

Web-Based Engineering Portal for Collaborative Product Development

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Abstract. Nowadays, collaborative product development has become a strategic necessity to develop high quality products at low cost and with quick response time to market demand. Past decades have seen significant advances to collaborative product development. However, Enterprises are still confronted with some problems. Firstly, the research in strategic level of collaborative product development is lacking. There are no formal processes and models for collaborative product development. On the other hand, the full alignment between information system and collaborative business is still missing. The information system cannot adapt to the fast changed business. This paper aims to provide the strategy and reference business model for collaborative product development. And then, to support the implementation of strategy and model, a workflow and web service based engineering collaboration portal is developed. The workflow is used to model and execute the collaborative product development processes, and the web service is the implementing technology of the portal. The combination of workflow and web service can fit the gap between business and information system and achieve on-demand business.

Keywords: Web-based, portal, collaborative product development, web service.

1 Introduction

The advancement of information technology, dynamic market, and global environment has set a new stage for manufacturing. In order to remain competitive and to maintain their competitive advantage, enterprises must be able to 1) manage increasing product complexity and product innovation from market demands, 2) have faster and more flexible product development cycle, and 3) control globally distributed/outsourced operations[1]. One strategy for enterprises to succeed in this environment is Collaborative Product Development (CPD). Several similar terms already exist in the literatures, such as collaborative engineering [2], collaborative design [3], and collaborative product commerce [4]. Each term emphasizes different aspects and applications. In this paper, CPD is defined as: “an Internet based computational architecture that supports the sharing and transferring of knowledge and information of the product life cycle amongst geographically distributed companies to aid taking right decisions in a collaborative environment” [5]. The main goal of CPD is to integrate and leverage knowledge, technologies, and resources

among all the collaborators through the full life cycle of product development. In the last decades, significant efforts have been made in the research of CPD. Most of them have been focused on enhanced collaboration by leveraging information technologies, such as how to develop a collaborative information platform [6], what is an acceptable standard for information/knowledge exchange and presentation [7], what is an efficient information/knowledge schema to be shared among collaborators [8], how to improve detailed functionalities of the CPD system [9].

However, technology is not the whole of CPD anyway. Regarding collaboration processes between dislocated partners, collaborating companies still manage their product development processes in a highly inconsistent and inefficient way because there is no common model to specify the collaborative process to be shared in partners especially in cultural backgrounds (language, education, rules of behaviour etc.).

The past studies pay more attention to the research of theories and technologies. There have been very few reports concerning the best practices and the reference processes of CPD deployment in industry settings, especially inter-organization and cross-culture collaborations. Due to lacking knowledge of deploying CPD in current industrial settings, the research efforts may thus fail to fulfill practical needs [10].

On the other hand, in IT perspective, although numerous IT technologies and tools have been developed to facilitate the collaborative product development, they are simply the fraction of the software functions required to enable the collaboration process in the full lifecycle of CPD. Most of them focus on the engineering development, which is in the later phase of CPD. Few technologies and tools are developed to facilitate the early phase of CPD, such as contact initiation and collaboration establishment.

Furthermore, the alignment between business processes and supported IT system is largely missing. The current CPD system can not adapt to the fast changed requirements and business processes due to the architecture, implementation technologies, and control mechanism of the system. How to align the CPD requirements and processes with the supported IT systems is one of the key challenges of CPD.

In order to solve the above mentioned difficulties, in this paper, a web-based engineering portal is developed and implemented to enable value-added collaboration between European and Chinese partners by providing new technical solutions, best practices, and collaboration tools. The Engineering Portal represents a virtual, process-driven and service-oriented integration platform accessible to the involved companies within a heterogeneous IT-infrastructure.

The paper is organized as follows: In section 2, a structural top-down analysis approach is used to derive all the necessary business objectives and processes that must be achieved in CPD. Based on reference model, the strategy of CPD is proposed. In section 3, the development and implementation of a web based engineering portal for CPD is discussed. The web service is used to wrap all the components of the portal into services. Different services are provided by the portal to facilitate the full life cycle processes of CPD. In section 4, the scenario validation of the portal is described. The contributions of the portal in this scenario are introduced. Finally, the conclusions of the paper are summarized in section 5.