Chapter 2.20
A Stage Model for NPD Process Maturity and IKMS Implementation

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ABSTRACT

The objective of this chapter is to provide an analytical tool to assist organizations in their implementations of intelligent knowledge management systems (IKMS) along the new product development (NPD) process. Indeed, organizations rely on a variety of systems using artificial intelligence to support the NPD process that depends on the maturity stage of both the process and type of knowledge managed. Our framework outlines the technological and organizational path that organizations have to follow to integrate and manage knowledge effectively along their new product development process. In doing so, we also address the main limitations of the systems used to date and suggest the evolution toward a new category of KMS based on artificial intelligence that we refer to as intelligent knowledge management systems. We illustrate our framework with an analysis of several case studies.

INTRODUCTION

New product development (NPD) is seen among the essential processes for success, survival, and renewal of organizations, and firms have been constantly concerned with managing knowledge related to this process to drive performance and achieve time-to-market reduction. In this aim, organizations rely on a variety of information systems that range from simple knowledge repositories to more advanced knowledge management systems such as intelligent knowledge management systems.

While the importance of managing knowledge along the NPD process and using specific systems for this aim is widely acknowledged, few authors have so far attempted to characterize or relate the type of systems used with the characteristics of knowledge relying on the maturity of the NPD process. Such a framework will enable organizations not only to assess the maturity of their NPD process but also to support them in moving from one stage to the other and suggesting specific systems supporting each level of maturity. Today, these systems are called intelligent knowledge management systems (IKMS) because they rely more and more on artificial intelligence (AI) to overcome their limitations. In doing so, this chapter suggests an analytical framework for information systems implementation that depends on the maturity of the NPD process and the type of knowledge managed at each stage. Consequently, we examine some unexplored questions:

1. How can an organization move its NPD process from one stage to a more advanced stage?
2. Which systems should the organization adopt in each stage of its NPD life cycle?

The research on which this chapter is based relies on an in-depth analysis of the new product development process in five leading software and manufacturing companies. The remainder of this chapter proceeds as follows. First, we examine the literature related to the importance of managing knowledge during the new product development process, highlighting the tools and systems used and their main limitations. Next, we present our framework of analysis—the analytical framework for defining the maturity of the NPD process and the systems relying on artificial intelligence needed at each stage of the evolution process. We illustrate how this framework could be used through an analysis of five case studies. We finish with our discussion and conclusion summarizing our propositions, outlining the limitations of our study, and describing the implications for future research and for practice.

KNOWLEDGE MANAGEMENT AND NEW PRODUCT DEVELOPMENT

In many industries, the survival of firms is increasingly determined by their success in new product development (Cooper, 2001; Schilling & Hill, 1998). On average, more than one-third of a corporation's revenue comes from products that did not exist five years ago (Nambisan, 2003). This is particularly true for technology-driven firms, whose competition lies on the new product development (NPD) cycle time, and whose performance is a function of their ability to manage efficiently their NPD in getting to their markets faster as well as responding to their customer needs and expectations. NPD has also gained its

Figure 1. A generic model of NPD process stage and gate