THE 7C MODEL FOR ORGANIZATIONAL KNOWLEDGE CREATION AND MANAGEMENT

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Abstract

This paper proposes a conceptual model for organizational knowledge creation and management, known as the 7C model. The model is based on the distinction of individual and organizational knowledge and explicit and tacit knowledge. The 7C model suggests that the seven Cs (Connection, Concurrency, Comprehension, Communication, Conceptualization, Collaboration, and Collective intelligence) play a central role in the knowledge creation process. The paper also analyzes the Web environment at technology, language and organizational contexts. On the one hand, it is suggested that previous research has focused on the technology and organizational contexts, and on the other hand it is found that some of the Web's inherent key features have not been utilized to the extent they should. The paper suggests that better support for the largely neglected language context, i.e. the most human-sensitive sub-processes of organizational knowledge creation (Comprehension and Communication), may be achieved through deeper utilization of the Web's hypertext functionality. Moreover, this approach may help organizations to improve both their core business activities and improvement capabilities as well as search for competitive advantage from business alliances.

Keywords: organizational knowledge, organizational learning, intra-organizational knowledge, communities of practice, knowledge management, knowledge networks.

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Abstract

This paper proposes a conceptual model for organizational knowledge creation and management, known as the 7C model. The model is based on the distinction of individual and organizational knowledge and explicit and tacit knowledge. The 7C model suggests that the seven Cs (Connection, Concurrency, Comprehension, Communication, Conceptualization, Collaboration, and Collective intelligence) play a central role in the knowledge creation process. The paper also analyzes the Web environment at technology, language and organizational contexts. On the one hand, it is suggested that previous research has focused on the technology and organizational contexts, and on the other hand it is found that some of the Web's inherent key features have not been utilized to the extent they should. The paper suggests that better support for the largely neglected language context, i.e. the most human-sensitive sub-processes of organizational knowledge creation (Comprehension and Communication), may be achieved through deeper utilization of the Web's hypertext functionality. Moreover, this approach may help organizations to improve both their core business activities and improvement capabilities as well as search for competitive advantage from business alliances.

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Suggested track: C Knowledge creation and innovation.

1 Introduction

Today's organizations are continuously faced with the challenge of complexity and urgency in their core business activities. The business environment is very hectic and organizations need to be able to cope with many different kinds of business, technological, social, and human requirements. There is an inherent need for organizations to improve their core business activities. In order to be able to solve

complex problems the individual and group problem-solving processes involved in computer-mediated communication systems need to be integrated (Turoff, 1991). On the basis of their studies of Japanese companies, Nonaka and Takeuchi (1995) proposed their widely known model of the knowledge-creating company. They argued that much of the innovation created and accumulated in a firm is actually based on tacit knowledge, i.e. arising out of experience, and cannot be easily communicated by workers within excessively formalized management procedures.

In the pursuit of organizational performance, an organization's capability to improve its core business activities becomes critically important. Engelbart (1992) proposes a conceptual framework for enhancing organization's capability, known as the Concurrent Development, Integration and Application of Knowledge (CODIAK). This framework emphasizes the harnessing of technology to achieve high-performance capability. In this kind of an approach it becomes essential, even if admittedly challenging, to improve the organization's improvement capability. Yet, this may become the high-payoff opportunity for organizations.

Organizations also need increased sharing of knowledge across organizational boundaries within their business networks. This enables the sources of innovation quickly to multiply as organizations are able to establish procedures to communicate experience in the organization and its business network. As an example, the electronics industry in the Nordic countries has been one of the forerunners in developing intensive partnerships and alliances in its value networks.

This paper aims at deeper understanding of organizational knowledge creation and management. It studies ways in which new knowledge management theory might help the performance of knowledge-intensive organizations through improving their capabilities to improve their own core business activities. Moreover, there are possibilities for highly knowledge-intensive organizations, such as software companies, for multiplying sources of innovation through business alliances, which requests new inter-organizational knowledge management practices.

Section 2 proposes a conceptual model for organizational knowledge creation and management based on the distinction of individual and organizational knowledge and explicit and tacit knowledge suggested by Nonaka and Takeuchi (1995). Section 3 aims at providing an idea about the feasibility and applicability of the proposed model for managing knowledge both within and across organizational boundaries, by giving emphasis for the improvement of organization's improvement capabilities as well as the crossing of organizational boundaries through business alliances or networked

improvement communities. Finally, section 4 summarizes and discusses the contribution of this paper.

2 Understanding organizational knowledge creation

This paper proposes a new conceptual model for understanding organizational knowledge creation. This is known as *the 7C model*, which suggests that the following seven Cs play a critical role in the creation of organizational knowledge: Connection, Concurrency, Comprehension, Communication, Conceptualization, Collaboration, and Collective intelligence.

The 7C model may be described through different abstraction levels. See Fig. 1. Lyytinen (1987) defines the technology, language and organizational contexts as follows: In the technology context an information system confines object systems to a view of how efficiently data are processed and stored in a given material carrier, in the language context it provides a means and environment for comprehension and linguistic communication, and in the organizational context it supports, enables and takes part in an organizational process involving human interactions and collaboration, e.g. decision-making.

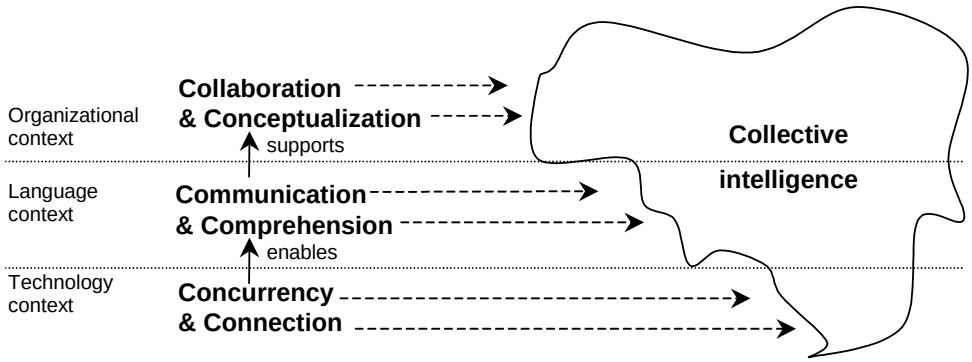

Fig. 1. Organizational knowledge creation at different contexts.

The benefit of the 7C model is realized in the technology context through the fluent *connection* that the Internet technology provides with information for several *concurrent* users (the 1st and 2nd Cs).

In the language context, the hypertext functionality's ability to promote options and allow freedom of choice with contextual support provides users with a rich environment for *comprehending* (the 3rd C) and *communicating* (the 4th C) the information they find (Thüring et al., 1995). Information readers can access the information in the most suitable order for their purposes instead of the pre-defined, sequential order implied

within many other electronic or printed documents. Likewise, information authors who provide multiple relationships around a piece of information can themselves gain a better insight through the enriched context.

In the organizational context, knowledge artifacts are *conceptualized* (the 5th C) as knowledge artifacts, which serve as a *collaboration* vehicle through interaction between information producers and consumers, within a team of co-workers or among other stakeholders (the 6th C). In general, support for understanding and communication helps in the individual learning of new things, and organizational learning mainly takes place through individuals and their communication and collaboration efforts. All of these six preceding Cs contribute to the growth of "togetherness" or *collective intelligence* (the 7th C). This might also be called the organizational memory.

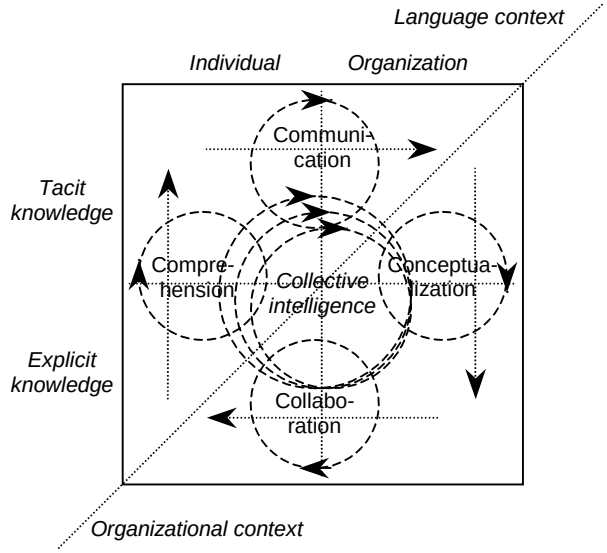

Fig. 2. **Organizational knowledge creation.**

The creation of organizational knowledge is not a linear process, but rather a multi-cycle spiral process. See Fig. 2. The framework assumes that *Concurrent Connection* of all stakeholders with the joint information space is provided in a technologically sound manner, e.g. through the Web, Internet, wireless, mobile and other technologies. The 7C model follows Nonaka and Takeuchi (1995) in that the integration of individual and organizational orientations is emphasized and that knowledge is assumed to create through interaction between tacit and explicit knowledge (Tervonen et al., 1997), and Engelbart (1992) in the outcomes of the Comprehension, Communication and Conceptualization sub-processes.

The four key phases or sub-processes in the knowledge creation are:

- *Comprehension* – a process of surveying and interacting with the external environment, integrating the resulting intelligence with other project knowledge on an ongoing basis in order to identify problems, needs and opportunities; embodying explicit knowledge in tacit knowledge, "learning by doing", re-experiencing
- *Communication* – a process of sharing experiences between people and thereby creating tacit knowledge in the form of mental models and technical skills; produces dialog records, which emphasize the needs and opportunities, integrating the dialog along with resulting decisions with other project knowledge on an ongoing basis
- *Conceptualization* – a collective reflection process articulating tacit knowledge to form explicit concepts and systemizing the concepts into a knowledge system; produces knowledge products of a project team, which form a more or less comprehensive picture of the project in hand and are iteratively and collaboratively developed; may include proposals, specifications, descriptions, work breakdown structures, milestones, timelines, staffing, facility requirements, budgets, etc.; rarely a one-shot effort
- *Collaboration* – a true team interaction process of using the produced conceptualizations within teamwork and other organizational processes

Each of the sub-processes may also be regarded as the building of an artifact and reasoning why it has been built the way it has. Going through these phases several times in a seamless spiral-like way step by step leads into the growth of *Collective intelligence.* Support for capturing deep individual thinking and recording the dialog between team members may help create truly innovative knowledge products.[1]

While the Comprehension and Communication in the 7C model are similar with the internalization and socialization concepts in Nonaka and Takeuchi (1995), the Conceptualization and Collaboration in the 7C model do not have explicit correspondences within their framework. Conceptualization in the 7C model includes features of both externalization and combination, while Collaboration, i.e. the use of the conceptualizations, has not been explicitly addressed in their framework.

[1] The learning involved in the comprehension and communication processes is closely related to the attitudes of the participants, i.e. whether they understand their weak points in the sense of learning styles, for example.

In previous research on Web services and knowledge management, the technology (Connection, Concurrency) and organizational (Conceptualization, Collaboration) contexts have received relatively large attention, while the language (Comprehension, Communication) context has received less attention. Admittedly, it may be easier to provide support for technological and organizational contexts, but similar attention should be given to supporting the most human-sensitive sub-processes of organizational knowledge creation, namely Comprehension and Communication.

One of the most central features of Web information systems is its inherent hypertext functionality. Hypertext functionality supports the relating of pieces of information to each other associatively, its key features comprising enhanced linking, annotation, orientation and navigation capabilities as a seamless part of the information system (Oinas-Kukkonen, 1995). Quite interestingly, many of these features have not yet been utilized to the extent they could in supporting the organizational knowledge creation and management (Bieber et al., 1997).

For example, capturing annotations and building typed hyperlinks may support both Comprehension and Communication. When users pay special attention for the true semantic of a link, i.e. what really is the connection between the two pieces of information that the link connects, they are forced to go deeper into the content and its meaning for other users. A link may contain information about its type or other attributes. Naturally, when navigating inside the joint information space the end-users benefit from such definitions. In a similar manner, annotations may serve as an important documentation and reasoning tool for the users and as a communication vehicle between the users. Many other hypertext functionalities (Bieber et al., 1999) may also be utilized to provide better support for organizational knowledge creation. These may also facilitate product innovation.

3 Crossing organizational boundaries through networked improvement communities

Douglas Engelbart proposes a strategic conceptual framework for enhancing organization's capability, known as the Concurrent Development, Integration and Application of Knowledge or CODIAK (Engelbart, 1992; Engelbart, 2000). Organization's core activities are described as A, B and C-work. See Fig. 3. The goals differ at each level. A-work denotes the core business activities, B-work tackles improvement of the core business activities, and C-work addresses improvement of the improvement capabilities. As such, the full approach in itself may be regarded as a

core business competence in the organization's capability infrastructure and as an ideal candidate for early improvement to achieve extra bootstrapping leverage.

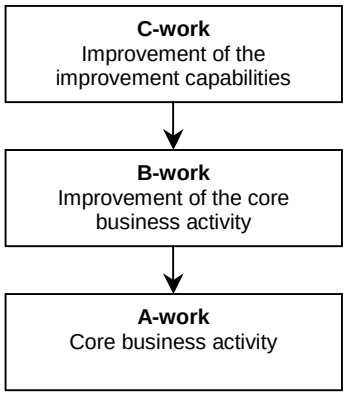

Fig. 3. The goals of A, B, and C-work (adapted from Engelbart 1992).

In Engelbart's framework, much of the knowledge would be shared and distributed through "knowledge workshops" or information spaces belonging to knowledge workers and their groups. Special "community knowledge workshops" focus especially on C-activities, and the use of computerized information systems enables a two-way transfer of knowledge among the C, B, and A-communities. Each organizational unit needs its' own working processes and knowledge domains, but at the same time they will all have some knowledge elements and dynamics that are mutual. Ideally, the enterprise sub-domain processes will benefit from being interoperable with other sub-domains. Similarly, corporate-wide task forces and subcontractors, suppliers, alliance partners, customers and others will become involved to the extent that knowledge-domain interoperability is needed.

To accomplish this a very flexible, wide-area sharing of pieces of the knowledge base is needed, such as the Open Hyperdocument System, which would provide for a range of user interface options, varying in areas such as complexity, potential competence level, difficulty of learning, types of interface devices and modalities (Engelbart, 2000). An example of this is the ability to create and use information through Web-connected mobile phones or palmtop computers independent of the time, place and context of use.

Interestingly, according to Engelbart (2000) many of the practices and tools will be regarded as natural and easy to use after they have become well established, even though they may be initially viewed as unnatural and hard to learn. Engelbart (1992)

notes: “The graphical user interfaces have been heavily affected by the “easy to use” dictum. This has served well to facilitate wide acceptance, but it is quite unlikely that the road to truly high performance can effectively be traveled by people who are struck with vehicular controls designed to be easy to use by a past generation.”

When the C-activity improvement takes place across organizational boundaries, *networked improvement communities* may emerge as a new but natural way of forming business alliances. Yet, the way to share business-related information with others is naturally always a matter of serious concern. One immediate thought is often that it would be impossible to share anything with competitors, because so many things are proprietary. Another line of thought concerns what useful things there would be in another business domain for a company to share. The A activities may be very competitive, but B activity tends to be less so, many of the things being more basic and generic, and the C activity even seems to focus on basic and generic matters. So even competitors could consider cooperating at the B and C levels. On the other hand, B activities differ less between businesses than A activities, and C activities may be surprisingly alike.

In some cases collaboration may very clearly be of value in a business sense, e.g. in the case of the procurement of appropriate systems and services. It might also be more expensive for each organization to operate its own advanced pilots and develop products privately than to do it within a networked improvement community. Moreover, the C-activity leaders may find it valuable to compare experiences and basic approaches with their counterparts in other organizations. As an example, they may be considering how much it would help the B activity to document the way in which things are done at present. Thus partner organizations may acquire value from C-community access and dialog, and they may consider multi-party alliances. According to Engelbart (1992), this improvement of improvement capabilities, and in particular through networked improvement communities, is the high-payoff opportunity to create high-performance organizations.

To a great extent, these networked improvement communities seem to operate similarly to *business alliances* which denote high value integration and a high level of self-organizing (Tapscott et al., 2000).[2] High value integration means that collaborators

[2] Five types of strategic business networks are discernible in a digital economy: supplier networks, producer networks, customer networks, standard coalitions, and technology cooperation networks. The strategic networks can be divided on two dimensions: self-

integrate value contributions from the members of the network in producing their offerings. In self-organizing business networks the market and its dynamics define the value and price level of the offerings. The main theme of alliance b-webs is creativity. Value proposition takes place through *creative collaboration* with the aid of a goal shared by a community of contributors, *customers participate as co-contributors*, *the focus of knowledge is on community and creativity* as well as standards and roles, and *the main organizational process is innovation*.

4 Conclusions

This paper introduced the 7C model for organizational knowledge creation and management. The benefit of the 7C approach can be achieved in the technology context through the concurrent connection of many participants with the information, in the language context through support for human comprehension and communication, and at the organizational level through conceptualizing the knowledge artifacts and supporting collaboration. Yet, it is the seamless cyclic nature of the whole process, which enables the true growth of collective intelligence.

This paper also integrated the model with Engelbart's framework for concurrent development, integration and application of knowledge within networked improvement communities, demonstrating the applicability of the proposed 7C model both inside organizations as well as at crossing organizational boundaries. A competitive organization may implement support for A, B, and C-activities in its business processes before their competitors. The improving of improvement capabilities is never-ending in turbulent, competitive business environments with fast-evolving technology and rapid changes in personnel as new employees march in and others leave. This also enables the establishment of new kinds of business alliances through networked improvement communities. These business alliances denote high value integration and a high level of self-organizing, setting emphasis on creative collaboration, customer participation, community knowledge, and organizational innovation.

Several important issues arise for further research. Since Web-based solutions are so dominant today, the possibilities of standard and more advanced Web technologies for

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organizing/hierarchical economic control, and low/high value integration. These two dimensions define the fundamental characteristics of five different broad types of b-web: agora, aggregation, value chain, alliance, and distributive networks (Tapscott et al., 2000).

supporting the seven Cs should be studied. It will also be important to study how the key software functionalities and the different sub-processes of organizational knowledge creation may be mapped with each other. Research should also be carried out off the Web, if only because the solution space may be limited by the Web's dominance. One healthy off-the-Web research direction would be to study mobile and pervasive technologies in relation to organizational knowledge creation processes. It will also be essential to know how to motivate knowledge workers not only to carry out their daily tasks but also to address the improvement capabilities of core business activities and the possibilities for improving these improvement capabilities. Finally, the described 7C model should be further elaborated and experimented with.

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