Chapter III

Towards a Methodology for the Development of Web-Based Systems: Models, Methods and Activities for the Conceptual Design of Large Web-Based Information Systems

Bernhard Strauch and Robert Winter
University of St. Gallen, Switzerland

E-commerce is changing the nature of business. To support ‘buying and selling over digital media’ for private and corporate Web users, companies need not only appropriate transaction systems, but also new information systems. While the systems development challenge for transaction systems is mostly restricted to separating access channel functionality from business transactions processing and developing systems support for new access channels, systems development needs for information systems are much more challenging since different media and different information source systems have to be integrated, novel forms navigation has to be supported and information objects become more complex and more volatile.

Based on a review of related work from hypertext design, Web site/intranet design and database-oriented CASE environments, this chapter tries to identify the “essence” of a Web-based information system and proposes an adequate conceptual model. The model is intended to capture not only hierarchical document structure and hypertext semantics, but also dynamic page generation from databases and various approaches to explicit and implicit navigation. It becomes evident that Web-based information systems can be regarded as supersets of traditional information systems, thereby requiring conceptual modeling to include various additional features. The proposed model comprises several classes of information objects, various types of associations, activities for the design and quality checks. For

Copyright © 2002, Idea Group Publishing.
illustration purposes, the model is applied to an existing Web-based information system. Current Web-based information system development tools are analyzed with regard to the extent to which conceptual Web-based information system modeling is supported.

**INTRODUCTION**

E-commerce is changing the nature of business. To support ‘buying and selling over digital media’ (Kalakota & Robinson, 1999) for private and corporate Web users, companies need not only appropriate transaction systems, but also new information systems. The systems development challenge for transaction systems is mostly restricted to separating access channel functionality from business transactions processing and developing systems support for new access channels (e.g., PC via HTTP, mobile phone via WAP, POS terminal via TCP/IP). In contrast, systems development needs for information systems are much more challenging since different media and different information source systems have to be integrated, novel forms navigation has to be supported, and information objects become more complex and more volatile.

Early systems development was dominated by using authoring tools (‘editors’) to manually edit procedural program code. As a consequence, handwritten code mixing up data usage and functional aspects was difficult to maintain (Martin, 1992). Besides expensive quality control and communication problems among developers, the resulting code suffered from various implementation dependencies, thereby forcing developers to re-do large portions of the development process when technical details (e.g., file structures, access paths) change. A rather similar approach can be observed for early development of Web-based information systems (Rosenfeld & Morville, 1998). By using HTML authoring tools, complex code is created that not only mixes up appearance and contents, but also depends widely on implementation details. Moreover, the utilization of different authoring tools complicates communication between developers. As an example, the following problems usually occur with regard to navigation when different Web-based information systems have to be integrated:

- Navigation is interpreted and implemented in different ways depending on the authoring tool in use. Different tools use identical terms for different concepts or different terms for identical concepts.
- Navigation is not based on user requirements for optimal access to information objects or associations between information objects (e.g., Morville & Rosenfeld, 1999; Richmond, 1999). Instead, implementation details like various frame implementations dominate design.
- As a consequence, similar navigational concepts are implemented (and specified) in different ways so that explicit integration efforts are necessary to identify common structures and implement them consistently.

In order to enable efficient communication between developers and to provide a stable foundation for adopting new technologies, conceptual modeling of Web-
Related Content

Sociotechnical Study of e-Business: Grappling with an Octopus
www.igi-global.com/article/sociotechnical-study-business/3450?camid=4v1a

An Internet Trading Platform for Testing Auction and Exchange Mechanisms
www.igi-global.com/chapter/internet-trading-platform-testing-auction/5542?camid=4v1a

The Role of eServices and Transactions for Integrated Value Chains
www.igi-global.com/chapter/role-eservices-transactions-integrated-value/6140?camid=4v1a
The Role of Digital Service Encounters on Customers' Perceptions of Companies
www.igi-global.com/article/role-digital-service-encounters-customers/3508?camid=4v1a