

## Chapter XLVIII

# Web Application Classification: A Maintenance/Evolution Perspective

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### INTRODUCTION

Many companies use the Web to communicate with the external world as well as within their organizations and to carry out their business processes more effectively. A survey on Web application development shows that 84% of development projects do not meet business needs, 56% do not have the required functionality, 79% are behind schedule, and 63% are over budget (Standish Group, 2002). García-Cabrera, Rodríguez-Fórtiz, and Parets-Llorca (2002) report that the development of a Web application is never finished, and the nature of Web applications is evolutionary. The architecture of Web applications has three layers: conceptual, presentation, and navigation. It also has two perspectives: designer and viewer. Software evolution is “the dynamic behavior of

programming systems as they are maintained and enhanced over their life times” (Belady & Lehman, 1976). Web application evolution is of increasing importance as more Web systems are in production.

Taylor, McWilliam, Sheehan, and Mulhaney (2002) indicate issues of Web application maintenance activities. Those issues are the impacts of dynamic Web application, Web system structure, coding for specific Web browsers, documentation, and development standards. They classify Web application into two categories in terms of data: static and dynamic. Dynamic Web systems require more maintenance considerations than do static systems.

Web technologies have been adopted by organizations in the public sector. Many state agencies provide their services via the Web. This study

investigates the management of e-government applications at a U.S. state technology agency (STA).

## BACKGROUND

Web applications are the glue joining IT infrastructure with the business processes that deliver e-government services to the state constituents. Reviewing Web applications over the last 10 years, we can clearly see that they offer more features every year, and they are better structured with the advance of Web design methods and technologies. The factors contributing to the evolution of Web applications are the demand for new features and new Web technologies (Jazayeri, 2005). This section introduces the e-government application evolution from three perspectives: evolution stages and applications, processes, and services.

E-government is the use of information and communication technology in general and e-commerce in particular to carry out government operations such as providing citizens and organizations with more convenient access to government information and services, and the delivering of public services to citizens, business partners and suppliers, and other government agencies (United Nations [UN] & ASPA, 2002). E-government evolves from one stage to the other: from developing a Web page to integrating government systems behind the Web interface (Schelin, 2003). Each of the e-government evolution stages represents a different level of technological sophistication, citizen orientation, and administrative change (Holden, Norris, & Fletcher, 2003; Moon, 2002).

There are different stage models for e-government evolution stages (Hiller & Bélanger, 2001; Ho, 2002; Layne & Lee, 2001; Melitski, 2003; Moon, 2002; Sandoval & Gil-García, 2005; UN & ASPA, 2002; West, 2004). At the aggregate level, technological sophistication has been con-

tinuously added to e-government applications. Four different stages for e-government evolution emerge from the aggregation of the different stage models: publishing, interaction, transaction, and integration. The growth stages of this approach are determined by the service provision or functionality (sophistication) of the e-government applications.

- **Publishing:** This refers to providing access to services, applications, or data through the same user interface (e.g., Web site or portal) with static information about agencies and some of the services they provide to citizens and private organizations. Content in this stage is generally limited to HTML (hypertext markup language), images, PDF files (Portable Document Format), and Office files (such as word processing documents, spreadsheets, presentations).
- **Interaction:** This refers to the increasing interaction between citizens and different government agencies. Citizens and businesses can access information according to their different interests. The government portal provides both static and dynamic or interactive content. At this level, users interact with information in the form of a survey, an account, or another means of personalizing the Web experience.
- **Transaction:** This refers to customizing the government portal for citizens and businesses. The government portal communicates either synchronously or asynchronously with various enterprise application (back-end) environments. This portal provides secure electronic payment services to facilitate transactions such as taxes, fines, and service payments.
- **Integration:** This refers to the full integration (vertical and horizontal) of government services. Governments must undertake institutional and administrative reforms to

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