Chapter 11
Developing a Collaborative Supply Chain Management Platform:
A Service-Oriented Approach

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ABSTRACT
Service-oriented computing is becoming increasingly popular. It allows designing flexible and adaptable software systems that can be easily adopted on demand by software customers. Those benefits are from primary importance in the context of supply chain management; that is why this paper proposes to apply ProDAOSS, a process for developing adaptable and open service systems to an industrial case study in outbound logistics. ProDAOSS is conceived as a plug-in for I-Tropos - a broader development methodology - so that it covers the whole software development life cycle. At analysis level, flexible business processes are generically modelled with different complementary views. First of all, an aggregate services view of the whole applicative package is offered; then services are split using an agent ontology - through the i* framework - to represent it as an organization of agents. A dynamic view completes the documentation by offering the service realization paths. At design stage, the service center architecture proposes a reference architectural pattern for services realization in an adaptable and open manner. The paper finally presents the implemented platform for a particular service – manage transport – so that the reader can realize how the developments have been achieved.

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1. INTRODUCTION

Today’s enterprise information systems have to match with their operational and organizational environment. Unfortunately, software project management methodologies are traditionally inspired by programming concepts rather than by organizational and enterprise ones. In order to reduce as much this distance, Agent-Oriented is increasingly emerging and has been the object of more and more research over the last 10 years. Its success comes from the fact that it better meets the increasing complexity and flexibility required to develop software applications built in open-networked environments and deeply embedded into human activities.

The gap between the traditional software engineering approaches and multi-agent software systems using artificial intelligence concepts remains nevertheless important. A series of development methodologies for designing multi-agent systems (MAS) have appeared over the years; those methods have their own characteristics and use various models to analyse the environment, to design the system and also various languages to implement the proposed solution. This paper is part of the effort to dispose of methodologies covering the whole development life cycle: from the analysis of industrial (multiactor) cases to the development of MAS software applications by extending the I-Tropos software process (Wautelet, 2008) notably through service orientation. This plug-in is the Process for Developing Adaptable and Open Service Systems (ProDAOSS, see (Achbany, 2009; Achbany et al., 2008b)). Contributions also includes the development of the supply chain platform itself.

A supply chain is the set of all actors and relations between them which participate in the process of delivering value to a customer as a product or service. It includes all the processes from raw materials to delivery and is viewed as a network of information, materials and financial flows. In this paper we particularly focus on the application of our software development methodology on outbound logistics - i.e. the process related to the movement and storage of products and goods from the supplier to the end user - with a strong focus on transportation. The idea underlying the developed collaborative application package is to offer the most advanced services to optimize the transportation chain on a global basis. The paper will present the analysis and design stages of the application package development.

The paper is structured as follows. Section 2 discusses the state of the art including actor collaboration and the services approach in supply chain management as well as the related work. Section 3 briefly presents the development process – ProDAOSS – and its application domain in the context of this book chapter – outbound logistics. Section 4 overviews the application development: the analysis and design stages are depicted in detail and the implementation is presented through screenshots. Section 5 presents the future research directions. Finally, section 6 concludes the paper.

2. STATE OF THE ART

This section envisages actor collaboration and the services approach in supply chain management, it also browses the work related to the one developed in this chapter.

2.1 Actor Collaboration in Supply Chain Management

By nature, supply chain management is an interesting area for the development of industrial multiactor software systems since it involves a series of collaborating or competing companies with tens of roles played by hundreds of individuals. The benefits that can be taken from such systems can lead to avoid waste of resources for all the involved actors. Collaborative decision will tend to avoid local equilibriums (at actor level) and