Chapter 8

Semantic Web Service for Global Apparel Business

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ABSTRACT

Nowadays a substantial share of the production processes of the world’s apparel business is taking place in developing countries. In the apparel business, supply chain coordination needs resource and information sharing between business partners. Semantic web service computing (SWSC) provides numerous opportunities and value-added service capabilities that global apparel business requires to exchange information between distributed business partners. The ability to dynamically discover and invoke a web service is an important aspect of semantic web service-based architectures. This chapter describes the main features of an ontology-based web service framework, known as CSIA (collaborative service integration architecture) for integrating distributed business information systems in a global supply chain. The CSIA framework uses a hybrid knowledge-based system, which consists of structural case-based reasoning (S-CBR), rule-based reasoning (RBR), and an ontology concept similarity assessment algorithm.

INTRODUCTION

In recent decades, global apparel businesses have an inclination to be worldwide activity due to the economic advantage of globalization of product design and development. As a consequence, apparel businesses are operating increasingly globalized multi-tier supply chains and deliver products and services to customers all over the world. Optimizing design and manufacturing cost, an increase of outsourcing activities and globalization of markets have led to integrated supply chain planning and management processes. In this way, apparel supply chains heavily depend on their collaborative corporate partners; and they are depend on each other for resources and information sharing. Right information, at the right time makes apparel supply chain operation much more agile. It has been acknowledged by academics and practitioners that the autonomy of supply chain partners information sharing (Pal, 2018) need to keep in mind at the time of supply chain information sharing infrastructure design. There exist different approaches for sharing information within garment manufacturing supply chain partners.

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How to establish an open, flexible integrated business information environment is the key to solve this problem. Traditional stereo-type information systems integration techniques are very tightly coupled, and these systems are not very useful in heterogeneous system integration purpose. When data exchange format or business unit process logic is modified, adaptability adjusted of system integrated to both sides is necessary. In other words, interoperability plays an important role when heterogeneous information system needs to be integrated. Service Oriented Computing (SOC) using web services and Service Oriented Architecture (SOA) offer a promising solution to this kind of system integration dilemma. It provides a framework to represent business processes as independent modules (services) with clear and accessible interfaces. This service interactions take place using a standard description language (e.g. XML) and it makes easy for integration of different services to build a supply chain business application.

These applications are using the Internet, Intranet, or any other forms of computer network forms to connect with customers, suppliers and other associated business partners. Web service has generally been pioneered by information technology (IT) companies, where demand is constantly changing, and products have very short product life cycles and short order-to-delivery times as a result. Apparel businesses successfully engaging in service-oriented applications can convert data from their back-end systems into a common readable format and thus are able to share information and conduct online transactions with their business partners via the data communication network. It also encompasses the use of innovative business concepts, such as dynamic pricing through software agent-based negotiation mechanism (Pal & Karakostas, 2016), competition via purchasing consortia and direct online sales to customers.

In a distributed web service environment, service discovery is one of the main functionalities to locate the desired services. Service discovery is a process of finding the desired service(s) by matching service descriptions against service requests. A service description provides service-related information which can be advertised by a service provider and search during service discovery process. Such information usually includes functional properties and non-functional properties.

Ontologies are the basis for adding semantic expressiveness to service descriptions and requirements. Ontology is an explicit and formal specification of a shared conceptualization. A service ontology is accordingly an explicit and formal specification of core concepts of the functional and non-functional properties of service. A domain ontology (or domain-specific ontology) models a specific domain and represents the meanings of terms as they apply to that domain. Ontological relations such as “is-subclass-of” or “part-of” are used for ontological inference.

Semantic service discovery is a service discovery process based on ontology concepts. By using ontology concepts defined in a service ontology expressively in a service description, semantics of the service description can be defined. These service descriptions are therefore expressive semantic descriptions. At the same time, by having both ontology-based descriptions and requirements, an ontology-enhanced reasoning engine (i.e. capable of ontological inference) can be used to locate services automatically and accurately.

Hence, the problem requires a methodical approach which has specific knowledge for capturing the web service execution experiences and appropriate reasoning mechanisms based on the enhanced service descriptions. Semantic web services empower web services with semantics. Moreover, the popularity of semantic web service-based computing (Berners-Lee et al, 2001) has attracted attention to the area of service modeling. For example, one of the main research projects including the US-based initiative – Ontology Web Language Service (OWL-S) (Martin et al, 2004). European projects include DIP (Data, Information, and Process Integration with Semantic Web Services), SUPER (is security-focused research project using social media in emergency management), and SOA4All (a project that provides a compre-