Chapter III

Collaborative Product Development

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Abstract

This chapter discusses the roles of electronic business solutions (EBSs) in supporting collaborative product development (CPD). Two fundamental questions are of primary interest. One is when and where EBSs should be applied for what CPD decision activities. The other is how EBSs should be designed and developed to maximize their usefulness and usability in supporting CPD decision activities. The author advocates an approach based on decision activities. By this approach, CPD is considered as an extended enterprise business process, which is in turn decomposed into relatively simpler business decision processes (e.g., design specification, design review and release, design change management, etc.). Such decomposition takes place towards the level where appropriate EBSs can be most cost-effectively designed, developed, and applied. The logics and data requirements of these business decision processes form the natural basis for designing the navigations and user interfaces as well as the back-end databases and middleware for the corresponding EBSs. Individual EBSs related to product design and development decisions are then collated and deployed to form what is described in this chapter as a collaborative product commerce (CPC) portal — a special enterprise portal. The proposed approach is demonstrated with several examples as has been followed by many researchers and practitioners.
Introduction

Product development and design have been recognized as the heartland of both manufacturing and service industries and received considerable attention and investment from both academic researchers and industrial practitioners. Their importance, complexity, and challenge have been widely recognized and emphasized in the vast literature accumulated over the years. Excellent textbooks have appeared with varying emphases. Theories and methodologies, emerged from good practices accumulated over the years by leading practitioners and researchers, have been collected in these texts. In terms of research, several excellent literature reviews have been conducted (Balachandra & Friar, 1997; Brown & Eisenhardt, 1995; Cusumano & Nobeoka, 1992; Finger & Dixon, 1989a, 1989b; Griffin & Hauser, 1996; Krishnan & Ulrich, 2001; Shocker & Srinivasan, 1979; Whitney et al., 1995).

Product development and design are distributed and collaborative in nature. Multiple disciplines and heterogeneous tools are used. Teamwork is essential through seamless tool integration and better coordination of human activities. Researchers and practitioners have always been instrumental in applying the latest information and communication technology (ICT) to deal with different aspects of collaborative product development. There have been enormous efforts in devising computer-supported environments to facilitate and enable collaborative product development. Early developments and achievements in computer-supported concurrent engineering (CSCE) had been reported in an ASME workshop organized by Sriram, Logcher, and Fukuda (1989) and a special issue in the IEEE Computer journal (Computer Support, 1993). Further developments are widely posted at several Web sites, e.g., http://www.cenet.org/ and http://www.ceteam.com/.

With the increasing popularity of the Internet and World Wide Web (Web or WWW), there have been renewed attempts recently. One of the first and most significant initiatives in the development and application of Web-based systems in CPD is the American research project — the MADE (Manufacturing Automation and Design Engineering) program. MADE is a DARPA (Defense Advanced Research Projects Agency) program initiated in 1992 and completed in 1996. The MADE program supports research, development, and demonstration of enabling technologies, tools, and infrastructure for the next generation of design environments for complex electromechanical systems. This program involved a number of major research centers/groups, resulting in valuable publications at conferences, in journals, and on the Internet (Bryant et al., 1996; Cutkosky, Tenenbaum, & Glicksman, 1996; Petrie, 1996; Whitney et al., 1995; Will, 1996). This program is concerned with comprehensive information modeling and the design tools needed to support rapid design of electromechanical
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