Deep Learning and Optimization of Organizational Memory

Anis Sefidanoski

European University – R.M, Sv. Kliment Ohridski Blvd. 68, Skopje, Macedonia

Abstract **– Knowledge is the greatest and the most valuable asset a company can have. With every customer interaction we learn more and get closer in providing the best possible customer service and experience. Employees are using valuable time and information dealing with dispersed data and information silos. Deep Learning (DL) based organizational memory (OM) platform aims to make information tangible, measurable and omnipresent in order to create 360 degree awareness of your corporate knowledge using cutting edge technologies, i.e. Artificial Intelligence (AI), Big Data, Machine Learning (ML), Internet of Things (IoT), Natural Language Processing (NLP) and predictive analytics, combined with the power of the new communication paradigms and interaction styles. Ubiquitous capture, processing and dissemination of knowledge will deliver unified and continuous knowledge management experience and evolve the way organization learns and works.**

Keywords **– Organizational Memory, Deep Learning, Artificial Intelligence, Big Data, Machine Learning.**

1. Introduction

In recent years, organizational aspects related to information, knowledge and intellectual capital management have been widely explored: many scientists have in fact analyzed the organizational implications linked to the creation, storage, circulation and usage of corporate and organizational memory [1]. The various proposed models have highlighted many particular aspects of some social and psychological issues that come into play in relation to the various forms that organizational memory can assume. A factor that integrates the plurality of existing models which can be found both on the market and in the academic literature embodies the presence of a life cycle through which knowledge evolves during the realization of the business processes, be they managerial, operational or of any other nature.

One of the main objectives of this research is to increase consistency of information and standardization of processes as well as increase efficiency of accessing the specific information that workers and/or customers need. In order to be able to search both internal and external information (corporate IP and 3rd party databases) with a single natural language query, our proposed model will consolidate the organization's information assets into a single repository. Through the enhanced search and discovery options which make it easy for users to find information no matter where it originates, the right information will arrive to those who need it at the place and right time.

A DL platform for optimized OM is continuously training to proactively publish top-down qualified information, while capturing, managing and sharing knowledge from every unique issue related to the core business processes. It can use skills and experience inherit in the employees and customers for the benefit of everyone in order to apply derived corporate wisdom at any step of the customer experience.

2. Intellectual Capital Management

The management of organizational memory is to be understood as a process of diffusion, in which information and data created by individuals or other entities is systematized internally within the corporate network [2]. This process often is represented by a spiral by which knowledge is always evolving and regenerated. This spiral concerns the dynamics of knowledge creation based

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Corresponding author: Anis Sefidanoski,
European University – R.M, Sv. Kliment Ohridski Blvd. 68, Skopje, Macedonia
Email: anis.sefidanoski@eurm.edu.mk

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on tacit/explicit conversions through socialization processes, outsourcing, integration, unification, internalization and externalization. The activities of creation, acquisition, dissemination, fruition and application of knowledge to business processes primarily involve individuals, which are strongly influenced both by social and organizational dynamics. The management of the corporate knowledge therefore concerns not only economic and technological, but also psychological and organizational aspects. Technology, therefore, plays a central role in building management solutions of the intellectual capital of the company. This implies that the initiatives of management activities related to organizational memory risk failure if they do not implement adequate, effective, efficient technologies or they underestimate some of the many aspects linked to it.

2.1 Organizational models and IT solutions

Socialization is the process of transferring tacit knowledge from an individual to an individual, without any previous information processing or data transformation. Tacit knowledge transfer does not happen via the natural language itself, but through a learning process based on observation, imitation and experience (learning by doing method). This aspect of knowledge management has a fundamental role, as it contributes to the enrichment of human intellectual capital present in the organization [3]. Socialization is supported above all by the technological tools of groupware and synchronous or asynchronous communication and collaboration such as video conferencing, e-mail, instant messaging, chat, forums, e-learning and other forms of communication.

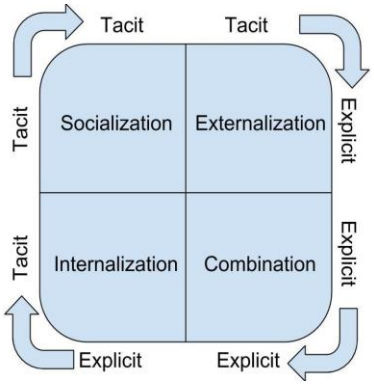

Figure 1. The SECI model of knowledge dimensions

Outsourcing concerns the transformation of a tacit knowledge into explicit and represents state of the art in the theory of corporate learning [4]. To perform the encoding of the tacit knowledge of an organization, which by default is represented in a decoded form, we make use of a natural language processing in order to perform different degrees of information and data structuring. This facilitates the process of information conversion that tends to develop around specific communication schemes and interaction between corporate members. Continuity of interaction and redundancy of contexts allow members of the organization to have real-time access to the ongoing corporate experiences. Outsourcing has profound benefit from information and communication technologies (ICT) that enable capture and acquisition of explicit knowledge, classified storage, according to specific formats characterized from different degrees of structuring and formalization, in appropriate media that may be accessed by various hardware and software interfaces. The core technologies used in this module of the proposed platform are those of knowledge acquisition, database operations, document and content management, signal and information processing, etc.

The organizational memory combination consists in the transfer of explicit knowledge among individuals through corporate social interactions and typically takes place through dialogue and communication, enabled directly in synchronous and asynchronous form based on information technologies. Individuals exchange and combine knowledge by using different tools such as meetings, sharing documents, telephone calls, interaction via ICT networks, communication channels and collaboration. When the information from various sources is synthesized in a single report, a chart, or in a tool that allows you to express the status of the corporate processes, we use a mechanism for codification of knowledge that makes information complete and systematic in respect of the individual (explicit) or proprietary business data. This combination probably is the area where ICT plays key role. Explicit knowledge can be expressed through documents, emails, databases, web pages, and can be more or less processed according to the degree of formalization and structuring with which it is represented. The higher the degree of structuring, the more powerful and expressive the tools that process it (Databases, CRMs, ERPs, etc.)

Over the last few years, new technologies have been emerging on the market for the representation of formal ontologies and the management of semi-structured and unstructured data that can automatically turn explicit organizational memory to fully structured data. The most obvious consequence is that information technologies are transforming and widening the possibilities of processing and managing the intellectual capital composed largely of knowledge dispersed within and outside the corporate information systems. Interactive tools for e-learning, workgroup applications, synchronous and asynchronous communication modules like instant

messaging, e-mail, chat, forums, blogs, allow two-way communication both vertically (from the organization to a customer and vice versa), as well as horizontally (from an employee to employee or from a customer to customer). All functionalities are accustomed to online knowledge sharing and training based on continuous learning, thus developing the ability to search, generate, acquire and share knowledge in real time. This translates into a continuous evolution of intellectual capital in its various human, organizational and relational components. Appropriate orientation of the organizational structure and the adequate technological solutions to support this cycle can enhance the effects of knowledge management on the growth of the intellectual capital.

3. Knowledge life cycle

The knowledge produced by individuals, according to the social models described in the pages above, while being present in the form of the various dispersed components of intellectual capital (human, corporate and relational), circulates in the business processes of the organization through a precise life cycle, contributing to the creation of a value asset. In every organization there is a key process, transversal to all other business processes, taking into account organizational, motivational aspects linked to the management of knowledge, which makes use of the benefits offered by the knowledge data generated by the realization of managerial and operational processes [5]. Within this model, knowledge management can boost efficiency and effectiveness of business processes and contribute to the growth of intellectual capital and corporate education.

3.1 Dissection of organizational memory

In order to put in place the OM management solution, it is necessary to fine-tune an appropriate strategy to define how the platform needs to interact between different actors, variables and methodologies of governing the organization implements. The availability of a strategy means that creation, storing, distributing and usage of knowledge within processes takes place in a conscious and finalized manner with the aim of reaching certain business goals [6]. The life cycle of knowledge involves two initial phases: the definition of knowledge management objectives and identification of the knowledge to be managed. These first two phases are carried out through knowledge audit process from which the configuration of the life cycle itself is being defined.

The other four phases, the creation, storage, distribution of knowledge and its application, constitute the body of the cycle. They, continuous iterates, realize the life cycle of knowledge within any organization. Every single step of the process is called upon to manage different forms and types of knowledge resources in a concurrent way, for the realization of business processes and the creation of value in the form of intellectual capital. In the generation phase, knowledge generated within the business processes at individual and social level, is being captured, acquired and made available to the entire organization. At first, only a small amount of created knowledge is directly available in explicit form (stored in manuals, databases, case studies, reports, best practices, procedures, business processes and routines, etc.), while the majority is presented in tacit and implicit form (accumulated in people's minds), and requires appropriate capture and acquisition methods (questionnaires, learned lessons, knowledge acquisition tools, etc.)

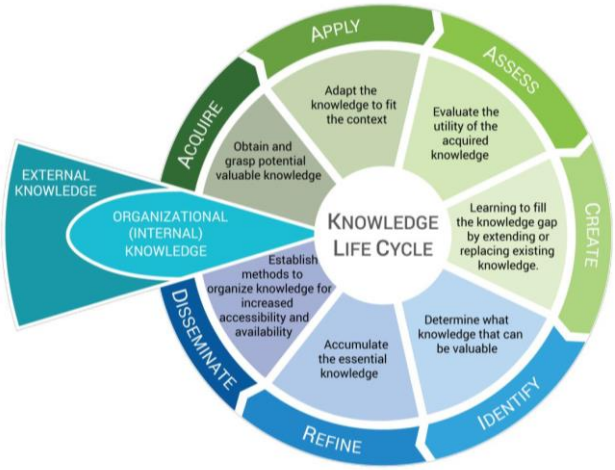

Figure 2. Knowledge life cycle

The process of creating knowledge in the organization is guided by individuals who learn, generate new ideas, remove pre-existing assumptions and thoughts with innovations. Knowledge creation, however is a process that is not systematic, but constantly evolving, difficult to plan and control, thus often acquired from plurality of sources, often outside the organization itself, and in many cases adapted to different objectives. Organizational memory storage mechanisms allow the deposition of intellectual capital of the organization and access to the same when needed. The greater the amount of knowledge acquired by the minds of people and made available in an explicit way, the easier to manage it. OM storage further facilitates the process of developing new products and improves business processes, thanks to the ability to retrieve and classify existing knowledge.

4. Applied ICT for efficient OM

Information and communication technologies (ICT) for OM constitute the true enabling factor of any knowledge management strategy. Understanding the potential offered by the different available

technology solutions is crucial to their correct application: the attempt to create corporate culture of shared data management, based exclusively on a social approach and active collaboration between people, without the presence of an adequate computer system, necessarily results in partial results. The creation of an adequate solution for the management of corporate memory within organizations, in addition to the suitable model and analysis of human and organizational variables, requires the use of appropriate technologies that can handle knowledge in its various evolutive forms. ICT favours the establishment of organizational configurations to support OM and on the other hand define the functionalities that enable the realization of the life cycle of knowledge, as well as the dissemination of information in all business processes. IT, therefore, represents the infrastructure to support key activities in the creation, storage, distribution and application of knowledge.

4.1 State of the art OM solutions

In order to effectively use ICTs that enable activities of OM and KM on corporate level, it must be kept in mind that knowledge is manifested throughout the organization in different forms, while each of them must be treated with appropriate tools [7]. State of the art and future OM management technologies need to emphasize that knowledge is generated in the minds of individuals as a fluid combination of experiences, values, contextual information, expert knowledge, and flowing from an individual to another. Moreover, only a small part of knowledge ends in becoming explicit because collected in existing knowledge management system, with the far inferior structured part, in respect to the semi and non-structure (a ratio estimated to be 20% vs. 80%).

Some of the major scientific and technological fields from which knowledge management technologies originate are database systems, big data, artificial intelligence, machine learning, information retrieval, natural language processing, human-computer interfaces, etc. The models, the techniques and the conceptual tools which are result of research in the field of information technology and telecommunications, in the last years gave rise to an emerging technologies that play a central role in the formal representation of knowledge (databases through which it is possible to define shared interpretations) in retrieval and classification contained in big data and information queues (knowledge discovery), collaborative and group use of tacit knowledge, implicit and explicit (workgroup); in speeding up and enabling video, voice and writing communications (communication and collaboration system, CRM); in lending and explicating implicit knowledge (knowledge acquisition); in favoring organizational learning processes (e-learning). However, the current knowledge management technologies, due to of their youth throughout the knowledge management industry, still move their own first steps.

5. Conclusion

Technological solutions for OM management need to be obtained as a combination of existing technologies with the addition of improvements coming from emerging scientific areas such as ontologies and workflows, which allow a more expressive representation of declarative knowledge and procedures typical of an application domain, web services that make up the definition of delocalized and interacting architectures through the network. A further improvement is represented by the new ICT technologies that are giving rise to flexible, adaptive systems, scalable, multichannel and multimodal platforms that allow you to capture knowledge, in real time, where it is created, in order to disseminate it in a distributed form, and to keep record of all the changes in both information and data level, so as to facilitate adaptation to discontinuity by updating knowledge available to the changing needs of the organization. The life cycle of existing technologies will be very short and over five years the horizon of the state of the art technologies for OM management could be completely different compared to today.

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