INTERNATIONAL JOURNAL OF INFORMATION TECHNOLOGIES, ENGINEERING AND MANAGEMENT SCIENCE

Knowledge in information systems

Boris BUČKO, Katarína ZÁBOVSKÁ

University of Žilina, Faculty of Management Science and Informatics, Slovak Republic

boris.bucko@uniza.sk, katarina.zabovska@fri.uniza.sk

Abstract

Knowledge Systems are characterized by the retention of knowledge. This fact puts the knowledge systems into a wide domain area. In general knowledge can be stored in any form and in any type of system (not only information system). For example also the notes in notepad can be considered as specific type of knowledge. This paper presents several points of view to knowledge in information systems.

Keywords: data, information, knowledge, ontology, knowledge management

Introduction

From the perspective of knowledge-based software development we can assume that these development principles are very similar to the general principles of IS development. The difference is that knowledge systems consider not only the processing of information but also the knowledge management - representation, storage and retrieval of knowledge. Many existing information systems can be considered as knowledge systems although these systems have not been developed with an emphasis to knowledge management.

The knowledge itself is an elementary part of every organization but it is often underestimated. There is not such emphasis on storage of knowledge in a form that can be easily accessed and managed across the organization. Organizations work with knowledge and that is why it is necessary to manage knowledge.

Data, information and knowledge

In the context of knowledge management it is important to understand the terms *knowledge*, *data* and *information*.

Data, according to [1] is a collection of facts, measurements and statistics. Information are organized and processed data in the specific time period and accuracy, for example, with reference to the original data.

Knowledge can be defined as a fact or state which is based on gathered information, experiences and association. There are many definitions of knowledge in various books. Knowledge can be characterized as thoughts, attitudes and overall understanding that use individual, group or organization for their actions in order to achieve the objectives.

Data - Information - Knowledge - Wisdom (DIKW) pyramid is often used to illustrate relationships between data, information, knowledge and also the wisdom (Fig. 1)

Figure 1. – DIKW pyramid [2]

Enterprise architecture

Information systems and also the development of information system itself is closely related with the concept of enterprise architecture. Enterprise architecture can be characterized as a comprehensive set of key elements which create the organization. This definition, however, is considerably general.

According to ISO / IEC 42010 is the definition of enterprise architecture by [3] described as follows:

Enterprise architecture is an approach, concept, medium and instruments, which express the fundamental arrangement of relations between business and information system which leads to the fulfillment of the mission of the organization while respecting the surrounding environment and principles formulated in the design and development of the system.

Enterprise architecture often suffers from a lack of semantics which is reflected in issues with communication between people and between systems or even directly between people and systems.

Better knowledge management within enterprise architecture could help resolve the problem mentioned above.

Knowledge management

The knowledge management includes managing corporate knowledge and intellectual property. This approach can improve a whole range of performance indicators of the organization. Knowledge management plays an important role in processing and delivering knowledge to the entities which require it - whether it is the staff or the actual information systems.

There are many ways to represent and manage the knowledge. One approach is ontology which is widely used nowadays.

Ontology

As was mentioned in [4] in computer science ontology is a set of terms and relations between data - dictionary, which allows you to differentiate semantically different and associate semantically similar terms, and this dictionary is readable for the computer. Most often it is the data, that is large respectively it has a complex structure. The dictionary formally unifies terminology for entities and their attributes, and defines the relationships between entities. A key feature of the use of such data is to know their meaning. Therefore, for the correct interpretation it is necessary to k now the semantic accuracy.

Ontology is also defined as explicit specification of a conceptualization [5].

Ontologies in knowledge management

According to [6] the main purpose of ontologies in the development of information systems for knowledge management is to allow communication in a way that is independent from individual system technologies, architectures and application domains.

Key elements which create ontologies are dictionaries of elementary concepts and also the specification of what these terms mean. Set of relationships between concepts navigates workers of the knowledge system so they can work over the defined semantic space.

According to the mentioned approach ontologies in information systems can also be used for:

- Document categorization.
- Indexing documents
- Browsing documents
- processing user queries
- Verification of the results.

Knowledge engineering

According to [7] Knowledge Engineering (as a discipline and profession) resulted from the practical application of long-term research in artificial intelligence and intelligent systems.

The term knowledge engineering refers to the development of systems which use knowledge to solve a wide variety of computational problems by transforming data into knowledge.

TechnoPedia Dictionary defines term "Knowledge engineer" as a professional who deals with building of an advanced logic to computer systems to simulate human decision making and cognitive tasks at a high level. The knowledge engineering is about transferring human logic and knowledge into technology.

Conclusion

Knowledge is an important aspect of information systems. But there is much behind the term "Knowledge" than one could think. This paper briefly presented several topic related to knowledge including knowledge management, knowledge engineering and ontology.

References

[6] Hussain, F., Lucas, C., & Ali, M. A. (2004). Managing Knowledge Effectively. Journal of Knowledge Management Practice.

[7] Vaes, K. Understanding; Data, Knowledge, Information & Wisdom https://kvaes.wordpress.com/2013/05/31/data-knowledge-information-wisdom/

[8] A. Buchalcevová and L. Gála, "Architektura v podnikové informatice," SYSTÉMOVÁ INTEGRACE, 2008.

[9] Joštiak, M., Švalec, M., Integration and languages of ontology, nternational journal of information technology and business management - ISSN 2304-0777. - Vol. 28, No. 1 (29th August 2014)

[10] GRUBER, T. A translation approach to portable ontologies. Knowledge Acquisition, 5(2):199-220, 1993.

[11] Varma, V. (2007). Use of Ontologies for Organizational Knowledge Management and Knowledge Management Systems. In R. Sharman, R. Kishore, & R. Ramesh, ONTOLOGIES A Handbook of Principles, Concepts and Aplicationas in Information Systems. New York: Springer.

[12] Kendal, S., & Creen, M. (2007). An Introduction to Knowledge Engineering. London: Springer.