# Audience-Driven Design Approach for Web Systems

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## INTRODUCTION

In the last years, Web systems have evolved from a simple collection of hypertext pages toward applications supporting complex (business) applications, offering (rapidly changing) information and functionality to a highly diversified audience. Although it is still easy to publish a couple of pages, it is now recognized that appropriate Web design methods are needed to develop more complex Web sites and applications (generally called Web systems). In the past, Web systems were created opportunistically without prior planning or analysis, and without any regard for methodology, resulting in Web systems that were lacking consistency in structure, navigation, and presentation, and were not transparent. A lot of these systems were also suffering from the classical maintenance problems and development backlog. In the same period, Web technology evolved at an equally dazzling rate enabling more advanced Web applications, but with the unfavorable consequence that Web development is no longer simple and easy. The latest developments in the field of the Web are related to the vision of the Semantic Web: an extension of the current Web in which information is given well-defined meaning, better enabling computers, and people to work in cooperation (Berners-Lee, Hendler, & Lassila, 2001).

Together with the Web, a new problem unknown in classical information systems emerged: competition for the visitor's attention. Especially for commercial Web systems, it is important to hold the interest of the visitors and to keep them coming back. As stated by usability expert Nielsen (2000, p. 9), "all the competitors in the world are but a mouse click away." Much more than in "classical" software systems, the usability of Web systems is a primary factor for their success.

## BACKGROUND

One way to deal with the usability of a Web system is by assessing the usability once the system is built and improving it if necessary. The techniques for accessing the usability of a Web system are mainly the same as those used in usability testing of classical user interfaces, for example, heuristic evaluation, expert-based evaluation, experimental evaluation, interviews, questionnaires, and so forth (Nielsen & Mack, 1994). Also, different tools are developed that support assessing the usability of Web sites (e.g., WebQuilt [Hong, Heer, Waterson, & Landay, 2001; Vanderdonckt, Beirekdar, & Noirhomme-Fraiture, 2004], and the full-featured experimentation environment of Noldus [www.noldus.com]). Another approach to enhance usability (and complementary to the first approach) is to use a Web design method that ensures a higher usability. The first Web design methods, HDM (Garzotto, Paolini, & Schwabe, 1993) and its successors HDM2 (Garzotto, Paolini, & Mainetti, 1993) and OOHDM (Schwabe & Rossi, 1995), and RMM (Isakowitz, Stohr, & Balasubramanian, 1995), were originally designed for hypertext applications or came from the database research community. These methods used database design methods like E-R (Chen, 1976) or OMT (Rumbaugh, Blaha, Premerlani, Eddy, & Lorensen, 1991), and focused on the organization of the data to be presented on the Web. These methods could solve to some extent maintenance problems, but they did not address usability. Essential for achieving a good usability in Web systems is meeting the needs of the (different) visitors. WSDM was one of the first Web design method to recognize this. This method was presented at the WWW7 conference (1998) as a "user-centered" design method for Web sites (De Troyer & Leune, 1998). The starting point in the approach is the set of potential visitors (audiences) of the Web system. The method recognizes that different types of visitors have different needs and that this should drive the design of the Web system rather than the organization of the available data. Later on (De Troyer, 2001), the authors renamed their approach from "user-centered" to "audience-driven," to avoid confusion with the term "user-centered" from the HCI (human-computer interaction) field. In HCI, a user-centered approach refers to a design process in which users are actively involved (by interviews, scenario analysis, prototyping, evaluation, etc.). This explicit involvement is not necessary in WSDM. On the contrary, the individual Web users are unknown during the Web development process; they cannot be interviewed in advance, and they cannot be involved in the development process. In the audience-driven approach as defined by WSDM, the users play a central role, but it is not necessary to involve them actively in the development process.

Since the late 1990s, several Web design methods have been conceived. Some examples are WebML (Ceri, Fraternali, & Bongio, 2000), UWE (Koch & Kraus, 2001), HERA (Houben, Barna, Frasincar, & Vdovjak, 2003), OO-H (Gómez, Cachero, & Pastor, 2003), SHDM (Schwabe, Szundy, de Moura, & Lima, 2004), and Co-Design (Schewe & Thalheim, 2005). Some of these design methods focus on adaptivity or personalization as a way to enhance the usability. These methods use a user model to adapt the Web system to the needs or characteristics of an individual user. This implies that a particular Web system will look different to two different users, or even that the system will look different when the same user revisits it. Although personalization may be undoubtedly a good solution in some situations (e.g., e-learning, e-commerce), in other situations it may be less appropriate (e.g., regular Web systems). In this article, we will not consider personalization as a way to enhance usability.

When designing a Web system, there are two important questions to be answered:

1. What information and services should be provided?
2. How should all this information and services be structured?

To answer these questions, different design approaches can be followed. One of them is the *audience-driven* approach. Other possible approaches are the *data-driven* approach and the *organization-driven* approach.

In a data-driven approach, the data (and services) available in the organization (in databases, brochures, internal documents, etc.) are the design's starting point. Following this approach, the structure of the Web system will reflect the way the data are structured and maintained in the organization, and the content will parallel the internal data. The same applies for services or functionality. Forms available in the organization will be converted into e-forms, and the current way of working will be reflected in the Web system. The advantage is that structuring the information and services is easy and that the maintenance can be done in parallel with the maintenance of the internal data and procedures. However, the disadvantages are: (1) the data are presented and organized the way they are used in the organization. This is not necessarily how people external to the organization need it or perceive it; (2) information or services may be missing because it was not available in the form of a specific document or existing procedure and the designers were not aware of the fact that users may need this; (3) all information and all services are offered to all users. As a consequence, visitors may be drowned in information.

In an organization-driven approach, the internal structure of the organization is the starting point: the structure of the Web system reflects the structure of the organization. This approach is often used for large organizations with a lot of divisions, for example, a university Web system that reflects its internal structure into faculties, departments, and research institutes. As for the data driven approach, it is easy to structure the Web system, and the development and maintenance of the different parts can be assigned to the different divisions of the organization. The disadvantage is that it may be very difficult for visitors not familiar with the internal structure of the organization to know where to look for information or services.

In the audience-driven approach, the information and services needed in the Web system are determined by the needs and requirements of the target audiences (users). Also the main structure of the Web system will be based on the different types of audiences and their requirements. This last point differentiates the audience-driven approach from many so-called user-centered approaches. We illustrate this with an example, a university Web site. Following the audience-driven approach, the university Web site would (at least) contain a part with general information interesting to all visitors; a part with information specific for students and lecturers; and a part containing information for researchers and third parties interested in research. The audience-driven approach gives consideration to the fact that (large) Web systems usually have different types of visitors that may have different needs. Clearly, such Web systems will have a higher usability than the ones structured using a data-driven or organization-driven approach. However, the downsides of the medal are that the effort needed to design the Web system is higher and that the task of maintaining may be spread over the organization (usually, there will be no one-to-one mapping from the structure of the Web system onto the structure of the organization).

## THE AUDIENCE-DRIVEN APPROACH

As explained in the introduction, an audience-driven design approach means that the different target audiences (visitors) and their requirements are taken as starting points for the design and that the main structure of the Web system is derived from this. Concretely, this results in a Web system where the homepage contains different navigation paths (called audience tracks), one for each different kind of visitor.

To arrive to such an audience-driven organization of the Web system, the different types of audiences and their needs are identified already in an early stage of the design process (Casteleyn & De Troyer, 2001). One way to identify the different types of audiences is by looking at the activities of the organization relevant for the Web system and the role people play in these activities. These people are the potential users (audiences) of the Web system. For example, the activities of a university are "performing research," "giving courses," and "advising third parties." The people involved are researchers, students, potential students, teaching staff,