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Creating Meaningful Museums: A Model for Museum Exhibition User Experience

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ABSTRACT

Combining existing knowledge of museum exhibition visitor experience with concepts of User Experience (UX), a model for Museum Exhibition User Experience (MEUX) is presented. The model was developed from research interviews and surveys with UK museum professionals and presents the museum exhibition experience from both museum and visitor perspectives. Its use as an evaluation tool for visitor experience is explored at Oxford University Museum of Natural History (OUMNH). In comparing results with those from staff, a disconnect emerged between museum and visitor preferences on motivations for visiting and what outcomes emerge from visits. The incorporation of the theoretical MEUX model into museum practice enables holistic conceptualization of the visitor experience through the pragmatic and hedonic qualities of an exhibition. With the development of further evaluation tools, this framework and methodology accurately captures institutional and visitor preferences and can evaluate how the development decisions of museums influence and impact the visitor experience.

Introduction

Temporary and permanent exhibition programmes form the cornerstone of activity for many UK museums. They are often complex entities, including objects, text, video, audio, and interactive technologies, with numerous means of communicating messages and facilitating visitor learning. They are also key components of the informal learning environment of museums, with the experience being freely directed by the learner and with no obligation for learning to take place (Falk & Dierking, 2016; Hein, 1998). Learning is complex, multifaceted, highly personal to each individual, and relies on visitors' prior experience and knowledge, beliefs and values (Hooper-Greenhill, 1992, 2000; Macdonald, 2006; Roschelle, 1995). Furthermore, museums are places of experience: to learn, to have family time, to enjoy a day out, and to discuss topics with friends, among other things (Masberg & Silverman, 1996; Packer, 2008; Packer &

Ballantyne 2016). They are an integral part of the leisure and tourism industry, competing with theme parks, cinemas, restaurants, shopping centers and sports activities for visitor attention (Higgins, 2015).

Exhibitions are usually developed by a museum, external company, or community group, and once they have opened to the public, are evaluated for their success of communicating messages to audiences. However, museums often have difficulty in ensuring that visitors learn from exhibitions (Bitgood, 2014) and summative evaluation practices struggle to capture visitor opinions and learning accurately and holistically (Falk & Dierking, 2016; Hein, 1998; Rennie & Johnston, 2004). This is largely due to the use of unsophisticated and unsystematic evaluation methods, scarce resources, a lack of standardized reporting protocols, and the restricted ability to affect change within institutions (Davies & Heath, 2013). Therefore museum exhibition practice may be lacking in fully understanding visitors and producing effective, rich, and meaningful learning and engagement experiences. It is important for the sector to better understand visitors, know more confidently what they are likely to get out of visits, capture this information effectively in evaluation, and then incorporate these insights into future exhibition planning. In a COVID age, despite even more scarce funding, museums are more important than ever. The process of creating meaningful museum experiences for visitors in a more systematic and efficient way needs to be improved within the sector. Concepts and practices from other industries may help.

User Experience (UX) is a research and design paradigm that has successfully created sophisticated and pleasurable products such as the Apple iPhone, luxury automotive vehicles, popular computer games, and more. The concepts and methods of UX are here explored for their potential application in museum exhibition practice, aiming to integrate detailed understanding of visitor behavior with intricate and often complex exhibition components and content. A successful application of UX research therefore has the potential to create rich and meaningful exhibitions, with visitor experiences captured effectively and utilized systematically for future exhibition development. This paper presents the inception and development of a model of Museum Exhibition User Experience (MEUX), integrating both new and existing knowledge from the museum sector. Exploratory research was conducted in two phases with museum sector staff to produce a theoretical framework, which was then further explored with museum visitors to accurately capture visitor experience. This framework, along with sophisticated and systematic evaluation methods developed in further research, has the potential to effectively and iteratively support exhibition development and evaluation of visitor experience within the sector.

Related work

Museum visitor studies

There are a number of notable studies and models that conceptualize visitor experience of cultural institutions. Most notable are Falk and Dierking's Museum Experience (1992, 2016) and Packer and Ballantyne's visitor experience model (2016). Falk and Dierking's model identified three contexts that are crucial for a visitor's museum experience. These are the personal context, which includes a visitor's prior knowledge

and experiences; the social context of who is visiting the museum; and the physical context of the museum setting. These three contexts come together to form their Interactive Experience Model. Alternatively, Packer and Ballantyne detailed several key factors in the conceptual scheme of the visitor experience, which included the "opportunity for an experience," the "immediate subjective experience," and "the experience remembered." Each of the factors is mediated by visitor perceptions, both before the visit in terms of motivations and prior experiences, and during the visit in terms of interpretations, narratives and transformations.

While these models conceptualize visitor experience, they do not relate this experience to the actions of the museum, gallery or heritage site in which it takes place. And neither detail how the actions of the museum influence and impact the visitor experience, meaning that there is little guidance from these systematic models for museums to implement in their work. Despite knowing largely what a visitor experience is, these models did not take the next step in detailing how an institution can influence or use these principles in design. However, the concepts and practices of UX address these aspects in its ability to connect features of a product to the resulting experience for the user.

User Experience (UX)

UX is primarily concerned with the emotional and holistic experience created when a user interacts with a product, usually an interactive one, such as a computer. It was first conceptualized by Don Norman (1988) who advocated User-Centred Design (UCD); a philosophy that places the user and their needs at the heart of the design process, producing products that are usable and understandable in real world contexts. UCD is the design process to understand the user, whilst UX is the specific interaction a user has with a product. The implementation of User-Centred Design principles is more likely to produce better UX.

Whilst there is some debate over its definition (Roto et al., 2011), UX is largely concerned with designing the experience people have when using a system or product; focusing on wellbeing and holistic emotional responses rather than usability and functionality. Hassenzahl (et al., 2008) defined UX as "A momentary, primarily evaluative feeling (good–bad) while interacting with a product or service." UX is concerned with both the functional and the non-task related aspects of a product, such as beauty, self-expression, and the positive emotions that result from such interactions. These hedonic concerns are underpinned by the important pragmatic features of a product: does it work? This means that it is difficult, if not impossible, to create good UX of a product if usability is not first satisfied (Hassenzahl, 2003). UX is unique to each individual and is influenced by prior experiences and expectations (Roto et al., 2011). There are three principal factors affecting UX: the context in which an interaction takes place; the current mood, motivations, and resources of the user experiencing the system; and the user's perception of the system, such as brand image.

Within the UX industry, one of the most successfully and widely utilized models comes from Marc Hassenzahl (2003, 2018; Hassenzahl et al., 2008; Figure 1). This process-oriented model demonstrated how *product features* come together to produce
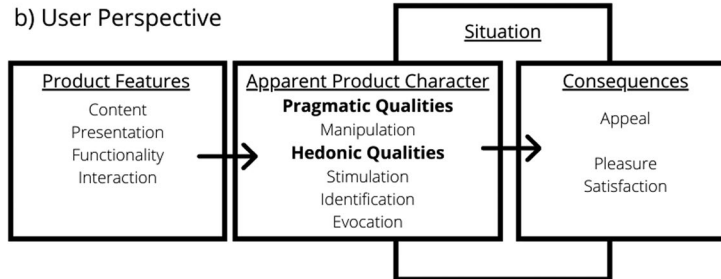
Figure 1. Model of UX, adapted from Hassenzahl (2003). The model is split into a *Design Perspective* and a *User Perspective*. This distinction highlights the key element of UX in that there is no guarantee the user will interact with a product in the way a designer wishes, and so the product character can only be "intended." The product is always mediated by the situation of the user, which creates actual consequences.

an overall *product character*, which is then mediated by a user's *situation* of use to produce *consequences*. *Pragmatic qualities* are those which relate to the functionality of the product, or its primary purpose, for example the technical functions of a mobile phone such as making a call or sending a text message. In contrast, *hedonic qualities* are those relating to esthetics, design, and emotions, such as how the phone looks, feels, and supports the user in connecting with their loved ones. Hassenzahl argued that *pragmatic qualities* are driven by "*do-goals*" (e.g. to make a phone call) whereas *hedonic qualities* are driven by "*be-goals*" (e.g. to be connected to a loved one). It is these *be-goals* and *hedonic qualities* that UX is most concerned with, and it is the fulfillment of such *be-goals* that produce a good UX.

For a designer, these *pragmatic* and *hedonic qualities* come together to form the *intended product character*. For the user, they come together to produce the *apparent product character*. This is a crucial feature of UX—there is no guarantee that the users will perceive and appreciate the product in the way the designers wanted it to be perceived and appreciated. This is because the *apparent product character* is the user's reconstruction of the designer's intentions and is dependent on the *situation* the user is currently in—such as the social or cultural context, or the motivation for interacting with a product. This reconstruction occurs every time a user interacts with a product. Crucially therefore, there is no guarantee that the actual *consequences* of a user interacting with a system are the same as the designer intended. This means that designers can only encourage the presence of the qualities that are considered to be "good UX:" feelings of pleasure, positive emotions, and an enjoyable experience for the user.

There are potentially several benefits in applying Hassenzahl's model to the museum sector. With its distinction between *pragmatic* and *hedonic qualities* of a product and the distinction between a designer's perspective and a user's perspective, the model captures some key concepts of museum learning and exhibition experiences. It conceptualizes that the learning taking place in an exhibition may not necessarily be what the museum intended, as highlighted by several previous studies (Bitgood, 2014; Falk & Dierking, 1992; Miles & Tout, 1994). It stresses the importance of *situation* and context for UX, and thus recognizes museums' diverse audiences and their wide range of motivations for visiting. In distinguishing *pragmatic* and *hedonic qualities*, it recognizes the nature of the informal learning environment that focuses on the experiences and emotional response of an exhibition, rather than just its educational information, and often enables visitors to alter their beliefs, values or attitudes about a topic.

With these similarities identified, the research took an inductive exploratory approach, focusing on the question:

> How can Hassenzahl's model of User Experience (2003) be adapted for use in the museum exhibition sector?

It is important to note that the focus of this research is based on museum exhibits and exhibitions, rather than the museum and all its related activities as a whole. This is because the model focuses on standard museum visitors who are not engaged in any particular museum activities or programmes, but simply visiting to have a browse of the displays. This means there may only be indirect interaction between the museum and the visitor through the engagement with exhibits, rather than meeting and working with any particular members of staff. These standard visitors are perhaps the most diverse and most difficult to quantify, but arguably make up the backbone of an institution's visitors. Despite their diversity, these visitors are a crucial group and thus require sufficient understanding.

The research involved a development phase, based on semi-structured research interviews with UK museum professionals and a testing phase of surveys with UK museum professionals and face-to-face visitor surveys conducted at Oxford University Museum of Natural History (OUMNH). The research study gained full ethical approval from the University of Warwick ethics committee (BSREC 114-19/20).

Developing the model

Methods

The development of a model for MEUX required adapting Hassenzahl's existing model to a museological context. This process was conducted through 28 semi-structured interviews, averaging 90 minutes in length with museum professionals with a variety of experiences across the UK. Their institutions ranged in size from small local museums to national museums and included museum spaces as part of other institutions such as theaters, universities and cultural centers across all subject areas. The staff members interviewed included directors, curators, exhibition directors, writers, interpretation managers, designers, digital producers, learning and engagement officers, project managers and freelance consultants.

Participants were asked questions about their role, the process of developing exhibitions at their institution, and how they would define an exhibition. They were also asked about the key features of exhibitions, what makes an exhibition successful, and the key facets of the visitor experience. Interviews were recorded, transcribed, and subjected to thematic analysis using QSR NVivo. The analysis identified common themes and ideas as discussed in interviews and grouped them appropriately using Hassenzahl's UX model as a guide. Where necessary, the model was given new headings to identify the specifics of the museum exhibition context of discussions. This inductive research methodology led to the formulation of a model for MEUX.

Analyzing interview material

The interviews conducted produced a mass of rich material detailing exhibition thinking and practice in the UK sector. To begin with, material was grouped by each question and then coded based on a summary of a sentence or phrase that a participant had said. For example, under the question about what type of exhibitions the museum put on, participant answers were wide-ranging and multifaceted, from these exhibitions being "collections based" (20 participants), "artist exhibitions" (7 participants), "contributing to museum strategy" (2 participants), or simply being "small" (4 participants). For each question therefore, coding was performed for each participant answer, producing a wealth of material to work from.

There were two types of questions asked to participants. The first were contextually based, asking about participants' job roles and the general exhibition processes that took place at their institution. This provided important information for the second type of question that focused specifically on aspects of Hassenzahl's UX model. The answers from these questions directly fed into the building of the MEUX model.

Participants were asked, within the context of exhibitions, what the term "content" meant to them. Answers varied from participants providing definitions of the term, different examples of exhibition components that made up content, to more general comments about this being the priority for professional working on exhibitions. A common definition (12 participants) that emerged was that "content" was the narrative and story of the exhibition, with one participant saying "so for me content is about the story and how you deliver that story." Components included objects (11 participants), visual elements (4 participants), text (3 participants) and digital (2 participants). One participant commented "it's objects and however you're explaining them, usually in text." With this coding, the research team then collected and summarized material into a definition and broad statement of what components made up the content of the exhibition. This was repeated for the three further exhibition features of "presentation," "functionality," and "*Interaction*."

Participants were also asked what an exhibition needed to have in order to be an exhibition, and what made an exhibition "good" or "successful." These two questions produced a wealth of answers. Some of them fed into the exhibition features described above, and others fed into the two "exhibition qualities" of "pragmatic qualities" and

"hedonic qualities." For *Pragmatic Qualities* of what an exhibition needs, answers were grouped into four areas which related to content, interpretation, audience, and the exhibition in general. To evidence the range of answers given by participants in this phase, the heading "relating to content" contained 26 different codes, with one participant highlighting the importance of "it's a clear message that you're trying to get across." For the *Hedonic Qualities* of what makes an exhibition successful, answers were grouped under the headings of practical engagement, intellectual engagement, emotional engagement, and experiential engagement. Intellectual engagement, for example, contained 15 different codes, again demonstrating the variety of answers participants gave. One visitor commented on the importance of content being engaging, stating "that's the main one isn't it; it won't be above their head intellectually you know it is something they can engage with." In the process of reducing such a mass of answers into more contained groupings, this coding contributed to definitions of exhibition qualities and the various elements that made up these qualities. These are discussed in detail below.

The remaining elements of the MEUX model that were discussed with participants were more straight-forward to code, as this involved collating existing sector knowledge. For *Affecting Factors, Motivations, Key Aims,* and *Visitor Gains*, the groupings of answers are detailed in the model explanations and tables below.

A model for Museum Exhibition User Experience (MEUX)

The results of the development interviews have produced a Model for MEUX. This is summarized below (Figure 2).

The MEUX Model is divided into the *Museum Perspective* and the *Visitor Perspective.* As with UX, the *Museum Perspective* is made up of *Exhibition Features*, which come together to form the *Intended Exhibition Character*, which in turn produces the *Key Aims* for the exhibition. From a *Visitor Perspective*, the *Exhibition Features* form the *Apparent Exhibition Character*, which is mediated by both *Affecting Factors* and *Motivations* to produce *Visitor Gains*. Tables 1–6 below detail the key concepts that form the components of the MEUX Model.

For both *Exhibition Features* and the *Intended Exhibition Character* a definition for each component is provided, which demonstrates how the key facets of Hassenzahl's UX model is adapted to a cultural heritage context. *Exhibition Features* (Table 1) are made up of *Content, Presentation, Functionality*, and *Interaction*, as adapted from Hassenzahl's model. Here, *Content* is defined as "what is in the exhibition space," with *Presentation* detailing "how content is delivered in the exhibition space." The "space" of an exhibition is not just limited to the room where the exhibition is, but also digital spaces, spaces that involve marketing, and anywhere that anything to do with the exhibition resides. A museum café with a leaflet for the exhibition in it is part of the exhibition space, as well as the social media websites that contain commentary on the exhibition. *Functionality* is defined as the bringing together of the content and presentation within the exhibition space, combined with how the audience can access it. Therefore, it acts as the hidden but crucial link between the exhibition and its audience and ensures that everything "works." With the successful underpinning of *Functionality*,

MUSEUM PERSPECTIVE

VISITOR PERSPECTIVE

Figure 2. Model for MEUX. Adapted from Hassenzahl (2003), the MEUX model distinguishes between the *Museum Perspective* and the *Visitor Perspective*. From the *Museum Perspective*, an exhibition character is intended, with the museum stating what it aims to achieve through the exhibition. The visitor interacts with the exhibition with their *Motivations* for visiting and *Affecting Factors*, which produces *Visitor Gains*. Whilst understanding visitors makes this more likely, there is no guarantee that visitors will understand, interpret and engage with an exhibition in the way the museum intended.

Table 1. Categorisation of exhibition features within the MEUX model.

Heading	Definition	Key concepts	Additional information
Content	What is in the exhibition space	Objects and interpretation	
		Story and narrative	
Presentation	How content is delivered in the exhibition space	Design and aesthetics	
		Must link appropriately to content	
Functionality	How the content and presentation operate in the exhibition space, and how the audience accesses this	Practical working of exhibition elements	
		Intellectual and physical accessibility	
		Navigating the space	
Interaction	How the audience operates in the exhibition space	Intellectual interaction	E.g. learning and engagement styles
		Physical interaction	E.g. digital and mechanical interactive exhibits
		Different types of interaction	E.g. between visitors, the space, and the museum
		Full participation of visitor in exhibition	E.g. intellectual and emotional participation
		Dialogue between visitors and exhibition	

the final exhibition feature, *Interaction*, concerns how the audience operates in the space and how they can engage with the exhibition.

The four *Exhibition Features* then come together to form, from the museum's perspective; the *Intended Exhibition Character*. *Pragmatic Qualities* can be defined as "how

effective the exhibition is at moving from the narrative presented to the outcome of an audience interaction and response." Essentially, how good is the museum at getting its message of the exhibition across to visitors? *Hedonic Qualities* are defined as "the audience experience of moving from the exhibition narrative to the audience outcome." This is where the importance of the emotional and experiential aspects of museum visits come into play. Many interview participants discussed the importance of empowering, inspiring, or entertaining visitors in their exhibition visits. The key concepts of the *Intended Exhibition Character* that influence *Pragmatic* and *Hedonic Qualities* are detailed below (Table 2). They emerge from the idea that, as expressed by interviewees, even if an exhibition contains objects, paintings, text panels for interpretation, or

Table 2. Categorisation of the intended exhibition character within the MEUX model.

Heading	Definition	Key concepts	Additional information
Pragmatic qualities	The effectiveness of the exhibition moving from the narrative presented to the outcome of an audience interaction and response	Good content	E.g. clear, interesting, presenting a new perspective
		Good interpretation	E.g. multiple layers of interpretation for a diverse audience
		Coherent look and feel	
		The audience is central in the exhibition	
		Physical accessibility	
Hedonic qualities	The audience experience of the exhibition, moving from the narrative to the outcome	Informal learning environment	
		Easy to navigate	E.g. accessible and welcoming
		Caters for a diverse audience	E.g. different learning styles and modes of engagement
		Intellectual engagement with the exhibition	E.g. ability to ask questions
		Emotional engagement with the exhibition	
		The exhibition is an experience	E.g. one that is imaginative, relevant, memorable, or meaningful

Table 3. Categorisation of the *Affecting Factors* within the MEUX model.

Affecting Factors	
Subheading	Key concepts
Audience factors	Visitor's interest in subject
	Comfort of visitor in space
	Relevance of exhibition material
	Visitor's prior knowledge of the topic
	Visitor's personal identity, such as age, gender, class
	Visitor's prior experiences
	Motivation for visiting
	Level of cultural and science capital
Exhibition factors	Accessibility of information
	Amount of content
	Engagement methods used
	Interpretation methods used
	Orientation and welcome to exhibition

Table 4. Categorisation of *Motivations* within the MEUX model.

Motivations	
Subheading	Key concepts
Intellectual motivation	Interested in topic Want to learn
Emotional motivations	Want to be entertained Want to relax Want to feel inspired
Spiritual motivations	Want to escape the everyday Museum is a safe space
Social motivations	Leisure time activity Good day out Sense of cultural and social status Opportunity to see something new Social engagement with family or group Word of mouth recommendations

Table 5. Categorisation of *Key Aims* within the MEUX model.

Key Aims	
Subheading	Key concepts
For the museum	Showcase museum material Present a narrative or concept Highlight something new or topical Showcase the museum brand Reach new audiences
Visitors to know	Encourage understanding of a topic Encourage engagement with a topic
Visitors to feel	Escape the everyday Encourage an intellectual or emotional response to a topic Inspire visitors Empower visitors Provide an experience for visitors Provide an experience visitors feel is relevant to them Provide an entertaining experience Encourage further learning about a topic
Visitors to do	Encourage further action, such as a change of behaviour Facilitate conversations about the topic Facilitate social engagement between visitors

Table 6. Categorisation of *Visitor Gains* within the MEUX model.

Visitor Gains	
Subheading	Key concepts
Visitors to know	Understand the topic Engage with the topic
Visitors to feel	Escape their everyday Intellectual response to the topic Emotional response to the topic Feel empowered Have an experience Have enjoyed their visit Visit has been a good use of time Feel a sense of relevance around the exhibition Create memories Feel a sense of identity around the exhibition Experience social engagement, with family or a group
Visitors to do	Want to return to the museum or another museum Want to learn more Want to take further action, such as changing their behaviour Visitors improve their social relationships

digital interactives, this does not automatically make an exhibition good or successful. Text panels may be far too long for anyone to bother reading them, and digital interactives may be exciting but not have much purpose. By defining these qualities, the MEUX Model can provide a framework to shape the exhibition material iteratively into one that is engaging, informative, and interesting for audiences, and even be used to promote particular emotional experiences for visitors. This is explored further in the discussion section below.

It is a well-established practice within the museum sector to consider the *Situation* of visits in an attempt to understand visitor behaviors. Interview participants were therefore asked to consider the model from a *Visitor Perspective*. Analysis of answers produced a *Situation* component which was made up of *Affecting Factors* (Table 3) (i.e. what affects a visitor's learning and engagement potential when visiting an exhibition) and *Motivations* (Table 4) for visiting. From the *Museum Perspective* of the MEUX model, the Intended Consequences took the form of *Key Aims* (Table 5), which were divided into specific aims *For the Museum*, and then three levels of visitor engagement: namely *Visitors to Know, Visitors to Feel*, and *Visitors to Do*. From the *Visitor Perspective*, the *Actual Consequences* were detailed as *Visitor Gains* (Table 6), echoing the *Museum Perspective* in the categories of *Know, Feel*, and *Do*. The categories and statements devised here are already well-established within the museum sector's literature and praxis.

The development stage of the research produced a conceptual MEUX model that, from a *Museum Perspective* combines the components of an exhibition, shapes them to produce effective and meaningful experiences, and explicitly states the key aims of this experience. From a *Visitor Perspective*, the MEUX model demonstrates how the exhibition experience is mediated by visitor motivations and factors that affect learning and engagement potential, and how this produces visitor outcomes.

Testing the model

After a model for MEUX had been developed through the combination of interview material and UX literature, the second phase of research involved testing and validating the MEUX Model with a wider pool of UK museum professionals.

Methods

The MEUX Model was tested in a survey of UK museum and heritage sector professionals who are directly involved in exhibitions. The survey was conducted online during October 2020 and distributed to museum workers across the UK. Participants were asked for their museum region and nation, the years they had worked in the sector, their job title, and the ways they were involved in exhibitions. The survey was then divided into two parts. The first section concerned *Exhibition Features* and *Exhibition Character* (Figure 2), and participants were asked, using a 5-point Likert scale (from strongly disagree to strongly agree) how much they agreed with the statements provided. There was also a free text box provided for participants to add comments. The second section considered *Key Aims, Visitor Gains, Affecting Factors*

and *Motivations* (Figure 2). Participants were asked to select the five concepts they considered the most important for each area of the model from a list of statements provided. For *Key Aims*, staff were asked to consider the statements from the *Museum Perspective* of the model. However, for *Affecting Factors, Motivations* and *Visitor Gains*, they were asked to consider statements from the *Visitor Perspective*, meaning they were asked to select what were, for example, the top five motivations for visitors to come to an exhibition, or the top five things that visitors would get out of their visit. The testing of each statement for agreement using a Likert scale was considered, but because of the large number of statements, and the fact that the concepts were already well-established in the museum sector, it was decided that a selection of five top statements was sufficient to produce useful data highlighting the priorities of visitor experience for museum professionals without inducing serious survey fatigue in participants.

A non-formatted version of the survey has been provided in the Supplementary Material for this paper. Responses were inputted into IBM SPSS and subjected to statistical analysis. This included descriptive analysis to identify participant demographics and frequency counts; analysis of significance using Chi-Squared statistics; and statistical analysis to obtain means.

Results

For the survey, 282 responses were collected from across the UK, with the largest group being London based (n = 55, 19.5%), closely followed by the South East (n = 54, 19.1%) and then Scotland (n = 32, 11.9%). There was a spread across the total number of years respondents had been in the museum sector, with the largest group being 1–5 years (n = 66, 23.4%) and then frequencies steadily decreasing across the other groups before an increase of respondents working in the sector for more than 30 years (n = 24, 8.5%). Respondents were asked their Job Title, which were then broadly grouped; the largest group comprised Curators and Collections Staff (n = 114, 41.9%), followed by Exhibitions and Interpretation staff (n = 53, 19.5%). Respondents were asked to select all the ways in which they were involved in exhibitions at their institution, with the majority of respondents selecting just one task, and the average selection being five tasks. The ten respondents who selected that they were not involved in exhibitions in any way were discounted from subsequent analysis, due to this being a requirement for participation, leaving 272 valid returns.

The first half of the survey tested the level of agreement from museum sector staff with the concepts presented under the *Exhibition Features* (Table 1) (n = 264) and *Intended Exhibition Character* (Table 2) (n = 262) headings of the MEUX model. Respondents were asked, using a 5-point Likert scale, how much they agreed with the series of statements presented. Simple descriptive statistics were calculated, identifying the Mean, Standard Deviation, and the 95% Lower and Upper Confidence Intervals (CI). These results were then grouped in order to analyze the level of agreement and thus the potential strength of the concepts in introducing them to the museum sector through the MEUX Model. The groups are as follows:

- Any statement with a Mean ± CI = 95% of less than 3.0 is rejected, as there is a lack of agreement with the statement amongst survey respondents
- Any statement with a Mean ± CI = 95% of more than 3.0 is categorized as weak
- Any statement with a Mean ± CI = 95% that crosses the 4.0 boundary is categorized as medium
- Any statement with a Mean ± CI = 95% of more than 4.0 is categorized as strong

The statements concerning *Exhibition Features* and *Intended Exhibition Character* received strong levels of agreement in the survey of museums professionals, which suggested there is a strong potential to use the framework of Museum Exhibition User Experience. None of the statements were rejected outright, and only four of the statements were categorized as "weak." Importantly, only seven were categorized as "medium," and the majority, nineteen statements, were categorized as "strong." These are positive results, demonstrating that the new concepts of UX can be introduced into the museum sector, but also that these concepts are firmly rooted within existing sector knowledge. The definitions provided for the categories *Interaction*, *Pragmatic Qualities* and *Hedonic Qualities* have lower mean scores and are therefore categorized as only having weak agreement by survey participants. These three definitions incorporate new, conceptual UX knowledge into the MEUX Model, which may therefore lead to more varied interpretation. For example, the *Interaction* definition concerns how the audience works in the space, yet during the interview process, many of the participants jumped straight to interpreting "*Interaction*" as the digital and mechanical "interactives" that are common within museums, with the wider definition emerging only after further consideration. This may mean that a broader and more conceptual definition of "*Interaction*" is particularly unfamiliar to museum professionals, and so the weak agreement may derive from a lack of awareness, rather than a sense of hostility. This may also explain the weak agreement with the *Pragmatic Qualities* and *Hedonic Qualities* definitions.

The second section asked participants to select the top five most important concepts within each heading of the MEUX model (Figure 2). The headings covered were *Key Aims*, *Visitor Gains, Affecting Factors* and *Motivations*. Frequency counts and the percentage of respondents who selected the statement are reported. They have been ranked from most popular to least popular, with the full results in Tables 7 and 8 below.

The results demonstrate that the key concepts of the MEUX model are well validated and accepted within the museum sector. Only three statements received a selection percentage of less than 10 per cent. These results appear to confirm the ability of the MEUX model to synthesize existing museum sector knowledge in a new way to support exhibition development and understanding of visitor experience.

Exploring visitor experience with MEUX

With the theoretical framework of MEUX established, it can then be used for a variety of purposes relating to exhibitions, including exhibit evaluation, consultation, development, and visitor profiling. Many of the specific methods used for these activities are currently under further development by the researcher team, but at this stage we

Table 7. Staff survey statement frequencies, *Key Aims* and *Visitor Gains*.

Key Aims: "The aim of an exhibition is to…"		Visitor Gains: "What do visitors get out of an exhibition?"	
Concept	N (%)	Concept	N (%)
Encourage understanding	137 (50.37%)	Enjoyment	157 (57.72%)
Further learning	135 (49.63%)	Want to return	143 (52.57%)
Encourage engagement	134 (49.26%)	Understanding of concept	128 (47.06%)
Intellectual or emotional response	121 (44.49%)	Engagement with concept	107 (39.34%)
Inspire	118 (43.38%)	Want to learn more	97 (35.66%)
Showcase museum material	96 (35.29%)	Emotional response	95 (34.93%)
Relevant experience	92 (33.82%)	Social engagement	86 (31.62%)
Experience	74 (27.21%)	Good use of time	84 (30.88%)
Present narrative	69 (25.37%)	Memories	81 (29.78%)
New audiences	54 (19.85%)	Relevance	77 (28.31%)
Escape everyday experience	51 (18.75%)	Experience	64 (23.53%)
Conversations	45 (16.54%)	Intellectual response	63 (23.16%)
New or topical	44 (16.18%)	Escape everyday experience	46 (16.91%)
Entertaining experience	44 (16.18%)	Further action	39 (14.34%)
Further action	41 (15.07%)	Empowered	38 (13.97%)
Social engagement	38 (13.97%)	Identity	32 (11.76%)
Empower	32 (11.76%)	Improved social relationships	8 (2.94%)
Museum brand	20 (7.35%)		

Concepts are ordered from most to least popular, based on the number of times they were selected by participants. Frequency and percentages are given.

Table 8. Staff survey statement frequencies, *Motivations* and *Affecting Factors*.

Motivations: "Why do people visit exhibitions?"		Affecting Factors: "What affects a visitor's learning and engagement potential in an exhibition?"	
Concept	N (%)	Concept	N (%)
Interested in topic	220 (80.88%)	Information accessibility	216 (79.41%)
See something new	181 (66.54%)	Interpretation	185 (68.01%)
To learn	148 (54.41%)	Comfort	174 (63.97%)
Leisure time	128 (47.06%)	Interest in subject	127 (46.69%)
Inspiration	125 (45.96%)	Engagement	114 (41.91%)
Facilitates social engagement	123 (45.22%)	Relevance	110 (40.44%)
Good day out	100 (36.76%)	Motivation	106 (38.97%)
Word of mouth	80 (29.41%)	Audience identity	72 (26.47%)
Entertainment	76 (27.94%)	Orientation and welcome	71 (26.10%)
Cultural and social status	55 (20.22%)	Prior experiences	57 (20.96%)
Escape the everyday	52 (19.12%)	Amount of content	43 (15.81%)
Safe space	47 (17.28%)	Prior knowledge	42 (15.44%)
Relaxation	10 (3.68%)	Cultural and Science capital	28 (10.29%)

Concepts are ordered from most to least popular, based on the number of times they were selected by participants. Frequency and percentages are given.

can explore using the model to capture visitor experience to demonstrate one of the benefits of implementing the MEUX model into museum practice.

Methods

Based on the MEUX framework, a visitor survey was conducted at OUMNH during the October school half-term holiday 2020. Survey design was again guided by *The Survey Handbook* by Fink (2003). Visitors were asked to select their top five *Motivations* for visiting the galleries, and their top five *Visitor Gains* from their visit (Figure 2). Adhering to government guidelines for the COVID-19 pandemic, random sampling of visitors was applied, with every third visitor being asked if they would be willing to take part in a

short survey about their visit to the exhibits in the galleries. Visitors were asked to take part toward the end of their visit to the galleries. As the research took place during COVID-19 restrictions, there were no activities or events taking place in the museum, and the museum café was not open. This meant that visitors were mainly engaged in viewing the permanent displays and temporary exhibition rather than other museum activity. The survey was conducted during a general gallery visit rather than after engaging with a specific exhibit because this research sought to identify more general visitor priorities. After ensuring visitors were reaching the end of their visit and that they consented to take part, participants identified their age group, gender, and visiting group (for example in a family with children, as a couple, as part of a school group, or by themselves) before answering the questions as described. However, unlike the staff survey, visitors had an 'other' option in which they could specify an answer not listed.

Results

Overall, 341 surveys were collected at OUMNH. No surveys had to be discounted, and all respondents selected their age group (n = 341) although some were incomplete for the gender (n = 311) and visiting group (n = 316) selections. It was also the case that some respondents selected fewer than five options, and some selected more than five options, but these were still included in analysis as it was deemed to not significantly affect results. Due to it being the school holidays, the demographics of respondents are slightly skewed in favor of family visitors. The largest age group was the 36–45 age group (n = 122, 35.8%), and the largest visiting group was families (n = 189, 55.4%). There were more female respondents (n = 178, 52.2%) than male respondents (n = 129, 37.8%) (9.9% of respondents did not select a gender). Visitors were asked to select their top five *Motivations* for visiting, and the top five things they gained from their visits (*Visitor Gains*; Figure 2). Full results of frequency counts and the percentage

Table 9. Visitor survey statement frequencies, *Motivations,* and *Visitor Gains*.

Motivations: "Why have you visited the exhibition/ galleries today?"		*Visitor Gains*: "What did you get out of your visit today?"	
Concept	N (%)	Concept	N (%)
To learn	238 (69.79%)	Enjoyment	239 (70.09%)
Good day out	232 (68.04%)	Good use of time	163 (47.80%)
See something new	202 (59.24%)	Intellectual response	159 (46.63%)
Leisure time	149 (43.70%)	Memories	154 (45.16%)
Interested in topic	135 (39.59%)	Escape everyday experience	143 (41.94%)
Inspiration	126 (36.95%)	Return	136 (39.88%)
Entertainment	121 (35.48%)	Experience	127 (37.24%)
Facilitates social engagement	95 (27.86%)	Social engagement	122 (35.78%)
Escape the everyday	81 (23.75%)	Understanding of concept	110 (32.26%)
Other	73 (21.41%)	Engage with concept	94 (27.57%)
Safe space	55 (16.13%)	Emotional response	82 (24.05%)
Cultural and social status	51 (14.96%)	Learn more	30 (8.80%)
Relaxation	46 (13.49%)	Relevance	29 (8.50%)
Word of mouth	38 (11.14%)	Other	21 (6.16%)
		Empowered	18 (5.28%)
		Further action	16 (4.69%)
		Identity	15 (4.40%)
		Improve social relationships	11 (3.23%)

Concepts are ordered from most to least popular, based on the number of times they were selected by participants. Frequency and percentages are given.

of respondents who selected the statement are reported below (Table 9). They have been ranked from most popular to least popular.

In both questions asked to visitors, respondents had an option to write in another motivation or gain that was not listed. For *Motivations*, 73 did so, citing reasons such as specifically bringing their children (n = 34), an activity to do during half-term (n = 3), to see the building (n = 5) because they had enjoyed previous visits and wanted to return (n = 8), and because of the cold and wet weather (n = 2). One visitor commented "this museum is Oxford's most precious treasure and also integral to our everyday life. Our daughter, now 4½ has been coming here every week or so since she was born," highlighting the valuable and integrated role museums play in peoples' lives. Similarly, 21 people reported other *Visitor Gains*, including that their children had learned something (n = 8), that they had had very specific learning outcomes, for example learning about the dinosaurs on display (n = 4), and simply having a lovely time (n = 3). Whilst visitors considered these other *Motivations* and *Visitor Gains* as not covered by the concepts presented into the survey, it was possible to integrate them into the existing categories, and so there was no need to add any more statements to existing lists.

Comparing staff and visitors

In collecting visitor data for the MEUX model, we are able to explore comparisons between staff and visitors in terms of their relative priorities when considering museum exhibition visits. With data from only one museum, these results do not intend to be a definitive picture but rather an indication of the insights that can be gained from using the MEUX framework in conducting visitor experience evaluation. One key benefit of the MEUX model is its ability to directly compare staff and visitor priorities, and so in this instance it was used to test the level of congruence between museum and visitor opinions. Survey results were analyzed to assess whether museum opinions on why people visit exhibitions, and what they gain from them, were congruent with what visitors themselves said. The purpose of UX research is to understand what users (visitors) want from and get out of products, and so comparing the results from the museum professional and visitor surveys provides an indication of how well museums understand the behavior and motivations of their visitors. Contingency tables with Chi-Squared Test statistics were calculated, with significant results ($p < 0.05$) demonstrating that museum professionals and visitors were divergent in opinion. Results are reported below (Table 10), with eight of the thirteen *Motivations* statements, and fifteen of the seventeen *Visitor Gains* statements, being statistically significant.

The results show that there are significant differences between the opinions of museum professionals and visitors, demonstrating a potential disconnect that museums have with their audiences. However, the results are not unidirectional. In some instances, staff rated a statement's importance far more highly than visitors did, but for other statements the inverse. This is particularly evident when the rankings of statements by staff and visitors are compared (Tables 11 and 12). For example, the top motivation staff thought visitors came to exhibitions for, "because they are interested in the exhibition topic," ranked fifth for visitors, whereas visitors' second highest motivation for

Table 10. Significant differences in selections between staff and visitors.

Key concept	Chi-square test statistic	Group with higher than expected count
Motivation: Interested in topic	105.849***	Staff
Motivation: To learn	15.355***	Visitors
Motivation: To be entertained	3.947*	Visitors
Motivation: Relaxation	17.554***	Visitors
Motivation: To be inspired	5.075*	Staff
Motivation: Good day out	60.752***	Visitors
Motivation: Facilitates social engagement	19.902***	Staff
Motivation: Word of mouth recommendation	32.485***	Staff
Visitor gain: Understanding of concept	13.955***	Staff
Visitor gain: Engagement with concept	9.515**	Staff
Visitor gain: Escape everyday experience	44.428***	Visitors
Visitor gain: Intellectual response	36.068***	Visitors
Visitor gain: Emotional response	8.721***	Staff
Visitor gain: Feel empowered	13.771***	Staff
Visitor gain: Have an experience	13.267***	Visitors
Visitor gain: Enjoyment	10.120***	Visitors
Visitor gain: Good use of time	18.002***	Visitors
Visitor gain: Sense of relevance	41.495***	Staff
Visitor gain: Create memories	15.144***	Visitors
Visitor gain: Sense of identity	11.596***	Staff
Visitor gain: Want to return	9.827**	Staff
Visitor gain: Want to learn more	66.480***	Staff
Visitor gain: Wants to engage in further action	17.238***	Staff

The table demonstrates the divergence between staff and visitor priorities when considering audience motivations and *Visitor Gains* of exhibitions visits. The group with a higher frequency count demonstrates a higher priority of the concept for that group.
*Significant to 95%.
**Significant to 99%.
***Significant to 99.9%.

Table 11. Comparison of staff and visitor results, motivation frequency selections.

Motivations: "Why do people visit exhibitions?" staff survey		*Motivations*: "Why did you visit the museum exhibition today?" visitor survey	
Concept	N (%)	Concept	N (%)
Interested in topic	220 (80.88%)	To learn	238 (69.79%)
See something new	181 (66.54%)	Good day out	232 (68.04%)
To learn	148 (54.41%)	See something new	202 (59.24%)
Leisure time	128 (47.06%)	Leisure time	149 (43.70%)
Inspiration	125 (45.96%)	Interested in topic	135 (39.59%)
Facilitates social Engagement	123 (45.22%)	Inspiration	126 (36.95%)
Good day out	100 (36.76%)	Entertainment	121 (35.48%)
Word of mouth	80 (29.41%)	Facilitates social engagement	95 (27.86%)
Entertainment	76 (27.94%)	Escape the everyday	81 (23.75%)
Cultural and social status	55 (20.22%)	Other	73 (21.41%)
Escape the everyday	52 (19.12%)	Safe space	55 (16.13%)
Safe space	47 (17.28%)	Cultural and social status	51 (14.96%)
Relaxation	10 (3.68%)	Relaxation	46 (13.49%)
		Word of mouth	38 (11.14%)

These frequencies demonstrate the divergence between museums and visitors by highlighting the disparities in rankings of different motivations for visiting an exhibition.

visiting, "to have a good day out," was ranked seventh by staff. Similarly, while staff thought that visitors would want to "return" to the museum as the second most important visitor gain, for visitors, this was ranked as the sixth most important. Alternatively, visitors ranked feeling that the visit had been a "good use of their time" as the second most important gain; staff ranked this as the eighth most important.

Table 12. Comparison of staff and visitor results, *Visitor Gains* frequency selections.

Visitor Gains: "What do visitors get out of an exhibition?" staff survey		*Visitor Gains*: "What did you get out of your visit today?" visitor survey	
Concept	N (%)	Concept	N (%)
Enjoyment	157 (57.72%)	Enjoyment	239 (70.09%)
Want to return	143 (52.57%)	Good use of time	163 (47.80%)
Understanding of concept	128 (47.06%)	Intellectual response	159 (46.63%)
Engagement with concept	107 (39.34%)	Memories	154 (45.16%)
Want to learn more	97 (35.66%)	Escape everyday experience	143 (41.94%)
Emotional response	95 (34.93%0	Return	136 (39.88%)
Social engagement	86 (31.62%)	Experience	127 (37.24%)
Good use of time	84 (30.88%)	Social engagement	122 (35.78%)
Memories	81 (29.78%)	Understanding of concept	110 (32.26%)
Relevance	77 (28.31%)	Engage with concept	94 (27.57%)
Experience	64 (23.53%)	Emotional response	82 (24.05%)
Intellectual response	63 (23.16%)	Learn more	30 (8.80%)
Escape everyday experience	46 (16.91%)	Relevance	29 (8.50%)
Further action	39 (14.34%)	Other	21 (6.16%)
Empowered	38 (13.97%)	Empowered	18 (5.28%)
Identity	32 (11.76%)	Further action	16 (4.69%)
Improved social relationships	8 (2.94%)	Identity	15 (4.40%)
		Improve social relationships	11 (3.23%)

These frequencies demonstrate the divergence between museums and visitors by highlighting the disparities in rankings of different *Visitor Gains* from visiting an exhibition.

These results provide an example of how the MEUX framework can be used to capture and understand the relative disparity between staff and visitor opinions on museum exhibit visits. However, they are not definitive results, and it is expected that different institutions will produce different visitor priorities. It nevertheless provides a clear example of the benefits of using the framework and audience-profiling methods of MEUX to capture clearly the priorities of museum staff and their visitors.

Discussion

This research has produced a Model for MEUX (Figure 2) based on the widely used concept of UX (Figure 1). The MEUX Model was developed through semi-structured interviews with UK museum staff, and subsequently tested and validated through surveys with museum professionals across the UK. The model was then explored with visitors of OUMNH. The benefits of the MEUX model are concerned with creating a standardized conceptualization of the key facets of visitor experience, and a method to efficiently collect nuanced data concerning these experiences. The MEUX model goes beyond previous models, such as Falk and Dierking and Packer & Ballantyne (2016) in its ability not only to conceptualize the visitor experience, but also provides a means to collect and assess real time data of this visitor experience in an efficient and effective way.

In comparing visitor data with staff views, the MEUX model provided a method to explore the relative priorities of museums and their visitors, highlighting areas of disconnect and an absence of nuanced understanding of museums visitors' behaviors and motivations. Whilst the analysis was based on a sample of museum professionals across the UK, and of visitors to a single museum, OUMNH, there is no reason to believe that these visitors constitute an un-representative sample. Assessing variation

of visitor (and staff) motivations across museum types, from sciences museums to art galleries, is possible because of the general applicability of the MEUX method and represents the immediate future of further methodological development by the research group.

The available data suggest that museums do have difficulties ascertaining why visitors come to exhibitions and what they gain from visiting them. It appears that the aim of museums to create rich and meaningful learning experiences in their exhibitions does not necessarily fulfill the needs and preferences of visitors. The MEUX Model has shown that it has the ability to discriminate between these standpoints, and provide a rigorous, repeatable method for capturing the current state of institutional understanding of museum visitors. These discrepancies emerge through the large number of statements provided in the surveys. Whilst there is the argument to group the statements in a more general way, the specific nuances are key to understanding the detailed visitor experiences and how this differs from institutional expectations. For example, staff rated a key visitor motivation as being interested in the exhibition topic, whereas visitors instead said they were motivated by wanting to learn. Both these motivations fall under an intellectual and educational category, but there is a key difference. Staff expectations are that visitors are coming for specific learning, whereas visitors see their learning as more open-ended and not aimed at any particular topic. The large number of survey items is beneficial in identifying such details.

Overall, the study demonstrated the need to improve museums' understanding of visitor motivations in order to fulfill institutional goals. The results also support a wider literature that highlights the lack of sufficiently rigorous evaluation practice within museums (e.g. Davies & Heath, 2013). If these and future results demonstrate that museums do not fully understand visitors, it follows that current evaluation practices do not capture visitor experiences effectively and do not cycle that understanding back into exhibition development.

Future research into MEUX is focused on developing specific evaluation methods to assess the "exhibition features" and "exhibition qualities" sections of the MEUX model across a range of museum types. The visitor experience evaluation methods explored here are a starting point for providing museums with effective methods in capturing visitor experience. They form part of a toolkit of methods used to capture and understand visitor experience of museum exhibits and exhibitions in a nuanced and quantitative way. In using such methods, direct comparisons can be made between exhibits and exhibitions by providing a standard framework for evaluation. Furthermore, there are benefits of undertaking these activities within a framework of UX.

The UX concept in general, and the MEUX Model in particular relation to museums, not only describes visitor experience, but also explains how it links to the components and qualities of the exhibitions that the museum produces. It maps the process of how the choices of curators, designers, and exhibition developers produce qualities that then interact with a visitor's motivation and identity to produce outcomes. Using the MEUX Model, museums can understand how the actions and choices made in exhibition development affect the visitor experience, and it can effectively and consistently evaluate the exhibition experiences that visitors get. Thus,

while a key principle of UX is that there is no guarantee that a designer's intentions are received by the visitor, the rigorous use of these evaluation and development methods improves this likelihood and reduces the gap between museum and visitor disconnect.

UX is an established concept for using a variety of methods and principles to gain a detailed understanding of how visitors use and experience products. Research has been conducted in a range of sectors such as the automotive industry (Gkouskos et al., 2015; Jung et al., 2015; Pitts et al., 2009; Wellings et al., 2008, 2010, 2012); the food industry (Gomez-Corona et al., 2017; Labbe et al., 2015); mobile digital devices and web design (Yu & Kong, 2016); technology (Gamberini et al., 2015); the beauty industry (Huang et al., 2012); and the education sector (Gasparini, 2015; Oliveira et al., 2015; Ovesleova, 2015). The concept has a proven ability to effectively capture complex yet tangible visitor opinions and translate findings into design recommendations to create sophisticated, usable, and pleasurable products.

The qualitative research undertaken here has collated current sector thinking and understanding of exhibition practice into a theoretical framework of MEUX. Wider sector surveying of museum professionals involved in exhibitions across the UK has identified a good level of agreement with the merging of museum thinking with principles of UX, meaning there is a solid framework to underpin future exhibition practice. One such method of using the MEUX Model is explored in this research through the surveying of UK museum staff and visitors of OUMNH, which demonstrates how the Model can capture and identify nuanced understanding of visitor experience and potential disparities with museum staff. In future research, which will develop further methods for evaluating exhibits with the MEUX Model, there is the potential to link visitor experience with exhibition features and qualities. This framework and associated evaluation methods can therefore act as a guide to museum staff in their practice. With evidence of success of using this practice in other industries, there is clear potential in replicating similar techniques within the museum sector. By focusing on the key *Exhibition Features*, *Pragmatic Qualities* and *Hedonic Qualities* of the model, development choices can be made that will speak to the overall visitor experience.

Conclusions

UX is a research and design paradigm that has proved successful in understanding the experiences of end users and subsequently creating products that provide meaningful experiences for customers. Here, its key principles have been adapted for use within the heritage sector in order to create better exhibition experiences for museum visitors. A model for MEUX was created and tested, integrating existing sector knowledge with the ideas of UX. This provided a holistic model of visitor experience and how this interacts with the exhibitions and displays that museums produce. The model was tested with UK museum professionals and visitors to OUMNH, capturing real time data of visitor experience and providing a means to assess the relative priorities of visitor experience for museum staff and visitors.

The MEUX Model and this method of visitor experience evaluation constitutes a rigorous methodology for the comparative appraisal of the relative preferences of visitor and museum professionals. Using the model as a theoretical framework, and with the development of further methods to evaluate specific exhibits, there is an avenue to make institutional understanding of visitor experiences at an exhibit level more congruent. Thus, the MEUX Model provides an ability to evaluate visitor experiences more effectively and to integrate learned knowledge back into exhibition development to guide future decision making.

Overall, the key advantage of adopting a UX methodology into exhibition practice is that not only does it capture the facets of visitor experience coherently, but it also details how the actions of the museum during exhibition development have an effect on such experiences. This ability to influence and impact visitor experience has a great potential for museums and has been proven successful in other industries. In bringing this powerful technique of UX into the cultural and heritage sector, there is an opportunity to transform the way museums think about their audiences and how they develop programmes to cater for them. This research presents the theoretical underpinnings of an approach that can inform the development and use of practical evaluation and development methods in the future.

Funding

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