Exploring Structuration in Knowledge Organization: Implications for Managing the Tension Between Stability and Dynamism

Abstract: This paper builds on numerous suggestions of the need for a theoretical basis for knowledge organization from the point of view of interest, concern, or problem (e.g., domain, ecology, use environment, or language game). This is accomplished by first developing a possible theoretical understanding of why knowledge organization schemes tend toward stability through structuration and autopoiesis. In understanding this tendency, the possibility of promoting (desirable) change is also considered through activity. Second, the paper considers the requirements for the contextualization provided by such mappings. Finally, the case of the Internet is briefly explored. All of this provides a recipe a theory for practice ‘stew,’ which would highlight the possibility that just as structures (e.g., classification schemes) enable actions (e.g., information retrieval, knowledge transfer), actions enable structures. For this theoretical stew to influence practice, rules and resources—the structures of a knowledge organization scheme or system—must both support self-reflection and needs for consistency and adaptability. The virtuality of the developing electronic information world suggests the possibility of both coexisting through, for instance, mappings or crosswalks.

1. Introduction
One stimulus for this paper has been the foundation laid by the contributions of those who have seen the importance of providing a theoretical foundation for knowledge organization. These contributions include calls for the application of notions related to domains (Albrechtsen & Hjørland, 1995; Hjørland, 1997), boundary objects and information ecologies (Albrechtsen & Jacob, 1998), information use environments (Taylor, 1991), communities of practice (Wenger, 1998) and language games (Andersen & Christiansen, 1999) as theoretical bases for aspects of knowledge organization. As all of these calls seem to be alternative approaches for the contextualization of knowledge organization, the question of interest here is how might we employ such theoretical conceptualizations to inform the practice of knowledge organization?

Another stimulus has been the tension between stability—the need for consistency, comparability, and control—and dynamism—the need for flexibility, variety, and adaptability in classification schemes. It, accordingly, seems that one desirable element in developing theory for practice to support the development of knowledge organization schemes is some reconciliation or accommodation of this stability/dynamism tension. The question here is whether such an accommodation is possible?

The paper explores these two stimuli and in doing so attempts to move us closer to a theory that supports the practice of knowledge organization.

2. Stability and Dynamism
This section briefly considers the question of accommodation by reflecting on some of the approaches for dealing with this issue. Several social theorists, including Berger & Luckmann (1967), Giddens (1984), Luhmann (1995), have written about the mutual constitution of society and the individuals populating it. In particular, structuration, social systems theory, and activity theory are considered here. It seems critical to incorporate systems thinking about knowledge organization in considering the tension between stability and dynamism.
2.1 Structuration

Gidden's (1984) structuration theory seems to have had the greatest impact over time (over, for instance, Berger & Luckmann (1967) and Luhmann (1995), though they and others have offered earlier similar templates). Gidden's term, therefore, is employed, though not in a way that is totally true to Gidden's writings with all of their complications. His general idea is used along with interpretations and elaborations in application to knowledge organization to incorporate systems thinking into the theoretical 'stew' of knowledge organization.

Key to structuration is the idea of duality of structure—that structures (resources and rules) constrain actions; actions, in turn, influence structures by either maintaining or altering them. Key aspects of structuration include: 1) the transfer of meaning through interpretative schemes and communicative acts (signification); 2) the exercise of control through resources and acts of power (domination); and 3) the presentation of values and goals through norms and acts of sanction (legitimation). These aspects seem to map well to what happens in the construction of categories and the application and use of classification systems, and, in turn, structure or constrain the possible actions.

Bowker & Starr's (1999) explication of the International Classification of Diseases (ICD) (as well as other knowledge organization schemes in the health area) provides numerous examples of the interaction of structure and action in knowledge organization. On the one hand, there has been an evolution in the ICD (through 10 editions) that reflects both advancing knowledge about, for instance, causes of death; on the other, acceptance of ICD-10 has been limited by the use in the United States of a clinical modification, based on ICD-9 (ICD-9-CM), "...for billing, insurance, and administration as well as patient medical records" (p. 71). Thus, for the optimist structuration implies an ability to change (dynamism); for the pessimist structuration offers an explanation for stability.

2.2 Social Systems and Autopoiesis

To elaborate on the tension between stability and dynamism, there is a need to go beyond the foundation provided by structuration. A critical addition is Luhmann's (1995) expression of the self-referential nature of social systems, which he names autopoiesis. Such self-referential systems are closed. That is, once social systems come into being, the structural elements of the system (e.g., indexing rules, index languages) limit possible actions in such away as to reinforce existing rules and maintenance of existing languages. Evidence of autopoiesis can be seen in many of the knowledge organization schemes of the information field. Library of Congress Subject Headings (LCSH) is an often-cited example of a cumbersome, very slowly updated subject indexing language with many archaic headings whose structures tend to support maintenance of consistency, comparability, and control over change in general or even within particular disciplinary areas. All of this is despite the existence of much grumbling, most notably by Bennan (1993). As such, autopoiesis clarifies the nature of the pessimistic constraint view to structuration.

Luhmann's notion of autopoietic systems seems critical because the closed nature of autopoietic systems makes it difficult to open up the system to what is happening within other such systems because the accommodation of the additional complexity that would be required to adapt would destroy the integrity of the focal system's resources and rules. Exploration of this notion of autopoiesis in knowledge organization may help elucidate the costs and benefits of creating systems that attempt to balance stability and dynamism. That is, while designing and building knowledge organization structures is difficult enough, their maintenance and updating is likely to be problematic without their explicit accommodation in the design and building process—the incorporation of structures for change.

A potentially positive example of this explicit accommodation is the Oxford English Dictionary (OED). Despite sporadic supplements and additions, the OED has not been completely updated since 1928 until just recently. The OED, in addition to now being
available via the Web, has a mechanism for continuing update, which currently provides for a ten-year complete update cycle. As one of the goals of the OED is to provide a history of the English language, no word is ever deleted. Rather, the history and evolution of usage of words is maintained and actually facilitated by this continuing update process.

2.3 Activity Theory

In the spirit of the OED, activity theory is offered as an addition to the theoretical stew to suggest that one possible way of dealing with the stability engendered by autopoiesis is by augmenting action producing rules and resources with those that are focus on self-reflection and adaptability.

While some who write about activity theory suggest that it really is not a theory but analytical and methodological in nature, it appears to incorporate the theoretical, analytical, and methodological within the range of variations and elaborations employed by researchers. Activity theory seems theoretical in that it attempts to develop a unified account of knowing and doing for some situation. It seems methodological in that it provides a framework for studying a situation. It seems analytical in that it points attention to certain elements—agent, object, community—and their interactions—instument/concept, rules, and roles/division of labor (Blackler, 1995).

To use an example from Engestrom’s (1991) study of a medical practice in Finland, the agent was a physician, the object of activity a series of health care priorities (e.g., the health status of a patient), and the community a health care practice. The activity approach builds on the description of these elements to understand the nature of knowing and doing and associated tensions via their interactions. The interactions in the health care practice involve such instrument/concept as models or procedures of care, such rules—implicit or explicit—as patient classification, and such roles or division of labor as the fragmented allocation of patients to physicians.

Such analyses help to identify tensions that occur when individuals come together in social situations and interact among themselves and with artifacts such as the ubiquitous categorizations that support human activity. This sort of analysis offers the possibility of contextualizing knowledge organization devices to understand if and how they limit knowing and doing (action) and feeds a further analysis of what to do to renew structures. It is also worth noting that this contextualization suggests a theoretical view that focuses on interaction, adaptation, and fit with situation. Thus, if a knowledge organization scheme is designed to support some function (e.g., information retrieval), we may learn that it not only has problems in doing this, but that there are other struggles going on related to what ‘information’ is or how it is used.

2.4 Discussion

Within the frame of theory for practice, there are several matters that need to be consolidated at this point. One is the recognition that even though we often act as if the world were static in the information field, it is in motion and without adaptive mechanisms our knowledge organization schemes are likely to become less and less appropriate over time. Some of us (myself included) have been heard to say that our knowledge organization schemes need to be seen as living things. This does not happen by chance, we need to make it so. The question though is how? Structuration provides a theoretical framework on which to hang this tension between the static and dynamic.

The idea of structuration by itself cannot breath life into the unchanging. While recognizing that structure may empower change (optimistic view), it also may limit change due to the self-referential nature of social systems (pessimistic view). If autopoiesis turns out to be something that can be managed through systems design—recall that the more we do to increase a system’s reference, the more complex it becomes, we are left with the problem of
defining what the structures of system learning and deciding will be. After all, change for change's sake is not the goal. Rather, these structures need to allow learning from error, breakdowns, and experience.

This leads to the question of what might these learning structures look like? While activity theory is not the only possibility here, it serves as an example of one approach (among many) that might be employed to support this learning. These approaches seem to have a common element of contextualization of the interactions of people in social situations involving knowledge organization schemes and other resources/artifacts. Thus, a remaining issue has to do with the nature and character of this contextualization.

3. Approaches for Contextualizing Knowledge Organization

The term contextualizing is employed here to stand for the process of how people come to know or make sense of their situation. Thus, the focus of this section is not so much on the particular views of contextualization that have been offered as theoretical bases of knowledge organization, but on the nature of knowing. Yet, it will be useful to briefly highly the essence of these approaches (see Table 1).

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<th>Strategy</th>
<th>Bibliographic References</th>
<th>Overview</th>
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<tr>
<td>Domain</td>
<td>Albrechtsen &amp; Hjørland (1995); Hjørland (1997)</td>
<td>&quot;...the best way to understand information ... is to study knowledge-domains as thought or discourse communities .... Knowledge organization, structure, cooperation patterns, language and communication forms, information systems, and relevance criteria are reflections of the objects of the work of these communities and their role in society&quot; (Hjørland &amp; Albrechtsen, 1995, p. 400).</td>
</tr>
<tr>
<td>Information</td>
<td>Albrechtsen &amp; Jacob (1998); Nardi &amp; O'Day, 1999</td>
<td>Ecology generally refers to the relationships between living things and their environment. Here, the term is used more specifically to indicate a concern for the relations between people, technology, and other related artifacts from which information is drawn. Albrechtsen &amp; Jacob suggest that: “In an information ecology, a classification system should function as a boundary object, supporting coherence and a common identity across the ... actors involved” (pp. 300-301)</td>
</tr>
<tr>
<td>Boundary Objects</td>
<td>Wenger (1998)</td>
<td>The intent of the idea of a community of practice is to indicate the result of a social theory of learning, which incorporates meaning, practice, community, and identity.</td>
</tr>
<tr>
<td>Language</td>
<td>Mauws &amp; Phillips (1995); Andersen &amp; Christensen (1999)</td>
<td>Inherent in the idea of language games are the struggles of participants in the games to create, form, and constitute their current reality. Mauws and Phillips suggest that &quot;...the notion of 'language games' is fundamentally opposed to the idea of 'calling things by their right names.' It is, instead, about the struggles which take place in determining what is right and what, for a time, may become fact” (p. 330). In addition, Anderson &amp; Christensen argue that words obtain their meanings not from their denotation of objects or actions; rather they obtain from the language game (discourse context) of their use. They further suggest that a theory of indexing needs to indicate how meaning develops.</td>
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<tr>
<td>Games</td>
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Table 1: Summaries of Contextualization Strategies

Whatever we name these contextualizations, they seem to have the common element of providing a situational focus to the development of knowledge organization schemes. While this is attractive, we need to go beyond the situational to ask: How might these viewpoints be
employed to advance knowledge organization? A domain such as Psychology would have existing knowledge structures (e.g., *Thesaurus of Psychological Index Terms*) that would provide a snapshot at some point in time—usually not quite up to date. These existing structures might even be satisfactory for the mainstream of psychology, but do we need to go further to map alternative viewpoints?

In exploring the *Thesaurus of Psychological Index Terms*, the experimental paradigm seems well covered; arguably the behaviorist paradigm seems less so; predecessors of these paradigms are not evident in the structure. Do we need to map the evolution of conceptions and their relationship to theories—past, present, or developing? Scope notes accomplish some of this. Yet, while concepts from long ago (e.g., conation, which focuses on people’s action instincts or preferences) are not part of the index language and, therefore, the indexing, even though the concept is being employed again in current psychological discourse. From another point of view, the language game of the psychological experiment provides its own structure and metalanguage to support indexing, but is this language game of the expert sufficient or do we need to consider the language game of student novice?

As the intent of each of the contextualization strategies in Table 1 is to provide a more comprehensive view of what information or knowledge is that is related to how people know, make sense, solve problems, learn, or however we care to characterize the broader context in which information comes into play (in the spirit of the activity theory approach outlined above), it seems useful to ask: *What is knowing?* Blackler (1995) suggests that knowing is a multidimensional concept. That is, it is situated, mediated, provisional, pragmatic, and contested. Table 2 provides an overview of these conceptual elements.

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<th>Dimensions of Knowing</th>
<th>Summary</th>
<th>Potential Influences on Knowledge Organization</th>
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<tr>
<td>Situated</td>
<td>Located in time &amp; space; placed in some context</td>
<td>How do the nature of skill &amp; task requirements &amp; related knowledge organization support requirements change with task?</td>
</tr>
<tr>
<td>Mediated</td>
<td>Manifest in systems of action: language, technology, collaboration, control</td>
<td>Does the knowledge organization scheme help people to improvise, communicate, &amp; negotiate as systems of action evolve?</td>
</tr>
<tr>
<td>Provisional</td>
<td>Evolving &amp; developing</td>
<td>How are the tensions that develop as the situation changes supported through knowledge organization approaches?</td>
</tr>
<tr>
<td>Pragmatic</td>
<td>Driven by some aim or purpose</td>
<td>How are multiple purposes accommodated via knowledge organization schemes?</td>
</tr>
<tr>
<td>Contested</td>
<td>Resulting from the interaction of participants and artifacts</td>
<td>Do knowledge representation schemes provide crosswalks to accommodate differing positions or points of view?</td>
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</table>

Table 2: Some Dimensions of Knowing

The strength of all of the contextualization strategies listed in Table 1 lies in their attempts to situate knowledge organization schemes in the work interactions of people and artifacts. The realization of this strength comes when we are able to step outside of our knowledge organization schemes, see people’s struggles as they go about knowing and doing, and design, implement and maintain structures that support these activities. This realization is of critical importance. While each of the contextualization strategies recognizes this need in various ways, the elaboration on knowing that is provided in Table 2 offers the potential of helping us look from outside to in.

The situated dimension focuses attention on the patterns of work and life, what constitutes information, how people struggle to gain and interpret information, and the role (or potential role) of knowledge organization structures in the situation. The mediated dimension focuses attention on existing structures that support communication, information
transfer, and action. We may find that problems and resulting struggles have less to do with classification decisions than with struggles due to terminological misunderstandings. The provisional dimension highlights issues of movement through time and space—as the world turns. Understanding the nature of environmental turbulence or technological change as they influence a situation should provide some sense of the need in knowledge organization schemes for an ability to support consistence, rapid change, or some mix of the two. The pragmatic dimension recognizes that knowledge organization schemes potentially support a variety of purposes. While we tend to focus on information retrieval in the information field, attention to such matters as organizational learning, knowledge management, and discovery will provide insights into the nature and form of supporting artifacts. The contested dimension gives voice to power and conflict in a situation. An understanding of the nature of conflict in a situation may provide insights into how artifacts can be designed and structured to enable productive outcomes.

Taken together these dimensions provide keys to what a knowledge organization scheme must be and do in order to facilitate human activity.

4. Knowledge Organization for the Internet

It is interesting to consider the development of the World Wide Web to reflect on the points made above. When viewed as a whole it is difficult to situate the Web as it is both huge and touches most interests and facets of life on this planet. What began as something akin to an art gallery promises to be the commercial hub of the world and a prime mechanism for information transfer by organizations to their constituents. Almost from the beginning there have been two approaches to knowledge organization. The first is the more of less brute force approach of Web search engines that relies on structural elements like HTML and URL along with the actual content of a Web page to automatically index what is out there. This approach bring us all of the problems of free text searching expanded many times in that the vastness of the Web may lead to many more hits than anyone has time for viewing, including many that have no apparent relation to the query.

Yahoo!, in particular, has made use of a classification system and human indexers from the beginning to reduce these problems. The classification scheme has become so complex that many of the benefits of a classification for access are lost as people rely on keyword access, which may cause people to be lost on the wrong branch of the classification tree, to gain a point of entry while sometimes loosing context. Interestingly other search engines have begun to offer various classification-based schemes (e.g., folders) to help people navigate and focus attention on areas of possible interest. There has, thus, been a drift towards the more particular classification-based solutions of the second approach, including the rise of metadata and related structures such as XML to provide a potential bridging strategy between the global and specific. While it is to early to tell whether the flexible structure of metadata will prove a satisfactory bridge, the excitement surrounding the approach is evidence of (current) openness of the structure of the Web to use an understanding of problems to generate possible solutions.

The second approach is based in knowledge organization. Individuals, organizations, and broader encompassing institutions provide the structure necessary access to related Web pages. These resources tend to be disciplinary or community of interest in nature. This second approach follows in the tradition of indexing, abstracting, and reviewing in the information field to provide some quality control by providing links to well regarded pages, and offer brief representations in the form of categories, labels, and sometimes abstracts to help us judge applicability. Incidentally these resources tend to be more in tune with current terminology and classification of activities in the addressed discipline or community.

It seems that many prefer these targeted and focused gateway pages. One problem is in finding these pages in the first place, which leads us to the search engines again. Another
comes from the frustrations that arise when they are not maintained and updated on a regular basis. The ecstasy of design gives way to the agony of maintenance and update unless the maintenance and update is part and parcel of the continuing functioning of the overseer of the page. What is exciting about the Web is that it is a place for learning, innovation, and testing.

5. Conclusion
This paper has (all too briefly) explored some of the roadblocks in trying to develop theory for practice related to knowledge organization. The result is a theoretical/conceptual stew that recognizes that there is no one best knowledge organization approach for any situation and provides some ideas that may move us forward in our struggles to deal with such tensions as stability and dynamism and the multidimensional nature of contexts that we to contextualize. An optimistic view is that we can do a better job of balancing stability and change by incorporating rules and resources regarding the maintenance and update of knowledge organization schemes. In part, these rules and resources need to be used to provide a view of knowledge organization in context. A pessimistic view is that all of this will add so much complexity that such efforts will die of their own weight. Such efforts as the one being employed by the OED seem a reasonable compromise in maintaining the past and looking toward the future.

References