Affordances and constraints in knowledge organisation

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Abstract

Knowledge organisation schemes affect directly the nature of knowledge states emerging as a result of their use. Basically a knowledge organisation system may expected to fit its explicit purpose in a more or less satisfactory manner, but besides the intended application, each system is capable to fit an unknown number of implicit quasi-intended and non-intended purposes. The scope and confines of knowledge potentially emerging as a result of an application of a knowledge organisation scheme is discussed here with a reference to the ecological approach introduced by Gibson. Special focus is placed on explicating the possibilities of using the concepts 'affordance' and 'ecological constraint' to understand the process of different knowledge organisation systems contributing on the emergence of different types of knowledge.

1 Introduction

A knowledge organisation system never resides in a total isolation. A system is always built in context, which has been conspicuously seldom discussed in literature as was remarked by Andersen (**?**). Only rather recently authors such as Bowker and Star (**?**), Jacob and Albrechtsen (e,g, **?**) and Hjørland (**???**) have begin to focus on contextual, including social and cultural, issues.

Cognitively and socially inclusive views on the scope of knowledge organisation consequentially imply to knowledge as an essentially subjectivist notion actually making the term 'knowledge organisation' to appear as somewhat misleading. Assuming the fairly typical understanding of the concept, knowledge is something, which may not be directly organised (**?**, 471). Accordingly with the assumed subjectivist viewpoint the scope of knowledge organisation is perused as management of 'knowledge claims' instead of 'knowledge resources' or 'knowledge representations' (**?**). The standpoint of perceiving organised knowledge

assets as claims instead of resources bears an important implication concerning the present discussion. In contrast to the empirical viewpoint (see **?**, 149), the subjectivist understanding of knowledge assumed in the present study makes knowledge organisation systems fundamentally artificial constructions. Determination of the organisation criteria is thus a result of a subjective choice, not of a straightforward observation.

The purpose of this paper is to discuss the determination of premisses and confines of a space where a single knowledge organisation system does serve a purpose. The issue of scope in knowledge organisation is scrutinised in the light of some insights from the ecological approach originally introduced by Gibson in cognitive psychology during the 1960's (**?**). The approach and its applicability is discussed with a reference to a set of findings gathered during a study on the information work of archaeology professionals.

2 Ecological approach

Becoming of likely and less likely matches between knowledge structures and knowledge claims is perused here by using concepts ecological 'constraints' and 'affordances' as a frame of reference. The concepts originate in the ecological approach first proposed by Gibson originally in the context of cognitive psychology (**??**). The notion of ecological constraint refers to the structures of external world, which do guide human action. They are contrasted with persons' internal cognitive processes. Affordance is used by Gibson to denote what an environment offers an animal, what it provides and what it furnishes. (**???**). For Gibson the notion of affordance is essentially a rather complex matter of relation between an organism and its environment. It implies the complementarity of a being and the environment. Gibson further argues that affordance cuts across the dichotomy of subjective-objective and enables us to perceive through its inadequacy (**?**, 127). It is both physical and psychical, yet being neither in entirety (**?**, 127). Summing up the complementary observations made by Baerentsen and Trettvik, affordances exist in temporally extended interaction oriented relationships (**?**). Perception of an affordance is perception of interactions and relationships.

Of the two concepts, especially the affordance has been widely popular in human-computer interaction (HCI) research especially since the publication of the influential *The psychology of everyday things* by Norman in **?**. On contrary, the notion of ecological constraint has received considerably little attention. However, in Norman and in the majority of the subsequent HCI literature, the understanding of affordances does differ rather significantly from the original Gibsonian notion as observed by **?**. Affordances have been perceived as characteristics, which do effectively cause some specific forms of action. In this perspective affordance is a fundamental property of an object determining its possible uses. Affordances determine that buttons are for pushing and knobs are for turning (**?**, 9).

The references of ecological approach in HCI has been criticised for referring

to affordances in a rather simplistic and acontextual manner omitting much of the originally salient point of ecology (**?**)(**?**, 101). In spite of the critique, the HCI researchers do have to be credited of placing emphasis on the need to articulate user and usage issues in information system design. The simplified use of concepts may be criticised of loosing some potential, but a thorough understanding of these issues is of major importance also in the context of the present discussion on knowledge organisation systems. They are however first and foremost meant to be instruments used by humans. Acknowledging the importance of usage perspective, the present paper scrutinises the notion of affordances and constraints assuming a viewpoint, which is basically more closely related to the approach of Gibson than to the one of Norman. An emphasis is maintained on the affordance as a relationship between a being and its environment; more precisely between a knowledge structure and a knowledge claim.

Baerentsen and Trettvik (**?**) observe that the cultural dimension of affordances and constraints stays as a somewhat weak notion in the writings of Gibson. Maintaining a somewhat artificial division between the natural and the cultural while discussing the issue, Baerentsen and Trettvik make a sharp distinction between the unintentionality of physical properties in the natural world and the artificiality of cultural world. This notion bears some meaning in theoretical sense when discussing the ecological approach in non-human versus human, i.e. in natural versus cultural contexts. As a whole, the division is rather problematic. The concept of culture and artificial design of objects does not apply most of the natural world, but every use situation may be argued to suggest of a theoretical intention even if the situation is lacking any human involvement. Thus it could be suggested that the affordances and constraints do function through an amalgam of physical properties and their cultural interpretations. Perceiving an affordance is a matter of common acceptance. Within the frame of activity-theory and cultural-historical psychology, the affordance is also an inclusion in a community of societal forms of praxis as pointed out by Baerentsen and Trettvik (**?**). In more general terms the capability to understand affordances and constraints may be thus argued to be a question of an existing cultural contract and essentially of a common shared knowledge base.

3 Affordances, constraints and knowledge organisation

Considering the present discussion, the most prominent finding from the empirical study were some distinctive traces of inconsistencies between existing knowledge management practises and information work behaviours. Knowledge organisation did not follow coherently the demands of information work, but rather showed signs of systematic source centrism.

Archaeological knowledge formation and organisation processes rather obviously vary between different contexts. However, at the general level of prin-

ciples and motivation, the process may be described as being relatively well standardised. Informants expressed mostly at least average satisfaction with the existing information work practises. However, when the focus was turned on the information use of the same group, it became apparent that the knowledge organisational approaches, which served well in the formation work, were unsatisfactory within the scope of information use. Formation of the knowledge resources is focussed on gathering and processing accurate quantifiable data on the archaeological sites and materials. However, while being information users, archaeologists seem to value interpretative and functional organisation in many cases far above the quantitative-descriptive paradigm dominating the documentation of materials.

Similar mismatches between formation and use practises have been addressed in existing literature typically as issues of lacking relevance in a context (e.g. **?**). The concept of relevance functions well in identifying an issue and situating it into a context. However, in an attempt to advance beyond the question of situational identification, another approach might be needed. One such viewpoint could be the ecological approach, which enables us to shift the focus from situational characteristics of knowledge states to the fringes of their formation.

The becoming of a knowledge state is highly dependent on complex mechanisms of formation. it is argued that the notion of affordances and constraints does offer some basis for understanding the formation criteria of emerging knowledge states. An observation that an eventual knowledge claim is dependent on its referential data is seemingly trivial. However, considering a process of a knowledge state emerging out of preexisting knowledge, its foreseeable outcome is far from being unambiguous. Therefore it is fairly safe to allege that a collection of knowledge assets does not end up in a predestined knowledge state. The reasons for particular variations may be found in individuals and their cognitive processes (as emphasised in the cognitive viewpoint, see **?**) and in social context (as emphasised by the multitude of socially aware viewpoints such as social constructivism and constructionism, see**?**). The potential contribution of the ecological approach to the discussion could be that besides the information processor and a relatively ambiguously definable context, some constituent constructors of knowledge states do reside also in the structural factors of form, organisation and presentation of the claims.

An evident structural factor behind a knowledge claim is the necessarily existing, either explicit or implicit historically formed discoursive standpoint assumed in the process of organising knowledge (**?**). Further perceivable factors include internal organisation of knowledge within a system, its presentation and the functional capabilities for processing, interrelating and searching the content. Taking these various aspects into account, it is plausible to claim that the formation process, structure and functionality of any individual knowledge organisation system do afford some distinct types of secondary knowledge claims to take shape. Respectively some competing knowledge claims are more unlikely to emerge within the confines of a given system.

The relevance of ecological approach for knowledge organisation lies in the possibility to examine knowledge formation and the processes of organising and

using knowledge as interlinked and contextually anchored projects instead of series of actions related to a thing called 'knowledge' or 'knowledge claims'. As already noted the coming to being of an affordance requires shared understanding of the environment. Affordances and constraints are based on knowledge, but they are also relayers. The basic argument of the present paper is to suggest that a knowledge organisation system constructs a distinct set of ecological affordances and constraints beyond the original knowledge claims. In this perspective the quintessential observation is that a knowledge organisation system is not as much a system of organising objects titled as knowledge claims, but a framework of constructing an environment of affordances and constraints usable in a warranted knowledge formation process.

4 Discussion

The empirical data discussed here was gathered in a interview study of Nordic archaeology professionals' (n=25, each individual is referred with a capital letter) information work. Thematically structured interviews were conducted in person by the author. The part of the interview referred in the present contribution relates to the conversations on existing knowledge organisation systems in archaeology.

The findings from the present study point out affordances and constraints in a number of passages where the informants described their information work. According to the respondents the contemporary archaeological research tends to prioritise social and cultural dimensions of the past in its contemplation on archaeological remains (see also **?**). On the other hand it has become increasingly apparent that the process of documentation and especially storage and archival of preserved objects makes addressing of some precise questions rather difficult. Catalogues and publications afford essentially research outlined by classification according to materials, size and provenience instead of, for instance, functional categories or visual characteristics [I, J, N, O, R, V]. Similar difficulties are immanent with research designs pursuing for comparative observations between various sites, locations and periods. Such attempts are practicable almost only in rare projects incorporating years of laborious studies and accumulation of long personal experience and specialised knowledge on the particular materials.

Reasons for the relatively artefact centric data management is at least partly premised on practical reasons. Functions and visual characteristics are more subjective, and to a degree less controllable notions than quantitative variables. An observation of the weight of an object is more achievable to standardise. Similarly a documented quantitative characteristic is likely to show less variation between individual observations. Attempts have been made to improve the descriptiveness of the archaeological documentation. Guidelines have been introduced to get archaeologists to add interpretative information in field work documentation. Besides the bare policy work, educators and designers of the new field work data and collection management systems have taken endeavours to catch more subjective and informal comments besides the quantitative and

formal indications [N, R].

According to the views expressed by the interviewed, it seems reasonable to suggest that material remains are in a figurative sense 'bound' to privilege essentially materialistic interpretations. The physical form of an artefact could be described as an infrastructural characteristic representing a set of constraints and affordances. These tendencies do not relate to the affordances and constraints posed by a system of organising archaeological or historical source material, but to the form of source material itself, which may be either emphasised or deemphasised by a knowledge organisation scheme.

Considering the feasible aim of attempting to enable archaeological work through adapting workable knowledge organisation systems, an important notion is that the infrastructural level of knowledge organisation is capable of augmenting the constraints of the first level instead of providing broader affordances. A critical observation on the present state of the affairs could suggest that this is a rather prevailing situation at the moment. However, even if the reasonable practicalities of archaeological work tend to steer the documentation and information management work towards easy documentation in the expense of usability, something might still be done. Regular reflection of the usage aspects during the cataloguing work, and at the minimum, relatively simple consideration of the probable forthcoming research use of the data could provide an information repository with a wide range of complementary affordances. As somewhat more advanced measures, a wide usage scope analysis, introduction of consequent parallel knowledge organisation schemes, implementation of a possibility to update and replenish existing system would provide more opportunities to enable further affordances and minimise constraints. In case of archaeology, an ideal measure to enable knowledge organisation would be a system, which would provide a radically new method to work with transient categories and classifications changing in the course of time.

5 Conclusions

The constituent contribution of the ecological approach for the broad scope of knowledge organisation research is in the process of making contextual factors of information work and knowledge discovery more explicit in the form of affordances and constraints. Acknowledging the ecology of knowledge organisation systems would enable developers and knowledge managers to enhance information usability by providing affordances for distinct work processes. Constraints might be used both positive and negative sense. A constraint may be for benefit in steering the knowledge work of an organisation to a desired direction. Simultaneously the notion of constraint might be used as an analytic tool to identify obstacles of efficient information work. After an organisation has become aware of the impediments, the constraints may be lifted or bypassed.