

## 4 Mass Customization of Software Products

As explained in the previous chapter, software has become pervasive in both service provision and in product solutions – the software often being the component that provides or deploys customization.

In that respect, it is extremely important to understand the methods that can be used to enable customization within software components themselves.

So far, the prevalent component agenda within *software* has been different from, or perhaps lagging behind, other sectors of industry. The emphasis in software has been mainly on component-based architectures concentrating on integration, interoperability, and the ability to add whole new software applications. This approach stresses the cost-saving nature as to development and to ownership over time (i.e. the “*Mass*”).

In contrast, the component agenda in more *mature industry sectors* often puts Configure-to-Order, Design-to-Configure, Parameterization (and dynamically customized structures in general) in the foreground. This mature approach stresses a more proactive market strategy of attacking new niches and finding new customers by increased variance (i.e. the “*Customization*”). Nevertheless, most CtO and *customization* techniques can be employed *across many sectors* of industry, including software development; therefore, we have decided to approach Mass Customization of software from the viewpoint of emphasizing the techniques that enable variation – i.e. in the light of the latter, more *mature* component agenda. In addition, we also point out examples of these “software” techniques being adopted by “non-software” sectors. Along with extensive footnotes, a longer example towards the end of this chapter demonstrates the benefits of applying dynamic product structures to the software industry. In the next chapter, a similar example will be provided for manufacturing.

## 4.1 The Multiple Roles of the Software Industry

The software industry is an important player in the trend towards Configure-to-Order.

*First*, it is a major *enabler* of component based product architectures and of mass-customization strategies in most industry sectors, by providing tools and applications such as Configurators, e-commerce systems, ERP<sup>1</sup>, CRM<sup>2</sup>, and PDM<sup>3</sup>.

*Second*, it is also a large potential *user* of the same CtO approach applied to software development and deployment itself.

*Third*, increased, improved, cheaper modularization (and in the near future, CtO) of software itself is extremely important in allowing many smaller product and service companies to afford the necessary technology as enablers for their own CtO strategies<sup>4</sup>. In this scenario, modern software vendors become providers of *mass-customized components or enablers* to other mass customizers. This third role is similar, in concept, to the Dayton Progress success story contained in Supplement S1, where Dayton Progress sell customized *components and tools* to other mass customizers in manufacturing worldwide.

## 4.2 Software Components Viewed as Service-Providers

The widening acceptance of this service-based view is much due to the breakthrough of e-business. Typically, automated services are built by reusing software components already at hand, purchasing additional components off-the-shelf and designing a few new components. In the past, enterprise systems mostly conveyed *data*. The system typically provided figures to the end-user who applied *some* – sometimes official, sometimes “individual” and home made – business rules to the data in his or her head, and then re-entered the resulting information to be stored back in the system. The business logic *within* the system itself was simple to almost non-existent – most of the logic was actually stored in the heads of individuals such as

<sup>1</sup> ERP = Enterprise Resource Planning packages.

<sup>2</sup> CRM (Customer Relationship Management) packages support both daily sales work and long-term customer care.

<sup>3</sup> PDM (Product Data Management) packages make it smooth for most roles, processes and systems in a manufacturing enterprise to share a common base of product information.

<sup>4</sup> That is to say, Mass Customization of software (the second role) makes the software products affordable downmarket, among SME's; this extends the reach of the (first) customization-enabler role to new mass customizers.