INFORMATION SCIENCE PUBLISHING
701 E. Chocolate Avenue, Suite 200, Hershey PA 17033, USA
Tel: 717/533-8845; Fax 717/533-8661; URL-http://www.idea-group.com
ITB11386

This chapter appears in the book, *E-Learning and Virtual Science Centers*
edited by Leo Tan Wee Hin and R. Subramaniam © 2005, Idea Group Inc.

Chapter III

Contextualized Virtual Science Centers

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Abstract

Today it is not enough just to supply content without the consideration of the recipient, his/her current task and situation. Therefore the time, the location, the particular technical limitations, and the modality and style of reception are important parameters for contextualized interactions and information delivery. Context-sensitive content and information processing are especially assets for the generation of added value in information delivery. This chapter describes how contextualization can be performed in virtual science centers. The demand for context-sensitive functionalities constitutes a crucial challenge for application developers, system integrators and product designers. This chapter furthermore offers a potentially substantive approach for development and maintenance of context-sensitive systems and services by adapting information brokering techniques.

Introduction

Given the affordances of the World Wide Web, one of its true instructional applications of high potential are online simulations of science experiments and phenomena. Thus far in the evolution of the Web this has surfaced in the form of *virtual science museums*: Web sites that offer vicarious science experiences using Web technologies. Most of these sites are the online presence for actual museums located around the world (such as http://www.science.edu.sg/ssc/index.jsp, http://www.deutsches-museum.de/e_index.htm), but it is their specific orientation to science that can make them especially invaluable for, for example, a classroom.

Virtual science centers encompass hands-on exhibits, lab spaces, science fairs, and communication spaces in a multi-user setting. These will include interactive interfaces to simulations and visualizations created to communicate key concepts in science and technology to an increasingly diverse audience. For example, the Chabot Virtual Space & Science Centre (http://www.chabotspace.org/vsc/) explains the physical constraints for a Lunar Lander and lets the visitor experience the behavior of the Lander in an online simulation. Virtual science centers make science information readily available to anyone with access to the Internet, like a family exploring exhibits from their home computer, or a group of students operating telescopes from their classroom. Integrated portals (like the European Collaborative for Science, Industry and Technology homepage: http://ecsite.ballou.be/new/index.asp) provide access to innumerable virtual exhibitions for multiple topics.

For the flexible use of information about exhibits of a virtual science center we propose a centralized model around a domain ontology that is described in a software tool for information brokering. We think that the proposed model is a very flexible way to reuse existing information and support curators and exhibition experts in the design of a variety of personalized experiences ranging from virtual exhibitions, virtual science museums to virtual science centers. In such scenarios, the authoring, meta-tagging and distribution of this valuable information on exhibits is a non-trivial task.

A variety of guidance or information systems have been developed in the last few years for the support of a museum visit or for the preparation of such a visit. In most cases the authenticity and the possibility to contextualize the information presentation to the current position or situation of a user were seen as a central issue (Shilit et al., 1994; Dey & Abowd, 2000). Classic information systems in electronic space (like e-learning applications) and physical space (such as museum guides, city guides, navigation systems) have a common information filtering process (cf., Figure 1). The user, while interacting with his/her device, provides information (implicitly or explicitly expressed) to the application, which recognizes the changed parameters due to the interaction. The incoming information is used for maintaining the personal profile of the user, which determines the filtering process for relevant information. Furthermore, the filtering process is influenced by domain-dependent knowledge inside the application. Only the information provided by the Content-Management System that passed the filters is finally handed over to the internal presentation engine for being delivered to the (information-) consumer.