

Social aspects of the ecology of information work

Isto Huvila

Department of ALM, Uppsala University

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Abstract

The model of the ecology of information work (Huvila, 2006, 2009) describes the relation of knowledge organisation systems, or in broader sense, the relation of information infrastructures and human information work. The present paper discusses the social aspects of information work and their impact on the interplay of information infrastructures and human activity. The theoretical underpinnings of the discussion build on the ecological approach of Gibson, infrastructural theory and social information theory. The concluding remarks summarise a reading of the earlier model that places a specific emphasis on foregrounding the social processes relating to the emergence of information infrastructures and their related information work patterns.

Keywords: information work, ecological approach, social capital, information foraging, communities of practice

Introduction

The model of the ecology of information work (Huvila, 2006, 2009) describes the relation of knowledge organisation systems (KOS), or in broader sense, the relation of information infrastructures (being traditional KOS or any other means of organising information and knowledge) and human information work. The present paper discusses the social aspects of information work and their impact on the interplay of information infrastructures and human activity. The theoretical underpinnings of the review are based on the Gibsonian ecological approach, infrastructural theory and three major social theories.

Capurro (1990) highlighted the interwovenness of the question of information ecologies and the social sphere already in the late 1980s by underlining the social

character of information. He was sketching a pragmatic approach for addressing the problem of abundance of information and the difficulty of discerning the limits of individual messages in a global perspective. The particular issues of control, information or message pollution and the continuum from earlier information infrastructures to the newer ones are relevant in the context of the ecological interplay of information interactions and infrastructures. Even more so, is the broader question of the influence of the social sphere on information work and its infrastructures (and vice versa) and its diverse theoretical and practical underpinnings. The present article aims at exploring some of the pertinent aspects of that interplay, but considering the scope of the issue, this discussion should be considered more as an opening paragraph rather than a comprehensive analysis of the entire question.

1 Ecology of information interactions and information infrastructures

The ecological model of information interactions and infrastructures (Fig. 1; for a detailed description of the model, see Huvila, 2009) is based on an observation of the dynamic relation of how knowledge is organised in information infrastructures (comprising traditional and non-traditional knowledge organisation systems, information systems and all other conceivable types of systems of how information is structured or organised) and how information is present in information interactions. Different scholars have referred to various ecological notions in the information science research (e.g. Steinerová, 2010; Williamson, 1998). It is not uncommon that different authors use the terms “information ecology” and “ecological model” or “approach” with slightly different connotations. Besides the concept of “information ecology” of Davenport (1997), one of the most cited notions of its kind is discussed in the work Nardi and O’Day (1999). The ecological perspective of the present model builds on the soft systems theory (Checkland, 2000) and the ecological approach of Gibson (1979) and the concepts of affordances and warrants. The notion of work has its underpinnings in the Straussian (1985) understanding of work as a complex and seemingly random yet coherent activity with certain, although often merely implicit, rules and codes. Information work is perceived as a constituent component of work, a sub-work that is present in all human activity (Huvila, 2009).

The basic premiss of the model is that the process of collecting knowledge assets does not end up in a predestined knowledge claim (referring to the concept in the sense discussed by Hjørland, 2008). Reasons for a particular variation may be found both in individual people and their cognitive processes, and in their social context, and in the structural factors of form, organisation and presentation of the claims. The infrastructural characteristics (formation process, structure, and functionality of any individual KOS) afford certain distinct types of secondary knowledge claims to take shape. Respectively, certain competing knowledge claims are more unlikely to emerge (i.e. be warranted, Beghtol, 1986) within

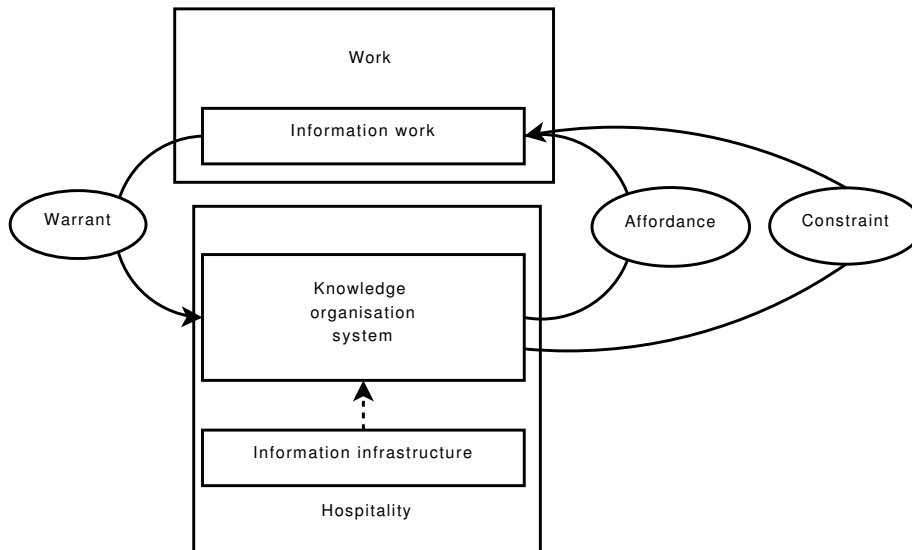


Figure 1: Ecology and warrants of information work and knowledge organisation (KO)

the confines of a given system than some others.

The model is based on an empirical study of Nordic archaeology professionals¹. Huvila (2006) points out that even though the contemporary archaeology often prioritises social and cultural readings of archaeological evidence, the process of documentation and especially the one of storage and archival of the preserved objects is not necessarily very helpful for making these types of inferences. The prevalently used archaeological information infrastructures (e.g. databases and cataloguing systems) tend to afford the type of research that is based on the classification of archaeological finds according to their material (e.g. wood or metal) or comparing the size of the objects and their provenance, instead of analysing their functional categories or visual characteristics (Huvila, 2006, 239). The earlier information science literature provides other examples of how information infrastructures and interactions affect each other, for instance, in the context of nursing work (MacIntosh-Murray & Choo, 2005).

The principal contribution of the ecological approach to the KO research

¹See Huvila, 2006 for a detailed discussion of the results and methods of the study.

may be considered to be in its capability to make the diverse contextual factors of the KO and information work explicit in the form of constraints and affordances (Fidel & Pejtersen, 2005). The ecological viewpoint makes it easier to understand how infrastructures affect the ways how people work with information and how the information activity supports the emergence of certain types of infrastructures. The questions of choosing an appropriate content and explicating a purpose for the provision of additional information may be based on a more precise motivation of tendering distinct affordances relating to the actual information work of a certain individuals or groups of people. Similarly, the constraints of information work may be lifted or maintained on a more warranted basis than by resorting to a guess of the user needs and behaviour or to a semi-informed design decision. As pointed out earlier (Huvila, 2009), the ecological analysis of information work and KOSs does not eliminate the need for conscious design decisions, a necessary step in the development of KOSs underlined by Feinberg (2007). It rather provides means to make both information work and infrastructures more well-defined in the sense Haraway (1988) means with her notion of situated knowledges.

2 Social aspects of information interactions

The present paper discusses the social aspects of information interactions within the framework of three social theories that shed light on somewhat different facets of social exchange. There are obviously a plethora of other potentially relevant theories, but the choice of the three particular theories is motivated by the fact that they provide a practicable framework for explicating the contexts, outcomes and temporal and structural dimensions of social intercourse.

Undoubtedly one of the most influential theories of social interaction from the 1990s onwards is the practice theory of Lave (1988) and especially the notion of community of practice introduced by Lave and Wenger in their book *Situated Learning: Legitimate Peripheral Participation* (1991). According to the authors, a community of practice is a context where learning takes place. The notion highlights the significance of perceiving learning, knowledge creation, and in terms of the present study, information work, as an on-going activity that is embedded in authentic work and everyday life contexts, meaningful activities and groups of people with shared interests, common language and procedures of work. The notion of the communities of practice has been popular in recent information science research, although as Talja (2010) remarks, the focus of the discussion has been on communities rather than practices.

The notion of social capital highlights another aspect of social exchange. With some exceptions (e.g. Vårheim et al., 2008), in information science research, the discussion on social capital has drawn typically from the work of Bourdieu (1980), Coleman (1988) and Putnam (2000) as in the studies of Hall and Widén-Wulff (2008), Suh and Shin (2010) and Huvila et al. (2010). The theory has also been used together with the notion of communities of practice, for instance, in the study of Audunson et al. (2011) on the role of public lib-

raries as a meeting place for immigrant women. Nahapiet and Ghoshal (1998) have identified three different dimensions of social capital that according to a model of Widén-Wulff et al. (2008) have direct implications to the information behaviour of individuals and groups. Nahapiet and Ghoshal (1998) distinguish structural, relational and content dimensions of social capital. The structural dimension is typically defined as network structures and the nature of the network ties between the actors. Structures provide channels for social interactions and information flows. The second, relational dimension is often conceptualised in terms of trust, identity, and roles. The relational dimension highlights the significance of underlying motives for sharing. Earlier studies have shown that the exchange of information can be highly dependent on social relationships (Hall & Widén-Wulff, 2008). The third, content dimension is defined through shared goals, common experience, language, and knowledge. Widén-Wulff et al. (2008) have argued that the content dimension or the social opportunities may be also seen as an outcome of the structural and relational dimensions.

In contrast to the notions of communities of practice and social capital, the theory of information foraging and more specifically, the theory of social information foraging (Pirolli, 2007) presents another perspective to the social dimension of information activity. The theory is based on the similarities of the foraging behaviour of early humans and the ways how people still tend to seek and find information in their environment. In addition to Pirolli and his colleagues, for instance, O'Connor et al. (2003) and Spink (2010) have worked on similar premises and explored the actual and metaphorical similarities of seeking information and sustenance. From the point of view of the present discussion, a significant implication of this type of theorising is how the notion of foraging provides an apparatus for explicating the temporal, social and strategic dimensions of information activity within a single framework.

3 Social information ecology

The premiss of the present discussion is that the social theories are useful in explicating the impact and of the social sphere in the ecological model. Considering the theoretical underpinnings of the model in the ecological approach and soft systems theory, the dimension of social exchange may be argued to be implicitly present in the cycle of warrants, affordances and constraints. In spite of this implicit presence of the social, it does make sense to explicate it in more detail.

There are, however, certain factors that need to be considered in advance. From an analytical point of view, it is important not to confuse the surrogate level infrastructural aspects with the characteristics relating to the form and structure of the data itself. In the study of archaeologists' information work (Huvila, 2006, 240), one of the informants pointed out that in spite of the frequent explicit theoretical undertakings to alter the prevalent viewpoints, the archaeological view of the past tends to privilege object-centric interpretations of human thinking and activity, while historians perceive the past often in a

conspicuously literary sense. In spite of their close relation to infrastructures, these material related tendencies do not necessarily relate to the affordances and constraints posed by a system of organising information, but to the form of the information objects themselves. It seems plausible to argue that material remains are bound to privilege materialistic interpretations and literary sources textual information interactions. The form produces a separate set of constraints and affordances that may or may not resemble infrastructural, behavioural and for instance, cultural, facets of information ecology.

Similarly to the relative externality of the information object specific affordances and constraints, also the social sphere may be seen as partly independent of the infrastructural premises. There are social motivations that are parallel to the infrastructure and that (at least relatively) independently permit or restrain information interactions. Information infrastructures have certain characteristics that affect information work, but at the same time, it is possible to use them in a particular manner that affects the qualities of actual affordances and constrains. In the case of archaeological information work, the social and professional ambitions to secure future jobs in an extremely difficult employment situation directed the use of available information infrastructures beyond the actual infrastructural affordances and constraints (Huvila, 2006). The correlation of information source use and perceived success in corporate finance work (Huvila, 2010) might indicate of similar exploitation of infrastructures.

In spite of the reservations, the discussed social theories may be used to open up the social dimension of the ecological model. Firstly, the notion of the community of practice can help to place information interactions in the context of specific communities i.e. particular groups with a shared interest, craft or a profession (Duguid, 2005). In the sense of Lave and Wenger (1991), the ecological cycle may be seen as specific to particular communities of practice. The process of developing and consolidating a shared interest in a particular domain and the evolution of the domain itself may be seen similarly as a result of the co-evolution of information practices and infrastructures. Both practices and infrastructures evolve over time to become increasingly particular for a specific community of practice.

The formation of communities was clearly visible in the study of the information work of archaeologists (Huvila, 2006). Standardised and to a degree, ritualised information interactions warranted particular types of information infrastructures and systems with direct affordances and constraints to future information interactions (Huvila, 2006). The emergence and distinction between different informational and social value-based communities was similarly apparent in the case of corporate finance specialists (Huvila, 2010). The preference of certain types of sources and the according formation of the infrastructure of the most used information sources and the associated values of successfulness may be seen as a form of distinctive communities that share particular practices and values. There are also other examples in the literature. The nursing work studied by MacIntosh-Murray and Choo (2005) incorporated a similar aspect of the interplay of how information was organised and how it was interlinked to the working practices of the nurses.

The interaction of information practices and infrastructures may also be seen as a process that increases social capital of individuals within participating communities. In the light of the three dimensions of social capital (Nahapiet & Ghoshal, 1998), the ecological model incorporates aspects of the structural dimension in form of infrastructures and relational dimension in social information interactions. The fact that information interactions and infrastructures are intertwined, may be seen as a source of social opportunities i.e. the content dimension of social capital. Their ecological relation is not only an observable characteristic of the interaction of the two entities, but also a process with perceptible social benefits for participating individuals. The interplay of the different dimensions is apparent in the formation of communities of archaeologists. Archaeological research report and associated documentation practices may be considered as a form of information infrastructure, in the sense of Nahapiet and Ghoshal a structure that supported social exchange and the emergence of the social capital in the form of professional opportunities, prestige and, for instance, career advancement. The social information interactions and their relational underpinnings formed a relational dimension for the emergence of content as information and social opportunities. The findings of Huvila et al. (2010) from a study of social capital in the virtual world of Second Life provide corresponding evidence in the context of virtual worlds. According to the negative correlation of social capital within and outside of the virtual world, Second Life seemed to form a comparable infrastructure that supports distinct kinds of informational and social opportunities and activities for its residents.

The notions of community of practice and social capital have been used to explicate the implications of the ecological model for the formation of communities and the accumulation of social opportunities in the form of social capital. The social information foraging theory (Pirolli, 2009) suggests that there are certain boundaries that affect the shaping of the social and informational benefits in the ecological cycle. It is necessary to stress that the information foraging theory is specific to information seeking and use whereas the ecological model is a model of structural interactions. Therefore, some caution is necessary while considering the reciprocal implications of the two frameworks. Firstly, the theory of social information foraging may be suggested to imply the benefits of social versus individual co-evolution of information interactions and infrastructures. From an information seeking perspective, social foraging has been observed to produce more relevant information for individual information seekers. In the general context of social information interactions, it might be similarly assumed that social foraging does consecutively produce more relevant information infrastructures. Secondly, the theory suggests also that the direct benefits of social foraging decrease over time and when the number of collaborators increase. It may be assumed that time and the increasing number of collaborators may have similar effects in the ecological model.

The effects of the social foraging of information may be observed in several contexts of social information exchange. The challenges related to the development of 'universal' knowledge organisation highlight the initial positive effect of collaborative work as the representativeness of the system (information infra-

structure) increases and the impending problems of accommodating all relevant viewpoints and information interactions into a single framework. The paradox of the prevalence of local information and knowledge practices and generally acknowledged benefits of universal infrastructures is apparent in the context of archaeology. The diverse, but in their local contexts relevant forms of information and information practices have been very difficult to accommodate in centralised registers that would be highly useful in comparative research and, for instance, cultural heritage management (Huvila, 2009).

The present discussion has made excursions to the implications of social exchange in the ecological model of information interactions and infrastructures. Even if the systemic perspective of the model incorporates a social dimension, a broader consideration of relevant social theories can provide useful insights into the social aspects of the ecology of information interactions and infrastructures. It may be concluded that the reciprocal influence of information interactions and infrastructures have both an informational and a social impact, and the both have a further reciprocal repercussions in the process of the emergence of warrants, and affordances and constraints. In the light of the discussed theories, it may be suggested that the relation of the discussed theories and the model may be conceptualised in terms of that the ecology of information interactions and infrastructures have a propensity to impact the formation of the communities of practice and social capital. At the same time, however, the informational opportunities of the interplay are bounded by the duration and heterogeneity of socialisation and the number of participating individuals suggested by the social information foraging theory.

Conclusion

The relevance of explicating the social dimensions of the ecological approach for information lies in the possibility to examine the knowledge formation and the processes of organising and using knowledge as socially interlinked and anchored projects following the recommendation of, for instance, Chatman (1996). According to the model, knowledge formation is an evolving process rather than a series of actions related to a 'thing' called 'knowledge' or a 'knowledge claim'. The present discussion has highlighted the social aspects of the interplay by referring to three different theories of social exchange. The notion of social does not pertain only to information interactions and infrastructures as individual components, but also to the ecology of their interplay as well. Besides having social underpinnings, the ecology of information interactions and infrastructures have social implications as well. The notions of communities of practice, social capital and social information foraging can be used to shed light on the contextuality of the ecological process in communities, the social outcomes of the process in terms of social capital and its dynamics in terms of the theory of social information foraging. The new perspectives to the model can be useful in explicating the social aspects of the consequences and causes of implementing KOSs and other information infrastructures. Similarly it can be used to elucid-

ate the non-informational factors of success and failure in their implementation and use. The approach also has implications on the design of systems. The augmented framework provides further means to conceptualise how information systems links to human activity, and how and why the users choose to use and not to use different types of information infrastructures.

About the author

Isto Huvila is working as a post-doc research fellow at the department of ALM (Archival Studies, Library and Information Science and Museums and Cultural Heritage Studies) at Uppsala University in Sweden and is an adjunct professor (docent) in information management at the School of Business and Economics, Department of Information Studies, Åbo Akademi University in Åbo, Finland. His primary areas of research include information work, information management, knowledge organisation, cultural heritage information, participation in archives and documents management and library 2.0 related issues such as information service, information literacy and information in virtual worlds.

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