



**Chapter XXIV**

# Conceptual Web Site Modeling

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*Current web site development is still dominated by technical issues. In order to enable efficient communication between developers and to provide a stable foundation for adopting new technologies, conceptual modeling of web sites is essential. Based on the state-of-the-art of conceptual modeling as implemented in current CASE environments, this paper tries to identify the “essence” of a web site 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 sites 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, design rules, and quality checks. For illustration purposes, the model is applied to an existing web site. Current web site development tools are analyzed with regard to the extent to which conceptual web site modeling is supported.*

## INTRODUCTION

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, 1982). Besides expensive quality control and communication problems among developers, the resulting code suffered from various implementation dependencies, thereby forcing developers to redo large portions of the development process when technical details (e.g. file structures, access paths) are changing. A rather similar

approach can be observed when looking at today's web site development practice (Rosenfeld and Morville, 1998). By creating web sites using HTML authoring tools, complex code is created that does not only mix 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 sites 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 (see e.g., Morville and Rosenfeld, 1998; 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 sites is essential. We understand web sites as server components of distributed applications which use the HTTP protocol to exchange data between servers and clients ("browsers"). By this definition, the principal problem of web site development becomes apparent: Even the relevant class of application components is defined by technical attributes (HTTP protocol, server functionality) instead of conceptual differences. Conceptual modeling should be independent of all technical and application dependent details. Before analyzing conceptual issues in web site design, proposing an appropriate conceptual model, and checking support potentials of current web site development tools, therefore, we should discuss whether our initial definition is appropriate, i.e., to what extent web sites conceptually differ from traditional information systems.

## Web Sites vs. Traditional Information Systems

Traditional business applications support business processes by implementing the entry and manipulation of data about business transactions. Web applications go beyond this functionality by integrating different media for information representation and by hypertext functionality, thereby supporting not only the handling of business transactions, but also the storage and transfer of knowledge.

As a consequence, organizational, functional, and data views of business processes have to be specified during conceptual design. Moreover, complex knowledge components and their associations should be specified in order to enable flexible access and efficient navigation.

As an example, the data view of traditional information systems development and web site development is compared: A traditional data model comprises:

- types of structured information objects (e.g. order, customer, product),
- certain types of relationships between information object types (e.g. generalization dependencies, references = existential dependencies),

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