

Chapter 26

An Enterprise Architecture Approach for Designing an Integrated Wood Supply Management System

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ABSTRACT

The wood supply chains encompass a multitude of agents with independent business processes and information systems. The network of interrelationships and information flows among the agents is often neglected when designing information systems. Common processes and automatic data exchanges can enhance collaboration as well as improve IT alignment with business needs across multiple organizations in the supply chain. This article proposes an Enterprise Architecture methodological approach for designing an integrated modular Wood Supply Management System. Both Process Architecture Framework and Information Architecture were developed and used to define individual systems and integration requirements, discussed on the Applications Architecture. The Technological Architecture was further addressed. Results of its application to the Portuguese pulpwood, biomass and lumber-based supply chains are presented. Results show that this approach can effectively specify individual systems requirements driven from the processes descriptions built in collaboration with the agents. It further shows that a Service-Oriented Architecture can be derived, ensuring systems integration and interoperability.

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INTRODUCTION

The wood supply chains are commonly presented as a pipeline of activities starting on the raw material acquisition and ending on its delivery on the transformation centers, where the finish goods are produced according to the final clients' specifications. They involve several companies, various business units inside the companies, many locations and consequently a paraphernalia of distinct information systems for planning and controlling the activities and information flows. Proprietary, client-tailored systems prevail, often without interfaces to other company's systems nor interoperability features with other agents systems. Redundancy and data inconsistency problems are frequent and some transversal processes, such as products traceability along the chain, are difficult or even impossible to implement.

This chapter advocates the advantages of developing integrated computer-based approaches to support the management of the wood supply chain activities as well as the interactions among its agents. It further proposes an Enterprise Architecture approach for designing the Integrated Wood Supply Management System (iWS) with the involvement of the end-users.

The chapter is organized as follows: The background section provides the description of the Wood Supply Chain using as an example the Portuguese context. The currently adopted information systems are reviewed. An overview of the Enterprise Architecture (EA) methodologies is also presented. The following sections detail the applied EA road-map and its main results, namely, the hierarchical top-down Process Architecture, encompassing the Process Architecture framework and its individual business processes. The information entities described under the Information Architecture. The description of the iWS main modular components, driven from the CRUD matrix analysis in the course of the Applications Architecture. Finally, existing technologies that can adequately support the iWS modules as well

as the technological requirements and developing guidelines, included on the Technological Architecture. The last sections are devoted to the discussion of future and emerging trends and presenting the concluding remarks.

BACKGROUND

The Portuguese Wood Supply Chain Management: Activities, Agents, Systems

The maritime pine (*Pinus pinaster*) and eucalypt (*Eucaliptus globulus*) plantations are the dominant forest occupation in Portugal (885 thousand ha, 740 thousand ha, respectively). Their production is almost entirely absorbed by the pulp & paper and lumber-based sub-sectors (annual sales of 1623x10³€ and 1131x10³€ respectively), which are key contributors to the forest cluster that represent 14% of the GNP, 12% of exports and 9% of the industrial employment (INE, 2007).

Both pine and eucalypt-based supply chains can be seen as large networks of activities and agents throughout which the tree products are explored, stored and transported until they reach the transformation centers (Figure 1). The efficiency of this procurement stage will dictate the raw material acquisition costs, thus conditioning the following wood transformation activities (e.g. bucking, sawing, pressing, and drying) as well as the wood distribution and sales channels and the finish product price paid by the costumers. At the beginning of the supply chain, the forest owners and forest practitioners perform long-term forest operations planning in order to grow mature trees suitable for different utilizations. At the end, the transformation centers acquire timber on the national and international markets through wood supply contracts (usually with wood-trade entrepreneurs) complementary to its eventual self-supply availability, in order to accomplish the target finishing products production levels. In

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