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How a museum knows? Structures, work roles and infrastructures of information work

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Abstract

Even if knowledge is a commodity that a museum offers as Hooper-Greenhill has argued, the mechanisms of how a museum comes to know what it mediates are not well understood. Using a case study approach the aim of this study is to investigate what types of sources and channels, with a special emphasis on social processes and structures of information, support collaborative information work and the emergence of knowledge in a museum environment. The empirical study was conducted using a combination of ethnographic observation and interviews of staff members at a medium-sized museum in a Nordic country. The study shows that much of the daily information work is routinised and infrastructuralised in social information exchange and reproduction of documented information and museum collections.

Introduction

Even though Marty (2007a) notes that museums have been referred to as information institutions as early as the early 1980s and knowledge is a central offering of museums, the analysis of Hooper-Greenhill (1992) in her already classical volume *Museums and the shaping of knowledge* that "[k]nowledge is not well understood as the commodity that museums offer" is still very accurate. She presents a thought-provoking analysis of how the idea of museums and the knowledge represented and mediated by the museums have changed over time. Even if the grand (Foucauldian) epistemic context of museums is central to the mundane project of knowledge of these institutions, the micro-processes of museums change more rapidly than the episteme. According to Hooper-Greenhill, the idea of a museum is mediated by the practices of museum work. Besides handbooks, there is, however, very little literature on these prosaic micro-level practices of information and knowledge in the context of museums. Similarly, knowledge is seldom considered as an offering of a museum, the mechanisms of how a museum comes to know what it mediates are not well understood.

The aim of the present study is to delve into the social micro-processes of knowledge in contemporary museum work. The study is inspired theoretically by a critical realist (Wikgren, 2005) reading of the interactionist role theory (Hilbert, 1981), the structuralist tradition of Durkheim (1990) and the revived 'old' institutional economics sketched by Hodgson (2006). The study subscribes to the currently prevalent view of the significance of interaction in knowledge creation (Suorsa, 2012). It is assumed that institutions like museums and structural categories of human activity incorporate systems of social rules and routines that structure the social reality and function as repositories of knowledge. Researchers need to be observant of these structures, but at the same time assume a critical position of their role and influence by acknowledging the dynamics and complexity of knowledge and social reality. The principal question of this study is

how a particular museum knows. That is, what are the major sources and channels, with a specific emphasis on social processes and structures of information, that support collaborative information work and the emergence of knowledge in a museum environment. The analysis is based on an ethnography of a middle-sized Nordic museum. As a qualitative study, instead of attempting to present a general model, the main purpose of the investigation is to provide a better understanding of the variety of patterns of how a museum may know and how the processes of knowledge can be related to their outcomes.

Literature review

Information work

Different information science researchers have conceptualised information activity from several different viewpoints. Information behaviour (Fisher et al., 2005), information use (Rosenbaum, 1996), information practices (McKenzie, 2003), information management and knowledge management (Schlögl, 2005) emphasise different aspects of using and working with information (or knowledge, if knowledge is seen as a synonym of information, or as a consequence and goal of information activity, Schlögl, 2005). Huvila (2009) uses the notion of *information work* to refer to the information component of human activity. He argues, "all work has an information component and presumes some degree of information processing whether the work is manual labour or highly abstract decision making". In information intensive contexts such as libraries, archives and museums, information work can be the primary activity. More often, however, information work is a secondary activity that supports the principal activity and provides a framework for explicating the generative informational mechanisms of work. Information work is

infrastructural and, in a sense, similar 'sub-work' (Huvila, 2009) as the notion of "computer work" discussed by Gasser (1986).

The perceived success of information work (and consequently, of work) has been observed to be influenced by multiple factors. Sun (2010) has identified five key themes that are critical to organisational knowledge processes: systemic knowledge, strategic engagement, social networking (external and internal), cultural context and process and structural context. The profound change in the prevalent ideology of work since the 1980s (Strangleman, 2004, 10-11) is paralleled with a change of emphasis in the academic literature. In contrast to the early paradigm of information management and emphasis on formal structures and technologies (Maceviciute & Wilson, 2002), the more recent studies have tended to emphasise the significance of the relational dimension. Researchers have underlined the role of social factors, for instance, information culture (Ginman, 1993) and social capital as a central contributing factor to the functioning of knowledge sharing (Widén-Wulff & Ginman, 2004). Choo et al. (2006; 2008) found that information culture is significant and can be a stronger explanatory factor of information use than explicit forms of information management. The change is visible also in prevalent conceptualisations of information work. Social arrangements have been conceptualised increasingly in terms of communities (of practice) instead of organisational units (Roberts, 2006). Work related identity (Strangleman, 2004) and work roles (Huvila, 2008) are perceived as transient and flexible rather than preordained.

Even if the prevalent management ethos and the empirical results of, for instance, Choo et al. (2006) stress the importance of the social factors, information activity is influenced by formal structures and structural interaction (Roberts, 2006). The different, both social and information related factors of information use are closely (Sun, 2010), if not always directly, interrelated (e.g. Husted & Michailova, 2010). Huvila (2009) conceptualises the dependency of formal information structures and information work in ecological terms as a spiral in which information work

warrants particular types of information structures that consequently afford and constrain certain types of information work. On the basis of the model of the dimensions of social capital of Nahapiet and Ghoshal (1998), Widén-Wulff et al. (2008) present a model of how the configuration of information activity is dependent on the balance of structural and relational dimensions of social interaction. The model suggests that extreme forms of disequilibrium of flexible relational and firm structural dimensions of interaction may lead to undesirable conditions that hamper productive (from the participants' point of view) exchange and use of information (Widén-Wulff et al., 2008).

The present study assumes a critical realist perspective (Collier, 1998) to information work. This point of view permits a dual perception of information work as being descriptive and critical of the informational mechanisms that influence the social action conceptualised in the context of this study as 'work'. The focus of the analysis is on the confluence of social and structural interaction framed by the notion of work roles.

Work roles

Role theory and the concept of 'work role' have been cited occasionally in the information systems and work related informatics literature. In information science literature, role based approaches have been somewhat less popular (e.g., Leckie et al., 1996; Sonnenwald & Lievrouw, 1997; Fidel et al., 2004; Fidel & Pejtersen, 2004; Huvila, 2006). Classical role theory has been criticised for externalising the roles of their actors (Davies & Harré, 1998; Layder, 2006). In response to the critique, interactional role theory started to place emphasis on the dynamics and vagueness of roles (Turner, 2001). Clifford sees that role is a concept with both abstract and tangible properties, but not a solid theory (Clifford, 1996). In contrast to the classical tendency to see roles as concrete entities, a work role is understood primarily as an analytical concept

(Hilbert, 1981). An individual may perform simultaneously in multiple work roles and share work roles with others. In contrast to job titles and professions, work roles are not as exclusive as professions or professional groups. Work roles are not necessarily related to work familiarity. As Chang et al. (2009) remark, people may work in similar roles, but not necessarily together. Another reason is that people may perform in similar work roles, even if the complete picture of their work is very different (e.g., in the case of professional and voluntary rescuers Dyregrov et al., 1996).

The notion of work roles has been criticised also for an assumption of stability that rejects the difference of action and interaction (Barley & Kunda, 2001). Less static conceptualisations such as Nadel's (1957) proposition of a distinction between relational and non-relational aspects of work roles or Barley and Kunda's (2001) model of work role dynamics, have attracted so far only relatively little attention. At the same time, however, even these models warrant some critique of conceptualising the dynamics of work roles in rather one-dimensional terms and failing to accept the relevance of the multiplicity of interactions and social relations. The present study acknowledges the critique of perceiving work role as a static entity and assumes an interactional notion of work role. The concept is used to refer to a distinct set of activities within the work similarly as the work is perceived to be a distinct set of activities in a broader scope of the human life-world (Huvila, 2008).

Information in museum work

Many professionals and researchers may be very reluctant to describe museums as "information institutions". Museums are places of culture, education and experience (see e.g. Hooper-Greenhill, 1999; Witcomb, 2003). The hesitation to characterise museums in terms of information depends partly on how information is conceptualised. Museums are not books and their primary

role is not to convey factual information (Hooper-Greenhill, 1999), but as recent information science research has pointed out, information is not mere facts. It pertains to experiences, affects and beliefs (e.g., Nahl & Bilal, 2007). As Hooper-Greenhill (1992) argues, knowledge (and information) is undoubtedly central offerings of a museum, but as Ellis (2006) remarks, they are embedded in the museum work and the different interpretative dimensions of museum objects, i.e. not managed as explicit information objects.

In spite of the controversies related to the notion of information in museums, an interest in the informational dimension of museum work started well before the publication of Hooper-Greenhill's book (Washburn, 1984; MacDonald & Alsford, 1991; Cannon-Brookes, 1992). Museum information management is an established field of interest (Orna & Pettitt, 1998) and there is a emerging consensus of the need for specialised museum information professionals (e.g. P. F. Marty, 2006, 2007b). A new scholarly topic *museum informatics* (P. Marty et al., 2003) has emerged at the interface of museum studies and information science (P. F. Marty, 2007a). Whereas museums-related information management literature has tended to follow the mainstream of knowledge and information management literature (e.g. Orna & Pettitt, 1998) by focusing on an 'efficient' documentation and management of information within and about organisations (Megill, 2005), Marty describes museum informatics as "the study of how information science and technology affect the museum environment" (P. Marty et al., 2003, 259). The perspective is broader and covers the impact of information (and technology) on museums and the ramifications of museum information in a broader societal context. The influence of this broader perspective is visible in analyses that emphasise the significance of an on-going change in museum work that is closely related to the emergence of new technologies (e.g., P. F. Marty, 2005; Skov & Kirkegaard Lunn, 2010) and the notion of information as a key category of the present society (e.g., Knell, 2003).

Information work of museum professionals and closely related professions has been studied

very little. Even Probably the best-known study of information work in a museum environment is the historical study of Star and Griesemer (1989) on the information practices at the Berkeley Museum of Vertebrate Zoology during the first half of the 20th century, even if the study is best known of the concept of *boundary object* (Star, 2010). The authors focused especially on the conceptual and material premises and the dynamics of an effective, but not entirely uncontroversial cooperation between museum professionals and volunteers at the museum. Star and Griesemer observed that concepts and objects had different meanings attached to them when they passed from the professional community to amateurs and back. The process has some resemblance to the process of recontextualisation that according to Kirschenblatt-Gimblett (1991) takes place when an object enters a museum. Other researchers have made similar observations of the conceptual indifferences of elementary museal notions (e.g., museum, artefact, information) between different professional groups including curators, conservators, educators and exhibition designers (e.g. Hooper-Greenhill, 1994; Lee, 2007; Jefferson & Vince-Dewerse, 2008).

In the context of somewhat more traditional information use research, Marty (2007a) has investigated the information activities of museum information professionals and Zach (2006) of arts administrators. According to Zach's findings, the arts administrators did not conceptualise their work in terms of formal information seeking. Information seeking was oriented to the mission of the organisation and consensus building. The role of a predetermined mission was also observed by Katriel (1997, 456) who emphasised the significance of institutionally endorsed ritualised practices in the emergence of knowledge and information in the museum environment (Katriel, 1997, 460). Information process in a museum can be described as a meta- or self-referential narrative (Katriel, 1997). The locality and contextuality of information work has also been discussed by Huvila (2006) in the context of archaeological museums. The interesting anecdotal narratives of museum work by Czerneda (1994, p. 8) provide additional insights into the same phenomenon.

Material and methods

The present study is based on an ethnography of a middle-sized Nordic museum conducted by the author. The study was conducted during a three-month period in summer-autumn of 2009. In addition, the researcher could draw on his familiarity with the institution since the late 1990s. The museum is located on one site in the centre of a large city, and has collections and arranges exhibitions on two different museal topics.

At the time of the study, seven employees had permanent or semi-permanent positions at the museum. In addition to the permanent staff, approximately 20-30 different fixed-term trainees, project workers and freelancer guides were employed by the museum in one year. Project workers tended to be academic subject experts, advanced students and professionals with specific qualifications for particular tasks. Guides were mostly university students with highly diverse educational backgrounds. On average, the temporary and part-time employed staff members stayed with the museum from a few months to a few years. The interviewees underlined that their institution is untypical because of the broad educational and professional background of the staff. Most of the permanent staff had the standard education of a museum worker with an MA degree in humanities, but the rest a background in a variety of topics from linguistics, political science, graphic design, and nursing to tourism and entrepreneurship.

The material was collected using a combination of non-intrusive observation (Adler & Adler, 1994) and structured interviews of six employees in total (of an average length of 120 minutes). The researcher was not an active participant in the working environment at the time of the formal observation, but did not withdraw himself artificially from participation if someone started to discuss, asked for help or otherwise chose to interact with him. Observation was documented using freeform notes and semi-structured forms with a particular focus on the documentation of

information interactions using the faceted classification scheme of information interactions (Cool & Belkin, 2002; Huvila, 2010) as a guideline. The extended scheme consists of 13 facets (create, disseminate, organise, preserve, access, evaluate, comprehend, modify, use, communication behaviour, objects interacted with, common dimensions of information and interaction criteria) and 1-3 sub-facets per facet. The interviews were recorded, transcribed and analysed using constant comparative method (Glaser & Strauss, 1967). In order to increase the validity of the analysis, the recordings and transcriptions were analysed together. Finally, the material was revisited using negative case-analysis (Lincoln & Guba, 1985, 309-313) with a specific purpose of finding contradictory evidence (as e.g., in Zach, 2005) that would decrease the reliability of the drawn conclusions. At the same time the second round of analysis gave an opportunity to critically review the analytical classifications of information interactions and the categorisation of work roles (Collier, 1998).

There are several limitations related to the material and data gathering method. The assumed qualitative method and the fact that the investigation focused on a single museum limits the possibilities to generalise the results. The studied institution was larger than an average museum in the country, but at the same time, significantly smaller than the largest institutions. The use of multiple data gathering methods addresses some of the limitations of observation and interviews, but as Adler and Adler (1994) remark, neither of the methods is capable of ensuring that the researcher would internalise the whole range of activities occurring in the context of the study.

Analysis

Work

Temporal organisation of work.

A typical day at the museum starts a little after 8 am. James and Minta (a list of all employees and groups of employees is in Table 1, all names have been anonymised) are usually the first to arrive. Other members of the office staff arrive little later. Most begin their work usually by checking their emails after which they start to pursue their tasks in hand. Customer service personnel come to work before noon when the museum opens for the public. Freelance guides like Paul, come and go according to their scheduled guidings.

The working day of the customer service staff, like Charles, Andrew and Jasper, begins with the opening and ends with the closing of the museum. The daily duties are largely determined by a weekly schedule of prebooked visits, guidings and events compiled by James and published every Friday as a paper copy and for freelancers as an electronic version on the web. The non-scheduled time is filled with diverse tasks at hand – from serving occasional visitors to general oversight, small maintenance tasks and lending a hand to colleagues.

In addition to daily routines, the work at the museum is paced by annual events. Class trip season in April-May, the start of the autumn season in September, exhibitions in spring, summer and autumn, annual planning in late autumn and the grand summer festival in particular were important annual milestones. They reccured in the interviews and their significance also became obvious during the observations. The annual rhythm provided a general framework of how the employees conceptualised their work and its organisation. Long sessions of exhibition building from early morning to late night during the days immediately before the inauguration of exhibitions and the intensive week of summer festival also changed the routine configurations of daily work. Paul, the freelancer, explained that the festival offered pleasant opportunities to socialise and get to know colleagues. Like Paul, Minta enjoyed the opportunity to socialise with colleagues during the festival. She worked routinely almost exclusively on marketing, but during the summer festival she participated in selling food and souvenirs and in diverse practical activities together with guides and other staff members.

Social organisation of work.

Apart from weekly staff meetings and frequent smaller and larger project and exhibition related gatherings, most of the employees worked alone or from time to time, on specific tasks and projects in smaller groups of two and three. Even if the constellations of working together with colleagues varied, the office staff in particular saw each other on a daily basis. Informal cooperation by walking to a neighbouring room, phoning or shouting (in a relatively discrete voice) was, however, common. Some employees used instant messaging to communicate with each other (e.g., Lily and Nancy), but otherwise the staff used this only occasionally for special purposes such as for having secret discussions on the birthday presents of their colleagues.

The customer service staff worked together less regularly but depending on their schedules, most of them tended to see each other a few times a week. Paul and other freelance guides met others more sporadically, but noted that sometimes even if they were not on duty, he and his colleagues might come to the museum just to socialise for a moment with each other. Besides the guides, Augustus could be described as being a relative outsider even if he was mostly there with his colleagues. Augustus was used as a source of information on a part of the museum collection and his special field of expertise. But similar to Lily, who admitted that almost all of her museum education-related contacts were external to the museum, Augustus too had his most significant contexts of professional information exchange outside the museum.

The employees knew the principal competencies of their colleagues relatively well. The colleagues were also the principal source of information for everyone. In spite of the closeness of the community from the information use perspective, most of the employees perceived the work roles of their colleagues in clearly different terms from the colleagues themselves (Table 1). Lily, the educational officer of the museum worked on diverse duties using approximately a half of her time on developing, marketing and running educational projects and the second half on exhibition planning, collection management, maintenance of archives and other duties. Much of the

educational activity was, however, largely invisible to her colleagues who conceptualised her role at the museum as functioning as a formidable reference on one of the museal topics of the museum and as an expert of the related part of the museum collection.

James, the booking officer, described his job primarily as a combination of booking guidings and programme for visitors and seeing that each group was assigned a guide. Rose mentioned James as an important reference in economic and employment matters. Guides and customer service staff on the other hand perceived him as an essential source of information on the day-to-day business of the museum. As a final example, Charles and Paul in particular attributed Andrew with the role of a very important subject expert of one of the museal topics even if his principal role was to work as a customer service staff member.

Only a few apparent tensions could be observed or were mentioned in the interviews. The major recurring issue related to priorities and the use of time. The open and communicative environment was a burden for some of the employees especially when they were supposed to focus intensively on that what they were doing. Another observed tension and an explicitly outspoken but in practice (seemingly) mostly historical lack of trust existed between the office and customer service staff. An apparent reason for the tension was the lack of contact between the two groups. The office resides in an adjacent building next to the exhibition space. The working hours of the two groups also only partly coincided.

In general, most of the staff members seemed to be highly satisfied with their work. A specific recurring reason for the contentment was a perceived level of independence enjoyed by the staff members together with a positive atmosphere and agreeable colleagues. All staff members had designated duties, but mostly they were relatively free to pursue them rather independently. Minta expressed the independence by reflecting that

"I think the best thing is that I have been given enough responsibility and I am trusted. I can define a certain part of my work time and use it as I like." (Minta)

Insert Table 1 here

Information work

Sources and channels of information.

Knowing and getting to know about things at the museum was closely related to work roles. Only the special events had a tendency to erode the usual patterns of information seeking and exchange. Using a systems metaphor, the museum could be described as a rather closed system from an information seeking point of view. Every employee tended to have their own channels and strategies of seeking and acquiring information. A list of major sources of information of staff members is presented in Table 2. Figure 1 visualises a network that consists of all information sources referred to by the informants and shows clearly the central role of social information that stems from within the museum and from contacts and colleagues working in other organisations (node Contact in upper right corner). Figure 2 represents principal information sources used by informants (without links to all other colleagues whenever mentioned). On the level of principal sources, the network is sparser and shows that even if the collection specialists Lily and Augustus were identified by all informants as important organisation wide sources of information, they were directly consulted relatively seldom.

Insert Figure 1 here

The most prominent source of information for almost all staff members was other colleagues at the museum. In routine tasks, the most important sources outside the museum were search engines and specific work-related web services. The major asset of Google was convenience, but very few seemed to use it for thorough or complex searching before consulting their presumably knowledgeable colleagues. It seemed also that using Google was primarily considered to be a tool

for ’checking’ routine matters related to the personal work. ’Real’ information seeking began only if Google failed to give a satisfactory answer. Only Paul, a guide, who worked as a freelancer, used Google more comprehensively to find work-related information.

Formal training in the form of courses, seminars and exhibitions, participation in mailing lists and reading literature had significance for some of the employees. A large part of the daily information seeking was internal to the organisation. When needed, the internal body of information was complemented with inputs from external sources. In the majority of cases it seemed that the sources were either known or that the employees could intuitively decide which sources were likely to be the most usable ones.

Within the museum, Lily and Augustus held very special positions as gatekeepers of the two collections and topics of the museum. In practice, almost all collection-related queries were directed to Augustus and Lily, and in her absence, to Prue. Colleagues were consistently describing Augustus and Lily almost as if these were almost personifications of the collections. Charles, Paul, James and others who worked directly with customers, repeated many times that they directed all content- and collection-related queries to Lily, Prue and Augustus. Even if Rose considered that she had not “drifted too far from the collections” and she “was able to work with content matter”, it was very clear that the collections were outside the scope of her daily work and direct expertise.

As a relative newcomer and a deputy, Prue was not mentioned as often in the interviews as Lily and Augustus, but it seemed that in practice, her work role was perceived to be comparable to Lily’s. Charles said that without any hesitation, he would direct any collection-related questions to Prue “because Lily was on a leave”. There was, however, no doubt that Lily was the cognitive authority (Wilson, 1983) and Prue was mostly seen as her proxy. Apart from the individual statement by Charles, the employees always mentioned Lily first and only afterwards might add that in the absence of Lily, they would naturally choose to consult Prue.

The significance of Lily, Prue and Augustus as gatekeepers was fortified by the fact that the formal documentation of the collections in three rather simple databases and physical records was mostly technical and lacked contextual information. The remaining documentation consisted of a few informal lists of relevant references and small collections of publications that were mostly used as memory aids rather than actual information sources.

In more complex and content related questions the most typical source of information were researchers working at the local university and other professional contacts outside the museum. For example, Lily explained how she once found an object in the collections she could not identify. She had a feeling that it might come from a particular geographical area. Lily took a digital photo of the object and sent it to four international colleagues who replied and presented independent but considerably similar opinions that helped Lily to reach a conclusion.

Insert Figure 2 here

Information sharing

Information sharing had been a issue in the museum for some time although during the time of the study, all informants were unanimous that the situation had much improved recently when the employees had begun to post files of common interest to a shared file area on a server more systematically than before and started to inform their colleagues on current matters on an intranet site. Another contributing factor was that some individuals, especially McNab had taken the responsibility to summarise staff meetings and write memos. In contrast, some other initiatives of enhancing knowledgeability such as the efforts of Rose to encourage staff to read a national museums related newsletter, had been less successful. Staff members tended to see the newsletter as relatively irrelevant for their work, or considered that they could get the relevant parts of the same information from other channels such as mailing lists. Similarly, some earlier attempts to create a well-structured intranet system and improving the small institutional library were less successful. Even if the present situation was described as better, the information exchange relied

heavily on McNab's initiative and the occasional participation of a couple of other individuals. The articulations of the improved situation in such terms as that "we" have began to do somewhat better than before did not signal an extremely strong personal commitment.

On an informal social plane, the summer festival and periods of exhibition building seemed to provide the best opportunities for information exchange and gaining insights into how colleagues worked at the museum. They established an organisational rhythm (Jackson et al., 2011), a framework of temporal structure and norms for a spontaneous coordination of information work. The problem with these intense periods was that they seemed to be too rare to provide frequent enough opportunities for information sharing. The communal lunch hour at 11 am functioned as an informal gathering of the office staff. Both Lily and Rose noted in their interviews that the lunch hour more or less substituted the need for regular informal gatherings even if there had been repeated attempts to introduce regular or semi-regular cultural activities for the staff. However, in contrast to the summer festival and exhibition building, the lunch tended to exclude guides, many part-timers and the customer service staff. Guides and customer service staff meet people mostly by the ticket office or in the museum café, which is an important site for socialising even during after-hours.

Besides the information sharing that took place in larger gatherings, all staff members tended to have a certain colleague within or outside the museum with whom they usually discussed and refined their ideas. Rose often discussed with Cam and Macalister. Lily discussed frequently with Nancy and her museum educator colleagues from other museums. Minta used her colleagues with her second employer, Paul his fellow students at his school and Charles his earlier work experience as a similar sounding board.

Insert Table 2 here

The social organisation of information work

In the routine work, the museum relied heavily on inscribed external information, but in its core activities of exhibition work, collection management and education, the process could be described rather as an iterative cycle of refinement based on social information sharing. The iterations proceeded within a network of involved people. First the idea of an exhibition tended to relate to a topicality of a subject (e.g., new research results, an on-going project, an anniversary, the possibility to show a touring exhibition). The idea was developed by staff members with some expertise of the topical area often together with one or two external experts, either researchers or other specialists. In the later stages, other people in the museum, for instance Lily the museum educator, Roger, Prue or Cam, joined the project and contributed their insights. Finally, Paul and other guides were the ones who presented the exhibition to visitors and made final adjustments to what was communicated.

The configuration of the system of information sharing resembled a network with peripheral participants (external contacts, trainees) and hubs (typically the permanent staff). The major central node in the network was James who was responsible for bookings, for scheduling the weekly work of the customer service staff and at the same time functioned as a contact point for freelance guides. Lily and Augustus were similar centre points in all matters that related to the collection. In contrast to James, Lily and Augustus who had assumed the role of a central node, Charles deliberately avoided being one even if he was perceived to be such by some of his colleagues as the formal supervisor of the customer service staff and its longest standing permanently employed member. He underlined that it was vital that all information was available for all customer service staff simultaneously independent of his working hours. In spite of his efforts, he had became the ’embodiment’ of the customer service staff for other employees of the museum and appeared to be a natural point of contact.

The system of knowing and sharing information at the museum was flexible because of its fundamentally social nature. At the same time it was vulnerable to the departure of individual actors, an aspect that was explicitly acknowledged by, for instance, Charles, Rose and Lily. Charles noted that the high regular turnover of the customer service staff was a problem. New staff had to be trained all the time and when the new staff members had mastered their duties, the employment was usually close to its end. Even if the high turnover was especially characteristic of the customer service staff, Lily was the only member of the office staff who had worked at the museum for more than ten years.

In spite of its seeming vulnerability the system was rather robust because of the flexibility of how the work was organised and how the work itself gave employees opportunities to define their own work practices rather freely as long as these met others' expectations of what they were supposed to do and know. Usually, it did not really matter whether a new employee had similar competences to the earlier ones – with the exception of some technical matters such as the coupling and decoupling of alarm system.

Discussion

The general patterns of information work at the studied museum had similarities with earlier documented work at museums and related organisations (e.g. Zach, 2005; Huvila, 2006). In contrast to the viewpoints of museum information professionals interviewed by Marty (2007a), the staff members of the studied museum were not conceptualising their work in terms of information. Yet information was "as available, as integrated with other kinds of activities as possible" (P. F. Marty, 2007a). In a similar fashion to the arts administrators studied by Zach (2005), (experience based) intuition played a major role in the information work at the museum. Experience and knowledge of colleagues both inside and outside the museum provided cues that

guided the employees to choose information sources and to decide how to proceed with the work. Ellis (2006) has described the same phenomenon as connoisseurship of a museum curator. The use of intuition and personal network seemed not to be, however, a sign of satisficing (Fu & Gray, 2006; Zach, 2005) behaviour (i.e. people seek adequate rather than the best possible information), but an indication of the effectiveness of their information seeking strategy and the perceivable lack of better information. Digital technologies and information were used throughout the organisation, but nothing in the organisation-wide patterns of information work suggests that they would have had the revolutionary effect on work practices expected in the earlier literature e.g., Anderson, 1999).

Perceived and self-perceived work roles and information culture

The major finding of this study relates to the observed significance of work roles in the organisation and how they formed a framework that guided information work. In contrast to the static conceptualisations of professional roles, the observed system of work roles resembles a system of Durkheimian (1990) norms. Work roles were less an entity than a tacit framework that helped staff members to retain a degree of personal freedom of action. The lack of time and distance between office and customer service staff had created tensions, but otherwise there were few apparent conflicts in the organisation. It seems likely that the lack of earlier documented conflicts between curators (and educators) and conservators (Jefferson & Vince-Dewerse, 2008) in the museum studied is related to the fact that both Lily and Augustus worked on both curatorial and conservation related duties.

In contrast to earlier literature that has seen work roles and structural contexts of work as a relatively one-dimensional contributing factor to the patterns of information use (e.g. Sun, 2010), the findings of the present study underline the twofold nature of work roles in the context of

information work. The personal information work of the individual staff members was guided by their own perceptions of the essence of their work roles. By contrast, collaboration and information exchange among the staff members was guided by their assumptions of their colleagues work roles that tended to be significantly different from the self-perceived roles. As in the observations made by Chang et al. (2009), the familiarity with the work of the colleagues seemed to be only partly dependent on the similarity of work roles and duties. In contrast to the assumption of competition as an explanatory factor that decreases interaction, the present evidence suggests that the similarity of work roles means that besides coordination there is less need for explicit interaction and information exchange.

The dual perception of work roles seemed also to have an impact on the perception of information flows. Lily, James and Augustus were obvious "hubs" (Hansen & Kautz, 2004) at the museum with a lot of incoming and outgoing (especially with Lily and Augustus) information flows. As Hansen and Kautz (2004) note, hubs can be important information brokers, but at the same time a hub can create congestion. Charles stressed in an interview that he deliberately avoided becoming a middleman in the information flow from the office staff to the customer service staff so as to avoid misunderstanding and information loss. The perceived 'hubness' of individual staff members was dependent on how the others perceived their work role. Lily did not perceive herself as an obvious hub and Charles was very explicit about not becoming a hub, even if at the same time many of their colleagues perceived them as definite hubs. In addition to the factors such seniority, work duties, expertise or social similarity (i.e. belonging to a same group within the staff, Wu et al., 2004), the *de facto* information shared by the potential hubs seemed to strengthen their 'hubness'. Staff members turned to certain key persons to obtain individually relevant information and to deliberately avoid irrelevant information.

Contrary to an assumption that work familiarity is a form of comprehension of the entire work of a colleague (e.g. Chang et al., 2009), the findings show that the partially 'false' assumptions

of the work roles of the colleagues did not necessarily have a negative effect on information sharing. On the contrary, the difference of the perceptions seemed to give individual staff members a relatively large space of personal freedom in which to realise their own ambitions as long as the interfaces with other work roles remained for the most part intact. Employees had a conceptual freedom to repurpose and recontextualise (e.g., as in Kirschenblatt-Gimblett, 1991; Star & Griesemer, 1989) notions such as information, museum and its purposes, museum objects and their functions according to each individual's self-designated understanding of the work role.

The duality of work roles also seemed to help in transitions. As long as the external assumptions were met, the individual behaviour did not manifest as an *anomie* (Durkheim, 1990) and they had a relative freedom to define and perform their duties as they deemed best. The dual perception of the work roles reminds one of Nadel's (1957) distinction of relational and non-relational aspects of work roles even though the way in which the work roles were conceptualised at the museum suggests (at least) two modes of relations instead of a sharp juxtaposition of a relation and non-relation. At the same time, the work roles resemble *boundary objects* (Star, 2010) that help individuals and communities to communicate and share knowledge with each other.

Even though the staff members were sensitive to the *status (Turner, 2001)* of the roles of certain individual staff members, (e.g., the museum director), the twofold perception of work roles seemed to limit the explicit reliance of information work on the formal hierarchy. The typical perception of work roles may de described as *functional (Turner, 2001)* and to a degree, as function based *value roles (Turner, 2001)* when the functional value of a particular individual was seen in very positive terms. Certain individuals had a universal function and value (e.g., Augustus who had a high functional esteem as the only one with an expertise of a part of the museum collection), but mostly the value roles tended to be individual (perceived by one or two employees, e.g., Andrew's expertise for Paul and Charles).

The dynamics of a formal status, functionality and values embedded in the perceived work roles also explain the balance of relational and structural dimensions of cohesion in a similar manner to the mechanism of the model suggested by Widén-Wulff et al. (2008). Formal and semi-formal norms provided a structure for information work while the dual perception and expectations left room for informal action and interaction. The relative independence caused by the twofold perception of work roles helped to curtail the impact of not only of hierarchies, but also other forms of formal, functional and value-related power positions within the organisation.

The information culture of the investigated museum was not uncontroversially open or closed in terms of Widén-Wulff (2003). From the point of view of information exchange, it was highly open, but the differences between work roles limited the possibility and need to share procedural and conceptual information. The information the employees could and needed to share was primarily related to the coordination and articulation of work. This explains why the efforts to manage information processes explicitly by recommending certain journals to colleagues, promoting the use of institutional library collection or developing a structured intranet system were only partially successful. A similar tendency for the higher significance of information culture (versus explicit forms of information management) was observed earlier by Choo et al. (2006) in an organisation known for the excellence of its information management efforts. In the present study, the observed marginality of the effectiveness of explicit information management stems from the fact that the museum relied very little on manageable documented information. In contrast, the museum was successful, even if not fully deliberately, in focusing management activities on creating a conducive and encouraging social environment for information work (e.g. Choo & Alvarenga Neto, 2010).

Information infrastructures

In contrast to the typical emphasis of collections and documentation in the museum informatics literature (e.g. Ambrose & Paine, 2006), the analysis shows that collections can have only a very marginal direct relevance to the daily work at a museum. This confirms Macdonald' (1996) observation that formal information is not necessarily very useful even in contexts that *a priori* tend to favour structured documentation. The key to understanding the seeming paradox is to recognise that the collections and catalogues played a significant role in the investigated museum, but they did not function as information. The collection functioned fundamentally as an infrastructure (as in Star and Ruhleder, 1996) that motivated, justified and provided a general framework for the work at the museum. The knowledge of the collections that was relevant for the daily work at the museum was known (and assumed to be known) by Lily, Augustus and Prue. Knowledgeability was a part of their perceived work roles that enabled others to infrastructuralise their relation to the collections and to replace it by an institutionalised routine. Even Lily, Augustus and Prue could partially infrastructuralise the collection by relying on their internalised knowledge and experience instead of consulting the collection or documentation *per se*.

The collection was not the only type of information that was infrastructuralised to the nexus of social relations in the museum. Guides and customer service staff had infrastructuralised much of their information work to James who acted as a hub. Similarly, they had infrastructuralised a large part of the general knowledge of the museum collections and exhibitions to Andrew who held no formal position, but was acknowledged to be a subject expert.

Even if the analysis shows that social information infrastructures were central to the perceived success of the work at the museum, the reliance on social rather than documented information is not uncontroversial. Klein et al. (2007) have argued that a constructivist "Markovian

organisation" (informed by on-going activities rather than memories of the past) is better equipped to thrive in a turbulent environment than an organisation that relies on "commodified knowledge" (i.e. inscribed information). Even if the findings show that a museum can undoubtedly benefit from a Markovian organisational memory, a museum is inherently an organisation with a focus on "commodified knowledge" in the form of collections and documentation, and knowledge *about* commodified knowledge. In the present study, both were infrastructuralised in the social texture rather than in written documents or knowledge organisation systems (e.g., as in Ribes & Bowker, 2009). A major disconnect takes place in this type of an organisational context when a key employee leaves the organisation. In the present study, it seems that the expertise of the remaining staff and the twofold nature of work roles helped the museum to cope with the turnover. Guides could succeed each other and assume the work role of a guide, and Prue could assume Lily's work role, even if their experiences and knowledge were not comparable, because much of the work and knowledge were negotiable. The patterns of producing and 'sharing' knowledge remind one of the notion of *emergent knowledge* (Stacey, 2000). Knowledge was reproduced rather than explicitly documented or passed on to a colleague that suggests of a certain 'Markovian interplay' of contemporary organisational consciousness and traditional commodified knowledge (i.e. information).

In spite of their relative infrequency, the special events seemed to play a particularly significant role as opportunities for information exchange and coordination of information work. Exhibition building and especially the summer festival can be described as Bakhtinian (1982) carnivalesques, which subverted and liberated assumptions of routine work roles. The employees, who normally tended to communicate only with their closest colleagues, hold to their routines and established social norms of the workplace were suddenly engaged in an intensive temporary social exchange, in terms of Smith and Paquette (2010), a form of temporary, creative chaos. The interviews suggest that the regular staff meetings were intended to function as similar occasions

when everyone could have the equal opportunity to have a say. In spite of their intended informality, the meetings did not have a similar equalising potential as the events, apparently because they did not similarly break down the difference between the self-perceived and externally recognised work roles.

It is obvious that a museum needs both commodified and Markovian knowledge, but it is not insignificant how they support each other. In general, (and for obvious reasons) outside the scope of museum informatics literature (P. F. Marty, 2007a), museum professionals and museological literature tends to have been less concerned with managing organisational memory and information work than their collections. It seems that the academic and professional museological episteme (in Foucauldian sense) seems to be concerned primarily with the aspect of information described by Buckland (1991) as 'information as thing' without considering any additional dimensions of that what information might be. The present analysis shows that a large part of what is known and done at a museums is only indirectly related to collections and documented information.

There is no doubt that the information work practices at the studied museum are apparently very effective and as long as there are reasons to trust the expertise of the key staff members, the information is likely to be reasonably accurate. At the same time, however, the heavy reliance on people and their expertise makes it difficult to trace information back to its sources. The fundamental question is whether a museum is an information institution within the prevalent paradigmatic point of view of information management. If the answer is positive, a necessary follow-up question is where the 'information' held by a museum is and where it should be kept. According to the contemporary museum information management literature, the social nature of information work at the studied museum, the significance of gatekeepers and the relative low degree of reliance on explicit documentation would undoubtedly be symptoms of an inadequate management and unsatisfactory organisation of information. Whether this perspective is relevant,

is conditional to a choice of perceiving information management as a governance of inscribed information or as an activity with "a goal of improving the generation of new knowledge and the sharing of existing knowledge" as Schlögl (2005) suggests.

Conclusions

The main finding of the present study is that a museum knows what is known by its staff and their personal networks and only secondarily that which is stored and documented in its collections. Knowing at a museum is supported by an institutionalised texture of documents, information systems and physical collections of artefacts, but the information practices of the staff is based to a high degree on routines, internalised knowledge and transitory forms of information exchange regulated by a complex set of social norms of communicating and, in practice, reproducing rather than (literally) exchanging knowledge.

Two significant factors that facilitated information work at the studied museum were identified. First, the employees were able to infrastructuralise a large part of their information work and rely on the expertise of their colleagues. Secondly, the difference between how the employees perceived their colleagues' work roles and how the colleagues themselves conceptualised their roles provided flexibility for the employees to realise their ambitions and reproduce their practical work according to their own preferences.

The way in which the interviewed and observed museum professionals conceptualised their information work was very unlike the idea of information management represented by the contemporary museum information management literature. Museums are undoubtedly information institutions, but the present study suggests that the information is as much embedded in the organisational memory of the museum as in its collections and documented information resources.

References

Adler, P., & Adler, P. (1994). Observational techniques. In N. Denzin & Y. Lincoln (Eds.), *Handbook of qualitative research.* Thousand Oaks, CA: Sage.

Ambrose, T., & Paine, C. (2006). *Museum basics, 2nd edition*. Routledge.

Anderson, M. (1999). Museums of the Future: The Impact of Technology on Museum Practices. *Daedalus*, *128*(3), 129–162.

Bakhtin, M. M. (1982). *L´oeuvre de francois rabelais et la culture populaire au moyen age et sous la renaissance*. Paris: Gallimard.

Barley, S. R., & Kunda, G. (2001). Bringing work back in. *Organization Science*, *12*(1), 76-95.

Buckland, M. (1991). Information as thing. *JASIS*, *42*(5), 351–360.

Cannon-Brookes, P. (1992). Manual of curatorship. In J. Thompson (Ed.), (pp. 500–512). London: Butterworth.

Chang, K., Chang, A., & Sha, X. (2009). Work role similarity and work familiarity between members: A tripartite view of social identity towards knowledge contribution in organizations. In *Pacific Asia Conference on Information Systems (PACIS): PACIS 2009 Proceedings.* Kaohsiung: Association for Information Systems.

Choo, C. W., & Alvarenga Neto, R. C. D. de. (2010). Beyond the ba: managing enabling contexts in knowledge organizations. *Journal of Knowledge Management*, *14*(1367-3270), 592–610.

Choo, C. W., Bergeron, P., Detlor, B., & Heaton, L. (2008). Information culture and information use: An exploratory study of three organizations. *JASIST*, *59*, 792-804.

Choo, C. W., Furness, C., Paquette, S., & Berg, H. van den. (2006, December). Working with information: information management and culture in a professional services organization. *Journal of Information Science*, *32*(6), 491–510.

Clifford, C. (1996). Role: a concept explored in nursing education. *Journal of Advanced Nursing*, *23*(6), 1135-1141.

Collier, A. (1998). Critical realism: Essential readings. In M. Archer, R. Bhaskar, A. Collier, T. Lawson, & A. Norrie (Eds.), (pp. 444–472). London: Routledge.

Cool, C., & Belkin, N. (2002). A classification of interactions with information. In H. Bruce (Ed.), *CoLIS4: Proceedings of the Fourth International Conference on Conceptions of Library and Information Science, Seattle, WA, USA, July 21-25, 2002* (pp. 1–15). Greenwood Village: Libraries Unlimited.

Czerneda, J. (1994). *Great careers for people who like to work with their hands*. Detroit, MI: UXL.

Davies, B., & Harré, R. (1998). Positioning and personhood. In R. Harré & L. van Lagenhove (Eds.), *Positioning theory: moral contexts of intentional action* (pp. 32–52). Oxford: Blackwell.

Durkheim, E. (1990). *Le suicide : étude de sociologie*. Paris: Presses universitaires de France.

Dyregrov, A., Kristoffersen, J. I., & Gjestad, R. (1996). Voluntary and professional disaster-workers: Similarities and differences in reactions. *Journal of Traumatic Stress*, *9*, 541-555.

Ellis, L. (2006). Museum studies. In J. Bintliff (Ed.), *A companion to archaeology* (pp. 454–472). Malden and Oxford: Blackwell Publishing.

Fidel, R., & Pejtersen, A. M. (2004). From information behaviour research to the design of information systems: the Cognitive Work Analysis framework. *Information Research*, *10*(1).

Fidel, R., Pejtersen, A. M., Cleal, B., & Bruce, H. (2004). A multidimensional approach to the study of human-information interaction: a case study of collaborative information retrieval. *JASIST*, *55*(11), 939–953.

Fisher, K. E., Erdelez, S., & McKechnie, L. E. (Eds.). (2005). *Theories of information behavior*. Medford, NJ: Information Today.

Fu, W.-T., & Gray, W. D. (2006). Suboptimal tradeoffs in information seeking. *Cognitive*

Psychology, *52*(3), 195 - 242.

Gasser, L. (1986, July). Integration of computing and routine work. *ACM Transactions on Office Information Systems*, *4*(3), 205-225.

Ginman, M. (1993). Information culture and business performance. In M. Ginman (Ed.), (Vol. Ser A:404, p. 1-9). Åbo: Institutionen för biblioteksvetenskap och informatik, Åbo Akademi.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Hawthorne: Aldine.

Hansen, B. H., & Kautz, K. (2004). Knowledge mapping: A technique for identifying knowledge flows in software organisations. In T. Dingsøyr (Ed.), *Software process improvement* (Vol. 3281, p. 126-137). Springer Berlin / Heidelberg.

Hilbert, R. A. (1981, March). Toward an improved understanding of role. *Theory and Society*, *10*(2), 207–226.

Hodgson, G. M. (2006). Institutional economics and analysis of work. In M. Korczynski, R. Hodson, & P. Edwards (Eds.), *Social theory at work* (pp. 208–232). Oxford: Oxford University Press.

Hooper-Greenhill, E. (1992). *Museums and the shaping of knowledge*. London; New York: Routledge.

Hooper-Greenhill, E. (1994). Museum education: past, present and future. In R. S. Miles & L. Zavala (Eds.), *Towards the museum of the future : new European perspectives* (pp. 133–146). London; New York: Routledge.

Hooper-Greenhill, E. (1999). *The educational role of the museum*. London; New York: Routledge.

Husted, K., & Michailova, S. (2010). Dual allegiance and knowledge sharing in inter-firm r&d collaborations. *Organizational Dynamics*, *39*(1), 37 - 47.

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. (Diss. Åbo Akademi University)

Huvila, I. (2008). Work and work roles: a context of tasks. *Journal of Documentation*, *64*(6), 797–815.

Huvila, I. (2009). Ecological framework of information interactions and information infrastructures. *Journal of Information Science*, *35*(6), 695–708.

Huvila, I. (2010). The Cool and Belkin Faceted Classification of Information Interactions Revisited. In *Information Research 15 (4). Special Supplement: Proceedings of the Seventh International Conference on Conceptions of Library and Information Science – Unity in diversity – Part 2.*

Jackson, S. J., Ribes, D., Buyuktur, A., & Bowker, G. C. (2011). Collaborative rhythm: temporal dissonance and alignment in collaborative scientific work. In *Proceedings of the ACM 2011 conference on Computer supported cooperative work* (pp. 245–254). New York: ACM.

Jefferson, R., & Vince-Dewerse, N. (2008). When curator and conservator meet: Some issues arising from the preservation and conservation of the jacques mosseri genizah collection at cambridge university library. *Journal of the Society of Archivists*, *29*(1), 41–56.

Katriel, T. (1997). The tools tell the story: Toward an analysis of the museum experience. In R. Kubey (Ed.), *Media literacy in the information age: Current perspectives* (pp. 449–461). New Brunswick, NJ: Transaction Publishers.

Kirschenblatt-Gimblett, B. (1991). Objects of ethnography. In I. Karp & S. Lavine (Eds.), *Exhibiting cultures : the poetics and politics of museum display* (pp. 386–443). Washington, DC: Smithsonian Institution Press.

Klein, J., Connell, C., & Jasimuddin, S. (2007). Who needs memory? the case for the markovian organisation. *Knowl Manage Res Prac*, *5*(2), 110–116.

Knell, S. (2003). The shape of things to come: museums in the technological landscape. *museum and society*, *1*(3), 132–146.

Layder, D. (2006). *Understanding social theory* (2nd ed.). Thousand Oaks: Sage.

Leckie, G. J., Pettigrew, K. E., & Sylvain, C. (1996). Modeling the information seeking of professional: a general model derived from research on engineers, health care professionals, and lawyers. *Library Quarterly*, *66*(2), 161-193.

Lee, C. P. (2007). Reconsidering conflict in exhibition development teams. *Museum Management and Curatorship*, *22*(2), 183–199.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills: Sage.

MacDonald, G., & Alsford, S. (1991). The museum as information utility. *Museum Management and Curatorship*, *10*(3), 305–311.

Macdonald, S. (1996). Informal information flow and strategy in the international firm. *International Journal of Technology Management*, *11*(1/2), 219–232.

Maceviciute, E., & Wilson, T. D. (2002). The development of the information management research area. *Information Research*, *7*(3).

Marty, P., Rayward, W. B., & Twidale, M. B. (2003). Museum informatics. In *Arist* (Vol. 37, pp. 259–294). Information Today.

Marty, P. F. (2005). Factors influencing the co-evolution of computer-mediated collaborative practices and systems: A museum case study. *JCMC*, *10*(4).

Marty, P. F. (2006). Meeting user needs in the modern museum: Profiles of the new museum information professional. *Library & Information Science Research*, *28*(1), 128–144.

Marty, P. F. (2007a). The changing nature of information work in museums. *JASIST*, *58*(1), 97–107.

Marty, P. F. (2007b, June). Museum professionals and the relevance of lis expertise. *Library & Information Science Research*, *29*(2), 252–276.

McKenzie, P. (2003). A model of information practices in accounts of everyday-life information seeking. *Journal of Documentation*, *59*(1), 19–40.

Megill, K. A. (2005). *Corporate memory : records and information management in the knowledge age*. München: K.G. Saur.

Nadel, S. F. (1957). *The theory of social structure*. Glencoe, IL: Free Press.

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, *23*(2), 242–266.

Nahl, D., & Bilal, D. (Eds.). (2007). *Information and emotion: The emergent affective paradigm in information behavior research and theory*. Medford, NJ: Information Today.

Orna, E., & Pettitt, C. (1998). *Information management in museums*. Aldershot: Gower.

Ribes, D., & Bowker, G. C. (2009). Between meaning and machine: Learning to represent the knowledge of communities. *Information and Organization*, *19*(4), 199 - 217.

Roberts, J. (2006). Limits to communities of practice. *Journal of Management Studies*, *43*(3), 623-639.

Rosenbaum, H. (1996). Structure and action: Towards a new concept of the information use environment. In *Proceedings of the ASIS 1996 Annual Meeting Global Complexity: Information, Chaos, and Control October 19 - 26, 1996, Baltimore, MD.* ASIS.

Schlögl, C. (2005, July). Information and knowledge management: dimensions and approaches. *Information Research*, *10*(4).

Skov, M., & Kirkegaard Lunn, B. (2010). The janus faced scholar: A festschrift in honour of peter ingwersen. In B. Larsen, J. W. Schneider, & F. A. B. Schlemmer (Eds.), (pp. 297–303). Copenhagen: IVA and ISSI.

Smith, S., & Paquette, S. (2010). Creativity, chaos and knowledge management. *Business Information Review*, *27*(2), 118-123.

Sonnenwald, D. H., & Lievrouw, L. A. (1997). Collaboration during the design process: a case

study of communication, information behavior, and project performance. In *ISIC '96: Proceedings of an international conference on Information seeking in context* (pp. 179–204). London: Taylor Graham.

Stacey, R. (2000). The emergence of knowledge in organizations. *Emergence*, *2*(2), 23-39.

Star, S. L. (2010). Ceci n´est pas un objet-frontiére! réflexions sur l´origine d´un concept. *Revue d´anthropologie des connaissances*, *4*(1), 18–35.

Star, S. L., & Griesemer, J. R. (1989). Institutional ecology, ´translations´ and boundary objects: Amateurs and professionals in Berkeley´s Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science*, *19*(3), 387-420.

Star, S. L., & Ruhleder, K. (1996). Steps towards an ecology of infrastructure: complex problems in design and access for large-scale collaborative systems. *Information Systems Research*, *7*, 111-133.

Strangleman, T. (2004). *Work identity at the end of the line? privatisation and culture change in the uk rail industry*. Basingstoke: Palgrave Macmillan.

Sun, P. (2010). Five critical knowledge management organizational themes. *Journal of Knowledge Management*, *14*(1367-3270), 507–523.

Suorsa, A. (2012). Vuorovaikutuksen käsite tiedon luomisen nykytutkimuksessa. *Informaatiotutkimus*, *31*(1), 1–11.

Turner, R. H. (2001). Role theory. In J. Turner (Ed.), *Handbook of sociological theory* (pp. 233–254). Berlin: Springer.

Washburn, W. (1984). Collecting information, not objects. *Museum News*, *62*(3), 5–15.

Widén-Wulff, G. (2003). Information as a resource in the insurance business: the impact of structures and processes on organization information behaviour. *The New Review of Information Behaviour Research*, *4*, 79 - 94.

Widén-Wulff, G., Ek, S., Ginman, M., Perttilä, R., Södergård, P., & Tötterman, A.-K. (2008).

Information behaviour meets social capital: a conceptual model. *Journal of Information Science*, *34*(3), 346-355.

Widén-Wulff, G., & Ginman, M. (2004). Explaining knowledge sharing in organizations through the dimensions of social capital. *Journal of Information Science*, *30*(5), 448-458.

Wikgren, M. (2005). Critical realism as a philosophy and social theory in information science? *Journal of Documentation*, *61*(1), 11–22.

Wilson, P. (1983). *Second-hand knowledge: An inquiry into cognitive authority*. Westport, CN: Greenwood Press.

Witcomb, A. (2003). *Re-imagining the museum : beyond the mausoleum*. London; New York: Routledge.

Wu, F., Huberman, B. A., Adamic, L. A., & Tyler, J. R. (2004). Information flow in social groups. *Physica A: Statistical and Theoretical Physics*, *337*(1-2), 327 - 335.

Zach, L. (2005). When is enough enough? modeling the information-seeking and stopping behavior of senior arts administrators. *JASIS*, *56*(1), 23–35.

Zach, L. (2006). Using a multiple-case studies design to investigate the information-seeking behavior of arts administrators. *Library Trends*, *55*(1), 4–21.