Innovation, data and social responsibility

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Introduction

The volume of user data generated in museums continues to increase rapidly. Data is collected from the visitor's physical experience and the digital touchpoints of their experiences: web, social media, ticketing, and mobile apps, among others. This data allows museums to demonstrate their continued relevance in an increasingly digital society, and present new ways for museums to collect, tell stories and engage with visitors (Murphy 2019; 2016; French and Villaespesa 2019). However, the technologies used to collect and process this data and the societal changes they have created raise important ethical questions for museums.

This is not a distinctly museum-centered issue, the use of digital data to influence decision making of individuals on key issues such as politics has also been called into question. In the UK and US there have been investigations into social media and data manipulations designed to influence the US Presidential Election and the UK Brexit vote ('Democracy Disrupted? Personal Information and Political Influence' 2018; 'Read the Mueller Report: Searchable Document and Index - The New York Times' 2019). Zuboff (2019) argues that technologies that were meant to liberate us (such as social media, search and the world wide web), and create a fairer society have actually created much greater divides. While museums collect vast amounts of data on their collections and on their visitors, this chapter focuses exclusively on data that is collected and created in relation to visitors.

In a 2019 article titled *Digital media ethics and museum communication* which surveyed current challenges facing museum practitioners, academic Jenny Kidd argues that more questions than answers currently exist when it comes to digital media, data and ethics in a museum context (Kidd 2019). Exploring, critiquing and understanding the ethical implications of data, and the increasing use of AI applications to process and interpret this data within a museum context is becoming a pressing need for museums. This chapter examines these ethical challenges in the context of current and emerging museum practices, as defined by the Museums + AI Network. The Museums + AI Network was established in 2019 by Dr Oonagh Murphy and Dr Elena Villaespesa through funding from the UK Arts and Humanities Research Council (Murphy and Villaespesa n.d.). Through a series of events in London and New York, the Network brought senior museum professionals and leading experts in the field of AI, data, and ethics together to frame new approaches to ethical practices within a museum context. This chapter presents thinking drawn from this network and serves as a foundation for an emerging conversation that

transcends academia, civil society and museum practice. This chapter is designed to compliment *AI: A Museum Planning Toolkit* which was published in January 2020, the toolkit provides a practice based model for developing AI projects within a museum context (Murphy and Villaespesa 2020).

Data innovation: strategy and management

Museums are by their very nature data-centric institutions. They are collectors and creators of a diverse range of data - be that the bone density of a dinosaur, the market value of an artwork, the most viewed collection item on their website, or how long visitors spend in a particular gallery. These datasets and the ethical and legal frameworks that govern them are complex, a complexity that is partly drawn out of the differing motivations and rationales for the collection and creation of these data sets.

Before we can begin to examine data collection and processing challenges within a museum context, we must first consider the role that data has begun to play in wider society. In the UK and US, we live in a data-saturated society, with algorithmic decision-making policies and processes being used to decide on cancer treatment, prison sentences, and the price we pay for a home or car insurance (Fry 2018). Data saturation in these two western countries has been brought about in two ways, firstly, neo-liberal ideals of metrics have popularized the collection of data, for both countries and individuals. From the state-controlled Social Credit System in China, to the privately driven strive for personal development and health in the UK and US through technologies such as FitBit (Liang et al. 2018; Whitson 2015) data and control are intertwined social constructs. Secondly, pervasive digital technologies have created new tools for the creation, collection and analysis of data on a scale never before seen. The 2020 COVID-19 pandemic has further intensified the collection of and public debate around data. This pandemic led to a global race to develop contact tracing technology that would allow health professionals to identify outbreaks, by analyzing location data of individuals through their phones (Ienca and Vayena 2020) .

Sluis defines this wider acceptance of data as a source of power and influence as “the mathematization and quantification of everyday life” a trend that she argues can now also be found in museums (Sluis, n.d.). Museums as social constructs are adept at change, and like they have done many times before are tasked with developing new ways of working, Parry centers this challenge on the ethical framework which scaffolds the museum construct. ‘As the museum moves into new social, situated, sensory and semantic media spaces, so its ethical framework needs to adjust and respond to the implications and consequences of these new interactions and interventions’ (Parry 2011).

Social media is, of course, not free to use, as is often perceived, but, instead, users pay for access with their personal data, data that is then sold to advertisers. Social media is perhaps best described as free at point of use. User data is traded to the highest paying bidder and then used to facilitate the micro-targeting of goods, services and experiences to an individual, or at least an individual’s data profile. This model of data payment is, however, something that many

users are not aware off, and it was only after a number of high profile ethically problematic data processing cases attracted news media did the public on mass begin to question the data that they had made available to private companies such as Facebook and Google (Amer and Noujaim 2019). This public reckoning happened after ten years of pervasive data sharing across these digital platforms, and as such made many review and reflect upon what they had shared historically (with limited abilities to change that data's availability), and greater consideration for data sharing in the future.

The collection of data related to visitors is not new, with visitor studies becoming pervasive in nature with the rise of neo-liberal approaches to arts and culture funding from the mid 1980s. Hooper-Greenhill describes visitor studies as 'a rapidly evolving, controversial, and dynamic field' (2006, 362). The methods used to collect early visitor data included measuring footfall, carrying out focus groups, questionnaires and interviews. All of these methods were visible and sought informed consent from visitors who were asked to contribute to such research (bar perhaps, the measurement of footfall). However digital tools and services have rendered many of the data collection methods used by museums as invisible, Parry suggests that in recent years many digital tools and applications have effectively disappeared from sight in museums (2011, 331). Whilst we may see less researchers in galleries today than were once present in the 80s, 90s and 00s, and digital technologies are becoming more pervasive (or as Parry suggests invisible), museums are collecting more data on visitors than ever before. Kidd argues that the term visitor is perhaps too narrow a term for those that now engage with museums, and indeed for those that museums collect data on, in her work she uses 'visitor', 'user' and 'audience' interchangeably (Kidd 2019, 193). Visitor data is today often collected through third party social media platforms, WIFI tracking services, and review sites. For example, a visitor may tweet about their museum experience, or write a review on Tripadvisor, knowingly creating data about their visit. However many visitors are also unknowingly creating data about their visit, simply by having their phone in their pocket and a Google account. Google uses this location data to provide live information on when the museum is busy, and how long visitors typically spend at the museum. Kidd argues that for many museum visitors a gallery visit is seldom completely offline (Kidd 2019, 195). The duality that is the invisibility of data collection methods, and yet the availability of visitor data poses many ethical challenges for museums.

In 2018, General Data Protection Regulation (GDPR) came into force within the European Union (EU), placing much stricter data management legislation on all organizations that collect data (Papaioannou and Sarakinos 2018; Albrecht 2016; Politou, Alepis, and Patsakis 2018). With significant enforcement penalties, that, dependent on the severity of the data breach or lack of compliance begin at 2% of total annual turnover or 10 million euro (whichever is greater), (larger penalties can be faced for continued lapses) ('Penalties' 2019); data management became a financial imperative. In 2018 we also saw a public reckoning with social media, and data trade, with the *Cambridge Analytica* scandal hitting the headlines and the general public becoming more aware of their digital footprint and data identity (Cadwalladr and Graham-Harrison 2018; Isaak and Hanna 2018).

Digital data collection methods

Focusing on the digital scene, an area where museums are innovating and becoming smarter in data collection, we can differentiate between those digital activities that are initiated by the museum on their own platforms or other third-party sites as a result of collaboration (e.g Europeana, Wikimedia), and those initiated by the users or the community. The user research and evaluation tools vary per platform and can include traditional methods, but also digital methods developed for the specific context. A summary of some of the tools and methods used in the museums' digital platforms are presented in Table 1.

Websites are the first online digital product that museums operated, and they served as a platform to upload visit planning information and their digitized collections. In most cases, the number of website visitors surpasses the number of onsite visitors, and this growing museum outreach has been a subject of research by both museum professionals and researchers. The majority of studies on museum website visitors have been quantitative with the usage of web analytics as the main method to gather and analyze the data. Web analytics is defined as "the measurement, collection, analysis, and reporting of internet data for the purposes of understanding and optimizing web usage" (WAA Standards Committee 2008). There are clear advantages of using web analytics in order to understand website user behavior and to measure the performance of online activities. Google Analytics is a widely used tool in the sector (Moffatt 2017; Chan, Clements, and Finnis 2011). Web analytics tools are inexpensive and collect a vast amount of clickstream and behavioral data. With a simple tracking code that is added to the website, museums can obtain data about their user characteristics, the device they utilize to access the website, their location and language, traffic sources, the content they visit and what they purchase. Similarly, museums can add other tools to collect behavioral data using heatmaps, scrollmaps and recordings, which allow them to reproduce a user's session, see their mouse movements, check how long they spend on a given page and what the whole user journey is. Other methods in the web analytics mix include A/B or multivariable testing, where two or more versions of the page are shown to target users in order to measure which one performs better to accomplish a specific goal. While in the past, a lot of these methods would require deep manual analysis, now AI is helping with this task. For instance, Google Analytics allows users to ask questions in natural language to discover insights. Examples of those questions are: How many people visited the website yesterday? Or Which traffic sources brought ticket sales last week? Google Analytics automatically highlights traffic or behavioral changes and creates user segments with those users that the model thinks are more likely to convert ('About Analytics Intelligence - Analytics Help' n.d.).

Museums also have a significant digital presence on social media, where they create online communities with the objective of building brand awareness, promoting their exhibitions and events, generating a dialogue with their followers, and distributing their content. There is a range of social media analytics tools and depending on the platform, this data is provided in their analytics system (e.g. Facebook Insights, Twitter Analytics, Pinterest Analytics, YouTube Analytics) or with third-party tools developed by commercial firms. These analytics tools collect a large amount of data on users' profiles and their interactions with the museum's profile.

Examples of metrics that can be collected include post impressions, reached users, comments, shares, likes, clicks on links and content views, among others (Villaespesa 2015). Moreover, social media, as the object of research, has led to the application of methods from various fields. Data from social media platforms APIs can be collected and publicly available data can be also scraped. Once data is gathered, then computational methods such as content, sentiment or network analysis can be applied.

The list of methods and tools to collect data from users continues to grow when museums expand their digital presence both in the galleries via Wi-Fi access (O Malley 2017; Yoshimura et al. 2014), interactives, voice assistants, robots, audio guide services, and online, where museums distribute their content on other sites such as Wikipedia, Google Art & Culture or TripAdvisor. The amount of data generated from both traditional and digital channels falls short of big data where, as defined by Boyd and Crawford (2012), large datasets exist which can help to make social and technical impact and can produce new insights. The motivations behind the production of insights from these data points are multiple in the museum. These insights can help to improve the visitor experience, increase revenue, monitor digital marketing campaigns, evaluate the results of their online engagement activities or assess the impact of the digital initiatives. Innovation happens both with emerging technologies being applied in the museum context and with the data that is being generated from their usage.

Table 1. Methods and tools to gather user data from digital platforms

Source of Data	**Methods and Tools**	**Privacy policy**
Web	Web Analytics (e.g. Google Analytics) Heatmaps, scrollmaps and recordings (e.g. Hotjar, CrazyEgg) A/B Testing (e.g. Optimizely, Google Optimize) User testing (e.g. usertesting.com) Online surveys (e.g. Qualaroo, SurveyMonkey)	Cookies Website privacy policy Terms of use
Social Media	Social Media Analytics tools: built-in tools (e.g. Facebook Insights, Twitter Analytics, YouTube Analytics…) or third-party analytics tools (e.g. Iconosquare, Keyhole, Hootsuite…)	Social Media platforms privacy policies, terms of service.
Mobile apps	App Analytics (e.g. Flurry, Google Analytics) Online surveys	App privacy policy

Wi-Fi	Wi-Fi analytics tool	Option to accept usage Terms & Conditions when user connects to the network
Review websites (e.g. TripAdvisor)	Platform's analytics tool	Privacy policy
Kiosks/interactives usage	Web or App Analytics Observations Surveys	Kiosk privacy policy
Email	Email Analytics	Email subscription policy
User generated content (on the museum own platforms or third party platforms, e.g. hashtag)	Content Analysis Sentiment Analysis Social Network Analysis	Third party's website or app privacy policy
Voice assistants	Analytics tools (e.g. Bespoken, BotAnalytics, Dashbot, Defined Crowd, Skilla)	Voice assistant's privacy policy
Partnership sites (e.g. Google Arts & Culture, Wikimedia, Khan Academy, Europeana)	Web Analytics (e.g. Wikipedia pageviews tools)	Third party's website or app privacy policy
Chatbots	Bot analytics tool (e.g. Dashbot, Bot metrics, Chat metrics)	Bots' provider privacy policy

AI and visitor data

Data has been traditionally used at the museum to count visitation, understand audience profiles and create segmentation models, assess the effectiveness of marketing campaigns, or evaluate the visitor experience. AI technologies bring a new set of computational methods that can automate some of the current analysis, examine existing data in new ways, and even generate new datasets. The application of AI brings new models and opportunities for museums to better understand their visitors and enhance their experience in innovative ways.

The number of people that go through the museum's door is probably the key metric that museums have collected since their origin. This number is included in annual reports and rankings of the most visited museums are published every year. AI can be used to impact ticketing and attendance. In an attempt to predict visitation for temporary exhibitions, the National Gallery in the United Kingdom, is using machine learning in order to create predictive models. The ultimate aim of this activity is to increase revenue through ticket sales, increase the quality of visitor experience and sculpt new audiences by targeting marketing messages to specific groups (Dobinson 2017). With a similar goal of influencing attendance numbers, the Art Institute of Chicago is using models based on multiple variables such as weather, holidays or events happening in the city (Bertagnoli 2018).

Another use case scenario for AI is to help the museum to evaluate the visitor experience using visitor comments on social media or review sites. While visitors are in the galleries they use their phones to take photos and share their experience on social media, in many cases using a hashtag or tagging the location. These publicly available posts and photos can be gathered in an automated way and then AI provides tools for the analysis to extract visitors' feelings and expressions (Gerrard, Sykora, and Jackson 2017). The Reina Sofía Museum (Madrid, Spain) used social media listening tools during the exhibition "Pity and Terror: Picasso's Path to Guernica" to capture the sentiment of what people were talking about (Telefonica 2017). One platform that they have been exploring with Natural Language Processing and, specifically, sentiment analysis is TripAdvisor from both the academia and professional angles. A study of 22,940 reviews about museums in London showed the potential source of information that this site can bring to improve primarily physical aspects of the experience by extracting the topics and linking them to the rating values (Alexander, Blank, and Hale 2018). Similarly, the British Museum and the American Museum of Natural History have tested the water using these tools to extract meaningful insights from people's comments and feelings (French 2018; Cuau and Pim 2018).

The potential impacts of AI in museums: data privacy challenges and dangers of algorithms

The collection of data to fuel metrics-based analysis of a museum's success could be considered a symptom of neoliberal cultural policy. Sluis argues that 'metrics have become powerful rhetorical weapons' rather than a data revolution 'we are witnessing a mania of metrics' (Sluis, n.d.). This is further problematized by the competing motivations of third party data sources such as Google, Facebook, Twitter, who seek to collect data to better serve their advertisers, and the demands of museum funders who seek data that evidences visitor engagement, beyond bound rate, and click rate. Critically engaging with the challenges created by these technologies and their inherent biases is key to their successful adoption. As the Black Lives Matter movement has shown us, technology can be used to further rather than demolish structural racism. Racism by design is not a new issue, but there is hope, Wittkower argues that to avoid creating discriminatory technology we can "take affirmative action to include minority bodies in our design spaces" (2017, 51). Their work posits not a general policy to 'fix' these

design biases retrospectively, but instead advocates for reflective practice and a ‘diversity impact assessment’ before technologies are adopted.

The characteristics of the online environment raise a series of ethical issues related to anonymity, consent, accessibility, representation, discrimination and privacy. However, there are no standard detailed and accepted worldwide ethical guidelines, and furthermore, regulations may change depending on the country. Museums provide information about their privacy policies on their websites, including which data is collected, the tracking tools they use, how they are utilizing the data and what are the options for the user in case they want to opt-out (see for example:‘Privacy Policy and Terms of Use | MoMA’ n.d.; ‘Privacy Policy | National Gallery, London’ n.d.; ‘Privacy Policy’ n.d). However, as mentioned before, museums’ online presence and content are not just confined to their websites and apps. In this case, the collection and usage of data is controlled by the social media site or partner’s platform.

AI brings unique privacy challenges for museums. We can divide the data management process into three steps and reflect on the algorithm dangers and biases that can occur on each stage:

1. **Data input.** The first step is the collection and data clean-up which brings a question about the quality of the input and the bias that potentially already exist in the data.
2. **Process.** The analysis of the data using the algorithms to create models is a crucial step, not free of challenges. Museums may partner with technology organizations to use their tools which can create ethical issues around how the data has been trained, what has been included and excluded, and how transparent and fair the model is to make decisions.
3. **Output.** The results and visuals need to be evaluated and again, this step generates questions about the accuracy, subjectivity, and relevancy of the output. And most importantly, it also raises the question of how this final result helps the museum to achieve its mission and respond to a specific organizational need.

Social and ethical responsibility in museums

Writing as far back as 2011 (which could be considered to be a long time ago when we consider the speed of technology development and application), Parry advocated a move towards ‘compassionate computing in museums’ and a realignment of value based rationales for museum computing projects. He noted an increasing emphasis on ‘social responsibility and trust’ in museums computing conferences in the UK around that period (Parry 2011). This utopian aspiration for museums is challenged by the power imbalance that exists between museums and big tech. To date, technology companies have operated in a loosely regulated space, which has allowed them to dictate the role such technologies have in society. In his book What You Really Need to Know About the Internet, academic and journalist John Naughton tells us, “The history of technology is littered with cautionary tales about what happens when powerful companies are allowed to control the pace of innovation” (Naughton 2012, 47). American Sociologist Robert Merton popularized the idea of “unintended consequences”, in which technologies that are intended to bring social good, have negative impacts. For example

a problematic unintended consequence of social media is the rise of Fake News (Keen 2015, 68). The modus operandi of technology platforms within wider society (particularly in shaping political discourse) is increasingly focussed on the use of data to predict and modify behavior as a means to 'produce revenue and market control' (Dencik, Hintz, and Cable 2016, 1). Whilst this may serve a useful purpose for museums, who are under increasing pressure to increase visitor numbers, sell more tickets and diversify audiences, such actions need to be critically dissected if museums are to avoid becoming an 'appendage of consumer society' (Janes and Sandell 2019, 1). In Museum Activism, Janes and Sandell center their discussion (which looks at wider civil society, rather than technology per se), on the 'museum's inherent power as a force for good' whilst a utopian ideal that has many potential critics, this serves as a helpful foundation from which to build data management and use practices within the contemporary museum. One mechanism that Janes and Sandell advocate for the development of a socially conscious or activist museum is a move away from expansionist tendencies (new buildings, champagne launches, a race to the top in terms of visitor numbers), towards 'moral leadership in support of ethical issues'(Janes and Sandell 2019, 9). If we consider expansionist tendencies within a data context, then more data is 'better'. However, if we consider moral leadership within a data context, then perhaps less data, processed more meaningfully in a transparent and publicly accountable manner is actually what museums should be striving for.

Regulation and professional codes of practice have, to date, been somewhat lacking when it comes to data collection and processing, however the introduction of the 2018 General Data Protection Regulation (GDPR) in Europe and the California Consumer Privacy Act (CCPA) a year later represents a slow shift towards regulation. Professional codes of practice have been slower to respond, with the Museums Association Code of Ethics (UK), American Alliance of Museums (US), and the International Council of Museum Code of Ethics all failing to make reference to data collection and processing (within the context of visitor data). Kidd asks a salient question in her article, *Digital media ethics and museum communication,* "Where can those working at the sharp end of delivery of participatory digital media projects go for guidance on all of these issues when their professional code of ethics is found wanting?" (Kidd 2019, 201). Emerging regulation may serve as one mechanism that will shape museum practices in this area, while efforts such as the Digital Social Innovation Framework, the One by One Initiative, and our own work through the Museums + AI Network provide valuable pathways towards developing new modes of museum practice in this area (Eid 2019; Barnes et al. 2018; Murphy and Villaespesa 2020).

GDPR reinforced informed consent as a requirement for all data collection and processing in the European Union (which has led to many US museums creating GDPR compliant websites as a means to allow access to their website in the EU). In practical terms this has meant a notification when a user first opens a webpage that asks them to 'agree' to the use of tracking cookies, with the promise that the tracking of data will improve their experience. However the detailed legal language and terms and conditions offered to a visitor should they seek it out, are complex and dense (Zuboff 2019, 48). As such, whilst legally compliant the endorsement of clicking 'I agree' arguably falls short of the 'moral leadership' of truly informing visitors what data is being collected.

Conclusion

AI technologies bring new opportunities and challenges to the collection and use of visitor data. As such, museums need to create a new model for data management, which is socially focused and ethically robust. Museums need to (now more than ever) work in a collaborative way to mitigate the biases and negative cultural impact of algorithms. This is indeed a challenge, and a significant one at that, but museums as social institutions offer a unique platform for critical inquiry, and the development of data literacy skills within wider society. As such it is our argument that museums should set a higher ethical standard than current regulations require. Museums should move towards a truly informed consent model of data collection, and greater transparency around how data is used to inform museum practice, curatorial decision making and visitor experience. At this critical juncture in the development of museum practice, it is important that we as museum professionals and academics are not led by the shiny lights or promises of the big tech companies. And instead, we focus on the creative application of technologies that aligns with the *raison d'être* of museums, institutions that exist 'in the service of society and its development' (Sandahl 2019, 2).

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