Chapter 22
Using COTS-*Widgets* Architectures for Describing User Interfaces of Web-Based Information Systems

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ABSTRACT

Modern Web-based Information Systems (WIS) must be flexible and prepared to be easily accessible and manageable in real-time. WIS user interfaces (UI) are still being constructed on the basis of traditional software development paradigms, without taking into account in their construction (or in the knowledge managed by the systems) the main criterion of globalization, that they must be distributed, open and changing. WIS-UI must be able to be constructed depending on the type of interaction (individual or collective) and the purpose of the interaction (management, technical, etc.). In this paper, the authors present a component-based development perspective to build user interfaces of WIS by means of the composition of widgets-components architectures and MDD approaches.

1. INTRODUCTION

Modern *Web-based Information Systems* (WIS) must be flexible, adaptable, extensible, accessible and manageable by different persons and/or groups of persons with common interests located in different places. Recently, special interest has been given to globalization of information through a common system vocabulary using ontologies and web semantics. A great effort has also been devoted to recalling information on the Web, with powerful search engines based on ontologies and

DOI: 10.4018/978-1-4666-4157-0.ch022

intelligent software agents, a mechanism known in the literature as "information retrieval". However, at present, WIS user interfaces (UI) are still being constructed on the basis of traditional software development paradigms, without taking into account in their construction (or in the knowledge managed by the systems) the main criterion of globalization, that they must be distributed, open and changing. This means that a WIS UI must be able to be dynamically reconstructed depending on the type of interaction (individual or collective) and the purpose of the interaction (management, technical, etc.).

WIS modernization techniques are aimed at the same priority consideration as the ICT EU of 7th Framework Programme: "The future of the Internet" (around the new Web 3.0). Some techniques of our interest are: (1) Web information retrieval applied to UI mediation services; (2) Semantic Web for cooperative UI intelligence; (3) Decision mechanisms; (4) Composition architectures in real time: for UI composition; (5) Multi-agent architectures: interface agents, mediation agents, etc.

Within this framework, our interest has been focussed on studying and developing an experimental methodology to work with WIMP-type simple user interfaces *(Windows, Icons, Menus and Pointers)* (Almendros & Iribarne, 2008). Such user interfaces are based on "bottom-up" composition of *widgets*-type COTS interface components (that we called *cotsgets*). The methodology is inspired on basic principles of *Model-Driven Development* (MDD) (Asadi & Ramsin, 2008; Stahl & Völter, 2006). A WIS/WIMP-*costgets* user interface is considered as an architecture based on *cotsgets*-type components; such architecture respects some principles of composition like dependence between components, restrictions in use, availability and visibility, etc. As we focussed on an MDD-based solution, here we'll consider an *architecture* as a WIS/WIMP-*cotsgets* interface meta-model. The meta-model instatiation, with the specific *cotsgets*-type components, represents the UI made up of "portions".

A WIS example requiring a solution for this situation gap are *Environmental Management Information Systems* (EMIS) (International Organization for Standardization, 1996). EMIS are social and technical systems with a variety of final users and actors (i.e., politicians, technicians, administrators, etc.) that cooperate with each other and interact with the system by means of powerful and strict UI for decision-making, problems resolution, etc.

SOLERES is a Web-based EMIS which sets up a framework for correlating satellite maps and ecological cartography using neural-networks (http://www.ual.es/acg/soleres). This information system, like other current WIS, must be flexible and allow simple, quick access to promote globalization of the information. To accomplish this goal, our environmental information system was basically designed in two large subsystems. On one hand, all of the infrastructure and platform supporting the information system knowledge base (SOLERES-KRS), and on the other, all human-computer interaction (SOLERES-HCI). The system for representing knowledge, implemented in SOLERES-KRS, was modeled using ontologies, which allows the system to have meta-information repositories of satellite images and cartography, with the original information in repositories outside of the system. The platform was prepared to incorporate information from correlating satellite images and cartography. This subsystem, and also the system for representing the knowledge that it implements, has been widely described elsewhere (Asensio et al., in press; Iribarne et al., 2010; Padilla et al., 2008). On the other hand, the SOLERES-HCI subsystem manages exploitation of the information (in this case environmental), facilitating interaction with user interfaces that mediate for the users in searching for and exploiting the information and facilitating decision-making tasks (environmental), and prediction/prevention. Our proposal for building WIS/EMIS user interfaces is a real-time approach inspired on composition perspective with COTS-interface components (type interface *widgets*).