Perspectives of Emerging Museum Professionals on the Role of Big Data in Museums

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Abstract
The Big Data movement is sweeping across all sectors in society including museums. These organizations are being encouraged to explore new ways to generate, track, link, and analyze data to better understand their visitors and refine their business practices. While tapping into Big Data’s potential seems promising for museums, little is known about how museum professionals—that is, those who are responsible for building the museum-to-Big-Data bridge—speak of this trend in the context of their work. To begin to address this problem, we conducted an exploratory study consisting of a focus group with museum professionals having ten years or fewer of museum work experience. Preliminary findings point to enthusiasm for a number of perceived opportunities and benefits associated with Big Data. While limited resources such as money, skills, and infrastructure were identified as barriers, participants expressed very few concerns with the convergence of Big Data and museums.

1. Introduction
The concept of “Big Data,” while not new, has rapidly gained immense popularity in recent years across various sectors of society, including business, scientific research, government and policy, and the arts [1]. The term is not well defined or standardized. A fairly common definition involves data sets that are too large to store or process using widely available techniques at the current time [2]. However “Big Data” has become a buzzword for a host of related concepts, including the computational analysis of any data, the potential that such analysis could bring, and even the entire scope of novel technologies in general [3,4].

In its latest report, the Center for the Future of Museums (CFM), an initiative from the American Alliance of Museums (AAM), identifies Big Data as a major trend currently impacting museums. The report provides a broad overview of how for-profit organizations and large non-profit agencies collect and utilize Big Data, urging museums of all sizes to jump on this bandwagon lest they be left behind. For example, the report encourages museums to explore how data analytics might support and boost their business practices or how Linked Data might help them better articulate their public impact over time. The report acknowledges financial resources as a barrier for museums interested in harnessing Big Data’s potential, posing the question of whether or not the Big Data trend will widen the gap between museums with more or less financial means [5].

Since the CFM report draws from publications (e.g., blog posts, news stories, and research reports) emanating from outside of the museum field as its primary source of data, museum professionals’ voices are absent. If the museum field is interested in tapping into the benefits Big Data might offer, assessing where museum professionals situate themselves vis-a-vis Big Data could provide a springboard from which future research and/or an action-oriented agenda could be drawn. The inclusion of practitioners’ perspectives is crucial as museum professionals are primary stakeholders impacted by the convergence of Big Data and museums. In this exploratory study, we seek to bring museum practitioners’ voices to the discussion on Big Data and museums. Our research question (RQ) is: How do museum professionals speak of Big Data in the context of their profession? The present study is the first to explore this question. As such, we hope that our findings contribute preliminary conceptual building blocks to help inform more comprehensive study on the topic.

In this paper, we report on the findings of a focus group conducted with emerging museum professionals in the Seattle area. The AAM defines “emerging museum professionals,” or EMPs, as those with ten years or fewer of museum work experience. The Alliance currently sponsors sixteen regional
EMP groups, including one in Seattle with about 200 members. The Seattle EMP chair, with the support of other members, organizes quarterly events focused on networking or skills development (resume writing, negotiating a raise, etc.). We were motivated to work with EMPs because the AAM has developed an operational definition for this subset of its members that it uses to guide initiatives, such as career development workshops, on a national level. Focusing on EMPs, we can gain a better understanding of how those entering or relatively new to the field understand the contemporary and emerging trend of Big Data in the context of their professions. This increased understanding can help direct AAM’s future initiatives with EMPs and be used as a point of comparison for potential future work with senior museum professionals.

2. Literature

There is no consensus in the academic, business, or popular literature on what exactly is meant by the term “Big Data”. It is often defined as using data sets so large that they become unwieldy to process and analyze using commonly available software and techniques [2, 6]. The growing popularity of the term recently is often discussed as a “Big Data revolution,” and while many like to point out the exponential increase over time in the quantity of available data in the world, an article in Harvard Magazine stresses that “the big data revolution is that now we can do something with the data.” [7]

However, the scope of Big Data in the popular conception has become even broader than this, encompassing related terms such as data-driven decision making, analytics, and business intelligence; and even stretching to include the potential of using any sort of novel form of data collection, data analysis, or technology in general [3,4].

Our review of existing literature did not turn up any academic research on the perspective of emerging museum professionals on Big Data or related topics. However, the intersection of museums and topics frequently associated with Big Data has been studied extensively, although the term “Big Data” is not commonly used. For example, the use of social media to engage current visitors and attract new ones has been one focus of study [8]. Dawson et al. [9] looked at several case studies of experiments by museums with social networking websites, and explored the potential value and challenges involved. Russo and Peacock [10] examined the challenge of sustaining participation in online social spaces.

The use of new technology to track visitor behavior is another topic associated with Big Data that has been studied. Tracking, for example, the time that visitors spend in certain exhibitions or with certain objects is an area of interest for those who want to better understand the visitor experience [11]. Recent efforts have gone into leveraging technology to automate the process of tracking visitors; Bowman and Jaebker [12], for example, devised a low-cost means of tracking the physical location of visitors’ wireless devices using commodity hardware. Tracking technologies have also been designed and studied for enhancing the visitor experience, such as Sparacino’s [13] wearable augmented reality device.

Tracking and linking customer characteristics and evaluation of museum performance are two other topics that we would expect to be associated with Big Data, as these have been a major application of Big Data techniques in the business world. Museums have long been interested in collecting demographic information from visitors, even though there has been some debate about how useful this information actually can be [14,15]. Adams [15] has found that although museums regularly perform evaluations, these are often not shared outside of the museum in question. The website InformalScience.org [16] does allow museums to share their evaluation findings, but it can be a challenge to use to find relevant information. Other efforts have emerged, such as the Cultural Data Project [17], which offers a standardized format for cultural organizations to submit data to be analyzed for evaluation.

One more related topic that inevitably emerges around discussions of Big Data is that of privacy and ethical concerns. The collection and increasingly sophisticated analysis of data relating to people, often without their explicit consent, has begun to cause deep discomfort. Several recent examples have burst into popular consciousness that many find deeply unsettling, such as Target using purchasing information to identify and market to customers in the early stages of pregnancy, and the domestic spying practices of the US National Security Agency [18]. Wong [19] has presented a case study of the use of social media in the United States Holocaust Memorial Museum, exploring issues of ethics and privacy. She does not arrive at any definitive resolutions of these issues, but stresses that they need to be kept in mind on a case-by-case basis, and that museum staff need to be trained and involved in the discussion.

Marty [20,21] has looked at the changing role of information professionals in museums (e.g. web masters, information and communication technology specialists, etc.), and noted that people who work in...
museums often find themselves picking up new skills unexpectedly as the technology landscape changes. However, there has not been any academic literature to date addressing the perspectives of emerging museum professionals on the role of Big Data in museums. The existing literature in this area comes mostly in the form of blog posts. Suse Cairns, AKA “museumgeek,” is a PhD student and museum professional who has written enthusiastically about the potential of Big Data for museums in terms of engagement [22] and the Linked Open Data (LOD) movement [23], which has been identified as a promising development for museums [24]. Chris Unitt, a blogger on digital projects and arts and cultural organizations, has had a more critical perspective, focusing on the lack of resources available for cultural organizations to make use of the potential of Big Data [25], and expressing general frustration with a report on Big Data in the cultural sector and its overly exuberant tone and lack of clarity of what is actually meant by “Big Data” [3].

The CFM report, for its part, identifies several ways that Big Data and data analytics can serve museums, such as informing decisions on marketing, pricing, and exhibit design; evaluating measures of success for use in grant applications; and analyzing the long-term impact of museums in people’s lives. It identifies some existing examples of how museums are already using Big Data, including tracking visitor demographics and behavior at History Colorado and the Point Defiance Zoo & Aquarium, exchanging membership benefits for personal data at the Dallas Museum of Art, and using data as part of museum exhibits in the Seattle Art Museum and the Albuquerque Museum of Art and History. The report also mentions some concerns relating to the use of Big Data in museums, such as the inequity that is likely to result between moneyed institutions that can afford large scale Big Data projects and those that cannot, and the pitfalls of making decisions based on “bad data” [5]. A recent panel discussion at the AAM Annual Meeting and MuseumExpo in Seattle expanded on some of these issues, with recommendations for museums of more modest means to start small, use affordable and less complex tools for analytics, and “mentor each other to speed adoption of big data analytics” in museums [26].

3. Method and Analysis

To investigate our research question, we conducted a focus group with emerging museum professionals. We hoped this form of group interview would help give us an idea of the current landscape of how museum professionals understand Big Data in the context of their work and surface salient points for future research. Additionally, the co-generative character of the focus group was seen as beneficial given the emergent nature of Big Data discourses in the museum sector. Indeed, we were not sure of EMPs’ level of familiarity and comfort with Big Data and hoped that the “group effect” typically associated with focus groups would spur rich discussion [27].

3.1. Participants

Participants were recruited through the University of Washington Museum Studies program’s listserv and the local EMP chapter’s email list and Facebook page. The only requirement to participate in the study was to have ten years or fewer of museum work experience. Through this process, we were able to recruit six participants, four of whom showed up the day of the focus group. While six to nine participants is considered the ideal number of focus group participants, as few as three can be sufficient to capture the group effect [27]. Each participant filled out a brief survey containing demographic and employment-related questions. Three identified as women and one as “other” without further specification. All of them indicated being currently employed by a museum and had been associated with the museum field for three to seven years. The age range was 23-27, with one not reporting.

3.2. Procedure

The focus group was held in a private room at a local museum. The focus group meeting lasted 90 minutes during which we asked open-ended questions pertaining to Big Data in the context of museums. Since we were unsure how knowledgeable or comfortable participants would be regarding Big Data, we carefully scaffolded questions to allow participants to address any feelings they might have regarding the topic (question 1) and speak of (big) data they encounter in their daily lives (question 2) before focusing on museums. Questions were crafted to be broad and included the following:

1. What are the first three words that come to mind when you hear the term “Big Data”?
2. What sorts of experiences do you have with Big Data on a daily basis?
3. What types of data could be collected or generated in museums?
4. If museums had unlimited resources, what could they do with data?
5. How could museums connect to other institutions to access more data?
6. How do you see Big Data impacting your job in museums?
7. If you wanted to learn more about Big Data, where would you go?
8. If you had a Big Data expert in the room today, what questions would you ask?

Throughout the group discussion, one of the researchers took notes, while the second moderated the conversation. After receiving verbal consent from all participants, the group discussion was recorded, consisting of close to 75 minutes of audio.

3.3. Analysis

The audio recording was transcribed in its entirety. In preparation for data analysis, the transcript was read multiple times and discussed by the authors. The approach was thus open, inductive, and iterative. Through these careful readings, three broad categories emerged: opportunities and benefits, barriers and concerns, and questions. Each of these categories comprised a series of themes and, in some cases, sub-themes.

4. Findings

Through our inductive analysis, three broad categories emerged, each comprising a series of themes and, in some cases, sub-themes (see Fig. 1).

4.1. Opportunities and Benefits of Big Data

Participants spoke of a number of opportunities and benefits Big Data present to museums. These revolved around 5 themes presented below.

4.1.1. Tracking Visitor Behavior. Participants discussed a possible future in which visitor behavior would be tracked on site. This tracking would be carried out on a large scale and enabled through visitors’ personal digital devices such as smartphones, providing both general and personal data on visitor behavior. As a participant noted: “I think eventually museums are going to track, like, what pieces of art, or, you know, whatever museum object someone’s going to look at” (P4). This on site tracking would allow museums to collect data that could help with museum operations both in the short and long run. For example, participants discussed the potential large scale tracking could have on...
exhibition design, stating:

“And in exhibition design. Looking at how long people are...how much time people are spending at an exhibit. And yeah, like you said, they are doing things like that, but if they could be done on a much bigger scale, then...the possibilities are endless” (P2)

In this account, P2 seems to believe that tracking a larger amount of data pertaining to visitor engagement would provide museums with more opportunities in exhibition design, although she does not expand on what these possibilities would be.

Flow management, that is, the flow of visitors throughout the museum, was also seen to benefit from on site tracking, as it could help “move people around the museum at a better rate” (P4). Tracking visitor flow would also help provide more information regarding what exhibited artifacts get the most views. With this information, museums could promote pieces that get fewer views, thus providing better access to collections. In the words of a participant:

“It could also help with things like...guided tours. You could be like, well, you know, this painting and this painting are the most popular so we’re not going to include them on the tour because people are already going to them anyways. We want people to try and see this other painting over here that no one ever goes to” (P4).

Moreover, tracking individual visitor behavior over time was seen as a way for museums to better cater to visitors’ personal preferences through customization of the visitor experience. As a participant explained:

“eventually museums will know when you walk in the door and they will be able to curate your museum visit for you based off of your interests that are known from that data...So when you walk in the museum it might be like, ‘Hi [P4] you haven't been here in 375 days. Previously you liked painting but maybe you might like this one that we just recently acquired’” (P4).

Here, we see the participant pointing to an elaborate system that would not only track a single visitor’s behavior through—for example, WiFi signal triangulation [12]—, but would allow for interaction. A visitor could input personal preferences through ‘liking’ certain artworks and, in turn, the system could make personalized recommendations, curating the visitor’s museum experience and potentially providing greater access to the collection (e.g. recommending recently acquired works).

4.1.2. Tracking Visitorship. Beyond tracking on-site visitor behavior, participants spoke of how Big Data could help museums better understand who is and is not attending. For example, on-site evaluation paired with local census data would help museums identify gaps in visitorship. As a participant discussed:

“Well I think museums can do a lot more to use census data to inform kind of who they're trying to reach out to...and doing demographic surveys in museums solely, just that institution, is very time consuming and difficult…” (P2)

Participants discussed how better understanding visitorship could help museums conduct targeted marketing to reach out to those who might not be currently visiting, thus supporting business operations. In the words of a participant: “I think it [Big Data] can be helpful in making...marketing decisions and continuing to get people coming in the door” (P4). It is interesting to note that participants seemed to differentiate marketing in the museum context from marketing in the for-profit sector. For example, a participant discussed how important it is for marketing staff to understand the museum context and not approach marketing from a “sheer marketing perspective” (P4). While what she is referring to exactly is unclear, she does seem to make a distinction akin to ‘us and them’, ‘insider-outsider’, pointing to a potential desire to see ‘museum people’ able to work with Big Data.

4.1.3. Linking Cross-Institutionally. Participants spoke of how linking to other institutions collecting large amounts of data could help museums. Connected to the above theme of tracking visitorship, a participant stated: “if there's a way to . . . use data that's already been collected about like certain zip codes . . . you're not getting visitors from, and . . . they could benefit, or, you know, mutually beneficial” (P4). Here, we see how the idea of sharing cross-institutionally could be beneficial for all parties involved.

Connecting to other sources of data than those generated internally was also discussed as beneficial for exhibition and program design. For example, a participant (P3) spoke of using national and state testing scores in math and sciences as an impetus to help design exhibitions and educational programs that could be tailored based on a regional school’s specific needs. Additionally, linking cross-institutionally with other museums was discussed as an opportunity to make data that is currently context-specific and isolated more streamlined and connected for the purpose of exhibit design (this point is discussed in greater detail in section 2.3).

Participants also spoke of the opportunities that would be generated if museums could link to Big
Data collected by companies like Google and Facebook. In the words of a participant:

“I just wonder if eventually Google or Facebook will like sell some kind of, you know, subscription where an institution of any kind can subscribe if they pay a certain premium. You know? Like, not to like get really invasive data, but data that you know is easy to collect, like, gender, age, general...top five likes in the last minute. I don't know. But all that data is being collected and it does tell a lot about who you are and like who your friends are and like what you do in your free time, and all of that. Which— museums love to collect that data” (P4).

In this account, we see that linking to data collected by Google and Facebook could help museums better understand their visitors and potential visitors through analyzing general demographic information, user preferences (‘likes’), and studying network composition.

4.1.4. Evaluation. Evaluation, an activity that most museums are engaged in at some level, was believed to also be benefited by Big Data. Participants discussed the need for cross-institutional platforms where evaluation data could be streamlined and shared for the purpose of exhibition and program design. Since this point was mostly discussed as a barrier (i.e., the lack of such a platform), we will come back to it in section 2.3.

Aside from a collaborative platform, participants discussed how Big Data would open new doors in terms of the visitor input that could be collected. As a participant stated:

“You know, eventually they might even start evaluating like what's the best...what do people want to see the most in a museum? Is that important to us? Is it more important that people come because there's a recognizable piece of artwork or is it more important that we acquire artwork by more up and coming artists that are more important to the history, of our history right now?” (P4)

Here, we see how collecting large amounts of visitor input could help museums evaluate the relevance of what they currently offer and steer future decisions.

Larger data sets pertaining to evaluation were also discussed as beneficial for museums seeking funding. In the words of a participant: “And so, the powerful thing about seeing something like that [large collections of evaluation data] is that, I would like to imagine an opportunity for more leverage for the institutions...you know, for funding” (P1).

4.1.5. Data as Art. Lastly, a participant spoke of the new opportunity presented by artists using Big Data to create art. She discussed how her job involves supporting artists that are influenced by Big Data and recognized how the inclusion of this artwork in a museum can give “people an opportunity to talk about where we are with that” (P1). Interestingly, here, the focus is not so much on Big Data per se, but the opportunities for public dialogue opened up by Big Data-influenced art.

4.2. Barriers and Concerns

While participants spoke enthusiastically of certain opportunities Big Data could offer museums, they also discussed barriers and concerns associated with this convergence. All barriers coalesced around the perceived scarcity or inadequacy of resources museums have or might have at their disposal. Additionally, privacy concerns related to data collection were brought up.

4.2.1. Financial Resources. Participants discussed financial resources as a key factor to museums’ ability to tap into Big Data’s potential. For example, a museum like Crystal Bridges in Arkansas, which was established by the daughter of Sam Walton, founder of Wal-Mart, and is funded by the Walton Family Foundation, was believed to be able to collect large amounts of data because “they basically have unlimited resources” (P3). Similarly, another participant (P2) wondered about the level of access small institutions with limited financial resources would have to Big Data, questioning the impact this potential gap between large and small institutions would have in the long run.

4.2.2. Skills. Participants wondered about the skill level that would be required of them if they were to work with Big Data. This uncertainty came through when a participant (P2) shared that she had been struggling to analyze a data set composed of 200 data points and that she couldn’t imagine having to deal with more. Issues pertaining to skills were also touched upon when participants discussed the need for collaborative, cross institutional platforms for data sharing. Building such a system was seen to be beyond museum professionals’ skills, with a participant stating: “I want someone smart to put it together for me” (P2).

4.2.3. Infrastructure. While financial resources and skills were identified as presenting significant barriers to museums using Big Data, a lack of proper
infrastructure for collecting, analyzing, and storing data was seen as perhaps more critical. Participants discussed how a lack of standardized collaborative platforms hampered the amount of data a single institution could have access to, thus limiting the benefits they perceived Big Data could afford. In the words of a couple of participants:

“In the context of museums sharing all of that information [evaluation and visitorship data], just hypothetically speaking, if there was a system that was unified...Every museum is different so perhaps it doesn't make sense for everybody to have the same platform, but if there was something that spoke a similar language so that, you know, contacts could be shared, people could work a little bit more collaboratively when it comes to promoting partnerships etc.” (P1).

“Say you wanted to do an exhibit on animal conservation. There's nowhere you can go, you know...there's no forum where you can go okay what were exhibits on animal conservation. What worked well? What didn't work well? In a way that's really easy and accessible and just put together in one place. And I understand it's because exhibits in museums are so different and context specific. But one day...one day I hope that there will be some way we can come up with that...and to do it you have to come up with very generalizable and universal ways of doing evaluations; standardized language as far as what questions you're asking people, and that's a huge ballgame” (P2).

In the first account, we see the participant envisioning a collaborative, cross-institutional platform, framing it as a way to promote partnerships between institutions, which is generally seen as a positive thing. In the second account, the participant describes a scenario in which someone could easily access data pertaining to exhibit evaluations for the purpose of exhibit design. In both accounts, the participants touch upon a lack of standards, primarily described as disparities in terminology, which renders the task of searching across large amounts of data cumbersome. Participants did discuss the existing platform InformalScience.org [16], but mostly in a negative light, stressing how it is not widely used and not helpful in finding relevant information.

However, it should be noted that another participant worried that the establishment of standards could lead to prescriptive best practices that would not account for museums’ unique contexts, stating “that sounds really helpful but I worry people will translate it as being like best practices. And I hate that phrase a lot, because it's not, like, real. It's real for some things, like, yes there is a best practice for conserving an object of paper” (P3).

Participants also discussed the lack of systems designed for museums. For example, a participant (P1) wondered who designs the point of sale (POS) systems that are widely used in museum visitor services and postulated that a ‘museum person’ would think to design a system that could easily be integrated with other systems and databases used in museums such as Razor’s Edge and Frontdesk. Another participant concurred and described the POS system used at her museum as awful, suggesting that it is unfit for her organization since the winery “on the edge of the street the museum is on” (P3) uses it as well. Thus, adopting systems that are not designed for the museum, or non-profit, context can be a barrier to managing and using data generated by the institution on a daily basis.

4.2.4. Privacy. A participant expressed privacy concerns related to the data-collecting abilities of systems such as Google and Facebook. Based on an example from her personal life, she explained that:

“...what is a challenge for me is to participate in these social networking tools and platforms that then share back through advertisement things that I am sharing via an email that I sometimes am very surprised that I'm getting posts about things that are sometimes kind of personal [laughs]. [Others agree] It's just like how did you know I'm getting married?” (P1).

While this example illustrates concerns regarding her personal privacy, she did not make the leap to consider how this applies to the museum context. Another participant, however, agreed that the omniscience-like characteristic of these systems is a little scary, but that the amount of possibilities she saw in this data-collecting potential outweighed her fears. In her words:

“[Google] knows everything about me. It knows everything about all of you. [laughs] And it's a little bit scary but it's also really kind of exciting to think about what the possibilities are with a tool like that at our disposal” (P4).

4.3. Questions

Lastly, participants voiced many foundational questions that broadly related to ‘whos, whys, and hows’ of Big Data. These questions point to a certain degree of opacity surrounding Big Data and data science as a field. As a participant asked:
“what [do] they think...what their purpose is [laughs] in our society? Like, what are they doing to better everyone. Like, how are they using their knowledge and skills and all of this information to make museums better and to make schools better and to make the government better and to make the economy better? Like, how are they doing that, and who are they working with? Are they working with economists? Are they working with educators? Like, what do you do, and why do you do it?” (P3)

In the words of another participant:
“I would want to know what people are doing with Big Data, and specifically what...how the nonprofit sector is using Big Data, because it's easy to talk about the most obvious example what are Google and Facebook doing with it...but what is...like, people who don't have all that...that same level of resource. What are they doing with this data? What access do they have to Big Data? What are they doing with it? Are they doing things with it? Cause I don't really know” (P2).

More specifically, in the context of collecting data for evaluation and funding, a participant wondered about the lifespan of these data: “Whenever I think about all of this data living somewhere and then being shared, I always wonder where...what's the life cycle of all of this data past asking for support or helping you to analyze and measure what you're doing?” (P1). Later, she extended this line of questioning by wondering about how long the Big Data trend will continue. Is it finite? Will there be a pendulum switch? Another participant chimed in, asking if this trend expands, “can you opt out? You know, without unplugging from the world?” (P4) The same participant later built upon the notion of Big Data’s pervasiveness present in the statement above: "Yeah, I'm really curious about like how much they actually do know. Because there's this perception that the sky's the limit and they kind of are pulling as much as they can. And how do they do that? How do they figure...like the things that aren't really obvious, like when you don't post something on Facebook, say like...like if someone doesn't say what gender they are, for example, on Facebook, but Facebook still figures it out, how does Facebook figure that out? You know? Or if someone doesn't say that they're married but Facebook knows that they're married, how do they know that?” (P4)

Beyond the analysis of categories, themes, and sub-themes described above, we thought it would be interesting to share participants’ answers to question 1 (What are the first three words that come to mind when you hear the term “Big Data”?)) and 7 (If you wanted to learn more about Big Data, where would you go?) (Table 1). While question 1 was asked as an ice-breaker, we find that the simple answers participants provided encapsulate much of the discussion that subsequently took place.

5. Discussion

Since this exploratory study was the first to look at how museum professionals speak of Big Data in the context of their work, we were unsure what to anticipate and worried the conversation would meet a dead end. To avoid this, we designed questions to allow participants to speak broadly of (big) data they encounter in their daily lives and work. This allowed participants to envision and discuss what their data-related experiences might look like on a larger scale. The findings reveal that participants were, indeed, able to speak of Big Data in the context of their work. They articulated implications the convergence of Big Data and museums would have in terms of opportunities and benefits as well as barriers that would have to be addressed for successful collecting, storage, retrieval, and usage of data.

Overall, participants primarily framed Big Data as offering museums an opportunity to better understand their visitors and visitorship, thus allowing these institutions to do what they are already doing—such as collecting, exhibiting, designing programs, conducting outreach, and evaluating—only better. They discussed Big Data providing museums a chance to expand their reach and more powerfully articulate their public value while becoming more visitor-centric, offering such services as customization to make the museum experience more relevant to individual visitors. In this regard, the participants echoed the themes that emerged in our review of the literature relating to marketing and visitor engagement, as well as the benefits of Big Data highlighted in the CFM report.

Participants’ enthusiasm for the potential Big Data can offer museums also came through in how they discussed barriers. Barriers were framed as obstacles to museums being able to successfully tap into the potential Big Data offers. The distinction we wish to make here is that participants did not bring forth any philosophical and ethical barriers or problems that could result from museums using Big Data. Even when a participant brought up privacy concerns, it was related to tensions she felt in her personal life, and not extended to the museum context. In fact, no one brought forth how visitors’ privacy might be infringed upon by the data
collection and tracking. Arguably, if we had asked a question pertaining to issues or concerns related to Big Data, privacy might have become more of a focal point. However, we are surprised by this omission given the fact that privacy issues are discussed regularly in the press [18,19] and that a participant did voice concerns regarding her own privacy.

Throughout the focus group, participants never formally defined Big Data. Tacitly, however, Big Data seems to have been operationalized as any data set bigger than those currently and/or comfortably handled. In parts of the conversation, census data was identified as Big Data museums can use, while at other times, 200-1200 data points generated by museums was seen as ‘big’. We find this range of how Big Data was conceptualized interesting, as it points to the contextual nature of what ‘big’ comes to mean; ‘big’ is bigger than what people in a certain context are used to. Additionally, at times, we found it hard to distinguish references to data from the technology used to capture it and the perceived opportunities resulting from it. Thus, Big Data seems to be conflated with its associated tools and opportunities. While this in itself is not problematic—one can argue that a car’s mechanics need not be understood to be able to drive one—we wonder how a fuzzy understanding of Big Data could impact the extent to which emerging museum professionals can help their institution tap into the opportunities Big Data might provide. This fuzziness came through more sharply in the main category entitled Questions in which participants voiced many uncertainties regarding the ‘whos, whys, and hows’ of Big Data.

6. Conclusion

The concept of “Big Data” is pervading many sectors of society, including museums. In response to the 2014 Trendswatch report published by the AAM, this exploratory study’s goal was to provide a first foray into how emerging museum professionals speak of Big Data in the context of their work. Findings from a focus group of four emerging museum professionals point to a great deal of enthusiasm for the perceived opportunities and benefits associated with Big Data. While limited resources such as money, skills, and infrastructure were identified as barriers, participants expressed very few concerns with the convergence of Big Data and museums. In addition to a high level of enthusiasm, participants expressed many foundational questions regarding the ‘whos, whys, and hows’ of Big Data.

Table 1. Words and resources

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<th>Words that are associated with Big Data</th>
<th>Resources to learn about Big Data</th>
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<td>• Google</td>
<td>• Center for the Future of Museums (Trendswatch reports and weekly newsletter)</td>
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<td>• Complex</td>
<td>• Government agencies (broadly)</td>
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<td>• Vast</td>
<td>• Science on a Sphere</td>
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<td>• Demographics</td>
<td>• Google (via search engine)</td>
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<td>• Statistics</td>
<td>• Academic peers across different departments</td>
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We recognize that one focus group is not enough to enable definitive statements; conducting subsequent focus groups and/or individual interviews with emerging museums professionals is necessary. We believe, however, that the findings we present contribute preliminary conceptual building blocks to help inform more comprehensive study on the topic. For example, questions or scenarios could be developed from our data and used as springboards for additional interviews or focus groups on the topic.

Moreover, we believe the uncertainties voiced in our data regarding the ‘whos, whys, and hows’ of Big Data present opportunities for immediate work. For example, since participants identified the CFM as a resource they turn to learn more about Big Data, there might be an opportunity for the CFM blog to feature more content pertaining to these foundational questions. A data scientist could, for example, explain what his/her work consists of, and how and why data is being collected, stored, and used. Another blog article could unpack how a Big Data-related system works, providing an overview of how a system goes from collecting data to providing information such as targeted advertising and recommendations. Finally, providing examples of how museums of different sizes and budgets are harnessing and being impacted by the power of Big Data, or even smaller data, could help emerging museum professionals better understand how they can use Big Data in their professions.

In addition, this exploratory study is limited by the narrow range of participant perspectives, focusing solely on emerging museum professionals. A more representative and perhaps richer picture of the field could be drawn if more mature museum professionals were involved in the discussion. We see this as another direction for future work.
8. References


