



# Functional Product Development Challenges Collaborative Working Environment Practices

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## ABSTRACT

*In this article, an activity-based modeling and simulation approach to functional product development (FPD) is suggested as part of a simulation-driven CWE approach to meet the new demands that are placed on tools and methods used in industrial product development due to companies' transformation from hardware providers to function providers. The rationale for a simulation approach is discussed as well as the usefulness when applied on a process of work. An iterative data gathering and analysis process based on interviews and field notes is presented challenges for distributed working environment practices posed by the introduction of functional product development have been identified. They include four different and interrelated issues pertaining to approach, methods and tools, tolerances for errors and the ability to distribute new tools with extensive demands on usability and interoperability.*

*Keywords: collaborative work; cross-functional teams; globalization; optimization methods; strategic alliances*

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## INTRODUCTION

This article discusses demands on collaborative working environments (CWE; EC, 2005) originating from companies' transformation from hardware providers to function providers. An activity-based modeling and simu-

lation approach to functional product development (FPD) is suggested as part of a simulation-driven CWE approach to meet the new demands that are placed on tools and methods used in industrial product development due to this transformation.

A shift in view, captured in the concept of functional products, is found within the manufacturing industry. Traditionally, the manufacturing industry has focused on providing excellent goods, that is, hardware. Services occur on an aftermarket basis as add-ons to the developed hardware, and much of the profit is made on activities such as maintenance and spare parts. Nergård, Ericson, Bergström, Sandberg, Larsson, and Törlind (2006) indicate that competition has increased in the manufacturing industries' aftermarket activities; one trigger for the concept of functional products according to information from the case discussed below is seen in the interest to control aftermarket activities associated with the developed hardware. By supplying functions, with hardware components as the core product, instead of merely selling the hardware, companies can control the aftermarket. The responsibility and availability of the functions provided by hardware remains with the service provider, as does the responsibility for maintenance and spare parts. This approach is a response to a necessity for business-to-business collaborators to gain economy-of-scale partnerships in the extended enterprise and ultimately to be able to develop competitive offers, as discussed by Löfstrand, Larsson, and Karlsson (2005) and Alonso-Rasgado, Thompson, and Elfström (2004). Hence, the shift in view is a move toward providing services while taking a life cycle commitment for the hardware as well as optimizing the availability of its

function in the customer's system. The redirection from hardware development to a process where the development of functions, comprised of hardware, software, and services, or total offers is in focus is hereafter referred to as FPD, an area in which technology processes (hardware) and business processes (service add-ons) merge. The function provider needs some partners to act as subfunction suppliers in an extended enterprise fashion. Based on information from the workshops discussed below, this calls for closer collaboration than what is normally the case in a project aimed at hardware development only. Different team members with different functions (e.g., engineering design, production, management, finance and marketing) must be able to share relevant function-specific information while doing distributed collaborative work. O'Donnell (2005) suggests using an approach based on systems thinking for handling business models. This might be carried out by team members in management or economy-related roles.

Product development literature provides a broad view of how to understand customer needs and develop and sell products, and includes discussions concerning best practices (Cross, 2000; Ulrich & Eppinger, 1995; Wheelwright & Clark, 1992). For example, P. G. Smith and Reinertsen (1997) offer a general view and aim to describe methods for generating a product (hardware or service) to meet customer needs. Within the hardware product development domain,

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