Chapter X
From Strategy Definition to Product Derivation Using a Scenario-Based Architecting Approach

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ABSTRACT

Mass customization is a business strategy that aims at satisfying, in a timely and cost-effective manner, the various needs of different customers. For that purpose, a system architecture is needed that supports two different kinds of variability: Variability in space provides a range of different products where each addresses the specific needs of an individual customer; and variability in time allows the products to evolve and thus meet new requirements. In defining such an architecture, two issues should be considered. One is how to anticipate the most likely changes in the external business environment, and hence in the customers’ future needs. The other is whether the architecture can address these changes effectively. This chapter presents a set of scenario-based methods and techniques to support the development of system architectures that are more future-proof, and also are advantageous for mass customization. These methods and techniques have originally been developed for highly-customized professional systems, in particular medical imaging equipment.
INTRODUCTION

In a competitive market, groups of customers have particular preferences for products that are more than just functional. Some are interested in a functional product which is also aesthetic. Others set high store by the usability and ease of use of the product, or are interested in its cost of ownership or its interoperability. The ability to deal with the preferences expressed by an individual customer is now known as the process of product customization or personalization. The ability to identify and deal with the preferences of a group of individuals who share similar preferences with respect to a specific product is known as the process of mass customization. Mass customization is, therefore, the process of “producing goods and services to meet individual customer’s needs with near mass production efficiency” (Tseng & Jiao, 2001).

The idea of mass customization also involves economic profitability. It has been observed that customers with a high level of product expertise consider a customized product as having a higher utility than a standard alternative (Dellaert & Stremersch, 2005). The equilibrium price and profit margin reached in the case of a customized product are therefore higher compared with the standard configuration. If this is the case, the question arises as to where to stop with customization. Reaching out to the individual customers and involving them in the codesign of the product proved to be complicated. Addressing communities proved to be a much more efficient way of collaborative customer codesign (Piller, Schubert, Koch, & Moeslein, 2004). Therefore, in highly competitive markets where customers set the rules and price, customization and personalization, that is, information about customers, their needs and wants, current markets, and future trends, is a key factor for success (Blattberg & Glaser, 1994; Hagel & Singer, 1999).

In this chapter, we look at the problems associated with designing customized systems in the context of professional products. In essence, this means being able to capture and manage change, in two of its forms. One is the modification of a product configuration to meet individual customer requirements, referred to as variability in space. The other is the evolution of one product into a new one to satisfy new requirements, referred to as variability in time. To deal successfully with these two issues, we look at techniques to discover and model variability at system architecture level, that is, ways to represent variability and to anticipate change in customers’ future needs. The success of customization, therefore, depends on the degree to which we are able to manage change. Although the examples provided in this chapter refer to high-end professional products, the techniques and methods apply to a wider category of mass-customized systems such as information systems. These include customer relation management systems (CRM), enterprise content management systems (ECM), document management systems, and so forth. The variation modeling and the mass customization process for information systems can be performed following the same steps as for professional systems. These steps will be described in the next subsections.

The remainder of this chapter is organized as follows. Section 2 introduces scenario methods as powerful tools to capture change and innovation and to communicate ideas. Section 3 explains variation within the context of product customization. Here sources and types of variability are presented, as well as techniques to manage them. Section 4 presents the strategic option design and assessment (SODA) method, which is an approach for designing system architectures that support customization. The SODA method has been developed at Philips Research. In this section, the steps of the method are explained, and some examples are given based on a case study for professional medical systems. Section 5 presents some conclusions.
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