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Information Needs and Behaviors of Museum Website Users
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Defining Museum Website Users and Their Real-life Contexts

Museum website users are defined by the particular information ecology they interact with, in this case the museum website, rather than by a specific set of demographics. The users of these types of interfaces range from the casual user with no training in the topic covered by the museum to cultural heritage professionals who use the museum website for their career (King, Stark & Cooke, 2016; Muiser et al. 2017; Walsh, Hall, Clough & Foster, 2018;). Additionally, the museum website is, in and of itself, a diverse concept. Many websites provide only venue information, while others provide searchable digital collections, interactive applications, or narrative games. Trying to define a user group amidst all of this diversity is a challenge. In this review and in much of the literature, the user group studied is constrained by the type of museum website used. In this instance, the studies covered here focus on those websites that provide access to digitized artefacts and/or interactive applications and visualizations. This focus necessarily intersects with research into users of digital cultural heritage resources, such as digital archives that do not have a physical public facing location. This defining line between museum websites providing access to collections and digital cultural heritage websites is small, therefore, this review includes work done on user needs in cultural heritage websites as well as museum websites.

Even limiting research to websites with digitized collections and/or interactive applications, the range of museums websites covered is vast. Several studies cover websites for national museums covering art, wartime history, civil rights, medical history and natural history, with each subject requiring different interfaces and services (Kidd, 2015; Ross & Terras, 2011; Skov & Ingwersen, 2014; Walsh et al., 2018; Windhager, Federico, Mayr, Schreder & Smuc, 2016). Other studies focus on both large-scale digital cultural heritage platforms like Europeana (Clough, Hill, Paramita & Goodale, 2017; Villa, Clough, Hall & Rutter, 2013) and smaller collections such as the IPSA manuscript collection housed within CULTURA (Agosti, Orio & Ponchia, 2018) and the Dutch Folktale Database hosted on Omeka (Muiser et al., 2017). One of the outlier studies by Hopes (2017) focuses on the steps taken before the digital collection goes live, inviting a wide range of users of objects found in the Royal Shakespeare Company museum storage facility to participate in his study.

Theories and Models in Museum Website User Studies

In most museum website user studies, the models used focus on the motivations and contexts of information behavior. A representative model of these would be Falk's motivational perspective (as cited in Walsh et al., 2018) as well as Booth's museum visitor categories (as cited in Orr, 2004), wherein users are grouped by their motivation for visiting a physical museum rather than grouping them by demographics. This perspective is extended to the digital realm, categorizing users by motivations for

visiting and using the museum website. Marrying Falk and Booth's models with user experience and design theories, museum website user studies take a "task-based" approach, fitting search tasks within broadly defined user categories (Agosti et al., 2018; Clough et al., 2017; Mayr et al., 2016; Ross & Terras, 2011; Skov & Ingwersen, 2015; Villa et al., 2013). While the specific definitions of these user categories vary between study, they all fall along the same general divisions: general or casual users, special interest users, and scholarly users. Each user group comes with their own set of motivations and contexts which drive their information behaviors and search tasks. Clough et al. (2017) follow this model closely, creating categorizations of tasks, motives, and users with which to test for. Other studies choose to restrain their research to a specific user group. Ross and Terras (2011), for example, focus on scholarly users of museum online collections within this framework, identifying specific tasks that this user group might undertake given their goals as researchers, such as specific-item searches and testing the behaviors surrounding this task. Skov and Ingwersen (2014) also create specific search tasks based on the predicted motivations and goals of their user group of special interest users, or hobbyists. Villa et al. (2013) use this task-based approach towards casual or general users of museum websites, but instead of providing a possible task, they explore what this user group does without a predefined task, reflecting the amorphous goals and motivations generally associated with this user group.

Task-based models bridge museum studies with digital user experience testing, but affective design theory as used by Kidd (2015) does so as well, only in a slightly different way. Rather than focusing on tasks, affective design theory focuses on the emotional states that can arise from interactions with technology. This reflects the idea that information seeking is not the only motivator for users in a museum context. Instead, emotional experiences are sought out in museums, something that may be difficult to replicate in a virtual context. However, online games provide a way to combine the principle of facilitating social engagement of Simon (2010) with the right to enjoyment outlined by Rand (2001). Through the use of online games, museum websites create emotional, first-person experiences that give the user choice and control as well as enjoyment.

Methods and Techniques in Museum Website User Studies

While many studies utilized more traditional information science methodologies such as case studies of actual services provided by museum websites (Kidd, 2015; King et al., 2016; Mayr et al., 2016; Windhager, 2016) and interviews (Hopes et al., 2014; Villa et al., 2013; Skov & Ingwersen, 2014), museum websites enable a unique method of data collection that can't be done in a traditional museum setting: the pop-up survey. A pop-up survey is usually integrated into the actual museum website, meaning that anyone who accesses the website during the period of the study will encounter the survey, allowing for researchers to gather information on actual users of the published museum website. This particular method of data collection is ubiquitous in museum website user research, with a number of studies reviewed here utilizing pop-up surveys (Clough et al., 2017; Marty, 2011; Muiser et al., 2017; Ross & Terras, 2011; Skov & Ingwersen, 2014; Walsh et al., 2018).

However, pop-up surveys bring with them some limitations such as low response rates as the survey interferes with the visitor's intended interactions with the site (Ross & Terras, 2011). In order to counteract this, many studies used the pop-up survey to supplement other methodologies, primarily utilizing the survey as a first step rather than the only step. Villa et al. (2013) and Skov and Ingwersen

(2014) utilized an in-lab method for gathering data. In this method, users' screens are recorded as they interact with the museum website, either with no specific tasks given or with a predetermined set of tasks. Pre- and post-activity questionnaires are given as well as an interview after the session that utilizes the screen recordings to assist users in discussing their information behaviors. In one instance, the pop-up survey informed the creation of a prototype service was created for use in a pre-existing museum website. In Muiser et al. (2017), the iterative methods found in user design was applied to the results of the pop-up survey, with further interviews and testing by the chosen user group to create a dynamic interface complete with visualizations, a process also used in Agosti et al. (2018). This particular method marries information science principles with user design in response to the unique ecology of museum websites.

Hopes (2014) uses neither the traditional methodologies nor user experience and design techniques. His methods are informed by Wenger's Communities of Practice model and Kolb's Experiential Learning Theory. In his study Hopes analyzes information behaviors in a bottom-up process where different user groups help choose and create the digital content and metadata rather than merely interact with it. Hopes runs a mock digitizing project of items within the Royal Shakespeare Company museum and gathers information throughout a multistage process through interviews and the participants' actual planning and implementation of the mock project.

Information Needs and Behaviors of Museum Website Users

The information behaviors defined by these studies fall on a browse/search spectrum with search tasks split most generally into general topics and more specific searches. These tasks are tested for and are then associated with specific contexts and user groups, creating probabilities of interactions users have with the environment of the museum website and the digital objects contained in its collection. While ecologies in a museum website are limited, as there is little human mediation when an end-user interacts with the digital collections and site interface, the design of the interface acts a sort of mediator, encouraging or discouraging diverse information behaviors. This is reflected in the wide variety of information behaviors and their instances among different user groups shown by the five studies reviewed here. Clough et al. (2017), identified five search tasks with a further seventeen modes/facets of the search tasks, while Hopes (2014) identified 123 different types of use of physical and digital artefacts. However, broad task/need correlations were found between studies.

The specialist user category is made up of academics and professionals whose work deals with the artefacts contained in the museum's digital collection. The information behaviors of specialists tended towards specific searches with high levels of refinement of search results (Clough et al., 2017; Ross & Terras, 2011; Skov & Ingwersen, 2014). Hopes (2014) also identified a higher incidence of interpretation behaviors from academics versus heritage practitioners, digital creatives, and performers.

The user category "general user" is defined by casual visitors or non-specialists coming to a museum website without a specific information need. Their motivation was primarily defined as "to pass the time." (Walsh et al., 2018; Agosti et al., 2018; Mayr et al, 2016.) Mayr et al. describes how general visitor often come to cultural heritage websites without a defined goal, navigating the website and its collection in an exploratory way, much like visitors to a physical museum. On the search/browse spectrum, general users engaged primarily in browsing behaviors (Villa et al., 2013; Skov & Ingwersen, 2014)

The hobbyist user category bridges the gap between the general user and the specialist user. These users do not have a professional interest or training in the subject matter of the museum website, but they are more informed than the general user. They are also categorized as “information hungry”. This correlates to behaviors that fall in the middle of the search/browse spectrum, combining highly visual browsing behaviors with known item searches (Skov & Ingwersen, 2014). Overall, the importance of images for information-seeking in museum websites was emphasized across all user categories. Skov and Ingwersen (2014) noted 89.4% of participants deemed photographs of objects as important, while 67.6% of respondents to Ross and Terras’ (2011) survey requested more images of items to be made available.

Beyond the information behaviors surrounding digital collection interfaces, Kidd (2015) highlights that information seeking is not the only motivator, especially in a museum context. Instead, emotional experiences are sought out in museums, something that may be difficult to replicate in a virtual context. However, online games provide a way to combine the principle of facilitating social engagement of Simon (2010) with the right to enjoyment outlined by Rand (2001). Through the use of online games, museum websites create emotional, first-person experiences that give the user choice and control as well as enjoyment.

Information Sources and Services for Museum Website Users

The information ecology of museum websites presents unique challenges for providing suitable services to users. Users come to the museum website with a diverse set of skills and needs, and the museum websites themselves are under funding and technical constraints in addition to their diverse subject matter (King et al., 2016). One solution to this is the “generous interface” (Agosti et al., 2018; Muiser et al., 2017) which provides different avenues of interaction and points of entry into the collection allowing the user to orient themselves towards the experience best suited for them (King et al., 2016). This is facilitated by a variety of tools that cater to both a casual user and an academic user, giving broad and detailed views of the collection as well as the ability to manipulate items and their relationships or create personal collections (Marty, 2011; Muiser et al., 2017; Windhager, 2016). This places the interface in the role of mediator as it is positioned between the visitor and the museum’s collection, creating a place for the museum to exert interpretive control as well as facilitate unique, layered experiences for the visitors. This is usually accompanied by browsing and orienting visualizations that give insights that a simple search function cannot. These visualizations utilize the metadata of the objects in the museum’s collection, displaying their aggregate through maps, network diagrams, or timelines, allowing the visitor to see where the objects in the collection cluster along temporal or geographic points or how the collection is connected within itself through creator or subject (Mayr et al., 2016; Muiser et al., 2017; Windhager, 2016).

In addition to the dominating digital collection interface, many museum websites provide other interactive services which primarily engage users that have come to the website for enjoyment beyond the act of collection or exploration. Online games provide narrative storytelling for emotional engagement as well as a platform for other styles of learning, from knee surgery simulators to following the life of a Maori child in the early twentieth century (Kidd, 2015). Museum websites may also share digitized objects with

other social media sites (Marty, 2011) or encourage users to interact with each other in friendly debates over the museum's content through social platforms as covered by Simon (2010).

Issues and Considerations to Better Serve Museum Website Users

The diversity of information behaviors of museum website users calls for a multifaceted interface for a museum's online collection. This interface must allow for both browsing and search behaviors, so that the information behaviors of the three main user groups of museum websites can be accounted for. A more robust browsing interface that creates an environment conducive to Erdelez's (2005) information encountering and Foster's (2005) nonlinear information behaviors is needed to engage with the non-task-oriented nature of the casual user's information-seeking. On the other end of the spectrum of browse/search is the failing of the British Museum Online Collection's search function for scholars. The search terms that scholars and academics use for information-seeking do not line up with those expected by the interface (Ross & Terras, 2011). Even the method of digitization of the artefacts themselves is called into question, particularly by Hopes (2014). Each community of practice engaged with the digital object differently and required different formats of digitization as well as specific aspects of the object to be digitized in order to be relevant and useful to them. The two aspects of online museum collections, from the actual digitized artefacts to the search and browse functions of the end-user interfaces are shown to be lacking. In order to create effective digital museum collections, the diversity of information behaviors must be taken into account and interwoven into every step of the creation of the digital collection, from digitization to interface. Muiser et al. (2017) exemplify this approach when designing an improved interface for the Dutch Folktale Database, giving both specialists and casual users tools with which to search and explore the collection.

Takeaways and Recommendations for Museum Website User Information Ecologies

The information ecology of museum websites presents unique challenges for providing suitable services to users. Users come to the museum website with a diverse set of skills and needs. Museum websites themselves are diverse, and suggesting a single set of services to be provided by them is difficult as well. However, for museums that provide a digital collection, a "generous interface" like the one created by Muiser et al. (2017) is essential in carrying out the principles of a user-centered museum. Interfaces for interacting with a digital collection need to have a variety of tools that can facilitate the interactions a casual user might want as well as the interactions an academic might want. Browsing and orienting visualizations benefit both the casual user and the specialist, giving insights that a simple search function cannot.

Providing services outside of the collection interface can engage users that have come to the website for enjoyment beyond collection or browsing-centered exploration. Narrative-based services provide emotional as well as interpretative engagement as shown in Agosti et al.'s final phase of research (2018), narratives were rated highly both on usability and usefulness, especially those narratives that provided visualizations and annotation. Bringing a social aspect to the museum, either by sharing digitized objects with other social media sites (Marty, 2011), or through the social platforms covered by Simon (2010), can round out a museum website and bring it closer to the rich ecology it has the potential to become. While these services are not possible for every museum website, and most likely not possible for all but the

largest institutions, applying some of the interface design considerations can go a long way in making a museum website more engaging. Orientation towards the breadth and depth of the available collection, providing multiple access points to a collection, and allowing for browsing are wonderful ways to encourage new and lasting experiences with museum websites.

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