2016

A Neo-Documentalist Lens for Exploring the Premises of Disciplinary Knowledge Making

Lisa Börjesson
Department of ALM, Uppsala University, lisa.borjesson@abm.uu.se

Nicolo Dell'Unto
Department of Archaeology and Ancient History, Lund University, nicolo.dellunto@klass.lu.se

Isto Huvila
Department of ALM, Uppsala University, isto.huvila@abm.uu.se

Carolina Larsson
Humanities Laboratory, Lund University, carolina.larsson@humlab.lu.se

Daniel Löwenborg
Department of Archaeology and Ancient History, Uppsala University, daniel.lowenborg@arkeologi.uu.se

See next page for additional authors

Follow this and additional works at: http://ideaexchange.uakron.edu/docam

Part of the Archaeological Anthropology Commons, Information Literacy Commons, Scholarly Communication Commons, Scholarly Publishing Commons, and the Theory, Knowledge and Science Commons

Recommended Citation

A Neo-Documentalist Lens for Exploring the Premises of Disciplinary Knowledge Making

Authors

Lisa Börjesson, Nicolo Dell'Unto, Isto Huvila, Carolina Larsson, Daniel Löwenborg, Bodil Petersson, and Per Stenborg

Introduction

To document is, beyond doubt, very human. To document humans might be even more human and is the basis for scholarly disciplines like anthropology and archaeology premised on a "need to record and publish what they [archaeologists] find" (Olsen, 2012, p. 79). Since the advent of scholarly archaeological research, archaeology has been almost obsessed with documenting, organizing, and describing to an extent that goes beyond questions of using, interpreting, and making inferences on the basis of documents. In its intense focus on recording, archaeology can be seen as a documentary discipline *par excellence*. A pertinent issue relating to archaeological documentation today is that archaeology has grown from a relatively self-contained domain to an immensely diversified field of practices and an academic discipline with a range of subdisciplines and links to an array of fields in the society from museums, public and private cultural heritage preservation activities, education, and development-led archaeology prior to land development (Huvila, 2014; Trigger, 2009). Actors in all of these areas are engaged in developing and influencing the making of knowledge about the human past. Yet their perspectives on documentation, its functions, and outcomes differ (Collis, 1999). Moreover, as a result of an ongoing movement from predominantly paper-based practices to digital documentation, archaeology all over the world is in the middle of a profound renegotiation of what counts as documentation and documents.

The richness and diversity of archaeological documentation, in combination with the state of flux in conceptualization and materialization of documentation, driven by digitization, is a fundamental challenge for disciplinary information sharing and knowledge-making. The explorative and boundary-crossing nature of the research activity in archaeology adds to the complexity, as does the fact that archaeological documentation balances between functioning as a premise for scholarly knowledge-making and as an instrument of cultural heritage administration (Huvila, 2006). However, it is this heterogeneity and variety of documents and acts of documentation (Collis, 1999) that makes archaeology a particularly rich context from the perspective of document theory. Furthermore, archaeology provides us with a case for explicating why and how documentation analysis is useful as a lens for exploring premises of disciplinary knowledge-making.

The aim of this article is to demonstrate how documentation analysis with a neo-documentalist lens can help us explore variations (and stabilities) in conceptions and materialities of documents, as intertwined with disciplinary and sub-disciplinary practices of informing and knowing. Drawing on documentation theory, and with previous research on archaeological documentation as a background, by means of autoethnographic vignettes we explore contemporary

conceptions of documentation in five areas in or related to archaeology (Intra-site 3D documentation, Development-led archaeology, Aggregating documentation for use outside the organization, Mediating documentation – or documentation mediation, and Documenting and displaying archaeology in a changing environment). Digitization, and how digitization has spurred renegotiations of what counts as documentation, functions as a common denominator discussed in all of the vignettes. The analysis highlights simultaneously ongoing renegotiations of documentation serving each area's unique epistemic purposes, and pushing document materialities in different directions. This operationalization of documentation analysis creates an understanding for intra-disciplinary variations in documentation but is importantly also a practical tool to uncover documentation-related premises of disciplinary knowledge-making. This tool can be applied for example in processes of information policy development (regulating what purposes documentation should serve, and what it should be like), information systems design (e.g. for creation and communication of documentation), and infrastructure development (e.g. for preservation and accessibility of documentation).

Documentation theory, neo-documentation, and archaeology

The revival of the documentation perspective in information science from the late 1980s onwards has informed a broad variety of research (Buckland, 2013; Lund, 2009; Skare, Lund & Vårheim, 2007). At a fundamental level the premises of referring to the document concept can be diverse (Francke, 2005). There are differences in how documents are conceptualized in research, for instance, as instruments enabling communities to sustain, as political devices, as information containers, and carriers (Brown & Duguid, 1996), in diverse contexts such as medical work (Siegler, 2010), software engineering (Cohn et al., 2009), and archaeology (Lucas, 2012). The more specific understanding of document theory as a continuation of the earlier documentalist traditions of Paul Otlet and Suzanne Briet make references to a similarly broad range of documentary artifacts and contexts of documentation, including the example of archaeology (e.g. Buckland, 1998, 2014; Grenersen, 2012; Huvila, 2011).

The theme of the special issue of *Proceedings from the Annual Meeting of the Document Academy* (in celebration of the 20th anniversary of Media and Documentation Studies at the University of Tromsø): "Neo-documentation Around the World: Global Developments," wherein this article is published, reflects this variety of research. The present article applies a document-theory lens to analyze documentation in several areas of archaeology, to explore conceptualizations of documentation, and the implications of these

conceptualizations on the archaeological discipline's knowledge-making. Although the vignettes presented in this article are based on Western European archaeology (in Sweden, Denmark, and Italy), the vignettes mirror a global development in archaeology (e.g. Kansa, Whitcher Kansa & Watrall, 2011).

The Otletian documentalist tradition, which we draw upon in our analysis of conceptions of documentation, has specific relevance in the context of archaeology because in archaeology texts rarely serve as the exclusive and independent basis for knowledge. Other formations, such as observations, experiences, narratives, measurement data, mathematical calculations, physical or virtual models, reproductions, and re-enactments can carry equal weight as premises of knowledge-making (e.g. Huvila, 2014). Later documentation-theory development (Lund, 2009, cf. Buckland, 2013) has elaborated on how the technical, social, and intellectual connotations implied by the concept of *documentation* in a particular situation, sub-discipline, and time change as analytical interests, techniques for documentation, and theoretical stances change. In the analysis, we make these insights our point of departure, and further probe into how changing conceptions of what documents are challenge attempts to identify, describe, organize, and share documents, and to make knowledge in a discipline like archaeology.

Archaeological documentation

The history of archaeological documentation follows that of archaeological thought (see e.g. Pavel, 2010) and resonates with the entanglement of scientific practices and knowledge-making across the sciences (Pickering, 1992). From the beginning artifacts and collections were the primary documents (Collis, 1999; Lucas, 2001; Moser, 2012). Early examples of the documentation of the *process* of archaeological investigations are letters written by excavating archaeologists, addressed to fellow archaeologists (Hodder, 1989). As investigation practices became more formalized in the late 19th century, new types of more structured fieldwork documentation, like horizontal maps and vertical-pit profiles, followed (Lucas, 2001).

Development of documentation in archaeology has been marked by a lively intra-disciplinary debate about what documentation should be like, and about the purposes for which it is produced (cf. Jensen, 2012 as a recent example). Methodological, technological, and theoretical development (often interwoven) have had a strong influence on what has been considered significant to document. For instance, when archaeologists began to embrace methods from natural sciences during the second half of the 20th century, presentations of numerical data and quantitatively oriented analysis increased in popularity at the expense of

the hand drawings (Lucas, 2001). Also, a variety of computational techniques have gradually shaped expectations on archaeological documentation since the 1930s, paving the way for the emergence of theoretical considerations of the impact and role of computing and digital developments in archaeology (Zubrow, 2006). One example of a theoretical development with significant impact on documentation is how archaeologists, especially during the 1980s and 1990s, have emphasized archaeological knowledge-making as dependent on the understanding of the *language* of material culture. From the perspective of the language of material culture, the role of the archaeologist is to be a translator of things into text (Olsen, 1997). Later on, the role of the archaeologist as an interpreter and narrator, but in a more constructivist sense, has become an integral part of post-processual and reflexive theories, and personal accounts have been brought to the fore in documentation (Berggren & Burström, 2002).

Just as how the practices and priorities of archaeological documentation have shown considerable variation, the concepts used to refer to *documentation* and *documents* have diverged. Gavin Lucas uses the term the *archaeological record* to explore the nature of archaeological documentation (Lucas, 2012). *Writing archaeology* is another entry point to critically examine documentation practices (Hodder, 1989). John Moreland (2001) uses the notion *archaeology as text* as he calls for a revaluation of (text) documents as archaeological evidence (in addition to artifacts). Other conceptualizations include, for instance, the notions of archaeological data and archaeological databases (e.g. Collis, 1999), and archaeological evidence (e.g. Thomas, 2006). Documentation (as an activity) has been described, for instance, as the accumulation of observations and finds (Collis, 1999), recording (Thomas, 2006), and documentation (e.g. Accary-Barbier et al., 2005; Charest, 2009; Davidovic-Walther, 2011). These descriptions harbor considerable variation in the explicit and implicit theoretical assumptions related to the choice of terminology, the conceptualizations of the documentation activity, and its outcomes. Conceptualization of documentation in archaeology and related fields have influenced, in ways similar to the use (and depending on the perspective, abuse) of concepts like *heritage*, what has been documented and what has counted as documentation (Enqvist, 2014).

Documentation in flux

The vignettes presented below apply a neo-documentalist lens to explore variations and stabilities in conceptions and materialities of documents in five different areas in or related to archaeology. In the analysis we conceive of documentation as a premise for knowledge-making (i.e. observations, data, and analyses are, via documentation, turned into something that is known by

individuals and collectives within and outside disciplines). Based on this assumption regarding the relationship between documentation and knowledge-making, the vignettes help us to demonstrate how the neo-documentalist lens can be used as a practical tool to explore and explicate the premises of disciplinary knowledge-making.

The vignettes are written by archaeologists (I, III, IV, V) or information scientists (II) with in-depth knowledge of the areas of activity described, their ontology and terminology, and the professional practices in the areas of activity. Each vignette briefly describes the shift from predominantly paper-based to digital documentation in the specific area, and reflects on the questions: What counts as documentation and documents today? What is seen as the most important type of document in this area of activity? What are these documents for? Who are they for? How is this different from previous times? How are the (albeit changing) conceptions of documentation and document intertwined with the (albeit changing) practices of informing, knowing, and producing knowledge? How do the current practices of documentation affect the professional practice? This method, the collective, multivocal autoethnography (cf. Davis & Ellis, 2010), exploits our experiences of, and results from doing research in and about archaeology. Even though the vignettes only partially cover archaeology, and are based primarily on observations and experiences in Western Europe, we argue that the vignettes illustrate the diversity of fluctuating conceptions of documentation across the discipline of archaeology, and do so internationally.

Vignette I: Intra-site 3D documentation
Recent development of new instruments for documentation such as laser scanning and image-based three-dimensional (3D) reconstruction techniques allows new data acquisition workflows for the implementation and use of 3D information in support of archaeological investigations. Experiments have demonstrated how 3D models can be used during fieldwork to generate highly accurate bi-dimensional maps and sections of the site (Berggren et al., 2014; De Reu et al., 2013; Douglass et al., 2015; Quartermaine et al., 2014), and for monitoring, in 3D, all the steps performed by archaeologists during fieldwork (Callieri et al., 2011; Forte et al., 2012). However, a large-scale production and use of 3D data in the context of any site investigation activity calls for the employment of visualization systems capable of displaying these new types of data in spatial relation to all the rest of the information retrieved during the investigation. Only then would scholars have an opportunity to simulate different scenarios with great accuracy to support of the interpretation of a particular site (Dell'Unto, 2015).

Today archaeologists can choose among a broad spectrum of approaches to visually or textually record contexts and materials retrieved on site. The single-context method is often adapted to host new types of information (Berggren et al.,

2015). However, despite the different approaches adopted so far, the difficulty in dealing with heterogeneous data is managing the ways the new modalities of information are organized and the types of infrastructures adopted for their visualization and fruition.

Geographic Information Systems (GIS) are today widely acknowledged as one of the most influential instruments for the management and analysis of archaeological data, and they are considered to be a standard tool for archaeological documentation in many countries (Allen et al., 1990; Chapman, 2006; Connolly & Lake, 2006; Lock & Stancic, 1995; Weathley & Gillings, 2002). Implementing and visualizing 3D resolute-textured models (resulting from fieldwork recording), together with more traditional digital datasets within a GIS platform opens new approaches to analyze datasets collected in field. The integration of 3D data in GIS provides archaeologists with a powerful simulation environment in which it is possible to analyze information in a more accurate and holistic way, and provides an infrastructure capable of, in the spirit of Otlet, connecting and processing various types of documentary evidence (information) together. The use of 3D and GIS integration platforms in support of archaeological investigations has already proven to be a potent instrument in the study of the relations between landscape and architecture (Agugiaro et al., 2011; Agugiaro & Remondino, 2014). Such platforms have also proven to be useful in performing spatial analysis on materials retrieved on site by combining data detected by specialists to review location and material aspects of the contexts when still in situ.

An interesting example developed in this direction was conducted on the island of Öland, Sweden, in the frame of the investigation at the archaeological site of *Sandby Borg* (*Sandby borg*, n.d.). During the investigation campaigns in 2012 and 2013, an experiment was developed by Lund University in collaboration with Kalmar County Museum to test and study the impact of a 3D field documentation method in support of field practice. In the frame of this work a combination of image-based 3D reconstruction techniques and 3D GIS platforms were used 1) to reconstruct the spatial relations among human skeletal remains retrieved on-site, 2) to visualize their integration with the archaeological context, and 3) to integrate the results of the analysis retrieved in the laboratory during the post-excavation activities. The possibility to 're-compose' the scene in 3D by relocating all the different types of data retrieved during the investigation activities during two seasons allowed researchers to gain a clearer view of the chronological sequence that characterized the investigation activity. Moreover, the possibility of visualizing data retrieved in the laboratory in direct connection with the models in 3D allowed researchers to identify patterns that proved crucial during interpretation (Wilhelmson & Dell'Unto, 2015).

Vignette II: Development-led archaeology

Development-led archaeology is archaeology prior to land exploitation. It is regulated by heritage-preservation legislation and commonly conducted as commissioned investigations. Development-led archaeology is intertwined in comprehensive administrative processes: city planning and zoning, environmental impact assessments, land-development permits, and heritage preservation (Carver, 2009).

If we zoom into practitioners' documentation of fieldwork, and their reporting thereof, a long-standing issue of discussion is: Why are text-centered, codex-like reports standard when digital representations of sites, finds from sites, and additional data about e.g. soil composition can be presented in more detail in databases (as exemplified in Vignette I)? Why cannot the database be the central document for reporting and preservation purposes (as in some cases even is prescribed by official guidelines, e.g. for Sweden in Riksantikvarieämbetet, 2015)? The advantages of viewing a database as the central document are numerous: the database could, with little post-processing, be completed during fieldwork, more data could be presented and linked to geospatial data in forms more readily available for future use in synthesizing research (cf. Vignette III). Reporting in database form would reduce time-consuming text writing, and reduce printing and distribution costs associated with reports.

So, why has digitization not pushed development-led archaeology in this direction? Based on a recent interview study with practitioners in Swedish development-led archaeology in September 2015, conducted by one of the authors (Börjesson, forthcoming, 2016), a few factors can be teased out. Even though central documents used in investigations and produced during investigations, like maps used for prognostics and recording of site and landscape features, are not primarily textual, a printable format prevails and limits what can be presented in a report. As Erik, one of the archaeologists in the study explains:

> When I'm done with one [investigation], and when the report is produced and done, then I print everything on archival paper, and make sure that everything that has to do with documentation, and, even a selection of e-mails, and some analysis reports and those kinds of things, [I] print all that on archival paper. And then I bring all the original drawings from the field work and that goes in [to the archive] too. And sometimes I even add notebooks used during fieldwork (Erik, 01:04:05, our translation into English and clarifications in brackets).

For example, when map-based impressions are reported to external actors, that is, the land-developer, the government agency, the public, and the research community, originally digital (sometimes even 3D) maps are reduced to fit into

printable documents. Printability is still central for preservation purposes (Riksantikvarieämbetet, 2015) and functions as a constraint on the reporting practice.

Further, practitioners explain that investigation reports are one link in a chain of text-centered documents. Content from preceding documents/links, like procurement specifications and investigation plans (the response to procurement specifications) are reused to show adherence to the instructions given by the former, and to the goals set up by the latter. In practice, this is an exercise of copy-paste that inhibits further interpretations or alterations (which must be re-negotiated with the government authority functioning as an intermediary between land-developer and archaeologist). Moreover, practitioners explicate how they use word-processing program templates to plan and follow-up on investigation progress. Subheadings, which can even be pre-formatted in the procurement specification, are considered slots to be filled. These report structures are used to sift through and single out pieces of fieldwork documentation for presentation.

Thus, the conception of documentation in development-led archaeology is characterized by the potential of a more inclusive perspective on documentation (as is also visible in guidelines for development-led archaeology, e.g. Riksantikvarieämbetet 2015, p. 25). Yet the conception of documentation in development-led archaeology practices supports the primacy of the text and printable-document formats. The professional practice is shaped by this report production. Professional pride is put in presenting a finalized report, with a beginning but perhaps most importantly an end, within the contracted time.

Vignette III: Aggregating documentation for use outside the organization
With the present focus on data-intensive digital documentation methods in archaeology, the amount of archaeological data is rapidly growing. Individual organizations can have large volumes of digital information from investigations from the past two decades. Unlike the situation in the UK, for instance, where the Archaeological Data Service (ADS) based at the University of York has taken on a national responsibility to curate and disseminate digital data (Richards, 1997), there are no officially recognized repositories for archaeological data in Sweden. The Swedish National Heritage Board collects a limited set of information after each investigation but thus far does not accept databases. There is increasing concern about what to do with digital data, and there are widespread fears that much of the information is at a risk of being lost in server breakdowns or as data formats become obsolete. Several local solutions for data collection have emerged in development-led archaeology organizations and regionally at county administrative boards.

Notably the Swedish government agency National Data Service (SND) has started to curate harmonized GIS data collected in collaboration between county

administrative boards, the Swedish Transportation Administration, and Uppsala University (Löwenborg, 2014). With access to these complete databases from excavations, it is possible to analyze the material at higher resolution than before. This opens up for a wide range of new research questions where the information can be used to model complex relations between society and the environment, for example. The information will also be of great value to cultural heritage management, where detailed knowledge about existing archaeological remains can be used to predict where other, still unknown, sites might be, something that is key in planning heritage and land management. Detailed and complex dataset will also require new methods for analysis, and it will be necessary to work together with experts in computer science and mathematics to develop better methods for analyzing information when more extensive digital documentation is available. Previous statistical methods, like regression, will be limited in working with this complex data. It might be better to work with different kinds of statistical machine-learning techniques and artificial intelligence to capture the full complexity of the information.

With more reliance on digital data in the different organizations involved in cultural heritage work, there is an increasing awareness of the benefits of using digital technology and data. Multiple actors in development-led archaeology, cultural resource management, planning authorities, and research recognize the benefits of more efficient access to information and the possibility of aggregating information. Having direct access to archaeological databases through a central searchable online portal would make information easily reusable for different purposes, and increase the time- and cost-effectiveness of several steps in information-exchange processes. Currently the Swedish National Heritage Board is running a program to create processes and infrastructures for managing digital information from development-led archaeology at the national level, DAP, the *Digital Archaeological Process* (*DAP - Digital Arkeologisk Process*, 2014).

Easy and fast access to large amounts of information would also mean that research could be done much more efficiently, and it would be possible to support new quantitative research questions. Compared to the earlier situation when the focus was on individual objects, categories of objects or sites, with better access to information, it would be possible to correlate large-scale social developments between regions. With the ability to analyze settlement patterns and demographic fluctuations over large areas, it would become possible to correlate the archaeological material with other sources of information, for instance, on climate and the environment. Through a close integration with the natural sciences it would be possible to understand social development over time as a result of the complex interaction between culture and the environment. Hence, moving from isolated pieces of documentation to more generally available results from

archaeological excavations would not only provide additional answers to old questions but would also open up entirely new kinds of research programs.

Vignette IV: Mediating documentation

Focusing on the issue of documentation as a source for constructing representations of (pre)history (rather than on the documentation act itself), it becomes clear that the collection of large amounts of digital data as a part of contemporary archaeological activities opens opportunities for new ways to present scientific results in popular and pedagogical contexts. These possibilities are currently underexploited, partly because of the challenge of designing methods and procedures by which to capitalize on these opportunities. However, the relation between material objects, sources/documents, educational producers, and outsiders will inevitably be altered as a part of the ongoing development in archaeological practices, as in many other fields.

Historically (and also logically), public mediation has been situated farther away from data collection than most other elements of archaeological practice (a notable exception being public archaeology, the purpose of which may just as often have been to offer outsiders an insight into archaeological practice as to illustrate or explain particular past events or phenomena). Artistic interpretation and skill are still significant in most forms of mediation of archaeological information and knowledge, and stylistically, over the centuries the depiction of ancient monuments and artifacts has been influenced by both art movements and technical progress (Piggott, 1978). Prior to the adoption of digital and computer-aided methods of documentation in archaeology, however, literal and pictorial representation of pre-historical conditions were often based on rather meager information, which demanded (or gave freedom to) a significant degree of interpretative and artistic skill (e.g. for depicting life in a Stone Age village).

The richness and interconnected nature of modern information repositories allow a much quicker (and in some cases automated) translation of documentation into models of the past. While this bypass and simplification of the interpretative step is partly delusive (Garstki, 2016), it may allow a direct coupling between information repositories and the representation or translation of this information for purpose of mediation, whereby changes in the information stores can be immediately reflected in the models. The automation together with the apparent realism of models create a greater need to call attention to uncertainties, ambiguities, and the general status of the model as one of several possible interpretations (Andresen et al., 2010). While appearing realistic, the immaterial building blocks making up the digital model somehow set it apart from physical reality. This has made some scholars point to the potential independence of the digital realm vis-à-vis the physical world, which could result in alienation between digital and physical realms of reality. Paradoxically then, the capacity of

digital systems to make use of very detailed information about reality may also result in a detached and independent relation between physical features and the systems that hold digital information about them. This would be what Borgmann (1999) called "information as reality" — that is to say that information technology may be able convey an alternative and compelling version of reality. Unlocking the potential of the outcomes of digital documentation for the purpose of mediation therefore includes seeing through the apparent 'perfection' of digital versions of reality.

Vignette V: Documenting and displaying archaeology in a changing environment

In an ever-changing digital setting, the desires and potential to use traditionally documented and recorded archaeology from investigations in museum exhibitions are limited. In museum contexts, there is among staff at the moment more interest in presenting alternative, often digital, modes of display than in exhibiting objects and texts in a traditional manner. Just to mention one of several examples, the World Heritage site Jelling and the site museum there recently (in June 2015) opened a new exhibition and experience center, *Kongernes Jelling - Home of the Viking Kings*, based on the latest excavation results and interpretations of the site. In comparison with more traditional archaeological exhibitions the artifacts are very few in number, and this is a choice made by the exhibitors (Panum Baastrup et al. 2015, p. 288). The exhibition strongly relies upon digital storytelling, and it builds upon a process of interpretation and storytelling rather than on displays of the archaeological objects and finds from which the story evolves. This change of perspective from objects and descriptions to interpretations and storytelling increases the exhibition producers' reliance on interpreters, IT experts, scenographers, and light designers for the production and setup of experience and the visual design of exhibitions. It has also become common to contract copywriters specialized on producing accessible presentations for audiences from outside the archaeology profession. The success for this new kind of museums is seen in the fact that *Kongernes Jelling* exhibition was shortlisted for the *British Museums + Heritage International Award* in 2016.

The efforts, for example in development-led archaeology (cf. Vignette II), to streamline the format of, and access to fieldwork documentation (which also serves the needs of documentation aggregation, cf. Vignette III) can be a problem in the museum context. The standardized layout of fieldwork documentation can inhibit the processing and transferal of the content to the museum context, wherein museum curators prioritize finding and/or formulating a unique approach, rather than amassing and communicating standardized data. It is impossible to produce unique presentations if the museum staff is only allowed to make use of the archaeological record as it is created by archaeologists during fieldwork, that

is, (sometimes digital) archaeological primary documentation transformed into reports and other types of data. Moreover, these records are not always available to museum staff working with exhibitions because of the location of archives and lack of resources (e.g. museum staff time, search skills, topic skills, and archival records literacy).

Even if contemporary museums work less with traditional factual and object display than before, there are technologies used in museum settings that are text based but performed via touch-screen solutions. This technique offers access to in-depth knowledge for visitors interested in knowing more about specific themes. This way of communicating through text in an exhibition is suitable for traditional forms of knowledge of standardized kind, which is stored in databases and possible to extract for this specific format. Another advantage with digital screens is that it is easy for exhibitors to edit the material if changes are needed during an ongoing exhibition.

Since screen-based technology is not static in the way traditional museum signs with printed texts are, it is also possible to use screen technology to communicate combined aspects of the past and the present. Using screen technologies, exhibitors can construct elements in the exhibition narrative that makes it possible to interact with themes in the present. This can be done for example by using pictures, objects, and quizzes relating an archaeological theme with current issues. This way of using touch-screen technology is used for example at the Swedish History Museum in Stockholm, at the exhibition *Medieval Massacre* – The Battle of Gotland 1361 (*Medieval Massacre*, n.d.).

Within the contemporary increasingly visual and tactile communication paradigm in museums, there is a need to rethink the ways of working with archaeological information from the very start of the fieldwork. For documentation of fieldwork to be of more direct use in the above-discussed new kind of exhibitions, relying less on objects and more on storytelling, a new approach is needed for archaeological documentation. By keeping the museum display in mind as a context of communication, and by engaging specifically trained mediation staff to start planning an exhibition based on a fieldwork project already during the field campaign (e.g. by exploiting possibilities of 3D documentation, cf. Vignette I), it would indeed be possible to change the premises of using fieldwork documentation in exhibitions. Instead of producing more seemingly neutral data in field, the storytelling could be made part of every field situation and be inscribed in the documentation from start. Then of course the stories told would unavoidably become products of their time in a more explicit way than before.

The changing museum display implies a change from the more traditional aim to teach an audience about the unchanging and static past documented for eternity to the aim of teaching an audience to interact with the past in the present.

An interactive approach can make the audience understand the past as part and product of the present world and also as a product of the visitor him/herself. It is obvious that traditional, text-based documentation of facts works well as a foundation for presentation of fieldwork results. But in the context of the new museum display, it is fundamental that the past is filtered through the present and incorporated in an ongoing interpretation process relating the documentation to the present.

Traditional documentation of archaeology in the field is losing its former self-evident value as eternal knowledge in the context of museums that are doing their own interpretation for their own display purposes. In the past, perhaps as early as during the first half of the 20th century and before, there was often a direct relation between excavating archaeologists and a museum that exhibited results of the investigation project. Today, the archaeological record is filtered through a long chain of actors, made consistent and symmetrical and monitored by administrators to a degree that it is not equally attractive for display anymore. At the same pace as archaeology has been professionalized, so has museum staff, and their agendas differ more and more from the agendas of archaeologists doing fieldwork. Today, development-led archaeology is sometimes, for example in Sweden (cf. Vignette II), organized without an obvious relation to a museum where the results, the record of the archaeological work, can be presented in immediate connection with the investigation.

Contemporary museums, like past museums, produce their own museum record within the museum context. The museum record of today is not very clearly related to the excavated archaeological record. It is a mixed story of past and present in a unique combination. The archaeologist Jarl Nordbladh describes how models presented in museums, for example, give physical form to archaeological knowledge (Nordbladh, 2012, p. 241-257). Digital museum models also do that, but from a different perspective than that of the field archaeologists (as described in Vignette I). The changing practices and display modes within the museum world relating to archaeology are not synchronized with the documentation practices performed by archaeologists during fieldwork. It is as if the two worlds are gliding away from each other. The first premise to get them back on the same track is to acknowledge the significant difference between fieldwork documentation and museum display practices, and to bring exhibitors directly to the fieldwork situation already during fieldwork to plan and implement display-aware documentation practices.

Discussion and conclusions

Premises of disciplinary knowledge-making in archaeology

The set of vignettes illustrate how a major change, in this instance digitization, has spurred a broad renegotiation of what counts as documentation and documents in the various sub-disciplines of and areas related to archaeology. The vignettes show a wide variety of conceptions and materialities of documentation in archaeology, ranging from 3D documentation in fieldwork to how archaeological fieldwork documentation is used (and not used) in museum settings (cf. Collis, 1999; Huvila, 2014). Variations are notable both between sub-disciplines and areas (e.g. the discrepancy between how fieldwork is reported in development-led archaeology and the type of documentation sought after for data aggregation, cf. Vignette II and III), and within sub-disciplines and areas (e.g. the discrepancy between records offering in-depth knowledge vis-à-vis experiences in a museum setting, cf. Vignette V).

These new conceptions and materializations of documentation generate new ways of working with documentation for the practitioners active in each sub-discipline and area, but do not automatically lead to a significant homogenization of the documentary practices throughout the discipline. The vignettes about 3D documentation (I) and documentation (data) aggregation (III) provide illustrative examples of how digital techniques are exploited for widely different purposes (although both are concerned with combinations of different types documentation for computational analysis). In 3D documentation the primary use of digital techniques is to explore and produce new types of visual data. In documentation aggregation the primary benefit of digital techniques is to structure, harmonize, and standardize, with an emphasis on already-existing forms of data. The vignettes show that research archaeologists, practitioners in development-led archaeology, and museum staff alike make, manage, share, and preserve documentation according to their specialized professional purposes. The result is a profession-related digital documentation. Its status as documentation for other professions within archaeology and beyond is not, if it has ever been, given.

Although a concept like *digital archaeology* (much like the *archaeological record* or *archaeological documentation* for that part, cf. Lucas, 2012) may give an impression of a homogenization of disciplinary documentation practices and imply a promise of improved communication and information sharing, the vignettes presented in this article moderate the vision of digitization as a unifying force. Frictions between, for example, the ideal forms for fieldwork documentation, research data, and documents suitable for museum pedagogics, are present in the digital context in ways similar to how they were pertinent in the context of analogue documentation. The simultaneous renegotiation of documentation and documents in various sub-disciplines and areas has led to,

rather than a homogenization, a reconstitution of the frictions between conceptions and materialities of documentation in archaeology, and thus of the documentary premises for disciplinary knowledge-making.

The neo-documentalist lens

In this article we have conducted a document analysis inspired by the Otletian document concept. We explore a disciplinary practice by discerning conceptions and materialities of documentation and documents with a neo-documentalist lens. The relevance of the Otletian documentalist tradition lies in how it takes into account the multiple instruments and media used to generate and describe different types of information. The strength of the neo-documentalist perspective (as a continuation and development of the earlier documentation tradition) is how it enables analysis of how each of the forms of documentation are intertwined with technical affordances, as well as social structures and interactions, and intellectual processes (cf. Lund, 2009). This method helps us to articulate the current modalities of documents in each of the analyzed sub-disciplines and areas related to the discipline today. The approach allows us to go beyond a text focus, and to penetrate the intra-disciplinary differences (e.g. such differences related to epistemic goals and to professional identities) in conceptions of documentation. Highlighting and comparing these particularities helps us understand how a specific type of documentation is related to processes of knowing and informing in each of these sub-disciplines and areas. The analysis of the conceptions of documentation also helps us identify and explain how disparate ways of understanding what documentation is can emerge as obstacles to communication and information sharing in and between disciplines.

The case of archaeology illustrates the usefulness of the neo-documentation concept as an analytical lens. The approach can be used to explore conceptions of documentation in other academic disciplines and professional fields as well (e.g. in the medical field, cf. Siegler 2010). We argue that the approach is especially useful in deconstructing situations where conceptions of documentation are in flux due to major (e.g. ideological, theoretical, professional, technical) changes and where the different conceptions of documentation cause frictions between makers and users of documentation. A similar development can be seen for instance in health care, where the opening of medical records for patient consultation (Huvila et al. 2015), the development of electronic health records, and adoption of new analysis and imaging technologies have altered the conception of documentation (Olsen et al., 2007). Another illustrative context of a comparable development is the field of records management where the digitization of document production and use of social media tools have widened the perspectives to what might and should count as an official document (e.g. Waugh, 2014; Caswell, 2009; Meijer, 2001). The use of a neo-documentalist lens

as an analytical tool is relevant both for researchers and for others analyzing and evaluating documentation practices.

Beyond its analytical usefulness (for creating understanding), we posit that the neo-documentation concept is potentially useful as a tool for practical change. As this perspective enables us to point out the (probable) causes of friction between conceptions of documentation between and within different disciplines and professional fields, the concept could be used to outline and implement change in documentation practices. If less friction between conceptions of documentation is desirable, efforts should be directed to actively re-negotiate or bridge the identified discrepancies. The discrepancies should be singled out on the level of documentation practices, that is, where documents are planned, created, named, and organized. The desired change in documentation needs to be substantiated by its technical (e.g. methods for documentation) and infrastructural (e.g. methods for archiving) premises, and by implementation of new routines for documentation (e.g. standardized work processes). However, as the archaeology-related vignettes show, documentation has multiple stakeholders, and the stakeholders differ between the specific sub-disciplines and areas. Frictions are unavoidable, and only when both the producers and users of a certain type of document are motivated to reduce frictions is practical change possible, enabling the neo-documentation lens to be part of a practical approach to suggesting new ways to design documentation tools, systems, and infrastructures.

Finally, we argue that the neo-documentalist lens, as applied in this paper, has implications for understanding and explicating how knowledge is shaped through documentary practices. In this sense, the approach can be especially relevant for policy makers and those planning research and other knowledge-making activities. By illustrating the multi-modality of documentation, the concept of neo-documentation highlights the ways individuals and groups make and communicate knowledge by calling on different forms of documentation. Acknowledging the variety of documentary practices and artifacts can also be helpful in understanding what types of knowledge can be made within a certain discipline or practice. As such, (neo-)documentation analysis provides a lens to the premises of knowledge-making. It also brings our attention to how seemingly proximate activities (cf. the sub-disciplines of archaeology) can rely on and refer to widely different forms and conceptualizations of documentation in their knowledge-making. Documentation becomes a key to understanding how a discipline or professional practice is organized, and, on a more profound level, how a discipline or professional field knows.

References

Interviews

Erik (Informant 4/6), archaeologist in contract archaeology, project manager. Date: September 22, 2015. Duration: 01:35:53. Conducted by Lisa Börjesson.

Digital and in print

Accary-Barbier, T., Calabretto, S. & Bénel, A. (2005). Expression and share of temporal knowledge in archaeological digital documentation. *Proceedings of the IWAW 2005*. http://www.iwaw.net/05/papers/iwaw05-accary.pdf

Agugiaro G. & Remondino, F. (2014). 3D GIS for Cultural Heritage Sites: The QueryArch3D Prototype. In S. Campana & F. Remondino (Eds.), *3D surveying and modelling in archaeology and cultural heritage Theory and best practices*. Oxford: BAR international series, 145–150.

Agugiaro, G.; Remondino, F.; Girardi, G.; Von Schwerin, J.; Richards-Rissetto, H. & De Amicis, R. (2011). A web-based interactive tool for multi-resolution 3D models of a Maya archaeological site. In Remondino, F. & El-Hakim, S. (eds.) *4th International Workshop 3D-ARCH 2011: Virtual Reconstruction and Visualization of Complex Architectures, Trento, Italy*. http://www.int-arch-photogramm-remote-sens-spatial-inf-sci.net/XXXVIII-5-W16/

Allen, K., Green, M. S., Stanton W. & Zubrow, E. B. W. (1990). *Interpreting space: GIS and archaeology*. London: Taylor and Francis.

Andresen, J., et al. (2010). Kommentar till Brun & Sørensen "DiGitizing" – refleksjoner rundt bruken av digital teknologi. *In Situ: Västtsvensk Arkeologisk Tidsskrift,* 2008–2009.

Berggren, Å. & Burström, M. (Eds.). (2002). *Reflexiv fältarkeologi?: återsken av ett seminarium*. Stockholm: Riksantikvarieämbetet.

Berggren, Å., Dell'Unto, N., Forte, M., Haddow, S., Hodder, I., Issavi, J., … Taylor, J. S. (2015). Revisiting reflexive archaeology at Çatalhöyük: integrating digital and 3D technologies at the trowel's edge. *Antiquity*, 89(344), 433–448. http://doi.org/10.15184/aqy.2014.43

Börjesson, L. (forthcoming, 2016). Research outside academia? - An analysis of resources in extra-academic report-writing practices.

Borgmann, A. (1999). *Holding On to Reality: The Nature of Information at the Turn of the Millennium*. Chicago: The University of Chicago Press.

Brown & Duguid (1996). The social life of documents. *First Monday*, 1.

Buckland, M. (1998). What is a digital document? *Document numérique*, 2, 221–230.

— (2013). Document Theory: An Introduction. In M. Willer, A. J. Gilliland & M. Tomić (Eds.), *Records, Archives and Memory: Selected Papers from the Conference and School on Records, Archives and Memory Studies*, University of Zadar, Croatia, May 2013. Zadar: University of Zadar, 223–237.

— (2014). Documentality Beyond Documents. *The Monist*, 97(2), 179–186. http://doi.org/10.5840/monist201497212

Callieri, M., Dell'Unto, N., Dellepiane, M., Scopigno, R., Soderberg, B. & Larsson, L. (2011). Documentation and Interpretation of an Archaeological Excavation: An Experience with Dense Stereo Reconstruction Tools. In *Proceedings of the 12th International Conference on Virtual Reality, Archaeology and Cultural Heritage*. Aire-la-Ville, Switzerland, Switzerland: Eurographics Association, 33-40. http://doi.org/10.2312/VAST/VAST11/033-040

Carver, M. O. H. (2009). *Archaeological investigation*. London: Routledge.

Caswell, M. (2009). Instant Documentation: Cell-Phone-Generated Records in the Archives. *American Archivist*, 72, 133–145.

Chapman, H. (2006). *Landscape archaeology and GIS*. Stroud: Tempus.

Charest, M. (2009). Thinking Through Living: Experience and the Production of Archaeological Knowledge. *Archaeologies*, 5(3), 416–445. http://doi.org/10.1007/s11759-009-9116-x

Cohn, M.; Sim, S. & Lee, C. (2009). What Counts as Software Process? Negotiating the Boundary of Software Work Through Artifacts and

Conversation. *Computer Supported Cooperative Work (CSCW)*, 18, 401–443.

Collis, J. (1999). The Nature of Archaeological Evidence. In Barker, G. (Ed.) *Companion encyclopedia of archaeology*. London: Routledge, 81–127.

Conolly, J. & Lake, M. (2006). *Geographical information systems in archaeology* (Cambridge manuals in archaeology). United Kingdom: Cambridge University Press.

DAP - digital arkeologisk process (2014, April 15). Retrieved February 9, 2016, from Riksantikvarieämbetet website, http://www.raa.se/kulturarvet/arkeologi-fornlamningar-och-fynd/dap-digital-arkeologisk-process/

Davidović-Walther, A. (2011). Die Herstellung archäologischen Wissens. Praxen und Interaktionen. *Zeitschrift Für Volkskunde*, 107(1), 49–64.

Davis, C. S. & Ellis, C. (2010). Emergent Methods in Autoethnographic Research: Autoethnographic Narrative and the Multiethnographic Turn. In P. Levy & S. N. Hesse-Biber (Eds.), *Handbook of emergent methods*. New York/London: The Guilford Press, 283–302.

De Reu, J., Plets, G., Verhoeven, G., De Smedt, P., Bats, M., Cherretté, B., … De Clercq, W. (2013). Towards a three-dimensional cost-effective registration of the archaeological heritage. *Journal of Archaeological Science*, 40(2), 1108–1121. http://doi.org/10.1016/j.jas.2012.08.040

Dellepiane, M., Dell'Unto, N., Callieri, M., Lindgren, S. & Scopigno, R. (2013). Archaeological excavation monitoring using dense stereo matching techniques. *Journal of Cultural Heritage*, 14(3), 201–210. http://doi.org/10.1016/j.culher.2012.01.011

Dell'Unto, N. (2015). Using 3D GIS Platforms to Analyse and Interpret the Past. In M. Forte, M. & S. Campana. (Eds.), *The Age of Sensing*. Berlin: Springer, series Quantitative Methods in the Humanities and Social Sciences.

Douglass, M.; Lin, S. & Chodoronek, M. (2015). The Application of 3D Photogrammetry for In-Field Documentation of Archaeological Features. *Advances in Archaeological Practice*, 2015, 3, 136–152.

Enqvist, J. (2014). The New Heritage: A Missing Link between Finnish Archaeology and Contemporary Society? *Fennoscandia Archaeologica*, XXXI, 101–123.

Forte, M., Dell'Unto, N., Issavi, J., Onsurez, L. & Lercari, N. (2012). 3D Archaeology at Çatalhöyük. *International Journal of Heritage in the Digital Er*a, 1(3), 351–378. http://doi.org/10.1260/2047-4970.1.3.351

Francke, H. (2005). What's in a Name? Contextualizing the Document Concept. *Literary and Linguistic Computing*, 20(1), 61–69. http://doi.org/10.1093/llc/fqh043

Garstki, K. (2016). Virtual Representation: the Production of 3D Digital Artifacts. *Journal of Archaeological Method and Theory*, 7 April 2016, 1–25. DOI 10.1007/s10816-016-9285-z

Grenersen, G. (2012). What is a document institution? A case study from the South Sami community. *Journal of Documentation*, 68(1), 127–133. http://doi.org/http://dx.doi.org.ezproxy.its.uu.se/10.1108/00220411211200356

Hodder, I. (1989). Writing archaeology: site reports in context. *Antiquity*, 63, 268–274.

Huvila, I. (2006). *The ecology of information work -- A case study of bridging archaeological work and virtual reality based knowledge organisation*. Åbo: Åbo Akademi University Press.

— (2011). The Politics of Boundary Objects: Hegemonic Interventions and the Making of a Document. *Journal of the American Society for Information Science and Technology*, 62(12), 2528–2539.

— (2014). Archaeologists and their information sources. In I. Huvila (Ed.), *Perspectives to archaeological information in the digital society*. Uppsala: Department of ALM, Uppsala University, 25–54.

Huvila, I., Cajander, Å, Daniels, M. & Åhlfeldt, R.-M. (2015). Patients Perceptions of their Medical Records from Different Subject Positions. *Journal of the Association for Information Science and Technology*, 66, 2456–2470.

Jensen, O. W. (Ed.). (2012). *Histories of archaeological practices: reflections on methods, strategies and social organisation in past fieldwork*. Stockholm: Statens Historiska Museum.

Kansa, E. C., Whitcher Kansa, S. & Watrall, E. (Eds.) (2011). *Archaeology 2.0: New Approaches to Communication and Collaboration*. UC Los Angeles: Cotsen Institute of Archaeology. http://escholarship.org/uc/item/1r6137tb#page-73.

Lock, G. & Stancic, Z. (1995). *The impact of GIS on archaeology: a European perspective*. New York: Taylor and Francis.

Lucas, G. (2001). *Critical approaches to fieldwork: contemporary and historical archaeological practice*. London: Routledge.

— (2012). *Understanding the archaeological record*. Cambridge: Cambridge University Press.

Lund, N. W. (2009). Document theory. *Annual Review of Information Science and Technology*, 43(1), 1–55. http://doi.org/10.1002/aris.2009.1440430116

Löwenborg, D. (2014). Recuperating GIS data from Excavations. On the use, or lack of use, of digital archaeological information. In I. Huvila (Ed.), *Perspectives to archaeological information in the digital society*. Uppsala: Department of ALM, Uppsala University, 11–23.

Medieval Massacre. (n.d.). Retrieved February March 9, 2016, from The Swedish History Muesum website, historiska.se/utstallningar/medieval-massacre/

Meijer, A. (2001). Accountability in an Information Age: Opportunities and Risks for Records Management. *Archival Science*, 1, 361–372.

Moreland, J. (2001). *Archaeology and text*. London: Duckworth.

Moser, S. (2012). Archaeological visualization - Early artifact illustration and the birth of the archaeological image. In I. Hodder (Ed.), *Archaeological theory today*. Cambridge: Polity, 292–322.

Nordbladh, J. (2012). The shape of history - To give physical form to archaeological knowledge. In *Histories of archaeological practices*. Stockholm: Statens Historiska museum, 241–257.

Olsen, B. (1997). *Fra ting til tekst. Teoretiske perspektiv i arkeologisk forskning.* Oslo: Universitetsforlaget.

— (2012). *Archaeology: the discipline of things*. Berkeley: University of California Press.

Olsen, B. I., Lund, N. W., Bellika, J. G., Årsand, E., Hasvold, P., Ellingsen, G., Horsch, A. & Hartvigsen, G. (2007). Documents in medicine: from paper documents to quality-healthcare? In Skare, R., Lund, N. W. & Vårheim, A. (Eds.) *A Document (re)turn*. New York: Peter Lang, 95–116.

Panum Baastrup, M., Matthiesen, H. O. & Teilmann-Jørgensen, M. 2015. Fra vikingetid til nutid – på besøg i det nye Kongernes Jelling åbnet i 2015. *Nationalmuseets Arbejdsmark 2015*. Copenhagen: Danish National Museum, 284–295.

Pavel, C. (2010). *Describing and interpreting the past: European and American approaches to the written record of the excavation*. Bucharest: Editura Universitatii din Bucuresti.

Pickering, A. (1992). From science as knowledge to science as practice. In Pickering, A. (Ed.) *Science as practice and culture*. Chicago: University of Chicago Press, 1–26.

Piggott, S. (1978). Antiquity Depicted: Aspects of Archaeological Illustration. *The Walter Neurath memorial lectures*, vol. 10. Thames and Hudson: Hampshire.

Quartermaine, J., Olson B. R. & Killebrew A. E. (2014). Image-Based Modeling Approaches to 2D and 3D Digital Drafting in Archaeology at Tel Akko and Qasrin: Two Case Studies. *Journal of Eastern Mediterranean Archaeology and Heritage Studies*. 2:110-127

Richards, J. D. (1997). Preservation and re-use of digital data: the role of the Archaeology Data Service. *Antiquity*, 71(274), 1057–1059. http://doi.org/10.1017/S0003598X00086014

Riksantikvarieämbetet. (2015). *Riksantikvarieämbetets föreskrifter och allmänna råd om uppdragsarkeologi*. Stockholm: Riksantikvarieämbetet. Retrieved from http://www.kulturradet.se/Documents/Om%20Kulturr%C3%A5det/F%C3%B6rfattningssamling/krfs_2015_1.pdf

Sandby borg. (n.d.). Retrieved May 22, 2016, from the *Sandby borg* website, http://www.sandbyborg.se

Siegler, E. L. (2010). The Evolving Medical Record. *Annals of Internal Medicine*, 153(10), 671–677. http://doi.org/10.7326/0003-4819-153-10-201011160-00012

Skare, R., Lund, N. W. & Vårheim, A. (2007). *A document (re)turn: contributions from a research field in transition*. Frankfurt am Main: Lang.

Thomas, J. (2006). The Great Dark Book: Archaeology, Experience, and Interpretation. In Bintliff, J. (Ed.) *A Companion to Archaeology*. Oxford: Blackwell, 21–36.

Trigger, B. G. (2009). *A History of Archaeological Thought*. Cambridge: Cambridge University Press.

Waugh, A. (2014). Email - a bellwether records system. *Archives and Manuscripts*, 42, 215–218.

Wheatley, D. & Gillings, M. (2002). *Spatial technology and archaeology: the archaeological applications of GIS*. London: Taylor & Francis.

Wilhelmson, H. & Dell'Unto, N. (2015). Virtual taphonomy: A new method integrating excavation and postprocessing in an archaeological context. *American Journal of Physical Anthropology*, 157(2), 305–321. http://doi.org/10.1002/ajpa.22715

Zubrow, E.B.W. (2006). 'Digital archaeology - a historical context' in T. Evans & P. Daly (eds.) *Digital Archaeology: Bridging Method and Theory*, New York: Routledge, 10–31.