Better Interoperability in Smart Organizations

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INTRODUCTION

In order to maintain and increase the competitiveness of European companies in the advent of the emerging digital economy and smart organizations, the use of modern information technologies and standards among all agents involved in the furniture product life cycle and business has to be considered (Jardim-Gonçalves, Panetto, Nuñez, & Steiger-Garcao, 2006a). funStep is a community setup in the late 1990s with the support of the European Commission that implements an European research strategy for better interoperability in smart organizations (funStep, 2005). Starting in the beginning of the 21st century, the SMART-fm is an IMS project entitled "A standards-compliant framework to support complete integrated product life-cycle information management and electronic commerce for the furniture manufacturing industry, in the advent of smart enterprises" (IMS, 2006). The main objective of the SMART-fm project is to research, develop, and demonstrate in industrial environments, an interoperable open standards-based framework that supports smart environments through the complete product life cycle in the furniture manufacturing industry. This article presents the strategic objectives of the SMART-fm project as a case study to stimulate and accelerate SMEs to adopt technologies and practices in the emerging digital economy, extended enterprises, and intelligent services. It concludes by anticipating the strategic results that funStep will deliver for the next decade.

BACKGROUND: PROBLEM AND MOTIVATIONS

Based on the number of people it employs, the furniture industry is the largest manufacturing sector in the world. Most of the companies in the furniture manufacturer and related sectors are small and medium enterprises (SMEs) (COFURN, 2000; Gaston & Kozak, 2001). To keep its competitiveness, Europe needs to rapidly accomplish the new requirements in the e-global marketplace and promptly push SME-based industry to adopt e-business services and extended enterprise practices (Fan & Filos, 1999; Frederix, 1998; Hunt, Caskey, & Browne 1999). In order to maintain and increase the competitiveness of these companies in the advent of the emerging digital economy and smart organizations, the use of modern information technologies and standards among all agents involved in the furniture product life cycle and business has to be considered (Jacucci, Olling, Preiss, & Wozny, 1998; Camarinha-Matos & Afsarmanesh, 1999; Ducroux, 1999).

The problem of data exchange to support the manufacturing phase of the furniture product life cycle when doing business between manufacturers, retailers, providers, and customers is well understood (Cunha & Ribeiro, 2000; funStep, 2005). Nowadays, the furniture community considers this problem as a major inhibitor of e-commerce and smart enterprises (see funStep: http//www.funStep.org), and albeit identified as a problem for the furniture industry, there is

a global concern in the SME-based industrial sectors (Vlosky, Wilson, Cohen, Fontenot, Johnston, Kozak, et al., 1998).

The huge number of proprietary systems operating in the furniture industrial sector makes this problem bigger and more difficult to solve (Zarli & Poyet, 1999). Thus, this industrial community is eager to have an international standard for product life-cycle information in which software providers can have confidence in its worldwide adoption. Support from the international research community to create such a standard is being looked for, too.

funStep is a community setup in the late 1990s with the support of the European Commission that implements an European research strategy for better interoperability in smart organizations. The main objective of funStep's SMART-fm project is to research, develop and demonstrate in industrial environments, an open standards-based framework that supports the complete product life cycle in the furniture manufacturing industry. This should be done adopting secure electronic commerce (e-commerce) services, extended enterprise practices, and intelligent agents, products, and services (Lauro, 2000). It will establish new concepts, methodologies, and technology frameworks supporting all phases of the furniture product life cycle in a two level approach to business-to-business (B2B) electronic commerce:

- Interoperability among B2B user applications.
- Interoperability among B2B e-commerce platforms.

One of the principal SMART-fm motivations is to create and support an interdisciplinary network of actors involved in the study of smart manufacturing, having as a basis the European COFURN network (IST-2000-25183) and the FSIG (funStep Interest Group: http://www.funStep.org). FSIG is a worldwide interest group whose main objective is to follow and support the development of an international standard for furniture product and project data exchange. FSIG has now more than 700 members from industry (75%) and research/academia (25%) from 21 countries, and will be used by SMART-fm as a source of requirements, a forum for industrial review and a privileged medium for the dissemination and acquisition of the project results.

Standardization is one of the main aims of the SMART-fm network. Standards for data representation like ISO 10303 (STEP), ISO 13584 (PLIB), OMG/UML, and the Extensible Markup Language (XML) will be applicable (ISO, 2006). SMART-fm combines proven methods and standards for data specification with the XML language to demonstrate how furniture product life-cycle information can be exchanged and shared in an e-commerce environment using low-cost, scalable software tools. Nevertheless, specification of e-business services and XML documents for the furniture industry is a key issue to be standardized in order to contribute to the open interoperable platforms operating in this industry.

Recent developments in ISO TC184/SC4 have created an environment in which data exchange capabilities based on STEP application protocols can be created in a modular fashion, reusing components of existing validated standards and therefore reducing the time and cost to develop, implement, and deploy standards-based solutions. PLIB enables the development of industry-standard dictionaries and libraries of products and components that can be used by manufacturers to publish their product catalogues in an open format.

FUNSTEP: AIMS AND DIMENSION OF THE INITIATIVE

The general objective of funStep is to stimulate and accelerate furniture-related companies to adopt technologies and practices in the advent of e-business, extended enterprises, and intelligent services, preparing industry and researchers to advance on the state of the art, identifying requirements to move beyond and reach the future vision of furniture manufacturing business. The short (one-year) and midterm benefits for the industry when achieving these objectives can be estimated in tens of millions of euro.

Specific objectives are:

- Set up and conduct the network to be an outstanding research and industrial forum for discussion and information share on funStep working group areas.
- Harmonize and demonstrate to the furniture industry the state-of-the-art and future vision in standardization and research of complete integrated product life cycle (PLC), intelligent e-business, and extended enterprise practices; offer a good opportunity for consensus in interoperability of data and services with wide support from the