

Chapter 29

Multisite PLM Platform: A Collaborative Design Environment

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ABSTRACT

Today, product development is a result of a collaborative design process in network. Taking into consideration this fact, a National Research Network for Integrated Product and Process Engineering (INPRO) has been created. The present chapter presents the relevant items for building a PLM multisite platform for collaborative integrated product development based on the common researches developed in the INPRO project and network. The authors argue this approach by presenting the collaborative distributed design process, the product model and the PLM multisite platform for collaborative integrated product development. Based on these was built a collaborative multisite platform that join together the methodology, methods and tools for Product Lifecycle Management (PLM), Knowledge Management (KM) and Human Resources Management (HRU), examples of good practice. The core of the proposed approach is the product lifecycle model which is the base for the proposed collaborative product development methodology and the multisite PLM platform architecture. The presented research results were gained from our implication in the project “National Research Network for Integrated Product and Process Engineering – INPRO” (contract no. 243 / 08.09.2006). The model of building such collaborative design environment was inspired by the Virtual Research Laboratory for a Knowledge Community in Production (VRL-KCiP) a Network of Excellence project (contract no. FP6-507487). From 2008 the authors extended their research at the European level, in the context of a Lifelong Learning Programme, Leonardo da Vinci - Transfer of Innovation (contract nr. FR/08/LLP-LdV/TOI/117025), “Certified Integrated Design Engineer – iDesigner” in which they used the collaborative platform for the students and researchers professional qualification and certification.

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INTRODUCTION

The Specificity of Collaborative Distributed Design

The product development process has changed dramatically in the last time because of the progresses in the information and communication technology field. Nowadays, the product development is a result of a collaborative design process in network (Shpitalni, Guttman, & Bossin, 2005). Integrated product and processes development supposes to consider all the knowledge about the product lifecycle from the beginning of product design stage, by integrating the user requirements, with the quality, terms and costs constraints (Draghici, 1999), (Usher, Roy & Parsaei, 2005). Therefore, we can talk about the whole product lifecycle integration and management (Stark, 2005). The design of successful and sustainable products is increasingly linked to mastering the challenge of the complexity and multidisciplinary nature of modern products in an integrated fashion from the very earliest phases of product development.

In the same time, many product development projects require cooperation between research teams with different competence, which can be also, geographical distributed. When such a project/product team is set up, all the require knowledge must be considered to solve a certain design problem in a collaborative environment. Design engineers are increasingly confronted with the need to master several different engineering disciplines in order to get a sufficient understanding of a product or service. Competence in the major aspects of the whole product lifecycle is a key element of the skills they require to be able to conceive a product design that fulfils the requirements of all the different actors involved in the product's lifecycle as well as the constraints imposed by their individual environments. Likewise, engineering teams are getting increasingly interdisciplinary, and thus there is a strong demand

for a mutual understanding and collaboration between domain expert team members.

In the following will be explained the specificity of human resources interaction, in the new context of the collaborative distributed design process for better understand the need for building such environment. When a product is designed through the collective and joint efforts of many designers, the design process can be called as collaborative design. This work has to be done by taking into consideration the product lifecycle processes by including those dispersed functions such as design, manufacturing, assembly, test, quality and purchasing as well as those from suppliers and customers.

The main goals of such a collaborative design team might include optimizing the mechanical function of the product, minimizing the production or assembly costs, or ensuring that the product can be easily and economically serviced and maintained etc. Since a collaborative design team often works in parallels and independently using different engineering tools distributed in separate locations, even across various time zones around the world, the resulting design process may then be called distributed collaborative design.

Johansen used time-space 2D matrix to examine cooperative works (Johansen, 1998). The matrix categorizes collaboration into synchronous and asynchronous patterns, shown as Figure 1.

This space-time matrix cannot fully represent the emerging collaboration trends. For example, collaboration may happen among different geographically dispersed companies, or within the same company but between two distributed divisions. Here we extend the matrix to a three-dimensional time-location-group space, defined as $O(T, L, G)$ to describe when, where and who are collaborating (Chen et al, 2005).

Compared to the Johansen's time-space matrix, which is a very useful and concise reference to the particular design circumstance, the proposed 3D time-location-group matrix not only looks at whether participants are in the same place, but

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