

Formalizing E-Business Models with UML

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1 Introduction

In the last years, the world wide web has not only been exploited for disseminating information but also, companies use it to improve their interaction with customers, distributors, suppliers and partners. This way of conducting business using the Internet is known as electronic commerce (e-commerce). Broadly defined, electronic commerce is a modern business methodology that addresses the needs of organizations, merchants, and consumers to cut costs while improving the quality of goods and services and increasing the speed of service delivery [KW96]. The term e-commerce is used to describe a new on-line approach to performing traditional functions such as payment and funds transfer, order entry and processing, invoicing, inventory management, cargo tracking, electronic catalogs, point-of-sale data gathering, advertising and marketing.

The design of an e-business application consists of different activities. The most important of these is the specification of the business model which describes the way of doing business. A business model is an abstraction of how a business functions. Then, the model not only provides understanding of the business but can be used as the foundation for the development of applications tools. There are many business models present in the web. These include transaction aggregators, portals, service providers, etc. [Fai00].

There is a growing literature on business models by academics and consultants. For example, Tapscott provides a taxonomy of e-business models [TL00]. Gordijn et al. provides a business model framework based on a generic value-oriented ontology specifying what should be in an e-business model [GAvV00]. However, he focus on a generic business model and does not addresses differences among existing models.

One of the major initiatives to establish a standard architectural framework to support enterprise solutions is IBM's Enterprise Solutions Structure (ESS). ESS consists of a way of describing architecture assets, based on IBM's standard and method for reusing these assets; architecture content in the form of business process patterns and technical models; and a

tool that organizes the content [PH99, FV01]. However, although ESS delivers a standard approach for business modeling [McD99], the approach adopts an information technology perspective. This is necessary since information technology plays an enabling and critical role. In architecture modeling, technology designers can define models that are flexible, robust and in conformance with the latest industry standards. However, we believe that a framework based on a *business perspective* would better ensure that the resulting models follow enterprise specific best practices.

The need for a framework based on a business perspective arises because an electronic solution impacts in all the processes of an enterprise. An e-business strategy requires an integration of the enterprise with all suppliers, clients and partners from the web. Then, a model that provides a complete picture of the business is mandatory.

2 Research line

We propose to provide a precise description of different types of e-business models. For this purpose, we first need to determine the most relevant e-business models used in practice.

Then, for each business model, we can provide a formal semantics based on Unified Modeling Notation (UML)[BRJ98]. UML is being widely adopted as *de jure* and *de facto* software modeling standard. It represents a major investment of intellectual effort and conceptual convergence by the worlds leading software methodlogists. In addition, most tool vendors provide CASE (computer-assisted software engineering) tool support for UML.

In particular, as a basis for defining a model we chose the Eriksson-Penker Business Extensions which include four views of an enterprise [EP00]. The four views describe (a) the overall vision of the business; (b) the processes and value created in the business; (c) the structure of the resources and products created; and (d) the individual behavior of each important resource and process. Each view is defined using UML diagrams.

Since we intend to provide a generalized solution that can be implemented and applied in an e-business context, we will consider the use of *patterns*. As defined by Christopher Alexander, a building architect, “each pattern describes a problem that occurs over and over again in our environmental and then describes the core of the solution to that problem in such a way that you can use this solution a million times over without ever doing it the same way twice” [Ale77]. Patterns were introduced to the software engineering community at a conference where *Design Patterns: Elements of Reusable Architectures* [GHJV95] was first presented. Patterns are used in software to reuse proven solutions.

There are many types of patterns, such as architectural patterns that show the high-level architecture of a system; design patterns that are more oriented toward programming. We intend to define patterns at a conceptual level of a business. These patterns would give clues about how to model and structure business resources, how to organize and relate business processes, business rules, corporate visions and goals.

To summarize, a successful electronic solution should consider the impact of e-business in all the processes of an enterprise. The creation of a web-page is a starting point but it is not the tool that will change the way of doing business. Internet serves as a means of searching and selecting suppliers, identifying commercial opportunities, doing funds transfer, etc. Hence, there is a transformation of the whole business model. The aim of our work is to develop semantic patterns for different e-business models. These patterns will serve to create the software solutions for an enterprise.

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