Research Article

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Land developers and archaeological information

Abstract: Land developers are significant stakeholders of archaeological work in the developed world. A better understanding of their information practices is crucial for the preservation and management of archaeological heritage. This study investigates land developers' use, needs and conceptions of the usefulness-value of archaeological information and their views of development-led archaeological process. The findings are based on a survey of Finnish and Swedish land developers (N=34) that have contracted and financed archaeological fieldwork. The results show that the most useful information for land developers is data on the spatial location of archaeological sites but that the situation is much more nuanced than often suggested. Even if the most of the respondents were rather satisfied with the current situation, the lack of information can have major consequences and there are several obstacles to obtain relevant information. Extensive reliance on people sources can be seen both a symptom of the current problems and an indication of the importance of closer collaboration between archaeologists and land developers. Further, the study shows that the different levels of the perceived usefulness of specific types of archaeological information can be explained by the different regimes determining their worth in the two communities.

1 Introduction

Archaeological fieldwork and information have many stakeholders in society. In many developed countries, the majority of archaeological fieldwork today is conducted as land owner- and developer- funded contracted projects preceding land development (i.e. construction and extension of e.g. buildings, mines, roads, railways, piping and electric grid) (e.g. Demoule, 2012; Gnecco & Dias, 2015). The terminology of this development-led branch of archaeology varies and the activities are refered to, for instance, as contract archaeology (e.g. Gnecco & Dias, 2015), professional archaeology (e.g. Aitchison, 2015), rescue, salvage or commercial archaeology (e.g. Demoule, 2012) and cultural resource management (e.g. King, 2005). There is significant country-specific variation in the practices and legislation concerning development-led archaeology. A typical premise of development-led archaeology is that developers have a legal obligation to apply for a permission to start a project and if deemed necessary by the authorities, fund archaeological investigations at the site of intervention before a the project is allowed to commence (Gnecco & Dias, 2015; Kristiansen, 2009). The gradual implementation of the principles of the European Convention on the Protection of the Archaeological Heritage (Revised), the so called Valletta Treaty, effective from 1995, in heritage legislation has changed the conditions of development-led archaeology in Europe (Demoule, 2012; Kristiansen, 2009). This is true even though the treaty does not prescribe the practical organisation of archaeological fieldwork. Although the developers tend to be only indirectly involved in the actual archaeological fieldwork, the funds and time required by the assessment process and eventual fieldwork

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mean that they have a real stake in the archaeological work (Zorzin, 2010) and the making of archaeological information and knowledge. The scope and conditions of conducting development-led archaeology are determined by economic and practical realities of private and public land development in society, not by archaeological scholarly interests. Even if the role of developers have been touched upon in the earlier literature (e.g. Demoule, 2012; Cumberpatch & Blinkhorn, 2001; Zorzin, 2010), there is little empirical research on their perspectives to archaeological process, their information needs, and how they use and value information produced and provided by archaeologists.

The aim of this study is to investigate 1) land developers' views of development-led archaeological process, 2) how land developers use and value the usefulness of archaeological information and what types of information needs they have in relation to archaeological information, and 3) what could explain eventual differences between land developers and archaeology professionals' perceptions of the usefulness-value (or worth) of specific types of information.

The study is based on an analysis of the results of a survey of 34 Finnish and Swedish organisations, which had contracted and funded archaeological fieldwork in the two countries in 2013-2014. The survey was based on a mixed-methods approach with an emphasis on qualitative open-ended questions combined with a small number of questions on a 5-point Likert-like scale. In the context of information science research, the study builds on earlier studies of the information use and the perceived usefulness of information (Savolainen, 2009). The Boltanski and Thévenot's theory of worth (2006) and Star and Griesemer's notion of boundary objects (Star & Griesemer, 1989; Star, 2010) were helpful in discussing the premises of how the usefulness and use of archaeological information was perceived among land developers, and how and why it might differ from the views of archaeologists.

In this study, *land developer* is defined accordingly as an organisation or individual (or their representative) engaged in a development-led archaeological process as (in Sweden) a developer (Swe. *exploatör* i.e. 'exploiter', sometimes also *företag* i.e. company or *uppdragsgivare* i.e. client/assigner, ref. RAÄ, 2015b), or (in Finland) funder or orderer (Fin. rahoittaja/tilaaja, Swe. finansiär/beställare, ref. Museiverket, 2016), an actor whose actions led to the commencing of an archaeological survey as required by the cultural heritage legislation, and that also normally funds the investigation. Land developer can be land owner or user, but also a public or private organisation responsible for developing a particular area of land (e.g. construction company or a municipal planning department).

2 Literature review

2.1 Development-led archaeology

The development-led branch of archaeology is known by many different names. The various terms used differ from one country to another and tend to emphasise different aspects of the activity. A traditional term used until the 1990s in Europe is *rescue archaeology* (in the US often *salvage archaeology*, e.g. Carver, 1999), which refers to fact that much of that archaeological activity is conducted to save archaeological sites (often by documenting them in course of an excavation) ahead of a forthcoming destruction as a result of land development (Stjernberg, 2010). The terms *professional archaeology* and *contract archaeology* (which gained popularity in the late 1990s, Stjernberg, 2010) describe the organisation of archaeological work as a professional (vs. academic) and contracted (vs. being executed by public authorities) activity. In Sweden, the National Heritage Board currently advocates for the use of the term *development-led archaeology* to describe the entire field of activities that are driven by development rather than scholarly or scientific interest. The organisation of development-led archaeology varies from one country to another. For instance, in the UK and Ireland, archaeological work is organised according to market principles (Stjernberg, 2010), the Swedish (Börjesson et al., 2015) and Finnish (Haggrén, 2014; Luoto, 2015) models can be best described as a (semi-)regulated markets, whereas, for instance, in Norway, Hungary and Denmark (Stjernberg, 2010) all development-led archaeology is conducted by public authorities.

Development-led archaeology has been studied to a certain extent especially in the UK where the

privatisation of fieldwork began in the early 1990s (Demoule, 2012; Everill, 2012). Much of the earlier research focused on the working conditions of field archaeologists in the private archaeology sector and the consequences of the privatisation to the quality archaeological work and field documentation (e.g. Andersson et al., 2010). Studies in multiple countries have reported positive developments in the quality and especially the timeliness of reporting (Green & Doershuk, 1998; Huvila, 2016b). At the same time, however, there have been increasing concerns about marketisation and its consequences (e.g. Zorzin, 2010; De Clercq et al., 2012; Thomas, 2006; Berggren & Hodder, 2003), relating to, for instance, the ownership and preservation of investigation data (Huvila, 2016a), working conditions of field archaeologists (Zorzin, 2010), and increasing influence of land developers on the archaeological work (e.g. Andersson et al., 2010; Zorzin, 2010; Demoule, 2012; Rocabado, 2015). Consequently, some critical voices have demanded increased public control of development-led archaeology (e.g. Willems & Dries, 2007; Demoule, 2007). As a whole, the research so far is somewhat anecdotal and there are few studies of the longitudinal impact of development-led archaeology, country-wise comparisons, or analyses of differences between specific approaches to organising archaeological activities. There are a few exceptions, including the overview of development-led archaeology in Europe by Demoule (2012), Kristiansen's comparison of public and market driven approaches to the branch and the 19(4) issue of the *International Journal of Historical Archaeology*, which includes a selection of papers describing development-led archaeology worldwide.

If there is relatively little literature on development-led archaeology in general, there is even less that would focus on land developers. The relationship of archaeologists and developers has been referred to in the earlier literature on archaeological work. For instance, some of the Finnish and Swedish archaeologists interviewed by Huvila (2006) commented on their professional relation with land developers and noted that the situation had improved from earlier cases when attitudes could be close to hostile by the date of the study. The perspectives of land developers are also, to a certain extent, reflected in general within development-led archaeology related archaeological literature (e.g. Green & Doershuk, 1998; Shepherd, 2007) and they are acknowledged (with some exceptions, e.g. Seppänen, 2014) as stakeholders of archaeological process (e.g. Groarke & Warrick, 2006; Andersson et al., 2010; Zimmerman & Branam, 2014). Despite this, there is a lack of systematic empirical research on how the land developers experience development-led archaeology and their priorities. The archaeological literature has understandably tended to focus on critical discussion of land developers' ambition to reduce costs and time required for archaeological investigations (e.g. Groarke & Warrick, 2006; Stjernberg, 2010; Demoule, 2012) and its consequences for archaeological work. Archaeologists have also expressed diverging opinions on whether land developers should be considered as clients in the archaeological process (a view advocated by the devotees of commercial archaeology, ref. e.g. Demoule, 2012; Luoto, 2015) whereas the sceptics tend to oppose and consider society and its representants as the customer (e.g. Demoule, 2012; Cumberpatch & Blinkhorn, 2001).

The lack of systematic research on the topic does not mean, however, that the perspectives of land developers would be entirely unknown in the sector. For instance, in Sweden, the National Heritage Board (NHB) has investigated their opinions as a part of developing guidelines for development-led archaeology (Riksantikvarieämbetet, 2012) and processes related to development of the national sites and monuments registry (FMIS) (Sohlenius, 2014). Additionally, the Uppsala County Administrative Board (Sweden) has investigated stakeholder attitudes with a focus on land developers and other actors in municipal administration. According to the study, the most positive attitudes are found in environmental and cultural administration whereas informants from other sectors tended to be more negative. A portion of the informants considered that archaeological heritage was an underutilised resource. They regarded archaeological sites as useful especially in the planning of new buildings and built areas (Skyllberg, 2013). In general, the findings of the Uppsala study are close to the results of the national survey conducted by NHB (Riksantikvarieämbetet, 2012) and the views expressed in the archaeological literature (e.g. Goudswaard et al., 2012b; Zorzin, 2010; Demoule, 2012). Land developers, owners and planners are generally not interested in archaeology *per se*, and perceive it primarily as a hindrance or a legal requirement among other requirements (Riksantikvarieämbetet, 2012; Skyllberg, 2013). Their priorities are speed and low cost of the process (e.g. Riksantikvarieämbetet, 2012; Goudswaard et al., 2012b). The conclusions of the Uppsala study do, however, emphasise that in spite

of the general lack of direct interest in archaeology, the municipal land developers asserted that they would welcome dialogue and came with practical suggestions on how to improve the archaeological processes (Skyllberg, 2013).

2.2 Use and usefulness of archaeological information

Savolainen (2009) notes aptly that it is common to refer to information use in the information science literature but in contrast to the relatively frequent mentions, it is seldom discussed in detail. The interest in the topic has been increasing since the 1990s (cf. Vakkari, 1997) but there is still no doubt that the topic is both empirically underresearched and vaguely conceptualised (Savolainen, 2009). A part of the question of the usefulness of information has been discussed extensively in information science research from the perspectives of information needs (Savolainen, 2017) and relevance (Saracevic, 2016) even if there is much less research on the topic in the context of use and perceived usefulness (for exceptions e.g. Madden et al., 2007; Soomai et al., 2011; Sinn & Soares, 2014) than assumptions and expressions of needs and the relevance of retrieved information. Usefulness and relevance are only a part of the broader question of the value or worth of information, but for the mainstream information science research aiming at understanding and facilitating information work, it is one of the key aspects of the issue (e.g. Cummins & Bawden, 2010; Darlington et al., 2008; Fleischmann, 2013; Hill, 2005).

In contrast to the relative scarcity of research on information use in general, there are only a handful studies on the use and usefulness of archaeological information. Huvila has studied information use of Swedish and Finnish archaeologists (Huvila, 2006, 2014a), De Roo et al. (2013) investigate the use of GIS (i.e. geographic information system) data in archaeology, and Faniel et al. study archaeologists' re-use of legacy research data (e.g. Faniel et al., 2013, 2016). De Roo et al. (2016) also make remarks on the use and production of archaeological data as a part of their survey of archaeological processes in Flanders. They identified three distinct types of information in the process: administrative, spatial, and scientific, noting there is a lot of overlap between these categories. Börjesson (2015) has studied literature use in Swedish field reports from development-led archaeology projects. She concludes that there is latent variation between academically and administrative oriented frames of reference in the information use of report writers. According to her findings, the academic frame tends to be more common among archaeologists affiliated with incorporated businesses and sole proprietorships whereas the administrative frame of reference was more common with affiliates of government agencies, foundations, and member associations. On European level, the ARIADNE infrastructure project has conducted a large scale survey of the use of archaeological information directed to researchers, directors of research institutes and managers of data repositories (Geser & Selhofer, 2014). In addition to literature with a focus on use, there are studies of the availability of data in different organisations and repositories, including the Swedish study of Törnqvist (2015) of information production and data repositories held by Swedish archaeology contractors conducted under the auspices of the Digital Archaeological Process (DAP) programme of the Swedish National Heritage Board.

Even if it is fair to remark that there is rather little research on the use of archaeological information in archaeology (Huvila, 2014b), there is even less research on the availability and use of archaeological information within other stakeholder groups. In general, there are tendencies to claim that the availability of archaeological and cultural environmental information is limited (e.g. Pere, 2014). Earlier studies that have focused on the perspective of land developers suggest that the information they need is limited to the administrative decisions that allows them to continue with the development process and spatial information on the limits of the area that should be avoided in the process (Riksantikvarieämbetet, 2012). There are some exceptions, such as the above-mentioned study in Uppsala in which some of the administrators referred to the inspirational value of archaeological heritage in the planning of new built areas (Skyllberg, 2013). Goudswaard et al. (2012b) make a similar suggestion of their interest in the "identity of the space and useable stories to inspire his or her development" (Goudswaard et al., 2012b, p. 138) while discussing the Dutch archaeological heritage policies and the specific approach of incorporating archaeological, economic and societal values to a single value-based framework developed by a Dutch heritage management

consultancy the Missing Link (Goudswaard et al., 2012a). Otherwise, as Goudswaard et al. (2012a) note, "the added value of archaeological research is rarely recognized" and developers are seldom incorporated in an active discussion about research and its demands. This lack of dialogue reduces archaeology to one of many items on a checklist that has to be completed in the planning process. Consequently, as Chirikure (2012) notes, developers do not use archaeological information at all. The advantage of an integrated value-based approach is that it can help the stakeholders work together instead of merely informing each other (Chirikure, 2012).

The demands to focus on the needs of non-archaeologists has also raised some critique. Cumberpatch and Blinkhorn (2001) discuss the question of the ownership of knowledge about the past and the past itself when the interests of different stakeholders differ from each other and the economic realities and relationships determine priorities. Bazelmans (2009) writes about the danger of archaeology losing its essence if extra-archaeological stakeholders are given too much influence. Also Chirikure (2012) agrees in that scientific value is deemed to have lower priority. He notes also that the integration of particular values and stakeholders does not mean that, for instance, the general public would have a stake in the process (Chirikure, 2012). Particular approaches adopted in specific countries also have implication for the availability and sharing of information. For instance, in the Netherlands, where the responsibility lies on municipalities, there has been calls for a better regional coordination (Dries & Vuuren, 2012) and in Sweden where decisions are made on a regional level, for national coordination (Huvila, 2016b).

3 Methods and material

Data was collected using a mixed qualitative-quantitative web survey, which was administered using E-lomake survey software. The survey included 20 questions of which 3 included multiple statements on a 5-point Likert-like scale. 12 of the questions were open-ended and the focus of both data collection and analysis was on qualitative understanding rather than quantification. The respondents were asked to describe and rate their experiences of the development-led archaeology process, usefulness and use of archaeological information, and to indicate the branch and size of the organisation they represented.

The sample is essentially a convenience sample of Finnish and Swedish organisations, which contracted archaeological investigations in 2013-2014. For Sweden, the names of the organisations were harvested semi-automatically using custom-written php-scripts from the PDF reports covering the chosen timeframe and available at the Samla database of the NHB (samla.raa.se). For Finland, the same data was collected from Muinaisjäännösten hankerekisteri (engl. Antiquities Project Registry) database (http://kulttuuriymparisto. nba.fi) maintained by the National Board of Antiquities of Finland. Email addresses of the organisations and, as possible, individuals working at relevant parts of the organisation (depending on the type of the organisation, generally planning, development and property management related functions) were collected using public online sources, including the websites of the organisations. Invitations were sent during the summer and autumn of 2015 to 241 Swedish organisations and 131 Finnish organisations. One reminder to participate in the survey was submitted to all organisations. Nine invitations were returned as definitely undeliverable.

In total 34 organisations participated in the survey, 14 from Finland and 20 from Sweden. Twenty of the 34 respondents classified their organisations as municipal which corresponds relatively well with the distribution of the organisations in the original population (126 of the 241 Swedish and 87 of the 131 Finnish organisations were municipalities, excluding municipal e.g. energy and water supply companies). Five of the 34 respondents represented construction companies, 3 organisations in the energy branch, 3 regional and 2 national public bodies. One organisation from the property development, mining and environmental consulting branches participated in the survey. Amounts of employess varied - eight of 34 organisations had less than 10, 14 of the 34 organizations had between 11 and 100, five of the 34 had between 101 and 999, and seven of the 34 organizations had over 1000 employees.

Especially for Sweden, it is important to note that the collection of reports is not complete, partly because only a part of the available reports contained information on the organisations who had contracted

and/or financed investigations. It is also possible that the semi-automated harvesting process failed to find a small number of organisations. In addition, it is likely that in a number of organisations, the invitation did not reach the relevant respondents even if the invitation contained a request to forward it to a colleague if the recipient considered herself to be unable to take the survey. Therefore, even if the sampling approach was designed to reach a reasonable level of systematicity, coverage and comparability, the lack of a comprehensive project or central report registry in Sweden, technical issues, variation in the reporting of the contracting organisations, and the varying specificity of contact details mean that the final sample is closer to a convenience sample than a systematic cross section. However, in spite of the small sample size and an unknown bias, the relatively large variety of represented organisations and consistency of the reponses in the sample suggest that it is useful for the exploratory purposes of the this study. Considering the finding that for a large number of the respondents archaeological information was of rather limited relevance, it is also conceivable that non-response is at least partly an indication of a lack of opinion and interest.

The open ended data was analysed using a version of qualitative content analysis (Krippendorff, 2004). The analysis followed an iterative process of categorising, writing and recategorising the material and identifying common themes in the narratives of the interviewees. In order to control for an over-expression of individual opinions, the analysis places a special emphasis on views expressed by multiple interviewees. Frequencies and descriptive statistics for quantitative data were calculated using R 3.2.2. (psych).

4 Analysis

The findings provide insights into respondents' experiences on development-led archaeology and their current use and perceived usefulness of archaeological information. The small sample size limited the possibilities to find statistically significant differences between different groups of respondents. According to a qualitative reading (rather than quantitative analysis of variation) of the data, it seems that individual and organisation specific variation might explain the variation better than contextual differences. A close reading of the open-ended questions suggest further that the main difference of attitudes could be found between respondents oriented respectively towards current projects, and future planning of development activities.

4.1 Development-led archaeology according to land developers

Most of the respondents were highly satisfied with the development-led archaeology process, especially with archaeology contractor (mn 4.70, sd 0.53, md 5.0) but also with the heritage administration (mn 4.07, sd 0.92, md 4.0) and the cost of the work (mn 4.12, sd 0.99, md 4.0).

The majority of respondents who commented on eventual differences between different contractors considered that the most of the investigations tend to be relatively similar. Respondents stated that sites are different but there are few (#4) or relatively few (#27) differences in the processes. Respondent #25 from Finland, who had experience working with three different contractors, noted that their working methods and reporting were largely similar. In contrast, the Swedish respondent #29 had experienced that the individual archaeologists assigned to different investigations by a single organisation had major differences in how "smoothly" they worked. The phrasing of the comments seems to suggest that, in general, the respondents appreciated that the different contractors followed similar procedures of work.

According to almost a half of the respondents (13 out of 31), the principal value of contract archaeology relates to the permission to continue with land development after the required investigations had been finished. For instance, a Finnish respondent (#2) explained that an archaeological assessment is "required" when new wind power projects are planned. A respondent representing a property developer (#8) noted that interfering with archaeological sites is not in their interest and in many cases there would be a significant risk of infringement if archaeological investigations had not been properly conducted. Respondent #21

elaborated this standpoint further by underlining that there is no inherent controversy between heritage and land use. There is merely a need of coordinating planning efforts to avoid building on archaeological sites. The "cultural historical" (i.e. archaeological) evaluation is a part of the general assessment. It is a part of controlling risks of a project. At the same time, a properly conducted investigation helps land developers to plan their work in detail and to use land more efficiently and work faster (#23).

Even if the respondents did not tend to put archaeology against land development (exception, e.g. #25), the respondents were inclined to refer to investigations as a necessity and legal obligation rather than an important part of the land development process (e.g. #28, #29). Respondent #15 wrote plainly that the archaeology has no direct utility for them. Developers merely have an obligation to carry its cost and it would have been good if the investigation had a dedicated budget. Respondent #22 agreed by commenting that the archaeological investigation has specific value when an archaeological site located (from developer's perspective) in an "important area" is "investigated off" and made available for development. Respondent #32 noted likewise that it is valuable if an investigation has been already conducted whereas the knowledge of a need for new investigations has little value.

In contrast to the first group of respondents who did not consider archaeological investigations as especially useful for their work, the remaining respondents (18 of 31) described how archaeological groundwork provides useful input in varying extent to the planning of current interventions and future land development, and for the repair of old buildings. However, many respondents gave an impression that archaeological work is still a separate undertaking from planning and land development. A closer integration of archaeological work in the planning and development process seemed to be somewhat more typical for owners of historical buildings and some municipal representatives than for other respondents. Respondent #7 noted that in the old centre of the municipality the planning officer usually follows up the construction works together with an archaeologist when the project starts. Respondent #15 explained that it was both her personal priority and a convention at her municipality to contract archaeological and environmental assessments in all planning projects without waiting for an explicit reminder from heritage authorities. Respondent #30 noted that her organisation tends to contract investigations ahead of particular land development projects. Respondent #31 stated the opposite by noting that her municipality never commissions archaeological investigations.

Six respondents (#8, #12, #13, #19, #22, #25) referred to the general, sometimes major, societal value of archaeological investigations. Acknowledging the historical and societal value of archaeological work did not seem to relate to whether the respondents indicated that the principal value of development-led archaeology for their organisations is in getting a go-ahead for land development or not. Additionally, among these respondents, the investigation results were perceived to be significant for development work, and some respondents referred to their broader significance, such as their potential in increasing the attractiveness of a locality for tourism (#12). Respondent #19 wrote that his organisation hardly needs the results of archaeological work at all but that it contributed to the general awareness of local history and the specific property. She also noted that in her organisation, results of archaeological investigations are sometimes distributed for general interest to the (non-archaeological) staff. As an exception to others who participated in the survey, for respondent #34 the archaeological knowledge rather than land development was the principal reason for contracting the investigation.

4.2 Use of archaeological information

Archaeological information and investigation results were generally seen as "necessary information" (#12) in land development. However, the implications of the information could vary. Sometimes archaeological information becomes a compulsory constraint of how land development can proceed, sometimes it can be used as a resource.

Most of the respondents used archaeological information as a basis for future land development plans. Municipal planning officers utilise information from archaeological investigations in developing building plans, producing statements on planning permissions and in writing programme plans, for instance, for

cultural environment programmes (e.g. #1, #24). In general, if the investigations have been conducted, it is easier to proceed with planning and avoid submitting unnecessary applications or unexpected appeals (e.g. #20, #21). Some respondents (#10, #27) noted that occasionally, archaeological information can have a major impact to final plan. For instance, respondent #10 specified that it can be crucial for deciding whether a specific area or building should be redeployed for a new type of use or not.

Real estate holders need archaeological information in planning and conducting real estate management and renovation work on historical buildings. Respondent #5 noted that all archaeological materials found during renovation need to be investigated by archaeology professionals before they can proceed with the work. Respondent #3 noted that her organisation needs reliable information on the history of their property and that archaeological investigation reports are frequently used in the planning of redevelopment and reparations. Reports contain information that can be used in selecting materials and methods for conservation and in assessing the need to repair foundations of buildings.

In the private sector, construction firms (#9) need archaeological information to plan their work before the erecting of a new building starts. Mining companies need investigation results during the planning of prospection and development of mines. Respondent #22 remarked that conducting an archaeological survey is not obligatory ahead of prospecting but is required when a mine is planned. Energy companies need information on archaeological sites in the vicinity of transmission lines and transmission towers need to be placed outside of existing sites (#4). Respondent #4 explained that, at the time of constructing a new line, archaeological sites are usually marked in the terrain to help construction machine operators to avoid them. Wind power companies have similar needs (#3). Respondent #4 described that her company has a standard procedure of acquiring a statement from the national heritage administration before all new projects.

For the most of the respondents, the most useful piece of archaeological information tends to be geographical data and maps indicating the extents of archaeological sites. Real estate holders use archaeological reports, consultant reports, information on construction materials and occasionally other archaeology related information such as historical maps and plans, and archival information and literature in their planning work (e.g. #5, #24). Individual respondents also named books (#1), the use of the national monuments registry in the pre-planning phase of new projects (e.g. #4, #10, #24), databases of regional museums (#10), existing plans and plan commentaries (#21) that contain information on already known archaeological sites, and local "history writing" (#17) i.e. diverse available local texts of the historical conditions of the area as information sources. According to #24, historical maps are especially valuable for areas that have not been previously investigated by archaeologists. Some respondents underlined the significance of discussions with archaeologists working at the regional administration (#29) or municipality (#31) as a source of information on how to determine the limits of an archaeological site. In some cases even less conventional information sources were mentioned. Respondent #32 noted that news on collaboration between archaeologists and planning officers can provide useful examples of best practices. Respondent #23 mentioned that her organisation uses shingle beaches as information. In Finland and Sweden, they indicate the position of ancient shorelines and can be indicative of the archaeological potential of areas situated on higher and lower ground relative to them.

In general, the responses did, however, give an impression that the respondents had a tendency to use information, which was familiar to them. Municipal planning officers used maps and geographic information, construction and renovation specialists used construction plans and some respondents (e.g. #11) noted that they do not use archaeological information at all but let consultants help them to investigate the "archaeological premises" (#11) of their work. Respondent #4 noted that she uses few information sources but assumed that there might be more sources of which she is not aware.

4.3 Usefulness and availability of archaeological information

The quantitative indicators of the usefulness and use of various types of information sources show that the respondents relatively highly valued the information produced by archaeologists (Table 1). At the same time, in half of the cases, the scores for the use of the material tended to be somewhat lower than for their

perceived usefulness. Investigation reports (3.50 vs. 3.62), the national sites and monument record (3.47 vs. 3.58) and information on the geographical position and area of sites (3.71 vs. 3.85) scored higher for use than usefulness.

Respondent #24 commented that there is no doubt that archaeological information would be generally useful, but from her perspective, the archaeological findings seem seldom significant enough to motivate the high costs of investigation. Respondent #23 noted further that there is a grey zone in interpreting what is a "sufficient survey". She added that sometimes expensive archaeological excavations are being proposed ahead of land development planning even if it would be adequate to demarcate a specific area out of the exploitable area. This controversy of limiting survey areas for financial reasons and its consequences are well documented in the literature (e.g. Willems, 2008; Demoule, 2012).

Table 1: Perceived usefulness and use of archaeological information sources.

	Usefulness			Use		
Information source	**mean**	**sd**	**median**	**mean**	**sd**	**median**
Investigation reports	3.50	0.72	4.0	3.62	1.18	4.0
Pre-investigation reports	3.30	0.88	3.5	2.82	1.34	3.0
GIS-data	3.52	0.87	4.0	3.16	1.55	3.5
National sites and monuments record	3.47	0.72	4.0	3.58	1.48	4.0
Geographical position and area of sites	3.71	0.72	4.0	3.85	1.46	4.0
Oral information from archaeologists	3.47	0.82	4.0	2.79	1.37	2.0
Oral information from archaeological administrators	3.29	0.64	3.0	2.91	1.26	3.0
Administrative decisions	3.52	0.63	4.0	3.00	1.27	3.0

4.3.1 Information types

Several respondents emphasised the usefulness of GIS data provided by archaeologists (e.g. #10, #23, #24, #25, #26, #27). In an ideal situation it would be possible to get boundaries of archaeological sites directly plotted on a map together with information on the status of their preservation. Detailed information is necessary for adjusting plans to accommodate for preservation and land development needs. Multiple respondents emphasised the importance of exact and reliable (spatial) information (e.g. #13, #15). The main problem with imprecise information is that the restricted areas need to be extended (#15), accessible area becomes smaller and development work more difficult.

When asked about any specific forms of information they would have preferred to have, the respondents mentioned better quality CAD-drawings (#3), GIS-data in general (#10, #24, #25, #26, #27), and maps and GIS-data in specific formats they had requested (#4). The lack of "compatible geodata" (i.e. data that could be directly imported to a CAD program used by the land developer, e.g. #6) and the uneven quality of CAD-material (#3) were considered to be significant problems. Getting archaeological GIS data seemed to be especially problematic in Finland. Also better availability of information in general (#18), and more specifically, getting it at an earlier date to support planning (#1), advance information on when preliminary investigation results will be available (#30), direct oral information from archaeologists during the investigation (#34), information if significant findings are being made during the investigation (#7), specification and dating of findings (#5), site specific data (#27), reports, statements and unambiguous opinions when required (#8), were mentioned. Respondent #23 noted that she tends to get information which is more interesting and easier to understand in telephone conversations and face to face discussions than in official reports. Also comparisons to other findings in other parts of the country and richer background information tends to prevail in oral discussions and be absent in written reports (#23). Another remark that underlines the significance of oral information was made by respondent #3 who stated that a lot of "silent information" (i.e. information that is never communicated to the developers) end up in

archives and becomes difficult to access.

4.3.2 Obstacles

Analysis of the qualitative data on the obstacles of obtaining information fell into three broad categories (Table 2). In general, the respondents were relatively satisfied and the general conclusion seemed to be that in the end, information was available either in the reports (e.g. #30) or in general in the material provided by the contractors even if there were multiple hindrances on the way. Respondent #15 was very emphatic that there had been no problems during the 15 years she had been working as a planning director at her municipality. The relative satisfaction does not mean, however, that there were no obstacles to getting informed. The Table 2 provides an overview of the categories and issues that recurred in the responses.

Table 2: Barriers and obstacles of getting informed.

Barrier	Obstacle	Description	Mentioned by respondents
Difficulty of accessing information	Lack of knowledge where information can be found	The location or provider of information is not known.	#20, #27, #23
	Lack of unified access	Information is not available in one place	#3, #10, #23, #27
	Lack of access	Difficulties to access information held by particular organisations.	#27, #3, #24
	Time	General lack of time (#1); Finding and retrieval of reports from archives is a slow process (#3).	#1, #3
	Suboptimal information management in own organisation	Even if an organisation itself has contracted archaeological investigations, the results are not always archived properly for easy retrieval. Some land developers acknowledge the need of archaeological investigation in budgeting and scheduling while others have a tendency to neglect it.	#13, #18
Information does not exist	Information is not obtainable	Archaeologists are sometimes unable to investigate a site completely enough to get all necessary information.	#3
	Information is not obtained	Too little information e.g. because of the low esteem of investigations and a tendency to be afraid of the possible results in advance leads to that investigations are not conducted, and that there is no information available.	#17, #29, #22
Information is difficult to use	Information overflow	Too much information.	#5
	Unclarity of information	Lack of a clear opinion of the significance of a site (whether it can be removed or not) restricts the usefulness of archaeological information; professional jargon; user-friendliness of reports.	#8, #29, #32, #24, #30, #32
Lack of competences	Lack of own competence	Lack of competence to understand archaeological information.	#25
	Lack of competent consultants	Lack of skilled consultants working in archaeology sector	#23, #24

Lack of competence in archaeological heritage administration	Administrators do not have enough competence in commissioning, consulting and cooperation.	#23

Firstly, a part of the obstacles related to the *difficulty of accessing information*. Respondent #10 from Finland complained that information is not available in one place but has to be collected from multiple sources, including the NBA and regional databases. According to #27, one of the problems is that information is not updated frequently enough from regional databases to the national databases of the NBA. Also #18 had experienced that getting information from the NBA was more difficult than from local actors. Her experience was that if an investigation was contracted by the municipality (her own organisation), she was better informed than when the tender was put out by the NBA. Respondent #24 noted that she lacked privileges in the national monuments registry to get a lot of information she would have found useful. Respondent #3 hoped that there would be a system with a map-based interface for accessing data from all archaeological and other types of investigations on a specific area. It would be a "huge relief and an improvement that would enhance the efficiency [of our work]". A Finnish respondent suggested that information should be available through open APIs (#27).

Also respondents #20 and #27 noted that it is not always easy to get information. They mentioned another obstacle - it can be difficult to know where information could be found. In some cases information was not found there where it should have been found. Respondent #20 wrote about a case when it had been impossible to obtain correct information on the state of investigations at a particular site even if the documentation on earlier surveys had been submitted to the NBA. Because of the difficulty of collecting information from multiple sources, respondent #23 stated that, in her organisation, it is customary to appoint an external consultant to search and gather all existing information to get an expert opinion on what information is really missing and what investigations need to be done.

Secondly, another obstacle mentioned by the respondents was that *information does not always exist* or it is impossible to obtain complete information. Possible reasons could be the lack of resources, and, for instance, in the case of standing monuments (e.g. historical buildings), a need to keep the investigated structure intact for preserving its authenticity (#3). Another reason can be that information is not always obtained even if it would be obtainable. In spite of the legal obligation to conduct archaeological investigations, in some cases anxiety of possible outcomes has meant that no investigations have been done (#17). Respondent #29 noted that the lack of information can end up being a major impediment to land development work. Therefore an outcome of an investigation that suggests the need for more investigations (i.e. a lack of comprehensive investigation) is not a positive result for a land developer even if the particular outcome would otherwise be important and useful (#22). In contrast to concerns of the inexistence of information at the present, respondent #6 was worried about the future availability of relevant information. She was especially concerned of the potential loss of archival material, integrity of digital information, and of incompetence that might lead to an accidental deletion of information.

Thirdly, getting informed can be hindered by the *difficulty of using information*. Unclarity of information is one possible reason. For instance, archaeologists may fail to give a clear verdict whether a particular site should be preserved (#29). Sometimes there is a lack of communication during the investigation, the report comes in late and is incomplete (#23). Respondent #23 reckoned that a common understanding between developers and archaeologists of what is archaeologically interesting at a specific site is the most important outcome of an investigation. She noted that a printed and illustrated report is a necessary starting point for this type of a discussion. Having an easily approachable report could help to increase the understanding and appreciation of research findings that sometimes may appear as rather meagre (as e.g. #30) – not withstanding that many, especially small, investigations do contribute only relatively little to the general understanding of the human past. For instance, the respondents #8 and #32 (both from Sweden) were hoping for more user-friendly reports. Respondent #32 hoped for less professional jargon in reports, and #8 suggested that a summary of the investigations written for non-archaeologists should be included in the

documentation. Such a summary would give land developers and their stakeholders a better understanding of archaeological work and would increase their engagement and interest.

Fourthly, the respondents considered that a *lack of competences* hinders their possibilities to get required information. Partly, the land developers considered that they were lacking competence of understanding the nature of archaeological sites and drawing correct decisions on the basis of the available information (#25). Partly, as the respondent #23 from Finland complained, there might be too few skilled consultants working in the archaeology sector in the country. She agreed that staff at the NBA might be experts in archaeology but they do not necessarily know enough about commissions, consulting and cooperation. A related problem, mentioned by the same respondent, could be difficulty of getting touch with a person with required competence, for instance, at the national heritage administration authority.

A quantitative survey shows that differences between the perceived severity of a set of typical hindrances of obtaining information derived from the literature were relatively small (Table 3). The preadministered quantitative categories coincided well with the categories extracted from the qualitative data. Lack of knowledge of the available information (mean 3.12, sd 0.94, median 3.0) and how to access it (mean 2.79, sd 0.96, median 2.0) together with that information is presented in a way that makes it difficult to use (mean 2.61, sd 1.22, median 2.0) and the lack of time to access information (mean 2.64, sd 1.19, median 2.0) scored highest, but still relatively low. The lack of knowledge of available information is obviously a challenge that might conceal other obstacles but in general the respondents seemed to be relatively content with their possibility to access information, or, as the open-ended answers show, to cope with the problems of obtaining it. The lack of relevance of available information and its availability in appropriate languages were considered to be the least pressing problems.

Table 3: Severity of hindrances to obtain relevant information.

	mean	sd	median
Information is not relevant for my organisation	**1.72**	**0.92**	**2.0**
Lack of availability	2.53	1.22	2.0
Difficulty to get information	2.47	1.14	2.0
Lack of permission to get information	2.10	0.99	2.0
Information is available only in paper documents	2.38	1.01	2.0
There is only digital information available	2.30	0.87	2.0
Information is presented in a way that makes it difficult to me to use it	2.61	1.22	2.0
I lack competence to use information	2.44	1.19	2.0
I don't get information even if I am entitled to get it	1.94	0.77	2.0
I don't know what information is available	3.12	0.94	3.0
I don't know how to get information	2.79	0.96	2.0
The information itself is not useful in my work	2.06	0.97	2.0
I have to prioritise and work with other information	2.43	1.22	2.0
I am lacking technical tools required in using information	1.94	0.91	2.0
Accessing information costs too much	2.30	1.06	2.0
Accessing information takes too much time	2.64	1.19	2.0
The quality of information is bad	2.31	0.97	2.0
Information is available in such languages I don't comprehend	1.71	0.97	1.0

4.3.3 Consequences of the lack of information

According to the respondents, the lack of archaeological information could lead to additional work or to the cancellation of projects in the beginning of land development initiatives (#7, #23), or at a later stage of the process (#12, #14, #31), to restrictions to planning (#20), making planned work impossible (#26), and plans non-realisable (#33), decreasing the quality (#3) and increasing the difficulty of work (#6, #10), implementation of legislation (#10, #13) and planning guidelines (#10), consumption of time (#5), erroneous decisions (#9, #13), and the destruction or damaging of archaeological sites (#4, #5, #12, #24, #27, #29). Lack of information would create a blind spot (#33), and possibly lead to a general need to consult national heritage administration on all projects (#1). Respondent #21 remarked that even if there would not be access to any earlier information, reports (i.e. investigations) would be probably required as today but that their results would be less reliable without information from earlier sources and investigations. Respondent #25 notes that information is crucial and it would be necessary to acquire it by other means if the present sources were not available.

4.3.4 Coping with obstacles

The data shows that the respondents had their ways of getting the necessary information even if it would not exist or it would be difficult to obtain. Multiple respondents used national registry portals (e.g. #3, #4, #6, #10, #29). Many relied also on people sources (e.g. #11, #18, #23). Respondent #18 noted that the "question is not about getting access to information because I contract it by myself" (#18). Respondent #11 noted that her organisation relies on consultants in all archaeology related information use, and #23 in specific tasks like traffic and street planning. Also municipal authorities could act in a consultative role as information brokers or intermediaries for others. For #18, the local regional museum was the primary and, in practice, only source of information. The reasons for relying in brokers ranged from convenience to the lack of expertise and access.

4.3.5 Benefits of an eventual digitisation of information

The large majority of the respondents saw major benefits in the possibility of accessing information in digital format. In spite of the critique of the current state of the availability of digital information, a part of the respondents were content with the current online services offered by the national heritage administration both in Sweden (e.g. #29) and in Finland (e.g. #6, #10). Respondents #27, #31 and #33 indicated further that for them all or most of the necessary information is already available in digital format. For #6 the problem with some digital information was that it was less useful because it was not downloadable. Respondent #25 advocated for the use of (standardised) geographical information exchange formats. Finnish respondent #24 remarked also that there are differences in the digital availability of specific types of information. The availability of information on archaeological sites is good but less satisfactory concerning built environment (buildings). Respondent #26 (from Finland) noted that, in general, the methods of sharing information had improved lately.

Many respondents saw benefits in continued digitisation of archaeological information. "Digitisation is a useful way of mediating information" (#20), it would have a positive impact (#22), "[i]t is always better if it [information] is easily available digitally [in digital format]" (#9) or that "digitisation is always good, more the better" (#13). For the respondents, the lack of availability of digital information would mean returning back to the past millennium (#26). Currently, a large part of planning work is done digitally (#12). Respondents #1 and #23 noted that the digital availability of information speeds up their work because if the material is not in digital form, they have to digitise it by themselves. Digitisation would make information more easily accessible for them (#34), increase the efficiency of their work (#3), make it faster (#4) and facilitate it (#4, #10, #11, #17). Respondent #21 noted that digitisation is in practice the only direction for accelerating their processes.

For some, the format (digital or analogue) was less crucial than the quality of information. For instance, for the respondent #5 working as a manager of a historical property, the quality of digital building plans is not comparable to paper plans. Respondent #19 considered for her part that digitisation would not really have an impact on her work. In contrast to the generally positive attitude, #18 claimed contrary to many others that digitisation of information would make her work more difficult.

5 Discussion

The analysis shows that even if the most of the respondents were rather satisfied with the development-led archaeology process and the availability of archaeological information, there is room for improvement. There seemed to be few significant differences between the two countries. Many of the findings confirm earlier observations and common knowledge (e.g. the relative disinterest of many land developers in archaeology, Skyllberg, 2013; Goudswaard et al., 2012b; Demoule, 2012; Riksantikvarieämbetet, 2012) but the study has revealed also some nuances that have not been discussed to a significant extent in the literature so far.

5.1 Value of archaeology and archaeological information

The relatively low level of interest in archaeology and archaeological information is known from earlier surveys (e.g. Riksantikvarieämbetet, 2012; Skyllberg, 2013). However, in contrast to earlier tendencies to portray land developers as predominantly disinterested and disengaged in archaeological questions, the present findings add nuance to the picture. A part of the respondents were inclined to perceive archaeology as a legal obligation that has to be dealt with. Their main concern was to get a permission to continue with their work as fast and inexpensively as possible. However, over half of the respondents used archaeological information actively as a part of the their work of planning, managing and performing current and future interventions. As the Table 1 shows, perhaps against what could be expected, the differences in how the respondents perceived the a priori usefulness and use of different types of archaeological information were relatively small. The most significant piece of information for the most of the respondents was the exact location and extent of areas that should be excluded from interventions. It is apparent that the two perspectives do not exclude each other. Archaeology can still be considered as a hinderance even if a developer uses archaeological information. The mentions of independent exploitation, inclusion and consideration of archaeological information in the work process still suggest that, at least in some cases and to some degree, it can be possible to encourage deeper dialogue and hospitability between archaeology and land development. Consequently, it is conceivable that collaboration based models of conducting archaeological work, with the Reverse Archaeology advocated by Goudswaard and colleagues (2012a) as one possible example, could prove to be useful in supporting closer cooperation between archaeologists and land developers.

Acknowledging and incorporating collateral values (e.g. land development vs. archaeology, economic vs. heritage) in the land development processes does not mean that archaeological value would (or necessarily should) be or become a central concern of land developers, or that they or archaeologists would (or should) begin to make claims about values lying outside of their domain of expertise. Even in the cases when respondents were working closely with archaeologists and archaeological information, the data can be interpreted to indicate that the values of land development and archaeology were determined separately and according to different value systems. Archaeology and land development were commented in most of responses very explicitly from their respective premises as distinct and unrelated matters. This arrangement can be explained in light of the theory of worth of Boltanski and Thévenot (2006) and their emphasis of the impossibility to find "legitimate tests" to compare values between two different "regimes" or systems of worth. In practice, according to their theory, it is impossible to make a direct comparison of archaeological value and the various values related to land development. From this perspective, it is

problematic to conceptualise land developers as clients of archaeological administration, or archaeological contractors as clients of land developers (cf. e.g. Demoule, 2016; Cumberpatch & Blinkhorn, 2001) within a single loop of exchange. Simplifying the relation of not only actors but also of the different value systems risks downplaying them both. Similarly, even if it might sound commonsensical to, *a priori*, prioritise one of the regimes of worth, either the societal (non-archaeological) value, admitting that "the era of science for science's sake is long gone" (Chirikure, 2012), or the (scientific) archaeological value (Bazelmans, 2009), it can lead to depreciating the other regimes. Instead of abandoning one of the competing regimes, the theory of Boltanski and Thévenot posits that if both archaeologists and land developers are oriented towards "common good", it is possible to reach a compromise that accounts for the values and premises of of the both regimes (and the conditions that underpin their priorities) to a satisfactory degree. These settlements are weak by their nature and subject to redefinition and debate of what is considered to be "common good" within the different regimes (cf. Chirikure, 2012; Demoule, 2012). Their weakness does not mean that the compromises would be useless but that they need to be actively negotiated and reconstituted. Even if the current survey material has certain limitations in this respect, the differences between the views of respondents who reported to have been integrating archaeological investigations and information in the early stages of a development process versus the outsourcing oriented perspective of "investigating off" (#22) archaeological sites seems to give some support to the proposal of Goudswaard et al. (2012b) that the incorporation of archaeology in spatial planning processes can be a viable approach to "ensure that [it] is taken seriously". As the individual responses, which highlighted the significance of working collaboration with archaeologists and called for more uniform practices, better availability of information, and a larger pool of consultants to work with show, the legislative integration that is warranted by the heritage legislation both in Sweden and Finland (cf. Goudswaard et al., 2012b) is not enough to support an optimal level of collaboration and additional measures are needed to facilitate it in practice.

5.2 Information use

Regarding information use, the analysis suggests that besides the already highlighted hurdles of inter-organisational and -sectoral information sharing and collaboration (e.g. Widén-Wulff, 2007; Kimble et al., 2010), there are many parallels between the information practices of the respondents and other professionals (Case & Given, 2016). In the analysed material, it was common that the immediate need of archaeological information was related to permission to proceed with the planned project or to obtaining as precise coordinates of the areas to exclude from current or further development. However, even if predominant information needs seemed to relate to the location of the sites, several respondents indicated that they had also at least occasional interest and use for more comprehensive accounts of the results of archaeological investigation, observation that is comparable to earlier findings of e.g Skyllberg (2013) and Goudswaard et al (2012b). At the same time, the analysis indicated that the respondents tended to focus on their customary information sources and act within their habitual small information worlds (Burnett & Jaeger, 2008) or bounded "boxes" (Huvila, 2012). Even if the scopes of interest are not comparable, the two perspectives are reminiscent of the earlier highlighted fault lines in archaeological information production and use (including Börjesson's academic and administrative frames of references, Börjesson, 2015, and De Roo and colleagues, 2016, distinction of spatial, administrative and scientific information). In spite of the somewhat diverging interests in different types of information and some respondents' complaints of an information overflow, the respondents were rather unanimous in their interest in an early access to comprehensive and precise information about known archaeological sites and need to conduct further investigations. The references to archaeological investigations as a part of risk management and general planning procedures underline the relevance of incorporating archaeological assessments and their results in the land development projects at an early stage as supported from an information management point of view, not only as a means of incorporating a balanced value discussion in the process.

Somewhat unsurprisingly, the main concern of the respondents was to get reliable information about

the geographical position and area of archaeological sites and secondarily, to obtain the data in a digital format, which can be easily imported to their own applications. The land developers had much less interest in getting direct access to the two other categories of archaeological information mentioned by De Roo et al. (2016), administrative and scientific data, even if individual respondents might mention, for instance, that a comprehensive investigation report was a good starting point for discussions with heritage administrators, or that in one organisation there was a custom of distributing short descriptions of archaeological sites to the members of their staff.

The general point of view of the respondents that spatial information should and could be made more easily available in one place is in line with the attitudes expressed in the earlier literature. The importance of access and the drawbacks of the lack thereof has been emphasised in earlier research (e.g. Demoule, 2012; De Roo et al., 2016; Huvila, 2016a, 2016b) and is emphasised in contemporary heritage management policies and guidelines (e.g. De Roo et al., 2016; RAÄ, 2015a; Museiverket, 2016). In general, the respondents did also seem to be in favour of standardisation of archaeological processes, access to information, and data formats. Even if standardisation is difficult to achieve without decreasing the granularity and richness of documentation (Huvila, 2016a), the general opinion is shared by many archaeologists, especially those working with administrative duties (e.g. Huvila, 2016a, 2016b; Faniel et al., 2013) and large scale data intensive multisite research (Löwenborg, 2014). Even if the availability of spatial data was clearly a central concern for a large part of the respondents, there a similar lack of comprehensive registers, uniformity and standardisation of information, and difficulty of obtaining relevant information in one place could be sensed with other information as well (Table 3). Considering the earlier documented impact of physical, relational and cognitive accessibility, perceived relevance and reliability of information, and the willingness of people to make a trade-off for readily available but less reliable (people) sources of information if they are comfortable with a source and it is capable of supplying comprehensible and relevant information (Woudstra et al., 2012), the popularity of people sources in the analysed material can also be speculated to be at least a partial consequence of time pressure and poor availability of other information.

Apart from being a symptom of the poor availability of information, the diversity of different information sources used by the respondents and the contradictory claims that there is too much and too little information (overflow vs. lack of information) can also be seen as indications of the variety of information needs, preferences and situations, and the complexity and diversity of land developers' information work. These observations are in line with earlier findings on the complexity and contextuality of information source use in archaeological and archaeology related work (e.g. Faniel et al., 2013; Huvila, 2014a). They are reminiscent of observations in the literature that the variety of information seeking strategies, increased use of external information and information aggregates, and the preference of people sources relates to a higher task complexity (Byström, 1999; Saastamoinen et al., 2013). Complexity of information work and the preference of using people as an information source is not necessarily a problem *per se*. In a situation where two areas of expertise, and two different (using the terminology of Boltanski an Thévenot, 2006) regimes of worth adjoin, a feasible solution could be to make sure that there are enough experts (cf. the lack of them in Finland complained by #23) with a proper insight of the regimes of worth related to both archaeology and land development and a capability to negotiate a working compromise between the two.

Even if there is no reason to doubt the complexity of land developers' information work and that a part of it can be facilitated by the use of information brokers and other experts, it is apparent that the quality and usefulness of written documentation could be improved (which has been a constant topic of discussion in archaeology e.g. Börjesson, 2016) as well. The outline of barriers identified in the data (Table 2) and the specific comments (e.g. #23, #3) of the lack of detail and context in the available inscribed (i.e. non-people) information suggest that a part of the complexity of land developers' information work can be traced back to informational obstacles. It seems believable that the problems of accessing information could be alleviated to a larger degree by better organisation and availability, and increased standardisation of information and information work. At the same time, however, the respondents indicated that access is not the only problem. Instead, the information, when available, can be of little practical value from the perspective of land development. One example is the lack of clear enough verdicts on whether a site should be preserved or not (e.g. #23, #29, see also Huvila, 2006). It is conceivable that the appeals for more user-friendly reports are at

least partly related to the same problem and not only to the issues with the report artefact itself (e.g. #8, #32).

The analysis of differences between the predominant regimes of worth were helpful in explaining differences in the attitudes towards development-led archaeology and is useful in understanding the perceived inapplicability of information (i.e. that information was not perceived to be useful). Partly, the question is about a broader breach between the regimes of worth in archaeology and land development that influences the perceived worth of information produced in these two contexts. In this sense, information can be conceptualised as a good with a potential of functioning as a boundary object (Star, 2010; Star & Griesemer, 1989) as long as it is possible to find a 'common good' and reach a compromise between the competing value regimes of the between the two communities (Trompette, 2013). From archaeological perspective, it can be both useful and appropriate (i.e. valuable) to express uncertainty with inconclusive evidence whereas for a land developer, such a statement is, even at the best, impracticable. The worth of expressing uncertainty and certainty in the two communities needs to be taken seriously, similarly to need of cultivating and tolerating a certain level of professional jargon. Taking the different regimes of worth into account would mean that information is made available in such a form that would be useful (i.e. valuable) within all relevant communities. Instead of focusing on unspecified access to all information or making all information comprehensible for all stakeholder groups, it could be more fruitful to aim at tailoring and supplying particular users with particular information that would be compatible with their specific competences (or information literacies, Talja & Lloyd, 2010) and the values that are pertinent to the regimes of worth governing their work. From the perspective of enhancing the usefulness of different forms and types of information across the communities, a possibility could be to try to focus on the sharing of information artefacts that would be considered worthy (i.e. legitimate, useful and possible to produce and use) within the predominant regimes of worth both in archaeology and land development.

6 Conclusions

In contrast to earlier observations in the literature, the present study shows that the image of land developers as disinterested stakeholders of archaeological work is not the whole truth. Even if, in many cases, their interest in archaeological information is limited, archaeological information is crucial for land development and a functioning, close collaboration between archaeologists and land developers throughout the planning and land development processes would be mutually beneficial. This analysis shows that many land developers would appreciate direct access to digital spatial information and that the information would be available in one place. Different obstacles of accessing and using information mean that many land developers rely on people for acquiring it. At the same time, however, the relative predominance of social information sources should not be considered as a problem *per se*. It is rather an indication of the complexity of information tasks in that specific context, a sign of the difficulty of negotiating the essentially incomparable relative worth of archaeological sites and land development, and an indicator of the necessity of active negotiation and translation of information and knowledge in this multi-professional working environment.

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