Chapter XLIII

KC–PLM: Knowledge Collaborative Product Lifecycle Management

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ABSTRACT

This chapter defines a system and a methodology, the Knowledge Collaborative Product Lifecycle Management (KC-PLM) to better support the complete product lifecycle in the industry. The KC-PLM system intends to reduce the lead-time from new product development to production by providing and integrating knowledge platform, based on a semantic information repository, domain ontology, a domain specific language and on the user collaboration. These characteristics differentiate the KC-PLM system from others PLM systems, because it supports an intelligent rules engine, to extrapolate and make inference with historical solutions that allow the generation of new solutions. A real case study in automobile business shows the current proposal application and its benefits in a product concept phase.

1 INTRODUCTION

The industry is growing rapidly. Globalization continues to introduce new opportunities and increases competition. Manufacturers are faced each day with a rapid globalization of markets and delocalization of suppliers; in this context, companies show a change of capital concerns: not more only physical capital (plants and equipments), but also intellectual capital (global knowledge of products and processes). Companies are trying, globally, to secure the best talent available at the most reasonable cost to serve world-wide markets and are demanding more innovations from suppliers while cutting their prices. Suppliers are asking for better working relationships and more
guarantees to justify their higher R&D expenses. Dealers want better and more extended (options) products range to sell to their customers and better training and tools for their technicians. In this increasing complexity also the expectations of customers have increased, forcing manufacturers and suppliers to develop new products frequently and each new product must be more technological and complex, but also more reliable and safer than the previous product, personalized with high quality and reasonable / low costs (i.e., value for money). As a result, new organizational approaches and new business models are required to handle the increased complexity of simultaneously managing knowledge, products, geographies and customers. Traditional bureaucratic designs that are built around vertical control and lateral segmentation are being replaced by organizational models admitting work to occur through cross-cutting processes that run across the organization. In a transnational company, dynamic configurations of teams carry out the development of products and processes, while lateral linkages coordinate and integrate diverse knowledge across dispersed knowledge centers. In other words, global new product development and production is a complex system, not simply the aggregation of multiple virtual and co-located teams. Besides, another consideration is the accelerating technology development. The rapid evolution of computing technologies has changed the automotive product development process to a “digital business” where many digital information formats, internet, pervasive computing and wireless communication are shaping the business landscape.

The companies are also stating that they need to re-evaluate their value propositions and how they differentiate themselves from competitors. They are focusing resources on their core capabilities to realize their competitive advantage, and leveraging business partners to do the rest. Areas in which companies are striving to differentiate themselves include product development, innovation and cycle time. This involves the processes associated with the research and design of products and services that are sold to the customer. Innovation, fast-time-to-market and development of desirable products are key business goals. This entails the integration and collaboration of business partners to respond to an emerging opportunity, customer need or competitive threat. Goals include developing collaborative working relationships across the value net, integrated processes and systems, dynamic linkages to engage and disengage members of the value net, and to formalize the knowledge.

In this industrial and technological scenario, decreasing product development times and costs while working in collaborative real time virtual environments, fast and smart retrieval and manipulation of past programs knowledge and increasing full product lifecycle managements are a must for industrial companies. This chapter idea appears from the collaboration of CEIIA <www.ceiiia.com> and Pininfarina both design companies, Portuguese and Italian. Development time must be reduced, by using automatic validation actions and optimization of knowledge acquisition and transfer flows, because Pininfarina plays a coacher role over CEIIA young engineers. My University is experienced in UML, Information Retrieval and IMATI-CNR <http://www.imati.cnr.it/> from Pininfarina side with the experience gained on ontology development conducted to FP7 project KREATE CAR. Also my background experience in AutoEuropa and the nightmare of data integration among development, planning and production raised the idea of exploring current advances in Semantic Web, Social networks and UML modeling to produce tools and create a methodology to handle the complete product life cycle.

These considerations already motivated some previous work on the scientific community as a collaborative, or a knowledge system or even in a Web system (Chiu, 2002; Hai-yue, 2004; Rose, 2005; Rosenman, 1999; Shem, 2007). Also the main Software development entities are looking on this