

Chapter 1 Introduction

1.1 Research Motivation

In the last decade, the Internet has changed human behavior and the ways in which business between companies is conducted. Companies utilize the Internet to exchange business information instead of using more traditional methods, such as the telephone and fax. Many technologies and standards have been proposed to support message exchange. Some such famous technologies and standards are XML, EDI, RosettaNet, ebXML, and Web Service. Although, the e-Commerce standards are proposed in order to provide a uniform way for business information exchange, in reality, a company must use different channels to link to its trading partners for various reasons. A company must usually manage the complex relationships between trading partners, various channels to connect with partners, the internal and external business processes, and different enterprise information systems. Heterogeneity and interoperability are one of the key issues in Business-to-Business (B2B) integration.

The traditional methods to solve this issue are the programmed-approach and using mapping table. Through mapping table, we map and transfer between business data. The mapping table seems like is a convenient way. However it only tells us the corresponding value of data, it does not provide the semantic meaning of each data. We also customize the business constraints through programming. The constraints of business messages specified by the B2B standard are designed for human readability.

A large and exponentially growing number of enterprises will make us to manage constraints difficult, and programming is a not an efficient and a flexible way to do this. It makes the mapping table disorderly and unsystematic. When the number of trading partners is growing, the complexity of relation between business data makes the maintenance hardly. It also makes developers confusing when mapping table provides without the meaning of each business data. The high complexity of the integration transactions requires development knowledge-intensive and highly automated integration technologies.

The Semantic Web (SW) is next generation technology. It provides a common framework that allows data to be shared and reused across applications, enterprises, and community boundaries (W3C, 2004). Ontology is the key technology enabling the Semantic Web. Ontology can reason easier and represent the semantics of a domain. The development of the Semantic Web is still going on. Much research is devoted to

exploring the possibility and feasibility of linkage between the Semantic Web and other current technologies, like Peer-to-Peer (P2P), Web Service (WS) and e-Commerce (EC). This research is interesting in linkage between B2B integration and Semantic Web technology.

XML provides a surface syntax for structured documents, but imposes no semantic constraints on the meaning of these documents. DTD and XML Schema are the languages for restricting the structure of XML documents. Ontology differs from XML schema in that it is a knowledge representation, not a message format. Most industry based B2B standards consist of a combination of message formats and protocol specifications. These formats have been given an operational semantics, such as, "Upon receipt of this PurchaseOrder message, transfer Amount dollars from AccountFrom to AccountTo and ship Product." But the specification is not designed to support reasoning outside the transaction context. For example, we won't in general have a mechanism to conclude that because the Product is a type of Chardonnay it must also be a white wine. XML Schema or DTD only define the entity "Product" in a XML document. However, computers cannot conclude the relationship between the instances in the context.

XML is not very good at expressing the kinds of complex constraints needed for business descriptions. Such constraints could be more easily expressed in a rich language for knowledge representation such as ontology language.

1.2 Research Issue

Heterogeneity and interoperability are the main issues in B2B integration. We must consider the integration of different exchange protocols, trading partners, business processes, and business documents. A B2B standard usually specifies those integration dimensions. However, B2B standards are syntactic rather than semantic. Computers cannot understand and read the meaning of business information directly. A good B2B standard should provide an aspect of semantic definition through machine-readable methods. B2B integration should reconcile the semantic conflicts between business messages, vocabularies, and data dictionaries.

In the complex commerce environment, the business model and logic are not always the same, especially when facing to different trading partners. This means that reviewing the messages and processes is inevitable when establishing each B2B connection. Although, B2B standard specify the format of messages and the process flows, we still have to select the fields of message and tune the content that will be

exchanged by each trading partner. In a real condition, a company will not follow the format of message content that specified by a B2B standard exactly. Besides, it is a waste of time especially when the business message is defined by hundreds of fields in accordance with the B2B standard. This research will focus on the issue of Ontology may help us to solve these issues.

1.3 Research Objective

In order to solve the issue of B2B initiative development, especially on the semantic integration between different B2B standards, we propose an ontology-based approach to analyze and develop a B2B initiative. By using the B2B ontologies, we hope to provide the ability to deploy new B2B projects rapidly.

The main objectives of this research are:

1. To develop an ontology-based method to model different B2B requirements and use these models to provide a common view on B2B domain.
2. To provide an efficient approach for the B2B initiative analysis, design and implementation.
3. To provide the semantics of B2B to the computer in order to reuse and reason.
4. To build the B2B domain ontologies for knowledge sharing and management,
5. To provide the ability to deploy new B2B projects rapidly.

1.4 Research Flow

In this research, we first start by identifying the research issue of B2B integration. Second, we review the literature related to B2B integration and Ontology. We also review the relationship and the conversion between UML and Ontology. This helps us understand the current state of B2B and Ontology, the technologies of linking B2B and Ontology. We examine relevant standards and technologies as the research foundation. Third, we propose a more generic method to model the B2B domain and standards. This method is an ontology-based approach. Then, we prove our approach is more generic through modeling two B2B standards, ebXML and RosettaNet. After that we analyze and verify if our approach is efficient for B2B integration initiative. At the end of this thesis, we conclude this research with conclusions and future research directions.

The research flow is shown in Figure 1-1.

1.5 Organization of the Thesis

This thesis is organized as follows:

Chapter One introduces the thesis and describes the research motivation, issue, objective, flow, and organization.

Chapter Two reviews the background and current issue of business to business integration, the B2B standard, the background of the Semantic Web and Ontology, the related work of marrying e-Commerce and Semantic Web technology.

Chapter Three presents the research model. It describes the steps to build up the ontologies of B2B standards.

Chapter Four uses ebXML and RosettaNet to apply our ontology-based modeling method.

Chapter Five discuss the managerial and technical implications of this research, as well as several research limitations of this research.

Chapter Six concludes this thesis with a summary and future research direction.

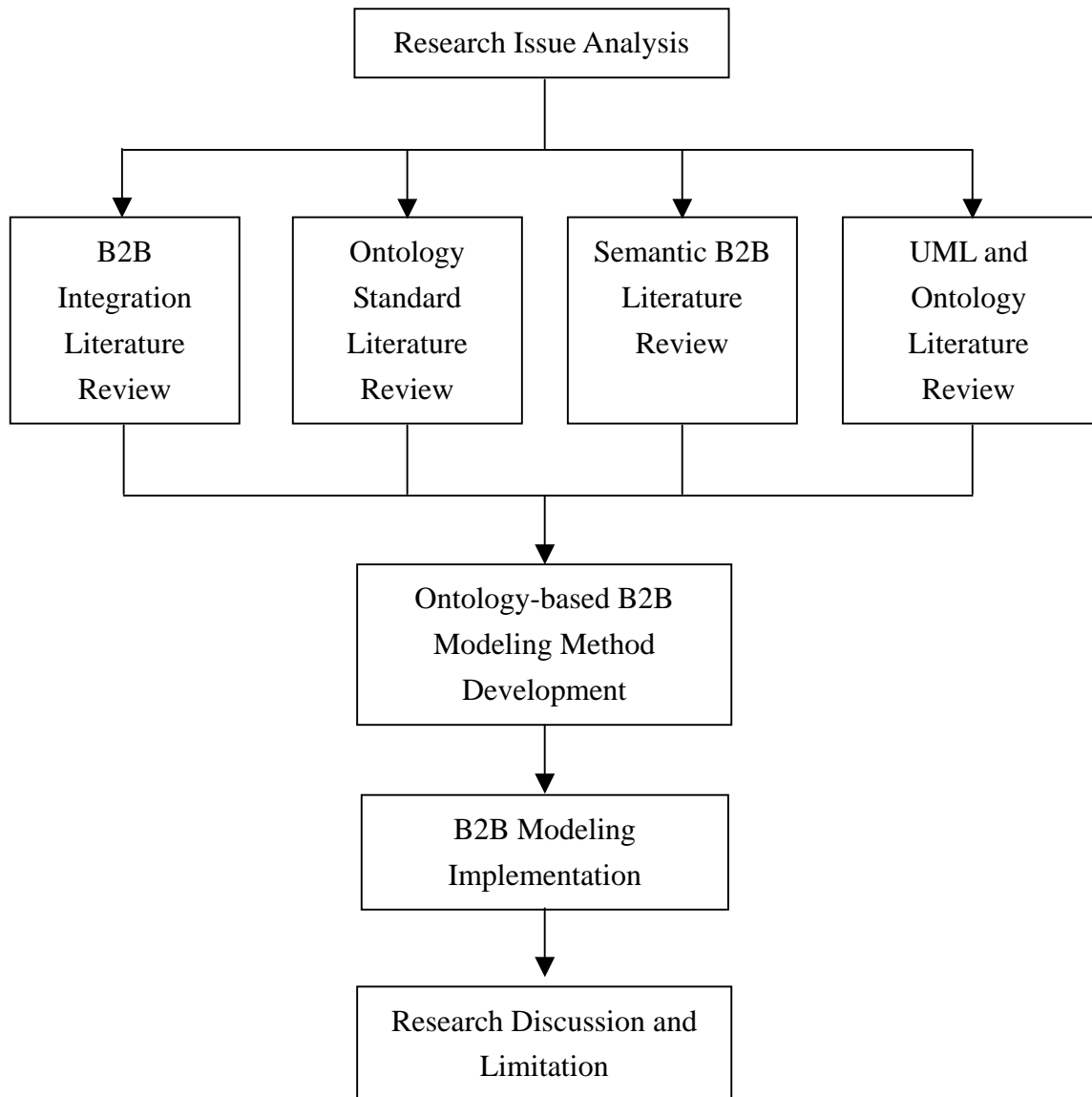


Figure 1-1: Reseach Flow