Impact of Individual Cognition on Product Lifecycle Management Systems

Pierre-Emmanuel Arduin, Julien Le Duigou, Marie-Hélène Abel, Benoît Eynard

IMPACT OF INDIVIDUAL COGNITION ON PRODUCT LIFECYCLE MANAGEMENT SYSTEMS

Pierre-Emmanuel Arduin, Julien Le Duigou, Marie-Hélène Abel and Benoît Eynard
Heudiasyc / Roberval, University of Technology of Compiègne, France

1. Introduction

Product Lifecycle Management (PLM) aims at an integrated management of all product-related information and processes through the entire lifecycle for Terzi et al. (2010). Within an extended enterprise, systems interact in order to share data and information throughout a product lifecycle. Beyond this computing point of view, individuals may be spread throughout the world and that is the reason why the same information on the same product shared through the same PLM system within the same extended enterprise may lead to different interpretations. Individual cognition, knowledge and particularly tacit knowledge as introduced by Polanyi (1958) have to be considered during the design of such computing systems.

The aim of this work is to outline a semantic interoperability between a collaborative platform and a PLM system. Such interoperability allows individuals to construct a shared understanding, supporting tacit knowledge sharing, i.e. knowledge that cannot be made explicit. Our approach leads then to focus on the impact of individual cognition on PLM systems.

2. Research Background

Information is continuously interpreted through individual cognition during sense-reading processes according to Polanyi (1967). Within extended enterprises, information can be transmitted by speaking, writing or acting, and more generally, by information systems such as PLM systems. Knowledge can then be:

- *explicited*, i.e. it has been made explicit by someone within a certain context and it can be supported by information technologies. Individuals, as well as computers are "information processing systems" as said by Hornung (2009, p. 9),
- *tacit*, it cannot always be articulated, relying on Polanyi (1958) notably:

"we can know more than we can tell". However, it can be managed as explained by Arduin et al. (2013).

Le Duigou et al. (2012) proposed a PLM model supported by the French Technical Institute of Mechanical Industries (CETIM). Such model should interoperate with a collaborative system in order to give individuals the means to elaborate a shared understanding. Through such interoperability, our approach focuses on the impact of individual cognition on PLM systems.

3. Research outlines

In Abel (2008) the MEMORAe approach is presented as aiming to offer an alternative to the loss of competencies and knowledge in an organization. Such approach offers an ontology-based learning organizational memory. Its use leads to collaboratively elaborate a shared understanding by focusing on individual cognition, so that tacit knowledge may be shared.

Our work aims at linking the PLM model of Le Duigou et al. (2012) and MEMORAe. The proposed methodology is to use a model driven engineering approach to create a transformation from a model to the other. The model transformation allows creating a target model from a source model and is constituted of two steps: the specification of the transformation rules and the application of these rules to generate the target model. We are currently realizing such transformation and we are planning to study its implications and limits within industrial fields.

References

Abel, MH: 2008, Competencies Management and Learning Organizational Memory. *Journal of Knowledge Management*: special issue on Competencies management: Integrating Semantic Web and Technology Enhanced Learning Approaches for Effective Knowledge Management, 12(6), p. 15–30.

Arduin, PE, Grundstein, M, and Rosenthal-Sabroux, C: 2013, From knowledge sharing to collaborative decision making, *Int. J. Information and Decision Sciences*, 5(3), p. 295–311.

Hornung, BR: 2009, Constructing sociology from first order cybernetics: Basic Concepts for a Sociocybernetic Analysis of Information Society. In: *proceedings of the 4th Conference of Sociocybernetics*, Corfu, Greece.

Le Duigou J, Bernard A, Perry N, and Delplace JC: 2012, Generic PLM system for SMEs: Application to an equipment manufacturer, *International Journal of Product Lifecycle Management*, 6(1), pp. 51–64.

Polanyi, M: 1958, *Personal Knowledge: Towards a Post Critical Philosophy*, Routledge, London.

Polanyi, M: 1967, Sense-giving and sense-reading. *Philosophy: Journal of the Royal Institute of Philosophy*, 42(162), pp. 301–323.

Terzi, S, Bouras, A, Dutta, D, Garetti, M, and Kiritsis, D: 2010, Product lifecycle management – from its history to its new role. *International Journal of Product Lifecycle Management*, 4(4), pp. 360–389.