tally monthly and yearly statistics about visits to the Museum and to special exhibits. Information on museum visits and exhibitions were collected using clicker counters and through the tallying of ticket sales (via software). The information collected was then provided to managers in the form of reports. The reports are used in management meetings to discuss the success (or failures) of past exhibitions. For example, since a toy-themed exhibit called 'Toys' proved extremely popular when first put on in the winter months of 2010/2011 (around the holiday season) senior management decided to repeat the exhibit (though in a slightly refashioned way) for several years that followed. Toy-themed exhibits were displayed in 2011/2012 as 'Toys 2', in 2012/2013 as 'Toys 3', in 2013/2014 as 'Toys' again and in 2014/2015 as 'The Island of Toys'. The information collected was also used to report statistics to the Board of Directors and to the public through regular and annual reports. These reports are, for example, used to justify funds spent on operations of the Museum. But the data collected and statistical information reported are basic, as will be discussed next, when compared to that which can be reported for the App.

In comparison to these more traditional reporting practices, the Google Analytics dashboards are able to display (through the collection of data by way of the MUM App) an unprecedented amount of statistical information about the App's usage. The five examples of standard dashboard views shown below illustrate how much information may be displayed about the use of the App (shown over a period of just over one year – from August 17 2011 to September 20 2012). The first dashboard shows usage by device (see Figure 6.3). It depicts the types of devices onto which the MUM App had been downloaded and used to see the App's display. The second dashboard displays the originating country (see Figure 6.4), the third the originating city (Figure 6.5) and the fourth the originating language (see Figure 6.6) of the user. Furthermore, the MUM App can even provide automated feedback on what images from the collection have been viewed, shown below in the fifth dashboard (see Figure 6.7). The statistical information presented on these dashboards could not previously be collected and presented for a 'physical' exhibit. Further, it would have taken much more human labour (as well other technologies, such as Excel or Power Point applications) to produce visualisations similar to those that are presented on the dashboards, such as world maps (used to visualise geographical statistical information) and line-graphs (used to plot usage over particular timeframes). Figure 6.3, for example, shows an example of a line-graph used to plot the periods in which the MUM App was used most and least – the 'lifeline', so to speak, of the App.

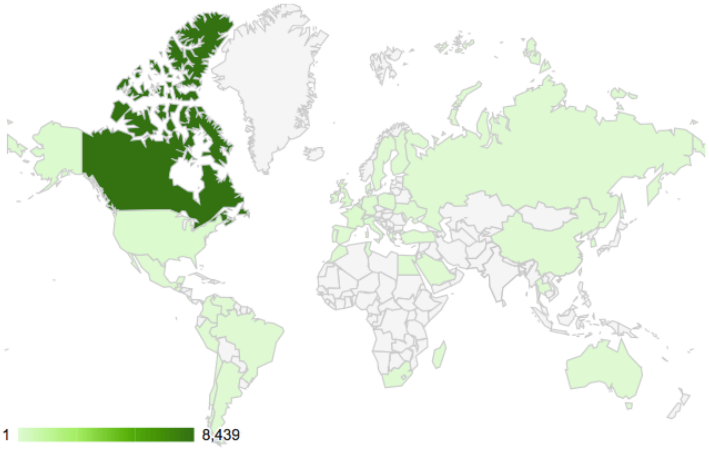
Figure 6.3 Usage statistics by device

Visits	Pages / Visit	Avg. Visit Duration	% New Visits	Bounce Rate
8,240	**6.16**	**00:05:45**	**26.98%**	**11.74%**
% of Total: 91.34% (9,021)	Site Avg: 6.25 (-1.36%)	Site Avg: 00:05:36 (2.77%)	Site Avg: 27.39% (-1.51%)	Site Avg: 11.44% (2.58%)

	Mobile Device Model	Visits	Pages / Visit	Avg. Visit Duration	% New Visits	Bounce Rate
1.	iPhone	**6,350**	5.90	00:06:36	27.01%	13.04%
2.	iPad	**1,739**	7.23	00:03:02	27.03%	6.67%
3.	iPod Touch	**151**	4.96	00:01:10	25.17%	15.23%

Source: The McCord Museum by way of Google Analytics, for August 17 2011 to September 20 2112, retrieved on September 20, 2012

Figure 6.4 Usage statistics by originating country (top 10)

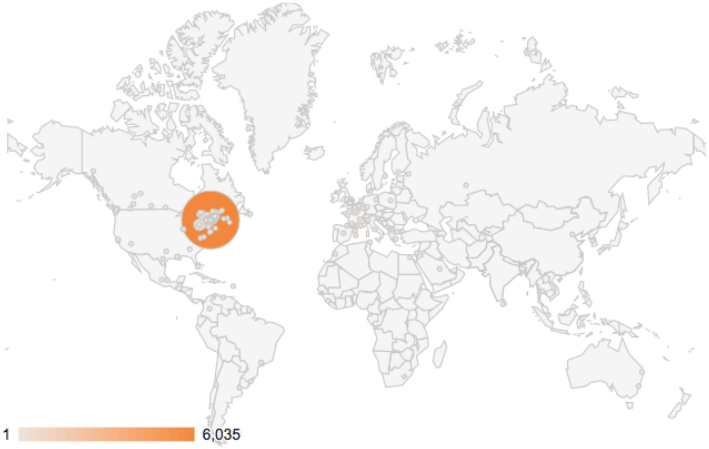


Visits	Pages / Visit	Avg. Visit Duration	% New Visits	Bounce Rate
9,021	**6.25**	**00:05:36**	**27.39%**	**11.44%**
% of Total: 100.00% (9,021)	Site Avg: 6.25 (0.00%)	Site Avg: 00:05:36 (0.00%)	Site Avg: 27.39% (0.00%)	Site Avg: 11.44% (0.00%)

	Country / Territory	Visits	Pages / Visit	Avg. Visit Duration	% New Visits	Bounce Rate
1.	Canada	**8,439**	6.36	00:05:42	27.22%	11.45%
2.	France	**142**	3.77	00:01:38	32.39%	7.75%
3.	United States	**122**	5.99	00:01:28	44.26%	7.38%
4.	United Kingdom	**97**	4.07	00:00:47	31.96%	16.49%
5.	Italy	**28**	6.04	00:14:26	25.00%	10.71%
6.	Russia	**15**	3.07	00:00:24	20.00%	20.00%
7.	Germany	**14**	5.71	00:02:21	28.57%	42.86%
8.	Spain	**14**	3.79	00:00:22	50.00%	0.00%
9.	Chile	**10**	2.30	00:00:09	40.00%	50.00%
10.	Mexico	**10**	4.90	02:08:04	70.00%	0.00%

Source: The McCord Museum by way of Google Analytics, for August 17 2011 to September 20 2012, retrieved on September 20, 2012

Figure 6.5 Usage statistics by originating city (top 10)



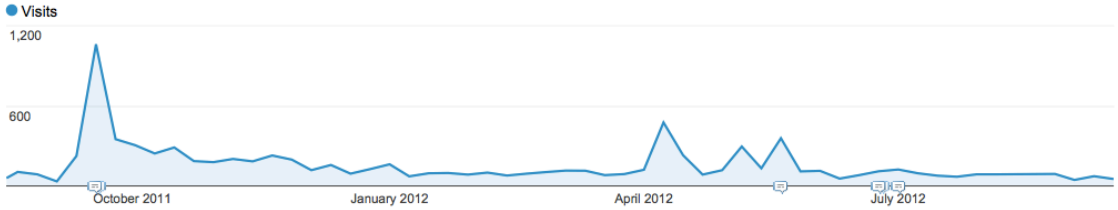
Visits	Pages / Visit	Avg. Visit Duration	% New Visits	Bounce Rate
9,021	**6.25**	**00:05:36**	**27.39%**	**11.44%**
% of Total: 100.00% (9,021)	Site Avg: 6.25 (0.00%)	Site Avg: 00:05:36 (0.00%)	Site Avg: 27.39% (0.00%)	Site Avg: 11.44% (0.00%)

(Continuation of Figure 6.5)

	City	Visits	Pages / Visit	Avg. Visit Duration	% New Visits	Bounce Rate
1.	Montreal	6,035	6.26	00:05:39	24.26%	11.70%
2.	Ottawa	408	5.76	00:09:44	24.75%	9.80%
3.	Toronto	249	5.25	00:11:34	27.31%	13.65%
4.	Laval	135	6.78	00:03:25	44.44%	11.11%
5.	Quebec	127	6.86	00:03:52	40.16%	9.45%
6.	Paris	104	3.62	00:02:03	25.00%	5.77%
7.	Verdun	76	5.42	00:02:38	38.16%	15.79%
8.	Longueuil	74	7.47	00:02:35	40.54%	5.41%
9.	Ste-Genevieve	70	6.03	00:01:33	27.14%	11.43%
10.	Lasalle	63	11.21	00:07:22	17.46%	6.35%

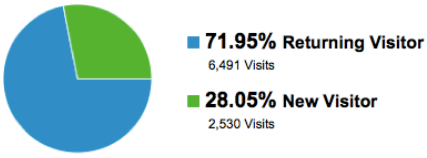
Source: The McCord Museum by way of Google Analytics, for August 17 2011 to September 20 2112, retrieved on September 20, 2012

Figure 6.6 Usage statistics by language (top 10)



2,475 people visited this site

Visits: 9,021
Unique Visitors: 2,475
Pageviews: 56,372
Pages / Visit: 6.25
Avg. Visit Duration: 00:05:36
Bounce Rate: 11.44%
% New Visits: 27.39%



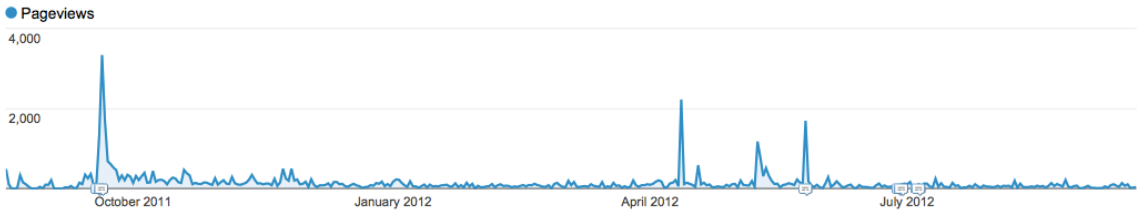
71.95% Returning Visitor
6,491 Visits

28.05% New Visitor
2,530 Visits

	Language	Visits	% Visits
1.	fr-CA	5,062	56.11%
2.	en-CA	2,797	31.01%
3.	en-US	484	5.37%
4.	fr-FR	328	3.64%
5.	en-GB	112	1.24%
6.	it-IT	33	0.37%
7.	ru-RU	23	0.25%
8.	es-ES	15	0.17%
9.	pt-PT	13	0.14%
10.	en-AU	12	0.13%

Source: The McCord Museum by way of Google Analytics, for August 17 2011 to September 20 2112, retrieved on September 20, 2012

6.7 Usage statistics by pages viewed (top 20)



Pageviews	Unique Pageviews	Avg. Time on Page	Entrances	Bounce Rate	% Exit	Page Value
56,372	**50,179**	**00:01:04**	**9,012**	**11.45%**	**15.99%**	**$0.00**
% of Total: 100.00% (56,372)	% of Total: 100.00% (50,179)	Site Avg: 00:01:04 (0.00%)	% of Total: 100.00% (9,012)	Site Avg: 11.45% (0.00%)	Site Avg: 15.99% (0.00%)	% of Total: 0.00% ($0.00)

	Page	Pageviews	Unique Pageviews	Avg. Time on Page	Entrances	Bounce Rate	% Exit	Page Value
1.	/main/splash	**8,662**	8,638	00:00:25	5,243	13.66%	14.56%	$0.00
2.	/main/map/fr	**5,794**	5,781	00:01:33	963	0.42%	18.66%	$0.00
3.	/main/view3d/fr	**3,676**	2,338	00:03:12	62	74.19%	36.48%	$0.00
4.	/main/firstrun	**2,457**	2,453	00:00:14	2,065	0.00%	2.32%	$0.00
5.	/main/map/en	**1,971**	1,959	00:02:28	331	0.91%	20.35%	$0.00
6.	/main/view3d/en	**1,090**	794	00:02:08	23	56.52%	39.72%	$0.00
7.	/image/Mount_Royal/MP-0000.1750.8.8/fr	**488**	447	00:00:26	6	100.00%	23.16%	$0.00
8.	/image/Ste_Catherine/MP-0000.816.1/fr	**461**	409	00:00:50	6	83.33%	22.34%	$0.00
9.	/image/Ste_Catherine/VIEW-5035/fr	**437**	392	00:04:39	7	100.00%	20.37%	$0.00
10.	/image/Ste_Catherine/MP-0000.587.141/fr	**391**	303	00:00:55	7	100.00%	16.11%	$0.00
11.	/image/Sherbrooke/VIEW-12153/fr	**379**	288	00:01:03	6	66.67%	15.83%	$0.00
12.	/image/Sherbrooke/MP-0000.872.2/fr	**370**	333	00:00:49	4	75.00%	23.51%	$0.00
13.	/image/Old_Montreal/MP-0000.1452.50/fr	**344**	321	00:00:23	3	33.33%	15.70%	$0.00
14.	/image/Ste_Catherine/MP-0000.587.145/fr	**333**	200	00:00:25	2	100.00%	9.61%	$0.00
15.	/image/Ste_Catherine/MP-0000.840.13/fr	**332**	303	00:00:39	3	66.67%	14.16%	$0.00
16.	/image/Old_Montreal/MP-0000.10.166/fr	**314**	296	00:00:49	10	80.00%	15.92%	$0.00
17.	/image/Mount_Royal/N-0000.29.2.17/fr	**313**	279	00:00:31	1	100.00%	14.06%	$0.00
18.	/image/Mount_Royal/II-201400.1/fr	**300**	284	00:00:19	6	83.33%	17.33%	$0.00
19.	/image/Sherbrooke/MP-0000.25.221/fr	**296**	221	00:00:19	5	80.00%	11.15%	$0.00
20.	/image/Mount_Royal/M2008.104.2.243/fr	**289**	276	00:00:48	3	100.00%	15.92%	$0.00

Source: The McCord Museum by way of Google Analytics, for August 17 2011 to September 20 2112, retrieved on September 20, 2012

Museum Staff could easily interpret some of this visual information. The peak in October 2011 could be easily explained as the launch of the App. The low usage that followed could also be explained by colder winter weather experienced in Montreal (between October and April). Relatedly, the peaks in the spring and summer months of April, May and June of 2012 may also be weather-related – as weather warmed up users began viewing collects with the MUM App again. On the other hand, other information presented through these dashboards could hardly be 'decoded' or interpreted by Museum staff. For example, in an interview with the Head of IT, I

asked him to explain what some of the column headers on the dasbhoards meant, such as ‘entrances’, ‘bounce rate’ and ‘% exit’. He did not know, nor could he figure it out – despite attempting to find out more about these terms by ‘Googling’ during the interview. This interview took place over a year after the App had been released, yet the information still remained technically cryptic to the Head of IT. In this way, a significant portion of the information presented through the dashboards could be little used to make meaningful interpretations about the usage of the App or understand user preferences. Further, terms that seemed less cryptic, such as ‘page views’, ‘unique page views’ or ‘average time on pages’, are still ambiguous. Are ‘page views’ calculated per view, per session or per day? Similar questions could be asked about ‘average time on pages’: is it calculated per view, per session or per day? And does it describe unique page views or count all page views?

Furthermore, the statistical information presented does not exactly capture how the user *performs* the ‘museum visit’ / ‘tour’ with the App. For example, did users pay more attention to the collections (the historical photographic images on display) or to the ‘real view’ around (the cityscape onto which the ‘digital’ objects were superimposed)? Did they close the MUM App after each use, or just abandon it mid use? If they did abandon it, why did they do so? Were they interrupted, were they distracted, were they bored or was it just how they decided to use the MUM App? This is not a ‘new’ problem, as De Certeau suggested in *The Practice of Everyday Life:* “surveys of routes miss what was” (1984: p. 97). But in this case, it seems, using digital media technologies to survey ‘users’ means we learn more about the activity of the ‘App’ (if anything) than of the actions of the users themselves. More specifically, rather than understand more about the users ‘average time on pages’ (see Figure 6.7), it may be more accurate to say that what is being presented by Google Analytics is the average time a ‘digital’ object was displayed by the App. Based on the information provided, we cannot be sure if a user has in fact looked at an object on display or at something else. Think here, for example, of the distractions, such as shops and texts, presented to me on St Catherine St. (in Chapter 5). One wonders how many of the Google statistics may be thrown off by such forms of distraction. But even this is a limited view considering the plethora of actors

involved in making the 'museum visit'/ 'tour' happen, including those involved in presenting information through Google Analytics. For example, there may be other issues or glitches that stand in the way of accurate information, such as if calculation errors are encoded into the dashboard's software or if the App fails in any one moment. Even though we may claim to know more about humans and their practices, particularly in a time of 'big data', in this case such claims seem to remain more in the realm of a technological myth. And so, Kitchin and Dodge's (2011) concerns over a 'culture of control' enacted by 'automated management' seems, through this example at least, unsupported. In this case, it is less about 'control' and more about 'confusion'. Much of the information about the use of the App is not employed in management practices, given the ambiguity in terminology as well as in the information presented. Without any direct guidance from Google Analytics (or another 'community of practice') about how to interpret or use the statistical information being produced, Museum staff are left to their own devices to 'decode' the information and determine how useful it may be to them. This is a similar issue to that which was demonstrated in Chapter 5 where participants did not know how to visit the display with the MUM App and as such developed their own strategies.

Furthermore, while the Head of IT at the Museum did seem impressed with the level of information that the App presented, he also admitted that it did not mean that the Museum could act on it and make significant changes to the App. This is because, on the one hand, the Museum has resource constraints – both in terms of funding and human resources (see Chapter 4). But perhaps most interestingly, the Museum does not have *practices* in place to manage a display with this level of information – leaving staff with 'what to do?' questions – for example, are they supposed to change the images displayed on a regular basis? Or keep adding to the existing set despite some being little viewed? How should they monitor and respond to the MUM App's use by particular visitors (i.e. be they 'local' or 'foreign')? Without establishing new practices in response to the information collected through the Google Analytic dashboards, Museum staff are limited in their ability to participate in the management (let alone control) of space. Thus, the findings point to the importance of practices in how space may be reordered, rewritten and controlled.

Overall, Museum staff are challenged to not only make the statistical information presented through the dashboards meaningful, but also to overcome constraints to *acting* on this information, which, on the one hand, requires the Museum to find additional resources for assessing and modifying the App's usage and, on the other hand, necessities new practices to be established (and this is challenged, in turn, given the information provided by the Google Dashboards is rather ambiguous). It is important to note though, that while this case may not fully support Kitchin and Dodge's concerns about a 'culture of control', it is not to say that digital media technologies cannot participate in control practices. Rather it is to say that to do so requires overcoming significant challenges, such as, establishing resources (to build, maintain and support technologies) and the establishment of practices, and the coordination of wide networks of human and nonhuman actors and vast complex infrastructures. In other words, the more digital media technologies are employed as a means of control, the more work may be required of humans to design, develop, maintain and use their precarious networks and infrastructures. And this is most challenged, as this study shows, in cases where funding remains a scarce resource.

Conclusions

This chapter first examined how the MUM App (among other actors) participates in the reordering and rewriting of spaces into, to use Kitchin and Dodge's (2011) term, 'code/spaces' and debated their role in these processes. By drawing on observations made during the participant study (including those discussed in Chapter 5) it was proposed that spaces – such as parks, streets and a university campus – are reordered along with the App's pinned card when it is employed as a 'navigational platform' and further rewritten – as places to view collections – in such instances when the App is used as a 'display platform' by users. In considering these processes, and the diverse actors involved, the analysis further debated Thrift and French's (2002) claim that digital media technologies are increasingly 'directing' urban space. Despite these claims, this case showed that not only is agency a 'distributed accomplishment' (as was also discussed in Chapter 5) but that participants in the study often found themselves in need of *more* direction. While Thrift and French

(2002), as well as Kitchin and Dodge (2011), point to software's 'intelligence', and increasing 'autonomy', this case points back to Barry (2001) who reminds us that this intelligence hinges on the invisibility of human skills and Suchman (2007) who also points to how machines inherit their intelligence when human labors are rendered invisible (as in the case of Cog, see Chapter 2). While the App does play a role in how spaces are reordered and rewritten, this analysis revealed the labour also required of the user to make this 'museum visit' / 'tour' work – and their lack of direction was evidenced in participants' demands for *more* direction. Participants often looked to me for guidance on how to go about seeing collections with the App, complained about feeling 'jumbled' on their own and suggested a (human) 'guide' would be helpful to explain more about how to move their bodies and where to look. Without more direction participants developed their own strategies – some flipped back and forth from the pinned card to the 3D View, mapping their routes along the way, while others remained in 3D View waiting to see what could appear along their path.

The second analysis examined a related claim made by Kitchin and Dodge (2011) – that software can act in an autonomous fashion allowing for the 'automated management' of society. This claim was assessed through an analysis of the 'automatic' feedback processes established for the App's display using Google Analytics dashboards, a method of presenting statistical information back to Museum Staff. At first glance, the dashboards seemed to provide an unprecedented amount of information compared to what could be collated about a 'physical' exhibit inside the Museum. Not only can Museum staff see statistical information about objects on display (for example, statistics on the top images that have been viewed) but also about the user's device (including what type of device the App was used on, the originating city and nation of the device, and what language the device is set to). But, on closer inspection, and in an interview with the Head of IT, it was revealed that the information presented to staff is difficult to 'decode'; for example, column headers on the dashboards such as 'entrances', 'bounce rate' and '% exit' were cryptic and could not be deciphered by staff. As such, Museum staff little employed the data in the management of the App or for other reporting purposes. Further, even if the information could be interpreted, and decisions made about the App, the

Museum continues to be under-resourced which would make possible changes unlikely without external public or commercial funding opportunities – a point which brings back into the picture the diverse actors that must be considered when examining questions of agency. Thus, the Google Analytics dashboards, while having rendered some aspects of data collection and reporting 'automatic' is here shown as limited in even participating in the decision-making processes about the App and its display spaces, let alone managing them. We are also reminded that the dashboards are only one actor in a larger network, where 'funds' still play a most important role.

This case shows that employing digital media technologies is less about 'control' and more about 'confusion', 'uncertainty' and even 'disorder'. Chapter 5 showed that viewing collections made some participants feel "jumbled" and passersby were confused by what participants were doing. In this chapter, the dashboards, with their cryptic column headers, left Museum staff confused. Like in Suchman's (2007) Xerox case of the 'smart photocopier' in which educated users (such as 'scientists') find themselves needing more direction (despite making photocopies with an 'intelligent' photocopying machine), so too in this case we see educated users (such as 'lawyers', see Table 3.1 in Chapter 3) asking for more direction to view collections on a 'smartphone' mobile device (and this despite having themselves generally considered the App 'easy to use'). For Suchman (2007) the confusion experienced by users of the 'smart photocopier' could be explained by the novelty of the assemblage they found themselves in. In this case too we may say that users and passersby, as well as the Museum staff, have found themselves in novel assemblages, a reason for which they felt confused. In this case, we see that the assemblages produced along with the App entailed not only a redistribution of actors – such as bodies, technologies and collections – outside the Museum but also a displacement, and therefore (re)delegation, of tasks, skills required and responsibilities across a heterogeneous network of actors and vast infrastructures. Within these novel assemblages both humans and nonhumans must perform tasks that require skills they may not have. And this process has, in turn, made the performance of viewing collections with the App uncertain in many ways, as each of the actors involved is responsible to perform 'new' roles in order for it all to work.

There is also a paradox at play here. Theorists continue to suggest that the more software is used, the more a 'culture of control' is instilled. Which is to say that the more spaces have been reordered and rewritten along with software, such as that of the App, the more control there is over space. But the opposite has been found here – I am, again, thinking about the precariousness of performing this act of viewing collections with MUM, which, again, involves extensive actor-networks and vast infrastructures. It would seem then that the more software is involved the less 'control' there may be on processes of (re)ordering. If we also take into account that objects, subjects and practices may exist as 'multiple' (see Chapter 5), then more likely what we have is a type of disorder, which Law et al. (2013) suggest hangs together in a type of 'non-coherence'. To Law et al. (2013) while 'non-coherent' (or 'syncretic') orders may persist as (and by way of) what they call 'dominant systems'. These dominant systems are themselves a result of non-coherence: they are made up of elements that structure and order but only partially hang together and of "relations of subordination that are relatively invulnerable precisely because they are not tightly connected… when one is undone the others are not pulled down with it" (Law et al. 2013: p. 641). Thus the dominant system of the 'museum' in this case holds together despite subordination in recent reconfigurations: while the 'museum visit' and 'museum visitor' may have been undone (see Chapter 5) and while spaces are filled with confusing (dis)ordered practices the museum is still not 'pulled down'.

7 Conclusion

This study has examined the 'remediation' of the McCord Museum's MUM App, exploring its social, cultural and political 'effects'. The aims of this study have been to 1) explore how, and by whom or what, the App was (re)made through a process of 'remediation', 2) examine its role (among other actors) in the reconfigurations of museum- and urban-related subjects, objects, practices and spaces when engaged in practice and 3) unveil the socio-cultural politics of such processes and their 'effects'. Thus 'remediation' has been employed by this thesis as a way to both express and explore the social, cultural and political transformations related to the deployment of a particular digital media technology. To examine these processes and their 'effects' the thesis first traced how the App was (re)made and subsequently examined how it is used in practice. This case study revealed 'new' politics (for example, in relation to emerging relations between the museum and other unexpected actors), 'old' politics (such as in relation to the practices of displaying historical collections) and even a possible 'absence' of politics (since, for example, in this case, claims of software 'directing' space have been found to be contestable). This conclusion will first provide a summary of the findings presented in the thesis and subsequently reflect on how the findings relate to the research approach taken, outlining some of the general implications of this research study for social, cultural and critical studies, and particularly those related to digital media technologies and museums. Following this, the chapter will last propose that 'digital' displays must, perhaps always, be considered 'experiments' in museum display practices.

On the Remediation of MUM: What This Empirical Study Showed

This thesis employed the concept of 'remediation', developed by Bolter and Grusin (2000), as a way to express and explore social, cultural and political transformation related to digital media technologies. In particular, the concept of remediation helps (re)conceptualise how digital media technologies transform over time and how to examine those changes. Within this conception, digital media technologies have

been considered as Latourian 'hybrids' or as Callon's 'actor-networks' that are made up of both humans and nonhumans. Considering digital media technologies as such means that media are never 'new' but rather remediations that can include 'older' media refashioned into 'newer' ones or 'newer' media refashioned into 'older' media or a combination of these. To trace the remediation of the MUM App and its particular social, cultural and political 'effects', this thesis reconstructed how the App was made and examined how it was used in practice by participants and how its Google Analytics dashboards were used by Museum staff. In particular, the thesis looked to answer three specific research questions: *1) How, by whom and what, was the MUM App (re)made? 2) How is the 'museum visit' rescripted along with the MUM App, and how are subjects, objects and practices reclassified in this changing practice?* and *3) How are urban spaces reordered and rewritten along with the MUM App?* This following discussion reviews what this research study showed.

In Chapter 4, this thesis began by analysing how the MUM App was (re)made. The remediation of the App was reconstructed by drawing on interviews and documentary analysis. The analysis found that the (re)making of the App involved diverse, and at times unexpected, actors. Not only were *human* actors involved – including staff members of the McCord Museum, the advertising agency, Brothers and Sisters, and the app development company, Thumbspark – but also *nonhuman* actors – such as industry reports, funding, various digital media technologies (including mobile devices and specialised cameras), digital platforms (such as Apple), as well as the predecessor app (the Museum of London's Streetmuseum). And expected actors, such as 'curators', were not involved at all since, in this case, curatorial practices were redistributed across these other actors. It was also found that the way in which this 'exhibit' was made, as an 'app' for the 'iPhone', ultimately entangled the Museum's exhibitionary practices with commercial organisations in unprecedented ways. In particular, Brothers and Sisters, Thumbspark and Apple became 'gatekeepers' in the management of the App: Brothers and Sisters owns the copyright (and continues to hold the role of middleman between the Museum and Thumbspark), Thumspark is the 'seller' of the App (and must be involved in any technical changes to the display), and Apple must approve any modifications to the

App. These gatekeepers, in turn, participate in shaping both the opportunities and limitations for how the App may be modified. Since the Museum lacks not only the ability but also the funding to make significant changes to the App on it own, the Museum continues to entangle itself with commercial players that sponsor changes to the App, such as the most recent partnership with Ivanhoé Cambridge. These commercial entanglements were not the only politics of this digital display, as it was found that how the App was (re)made also limited what digital collections could be displayed and how they could be described. This raised, for example, 'old' gender politics, since in the display women and men are relegated to the more traditional gendered roles of the 19th and early 20th centuries. While this first analysis focused on the implications of how the MUM App was (re)made, it was suggested that to understand the full implications of the remediation of the App the analysis must also examine the 'effects' of its employment in practice, the focus of chapters 5 and 6.

Chapter 5 turned precisely to that – an analysis of how the MUM App is employed in practice to view collections in augmented reality. This analysis drew on both my experiences with using the App as well as the participant study. The chapter was particularly focused on exploring how objects, subjects and practices are reconfigured, that is, reclassified and rescripted in relation to the App. To examine this I 'followed the actors' in practice, a method that required first assessing who the actors were. To do this, I first described my experiences while employing the App. The analysis found that the App relies not only on the device (and its hardware and software components) and an extensive infrastructure (that includes GPS, satellites, radio towers and service providers), but also on unexpected actors such as the weather, the architecture of the city and, of course, the user. This showed that a wide set of actors are involved in how the App works in practice. The analysis next turned to the participant study to examine how participants viewed the collections with the MUM App. It was found that there was not merely one way to 'visit' the collections, as participants preferred to see it in diverse ways (for example some flipped back and forth from the pinned card to 3D View while others preferred to remain in 3D View) and so participants developed various strategies for how the MUM App could be used and how the collections could be 'visited'. It was also found

that, at times, participants felt “strange”, “weird” or “awkward” especially among passersby who mistook what participants were doing for ‘taking photographs’ or ‘filming’. One reason for this awkwardness is that while the viewing of collections is an *existing practice* it became unfamiliar once removed from the Museum and performed in public spaces. In other words, the practice of the ‘museum visit’, here performed outside the museum, became ‘marginal’ and the smartphone on which it was viewed became a ‘boundary object’. This resulted in participants having to ‘translate’ what they were doing and how they were using the device to passersby who mistook them for ‘tourists’. The novelty of this practice was also a reason for which participants asked for direction – with one participant suggesting he needed a “tour guide”. Furthermore, rather than considering what they were doing as a type of ‘museum visit’, participants suggested that they were actually ‘touring’ the city. This complicated the assumption that the ‘museum visit’ is rescripted with digital media technologies (suggested by Parry 2007), and instead this thesis suggested that practices and people can exist as more than one thing and that whether this emerging practice is a ‘museum visit’ and/or a ‘tour’ is yet unsettled. To settle this, perhaps more members (both human and nonhuman) need to be enrolled in this reforming ‘community of practice’, for example, the museum could affix more ‘footprints’ on public sidewalks to indicate display sites (see also last section below). Lastly, the chapter touched on the politics of displaying and viewing collections outside the Museum with MUM. It was shown how the App can discriminate against non-users (and particularly those that are too old, too young or too poor), while at the same time participating in reconfiguring those that do use it (as, for examples, professional or not). Overall, the chapter showed how reconfigurations are made, as Suchman (2007) suggests, on an ongoing basis. The result being the ‘multiplicity’ of things (as Mol’s work, 1999, often points out) – that is, objects, subjects and even practices are reconfigured in multiple ways bringing about multiple realities, a point explored further in Chapter 6 which looked at how spaces may be ‘heterotopic’.

Chapter 6 also began by analysing how the MUM App is employed in practice, but this time considered how spaces may be reconfigured, that is reordered and rewritten with the App, and whether such spaces are being increasingly directed and

automatically managed by software. First, the analysis looked at how the App participates in reordering space, proposing that the App's pinned card, must be considered as a 'navigational platform' in this process. It was found that as a 'navigational platform' the App, along with the device, the supporting infrastructures and the user, all play key roles in a complex redistribution of bodies, digital objects and display devices across the city. It was further proposed that the App must also be considered a 'display platform', through which he exhibit can be viewed. By employing the App as a 'display platform' urban locations – such as parks, streets and a university campus – are transduced, or 'rewritten' into places to view digital collections. These rewritten spaces thus create what may be considered *digital* 'heterotopias', allowing for 'multiple' ways in which urban spaces may be reimagined and repurposed. In relation to these analyses the thesis then turned to the claim that software is increasingly 'directing' urban spaces (Thrift and French, 2002). In this case it was found that agency is redistributed, along with tasks, roles and responsibilities which are (re)delegated, across a precarious set of actors. And, as such, it was suggested that perhaps more cause for concern here is the *precariousness* (rather than the *direction*) resulting from this redistribution of agency which (re)delegates tasks, roles and responsibilities across complex networks and vast infrastructures making practices, such as the viewing of collections with the App, uncertain acts. The chapter further explored Kitchin and Dodge's (2011) claim that software allows for 'automated management' by examining the automatic feedback processes established through Google Analytics, a platform that presents the MUM App's usage statistics through standard dashboards as a way to manage the MUM App display. In this case, it was found that while this automated feedback process provides the Museum with more information than could be previously collected, Museum staff were left asking one 'big data' question – that is, 'what to do with the data?' This is because while more information is available than what could otherwise be collected about a physical exhibit, much of it is left unused because, on the one hand, Museum staff found it difficult to either decode or make sense of the data displayed and, on the other hand, the Museum had not (yet) established *practices* related to this type and level of data. Therefore, while the MUM App gathers a larger amount of information it did not yet allow for the

Museum to have any additional levels of management or control (than previously available) over the way in which its collections are viewed by the public. In this case, it may even be said that perhaps Museum staff have *less* control over what 'museum visitors' do since the viewing of collections with the App occurs outside the museum in an environment which the Museum can little command. Further, changes to the App still remain limited by a lack of funding and constrained given the commercial gatekeepers established during the process of making the App, as mentioned above. Overall, this case shows that when spaces are reconfigured with the App there may be less control by any one actor on their reconfiguration, and particularly on processes of reordering and rewriting. While this case may not fully support concerns about a 'culture of control', it is not to say that digital media technologies cannot participate in control practices. Rather it is to say that to do so requires overcoming significant challenges, such as, establishing resources (to build, maintain and support technologies) and the establishment of practices, and the coordination of wide networks of human and nonhuman actors and vast complex infrastructures.

While employing the 'remediation' concept developed in new media studies, this thesis has taken primarily an ANT (feminist) approach to understanding and examining social, cultural and political changes related to digital media technologies. Further, the term 'digital media technologies' has been used as a way to both expose and explicate the multiple ways in which they may be understood. The next section further reflects on the theory employed and approach taken, some of the tensions that arise between these and other theories discussed early in the literature review (such as domestication theory and museum theory) and the implications of the empirical evidence found in this particular study of MUM for future research.

Reflections on an ANT (Feminist) Approach and its Implications for Future Research

This section reflects on the empirical evidence found in this study in relation to the research approach taken, and discusses some of the general implications of the research for social, cultural and critical studies related to digital media technologies and museums. There are three particular aspects of the research approach that I will

look to comment on: employing an ANT principle of *symmetry* to the study of social, cultural and political change, asking *how* rather than *why* particular 'effects' occur and employing an (ANT) *feminist approach* in social and cultural studies. Taking a *symmetrical* approach to the study of how the MUM App was remediated put this thesis in a position to reveal some of the heterogeneous actors involved in (re)making MUM and to unveil the 'effects' of their negotiations. In examining who or what (re)made the App, the analysis unveiled *how* both *human* actors – such as staff from the McCord Museum, Brothers and Sisters and Thumbspark – as well as *nonhuman* actors – such as industry reports, funding, a predecessor app, commercial platforms, imagined audiences, equipment, and so on – negotiated the (re)making of MUM. In revealing these heterogeneous actors, the study was next in a position to trace their specific negotiations and examine their political 'effects'. The analysis showed that these actors were involved in negotiating, for example, the App's aesthetic design, the photographic images selected, the way in which collections would be displayed and explained, what platform the App would be made for and even what devices it would be used on. And the 'effects' of these negotiations, including 'new' politics (such as the entanglements of the Museum with commercial organisations) and 'old' politics (for example, the gender-based (re)presentations that the App reinforces), could be uncovered while tracing them back to a set of heterogeneous actors. Thus by employing a *symmetrical* approach, this study avoided determinist and constructivist explanations that look to explain *why* certain social, cultural or political 'effects' occur and instead described *how* they occur.

This study also showed that since the Museum considered making a 'digital' display a 'technical' job, the project was assigned to the IT Department. Thus the Project Manager of Web and Multimedia was given the responsibility of 'curating' the MUM App. But due to her time constraints and limited funds, an intern was assigned the task of selecting and labeling collections for the App. By taking a *symmetrical* approach to this research study, however, it was also found that *nonhumans* were involved in 'curating' the App display. For example, while the intern chose the photographic images from the Museum's immense Notman Photographic Archives, she could only select those from a reduced number of images that had already been

digitised. Therefore the form (i.e. digitised or not) of images in the collection acted as negotiator in the selection process, and thus in 'curating' this display. Further, ideas about what 'imagined audiences' would want (i.e. what would be aesthetically pleasing or interesting to view) also acted as negotiators in the content selection process, and was a reason for which a range of images depicting natural disasters was selected. In this way, the analysis unveiled that 'curatorial' tasks were here not only reassigned to other staff, but were in practice accomplished within and by an assemblage of *human* and *nonhuman* actors. So, again, to say that an 'intern' curated this App display would be only a partial story. The implication here is that if we want to understand *why* certain museum collections are put on display and others are not (as was the case when Participant 4 asked why more images in her own neighbourhood were not on display) we must look at *how* this happens.

Taking a *symmetrical* research approach also allowed this study to trace how tasks, skills required and responsibilities may be displaced in the reconfigurations made possible by the introduction of digital media technologies in practice. In the first place, *human* tasks were displaced to other *human* actors. For example, it was found in this case that participants performed tasks normally performed by the Museum's curators. Specifically, when viewing collections with the App participants in the study took on the role of curators when they had to find the best position in which to view 'digital' objects. And they also had to take on the tasks normally performed by technicians, such as finding the optimal lighting and fixing any related issues. As Participant 3 had remarked, "I think the sun is affecting the program, in the shadow it works quicker". But, in this case, it was also found that *nonhumans* have been delegated such curatorial and technical tasks normally designated for *humans*, and this made it even more challenging for users to see images on display. This is because accurate GPS readings of the device are required to position objects on display. Signals are inaccurate in city centers with tall buildings that interfere with geo-locational readings. By taking a *symmetrical* approach to this study, this case study has shown that innovative 'digital' displays displace tasks, skills and responsibilities across heterogeneous actors. The case study shows how technical mediation "designates a very specific type of delegation, of movement, of shifting,

that crosses over with entities that have different timing, different properties, different ontologies, and that are made to share the same destiny, thus creating a new actant" (Latour. 1994: p. 44). So this remediation has provided an example of a point "where society and matter exchange properties" (Latour 1994: p.35). This study thereby showed that agency is a 'distributed accomplishment', rather than a result of human or nonhuman action alone. And so, again, to avoid deterministic and constructivist approaches to understanding social, cultural and political transformations, *symmetrical* approaches must be employed in research.

This study also examined the role of the MUM App (among other actors) in *how* the 'museum visit' is rescripted and *how* museum-related objects, subjects and practices are reclassified in relation to viewing collections with the App. The analyses showed that while the App may be inscribed with a 'program of action' at the time of its (re)making, it is de-scribed and re-inscribed in practice, as participants viewed the collections in different ways and thereby rescripted the 'museum visit' on an ongoing basis. For example, some flipped back and forth from the pinned card to the 3D View, while others remained in 3D View waiting to be surprised and delighted by what might appear along their path. In the ongoing process of rescripting how the 'museum visit' is done other actors play a part too, such as the childhood memories of a dinosaur display that landed Participant 9 in another museum altogether! As such there is not one way to do this 'museum visit', as there is not only one way to constitute the 'museum' either. As Hooper-Greenhill has stated:

> There is no essential museum. The museum is not a pre-constituted entity that is produced in the same way at all times. (1992: p. 192)

Or to return to Mol's (2003) language, the 'museum' is not *done* in the same way at all times.[98] But the analysis also found that viewing collections outside the Museum entailed a reclassification of the 'museum visit'. Here, the analysis examined *how* reclassifications are made in practice – looking at *how*, rather than *why,* participants considered the 'museum visit' a 'tour' and why passersby confused participants with 'tourists'. It was shown that while more actors were enrolled in the practice of

[98] Here we may think, for example, of how 'cabinets of curiosities' were enacted as an early form of museum in the 16th and 17th centuries (see Hooper-Greenhill, 1992).

viewing the Museum's collections, the 'museum visit' and the 'museum visitors' were de-stabilised or, in other words, *undone*. In this case the 'museum visit' was considered more of a 'tour' and the 'museum visitors' more like 'tourists'. As such, the study found that subjects and practices, as well as objects (since the App was considered as both a 'display' and a 'public relations tool') all may exist as 'multiple', as part of what Mol (2003) calls 'a multiple reality'. But as such reconfigurations are also found to be ongoing, how these subjects, objects and practices will be "enacted, enacted and enacted yet again" (Law, 2008; see also Mol, 2003) remains uncertain.

The thesis also pointed to how spaces too may become increasingly 'heterotopic' based on the growing possibilities that digital media technologies open up. At the same time, given the complexity of 'code/spaces' assemblages, performances in these spaces may become more precarious, that is, open to glitches and failure. This, along with the way in which objects, subjects, practices and spaces may exist as 'multiple', points to the 'disordered' way in which things may hang together. For Law et al. (2013) this disorder is expressed through the notion of 'non-coherence' (or 'syncretism'). Non-coherent orders may exist as 'dominant systems' (Law et al., 2013), which here can be exemplified by the museum institution. For Law et al. (2013) such 'dominant systems' persist because they hang together only partially. So while one aspect of a dominant system may be *undone* other aspects may not *because* they hang together in such partial ways. In the case of the MUM App, this thesis has shown that while the 'museum visit' and 'museum visitor' were *undone* (when participants used the App to view collections), the museum institution, as the 'dominant system', was not. This suggests that in order to examine possible 'interventions' (Suchman, 2007; see Löwgren and Reimer, 2013; see also below) in dominant systems, studies will need to take into account loosely hanging aspects of the system, which serve to (partially) either undo or reinforce aspects of it.

This thesis also investigated claims about the autonomy of software, and its politics, examining two specific arguments made by spatial theorists: that space is increasingly 'directed' by software technologies and that society is thereby increasingly 'automatically managed'. In the first case, this study showed that rather

than finding themselves directed by the App, the participants found themselves in need of *more* direction. And, in the second case, this study showed that while 'automated' feedback processes may provide unprecedented amounts of information (as in the example of the Google Analytics dashboards) such information may in some cases be little employed. In this case the information was technically cryptic and too difficult to 'decode' for Museum staff; for example, column headers on the dashboards such as 'entrances', 'bounce rate' and '% exit' could not be easily deciphered. Furthermore, even if this information could be interpreted, decisions made about the App display (such as adding or removing collections) would require additional funds to implement, which are not easy to acquire by this under-resourced Museum. Thus the dashboards, while actors in the management of the App display, are limited in the way in which they may *participate* in decision-making processes, let alone *manage* them. Perhaps a lesson learned here is that politics can also be made and unmade based on the research method employed. By employing a *symmetrical* approach to the analysis of how spaces are 'reordered' and 'rewritten', this case found that on the one hand, both humans and nonhumans participate in these processes, but that, on the other hand, we need to pay attention to their negotiations as some actors may limit the participation of others. Here, a lack of funding limits both how Museum staff could modify this App, and to what extent any of the Google Analytic dashboards could be employed in such decisions. Further, to examine software's politics it may be more fruitful to look at how it participates in Law et al.'s (2013) dominant 'non-coherent' systems than to look at how it may embody a 'culture of control', as Kitchin and Dodge (2011) suggested.

This thesis also informs studies related to digital media technologies in respect to two contested notions: the 'domestication' of technologies and the 'digital' aspects of media technologies. The notion that technologies may be 'domesticated' here remains contestable. The participant study, as well as my own accounts of using the MUM App, have unveiled the heterogeneous actors involved in making the App's display platform work – including software code, bodies, mobile devices, architecture, historical images, sunlight and so on – and the infrastructures – from the city's electrical grids to telecommunications service providers to US military

satellites in space – in which the App is embedded. The thesis has thus brought to light the complexity of the App's actor-network and the many vast infrastructures within which it is enmeshed. This has meant that the performance of viewing collections with the App is a precarious act – at any point any one actor in the App's network may not perform. To 'domesticate' the App requires 'control' not only over these networks and infrastructures but also over the 'active' rather than 'passive' users. Users would need to use the App more uniformly if we are to 'tame' it. But as we have seen, users employ the App in different ways and, as such, experience different issues. For example, one participant saw 'green squares' while others did not. I too had issues with the App when the exit button disappeared and when the device's camera shutter would not open. Taking into account the App's network and infrastructures, there could be a number of reasons why 'untame' issues arose, and to go about debugging these would be taxing, if not impossible.

This study has also shown that the 'digital' still remains a contested notion (and one that must perhaps always be specified in its use). In this study I have employed it in the term 'digital media technologies' as a way to point to the software aspects of particular actor-networks. Through the case of the MUM App, it has been shown that software is embedded in sociomaterial and/or sociotechnical arrangements, practices and processes. Where some theorists, such as Kitchin and Dodge (2011), point to spaces being increasingly 'written' by software and hence 'automated' this case points back to feminist theorists like Suchman (2007) who show that machines (and we may add software) inherit their intelligence and agency only when human labours are rendered invisible. As this study has employed a *feminist* approach, it has examined the labours of the App and other heterogeneous actors in reconfiguring objects, subjects, practices and spaces (without decoupling software from its sociomaterial arrangements). This approach may also be useful to the study of 'interventions'. For example, by understanding what and how actors are involved in the remediation of digital media technologies and their subsequent reconfigurations, specific (and perhaps political) 'interventions' (Suchman, 2007) may be made at diverse stages of design, production and consumption processes (as Löwgren and

Reimer, 2013, suggest). Löwgren and Reimer, (2013) thus call for an 'interventionist turn' to begin and more trans-disciplinary and collaborative media research.

Lastly, I would like to reflect on some of the implications of using digital methods in this research study. As described in Chapter 3, a variety of digital media technologies (including various platforms, applications, social media sites, apps and devices) were employed to perform the research. For example, the Blogger platform was used to create a research blog, which was updated both online and through Blogger's remote blogging App. This required the use of an internet service provider, as well as several devices: a laptop computer and a smartphone device. Further, participants in this study were filmed using a tablet and the footage was viewed and edited using software applications, such as iMovie. Further, I used particular platforms and applications (such as, Skype and Microsoft Email) to communicate with supervisors from abroad and search engines (such as Google, Amazon and those of particular academic journals) to find books, articles and other information. As Lupton points out, "How we learn about the world is also digitally mediated" (Lupton, 2015: p. 3). As Marres (2012; 2012a) points out, digital media technologies act not only as 'objects' and 'instruments' of study but also as 'subjects' – a reason for which social research too is seen as comprising 'shared accomplishments' (Marres, 2012a). For some digital sociologists, "the very idea of 'culture' or 'society' cannot now be fully understood without the recognition that computer software and hardware devices not only underpin but actively constitute selfhood, embodiment, social life, social relations and social institutions" (Lupton, 2015: p. 2). As a result, Lupton has proposed that "sociology needs to make the study of digital technologies central to its very remit" (Lupton, 2015: p. 5). Thus more research must be undertaken to understand the role of digital media technologies in methods used to undertake a study and the overall production of knowledge.

Experiments in Display Practices: Moving Away from 'Success' and 'Failure'

The use of digital media technologies, such as apps, as a way to display museum collections may be considered a recent and particular type of 'experiment' in

museum display practice. In their edited volume, *Exhibition Experiments,* Macdonald and Basu (2007) propose that exhibitionary spaces have perhaps always provided a setting for 'experimental processes'. This sort of 'experimentation' involves considering the museum as a 'laboratory' in which "various 'actants' (visitors, curators, objects, technologies, institutional and architectural spaces, and so forth) are brought into relation with each other with no sure sense of what the results will be" (Basu and Macdonald 2007: p. 2-3). Macdonald and Basu's (2007) volume shows that curators, philosophers, anthropologists, theorists and artists alike have all 'experimented'; in the contemporary museum by devising novel displays of collections as well as contemporary interactional schemas between visitors and museum objects. But in the case of the McCord Museum's MUM App, it has been shown that 'advertising agencies' and 'developers' can also be engaged by museums in 'experimental' practices. For the advertising agency, Brothers and Sisters, which was involved in developing both the Streetmuseum App and the MUM App, (re)creating and (re)making such apps served as a way to bring together advertising and marketing practices with exhibitionary practices: both apps are at once 'public relation tools' and 'digital displays'. In considering the 'experimentality' of such practices, this thesis makes a case for museums, as well as museum theorists, to understand the use of digital media technologies in museum display practices as *always experimental.* This is for two reasons: firstly, since the deployment of digital media technologies always entails the bringing together of a large range of (sometimes unexpected) actors and, secondly, since the 'effects' of such reconfigurations may indeed be uncertain and unexpected. Further it is suggested that museums, and theorists alike, move away from the dichotomous language of 'success' or 'failure' in describing digital media technology deployment and use.

This is not an all-together 'new' proposal. For the contributors in Macdonald and Basu's volume "contemporary exhibitionary practice is – or should be – also an experimental practice" (Basu and Macdonald, 2007: p. 2). They insist that like the laboratory the "exhibition, too, is a site for the generation rather than reproduction of knowledge and experience" (Basu and Madonald: 2007: p. 2). This case shows that *digital media technologies*, and particularly apps, can be used by museums to

Figure 7.1 MUM's footprint

Source: Image taken on July 18, 2012 on Rue Sherbrooke

'experiment' not only inside the so-called 'laboratory' walls of the museum but also outside its walls – here by *re-displaying* collections in augmented reality and *re-imagining* interactional schemas through mundane devices. Further, by moving the 'museum visit' with the App outside the walls of the McCord Museum, this case has also shown that the experiment does not end with the production of the display but rather continues through its engagements with the users and other actors over time. As such aspects of the experiment may also intervene in everyday life in unanticipated ways. Here, users were left to very publicly and awkwardly perform the practice in urban centres where passersby often confused them with 'tourists'. Seeing 'digital' displays as experimental also means that the outcomes of such practices may be transformative, but how and whether this may happen is uncertain. For example, this case study showed that in some exchanges between actors, the 'museum visit' is reclassified as a 'tour'. But as the 'museum visit' / 'tour' is rescripted on an ongoing basis, the way in which this practice and its classification will settle, if at all, is uncertain. As such, in order for this 'digital' practice to stabilise, the McCord Museum may need to put more 'material' in place, such as incorporating more 'physical' cues for users and passersby to stabilise the performance. Specifically, the Museum may choose to affix additional 'footprints' on public sidewalks across the city in a similar fashion to existing ones already in place (see Figure 7.1). These could serve to indicate more of the locations where users may view collections in augmented reality (though, of course, the footprints could also serve to promote the App). But (ironically) this 'digital' display would then have led to even more of its actor-network being (re)materialised. Without such 'material' cues this practice may lack motivation to stabilise.

Lastly, I want to propose that museums (and researchers[99] alike) embrace the 'experimental' aspects of employing digital media technologies. This means understanding the use of digital media technologies as being (perhaps always) uncertain, and therefore unpredictable. The proposal also entails a shift away from understanding the employment of diverse technologies as 'successes' or 'failures' to accepting the unpredictability of their (re)use. In this case we saw that McCord Museum staff, having read reports about the 'success' of the Streetmuseum, decided to (re)make a similar augmented reality app – the MUM App (see chapters 1 and 4). But, while the Streetmuseum App was downloaded 65,000 times in the first four weeks of its deployment (an indicator used to suggest it as a 'success', see Chapter 4), the MUM App barely mustered 8,000 visits in the first year or so of its use (see Figure 6.3 in Chapter 6). Part of the reason for this significant difference is the unpredictability of how audiences will respond to such an app. But, more specifically, the reason is that when digital media technologies are 'remediated' they are then (re)deployed in and as a refashioned sociomaterial and/or sociotechnical arrangement. A couple of examples may serve to illustrate this. First of all, the larger city of London offers up a much wider possible audience for the Streetmuseum, whereas Montreal, a smaller metropolitan city offers a smaller audience for the MUM App. While a larger population does not determine its use, it can explain how more users were enrolled in using the Streetmuseum App. But, perhaps more tellingly, London offers a more temperate climate, which is more conducive to an outdoor activity like viewing collections with the Streetmuseum, whereas Montreal has a varied climate where temperatures can fall well below zero degrees Celsius. While weather does not determine its use either, we have seen in this study that viewing the MUM App display can become uncomfortable if it is too cold. The

[99] For example, Smørdal et al.'s (2014) study, *Experimental zones: two cases of exploring frames of participation in a dialogic museum,* looks to understand the use of mobile devices in creating 'experimental' interactional schemas between the Norwegian Museum of Science and Technology and the public. While the term 'experimental' is employed the ultimate aim of the project and the study is to find ways of integrating digital media in the museum 'successfully'. As the authors explain, the developers of these experimental zones looked to find "appropriate ways of integrating social media and digital technologies into dialogues with visitors" (2014: p. 224). But for Smørdal et al. too (2014) 'success' was explained as coterminous with 'integration': "there is an increasing understanding that successful use of digital resources entails how they are *integrated* into the social, timing and spatial aspects of exhibitions" (Smørdal et al., 2014: p. 225, original emphasis). But to take experimentality seriously is to understand the uncertainty of 'integration' and its unpredictability.

question of the ‘success’ or ‘failure’ of the App is therefore problematised. We can only conclude that remediations, such as that of the MUM App, which refashioned a complex actor-network, must instead be considered ‘experimental’.

Appendix A – Smartphone Market Share

Table A.1 Worldwide smartphone sales to end users in 2014 (1000s of Units)

Company	2014 Units	2014 (%)	2013 Units	2013 (%)
Samsung	307,597	24.7	299,795	30.9
Apple	191,426	15.4	150,786	15.5
Lenovo*	81,416	6.5	57,424	5.9
Huawei	68,081	5.5	46,609	4.8
LG Electronics	57,661	4.6	46,432	4.8
Others	538,710	43.3	368,675	38.0
Total	**1,244,890**	**100.0**	**969,721**	**100.0**

*The results for Lenovo include sales of mobile phones by Lenovo and Motorola.

Source: Gartner http://www.gartner.com/newsroom/id/2996817 last retrieved August, 9, 2015

Table A.2 Worldwide mobile device sales to end users in 2010 (1000s of Units)

Company	2010 Units	2010 (%)	2009 Units	2009 (%)
Nokia	461,318.2	28.9	440,881.6	36.4
Samsung	281,065.8	17.6	235,772.0	19.5
LG Electronics	114,154.6	7.1	121,972.1	10.1
Research In Motion	47,451.6	3.0	34,346.6	2.8
Apple	46,598.3	2.9	24,889.7	2.1
Sony Ericsson	41,819.2	2.6	54,956.6	4.5
Motorola	38,553.7	2.4	58,475.2	4.8
ZTE	28,768.7	1.8	16,026.1	1.3
HTC	24,688.4	1.5	10,811.9	0.9
Huawei	23,814.7	1.5	13,490.6	1.1
Others	488,569.3	30.6	199,617.2	16.5
Total	**1,596,802.4**	**100.0**	**1,211,239.6**	**100.0**

Source: Gartner (February 2011) http://www.gartner.com/newsroom/id/1543014 last retrieved August 9, 2011

Table A.3 Worldwide smartphone sales to end users by OS in 2014 (1000s of Units)

Operating System	2014 Units	2014 Market Share (%)	2013 Units	2013 Market Share (%)
Android	1,004,675	80.7	761,288	78.5
iOS	191,426	15.4	150,786	15.5
Windows	35,133	2.8	30,714	3.2
BlackBerry	7,911	0.6	18,606	1.9
Other OS	5,745	0.5	8,327	0.9
Total	**1,244,890**	**100.0**	**969,721**	**100.0**

Source: Gartner (March 2015) http://www.gartner.com/newsroom/id/2996817 last retrieved September, 21, 2015

Table A.4 Worldwide smartphone sales to end users by OS in 2010 (1000s of Units)

Company	2010 Units	2010 Market Share (%)	2009 Units	2009 Market Share (%)
Symbian	111,576.7	37.6	80,878.3	46.9
Android	67,224.5	22.7	6,798.4	3.9
Research In Motion	47,451.6	16.0	34,346.6	19.9
iOS	46,598.3	15.7	24,889.7	14.4
Microsoft	12,378.2	4.2	15,031.0	8.7
Other Oss	11417.4	3.8	10432.1	6.1
Total	**296,646.6**	**100.0**	**172,376.1**	**100.0**

Source: Gartner (February 2011) http://www.gartner.com/newsroom/id/1543014 last retrieved September 21, 2011

Appendix B – The Montreal-Points of View Exhibit

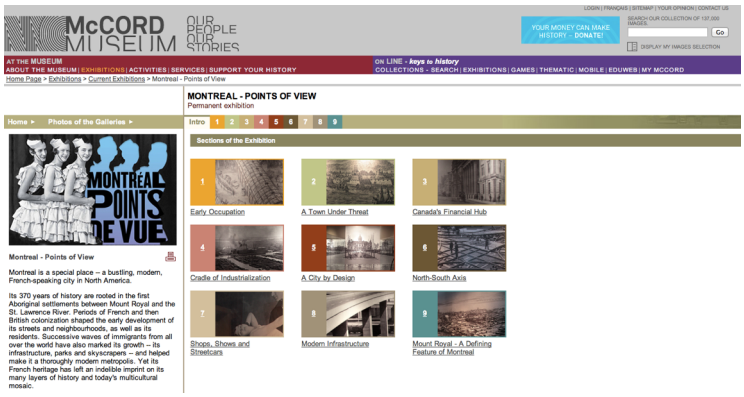
The *Montreal-Points of View* permanent exhibit reopened in 2011 and showcases artifacts from the McCord Museum's range of 'Canadiana' collections through mixed-media displays (such as glass-enclosed cases and also tabled displays see Figure B.1). The exhibit reflects the history of Montreal, and the historical changes that occurred on the island from the time it was settled by First Nations peoples such as the Iroquois (before the 16th century) to contemporary life, events and landmarks that give the city its identity.

Figure B.1 The Montreal—Points of View exhibit

Source: Ana-Maria Herman. Image taken on November 7, 2012.

The exhibit also has an online version. The physical exhibit presents the collections in ten 'zones', ordered in loose chronological order and each pertaining to a particular location in Montreal, which I suggest in Chapter 4, played a part in how the MUM App was organised around six locations in Montreal. The online version also reflects this grouping of objects (though it only depicts nine of the ten zones of the physical exhibit, see Figure B.2). The first visiting zone of the permanent exhibit relates to the early occupation by First Nations and explains early Iroquoian settlements around the St. Lawrence, and particularly, the 'Dawson Site'

Figure B.2 The Montreal—Points of View website



Source: http://www.mccord-museum.qc.ca/expositions/expositionsXSL.php?lang=1&expoId=71&page=intro taken by researcher on February 1st, 2014

an archeological site that was excavated in 1860 around Metcalfe Street and De Maisonneuve Boulevard. The second zone is titled "A Town Under Threat" and depicts the first French settlement of missionaries that founded Montreal (as 'Ville Marie'), in 1642, which had to contend with the 'hostile relations' of neighboring Iroquoian nations, and features the Place Royale (see Figure B.3).

Figure B.3 'A Town Under Threat'

Source: Ana-Maria Herman. Image taken on March 14, 2013.

Figure B.4 'Canada's Financial Hub'

Source: Ana-Maria Herman. Image taken on March 14, 2013.

The third zone shows the development of Montreal as "Canada's Financial Hub" in the early 19th century, featuring St James Street and in which a few artifacts from the Notman Photographic Archives are also on display (see Figure B.4). The fourth zone "Cradle of Industrialization" depicts the growth of transportation networks and industries in the late 19th century, and features the Lachine Canal. The fifth zone depicts "A City by Design" outlines the building of the city's infrastructure and public parks (see Figure B.5), featuring the Maisonneuve Market. The sixth zone showcases the "North-South Axis" though it features St. Lawrence Street that divides the city into east and west, and more significantly into the French-speaking and English-speaking communities. The seventh zone is focused on St Catherine Street and its "Shops, Shows and Streetcars"—as the city's main retail and entertainment areas.

The eighth zone exhibits the city's "Modern Infrastructure" completed in the 1960s and also showcases artifacts (such as a hostess uniform, a camera and posters) from the World Exposition of 1967 held in Montreal (see Figure B.6) and features Notre-Dame Island. Finally, the ninth zone focuses on "Mount Royal – A Defining Feature of Montreal" that showcases a panoramic view from Mont Royal—unto the financial district, old Montreal and the Port area—the city's central mountain that hosts a park designed by Frederick Law Olmsted, the designer of New York' City's Central Park (see Figure B.7). A window opening through the panoramic display provides visitors a view of Mount Royal (see Figure B.8). In the physical exhibit a tenth visiting zone provides a sitting area from which all the visiting zones can be seen and that offers contemporary artwork that depicts cityscapes of Montreal today.

Figure B.5 'A City by Design'

Source: Ana-Maria Herman. Image taken on March 14, 2013.

Figure B.6 'Modern Infrastructure'

Source: Ana-Maria Herman. Image taken on March 14, 2013.

Figure B.7 'Mount Royal'

Source: Ana-Maria Herman. Image taken on November 7, 2012.

Figure B.8 Window to Mount Royal

Source: Ana-Maria Herman. Image taken on March 14, 2013.

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