Software Reuse in Hypermedia Applications

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INTRODUCTION

Hypermedia applications were, at the beginning, hand-coded pages with “ad-hoc” links. This production method was acceptable until a few pages had to be produced, but it became rapidly unmanageable when several hundreds of pages with complex interactive objects had to be considered. In particular, two interwoven problems rapidly became relevant: how to ensure the “usability” of modern large hypermedia-applications (Garzotto, Matera & Paolini, 1999), and how to improve the efficiency of its production/maintenance process.

In good hypermedia applications, in fact, the reader should be able to effectively exploit the information contained in the application: that is, he or she should be able to quickly locate the objects of interest, to understand the inner structure of the objects and to easily navigate from one object to another. Several factors concur to the achievement of usability: one of the most important is to have a good structuring of the information objects and a good structuring of the navigation patterns.

BACKGROUND

Several authors have recently proposed the adoption of design models (Garzotto, Mainetti & Paolini, 1995; Isakowitz, Stohr & Balasubramanian, 1995; Schwabe & Rossi, 1995) and design patterns (Rossi, Schwabe & Lyardet, 1999), in order to improve the quality of hypermedia applications, at least for those aspects concerning structure and navigation. Other authors (Conallen, 1999; Schwabe & Rossi, 2000) have proposed the use of object oriented paradigm to model this kind of application, but the navigation structures are more simple. Design models provide, in fact, the primitives that allow structuring the information objects and the corresponding navigation patterns along regular and systematic features, improving consistency, predictability (for the user), robustness of the design, and therefore improving usability. The ancestor of these models can be traced to HDM (Garzotto, Paolini & Schwabe, 1993) and its evolution: W2000 Model (Baresi, Garzotto & Paolini, 2000).

The adoption of W2000 to design the internal structure and the navigational features of hypermedia applications is desirable for three reasons:

- the production process can be decomposed into sub-problems easy to manage;
- the application model can be “executed” by a suitable “interpreter” to create the application pages in a way that is independent from the specific application.

Furthermore, in several real-life projects we encountered the problem of dealing with application families. An application family is a set of applications sharing (part of) the content and also (part of the) conceptual design. The problem of application families is the typical situation where the application owner, after a successful first application, needs a second one very similar to the first one. At first it seems a simple problem of “reuse” of content: use the same pictures, use the same texts, use the same data, and so forth (Garzotto, Mainetti & Paolini, 1996). After a while it becomes apparent that not only content, but also (pieces of the) conceptual structure must be “reused”. Then comes a third “similar” application, and so on. So, the truth emerges: the designer should have started from the beginning having in mind a family of applications, knowing that several specific applications could have resulted from it. In other words the designer should have optimized the activity of “carving out,” from a family, a specific application, for a specific need.

Therefore it became clear that the design process, the design model and the design support system should adopt the notion of family of applications. Such kind of activity is made easily using a structured model.

BRIEF DESCRIPTION OF W2000 METHODOLOGY

The methodology was developed by the UWA Consortium (UWA), and specifically by Polytechnic of Milan.

W2000 methodology assumes that it is essential to make a clear distinction between the different aspects of the application that need to be observed during the design phase, in order to make the design itself a structured and easily controllable process, and to obtain clear modeling, suitable for different users and delivery devices.

After the Requirements Analysis phase, guided by a goal-oriented approach, the methodology suggests a sequence of steps that may be briefly summarized as follows:
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