# A Component-Based Method for Developing Web Applications

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**Abstract**

We describe, in this paper, a component-based software engineering method for helping development teams to plan, organize, control, and develop web applications. The method is described in terms of three methodological elements: a product model that captures the architectural characteristics of web applications, a team model that describes the different roles to be played by the members of a team during the development of web applications, and a process model that integrates the managerial and technical activities that are required to develop componentized web applications of high quality. The main features of the model are its component-based approach that helps reduce costs and development time; its ability to integrate managerial and development processes into a unique process model; and its emphasis on business modelling as a way of gaining a better understanding of the application domain objectives, functions and requirements.

**Keywords:** Component-Based Software Engineering, Web Engineering, Web Information Systems

## 1. Introduction

Developing web applications is a very complex process that demands highly skilful personnel. Its complexity is due to the fact that it involves many different information technologies including WWW, human factors, information systems, business modelling, programming languages, distributed systems, and databases. A web application is defined as a software application that uses a web-based user interface to provide a set of information services to its users. These services, called the business logic of the application, comprise the input, storage, update, access, retrieval, and manipulation of data objects that are stored in one or more servers. Web information systems, e-commerce systems, e-business portals, e-government systems, and instructional web sites are some typical examples of web applications.

The scope, purpose and complexity of web applications vary widely from small scale informational services to large-scale enterprise applications that support several business processes. Ginige and Murugesan (2001a) groups web applications into the following categories: informational, interactive, transactional, workflow-based, collaborative work environments, online communities, marketplaces, and web portals.

Although a great number of web applications are actually in use everywhere, the way most of them were developed raises many concerns. A survey conducted in Nov. 2000 by the Cutter Consortium evidences the following problems related to web-based development projects: (1) 84% of the delivery systems didn't meet business needs; (2) 79% of the projects reported schedule delays; (3) 63% exceeded the budget; (4) 53% of the delivery systems didn't provide the required functionality; and (5) 52% of the deliverables were of poor quality. Ginige and

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