Chapter XX

Ensuring Task Conformance and Adaptability of Polymorph Multimedia Systems

Chris Stary
University of Linz, Austria

ABSTRACT

This chapter shows how specifications of mobile multimedia applications can be checked against usability principles very early in software development through an analytic approach. A model-based representation scheme keeps transparent both, the multiple components of design knowledge as well as their conceptual integration for implementation. The characteristics of mobile multimedia interaction are captured through accommodating multiple styles and devices at a generic layer of abstraction in an interaction model. This model is related to context representations in terms of work tasks, user roles and preferences, and problem-domain data at an implementation-independent layer. Tuning the notations of the context representation and the interaction model enables, prior to implementation, to check any design against fundamental usability-engineering principles, such as task conformance and adaptability. In this way, also alternative design proposals can be compared conceptually. Consequently, not only the usability of products becomes measurable at design time, but also less effort has to be spent on user-based ex-post evaluation requiring re-design.

INTRODUCTION

Mobile and wireless applications provide essential benefits for their users (Siau & Shen, 2003): They allow them to do business anytime and anywhere; Data can be captured at the source or point of origin, and processed for simultaneous delivery in multiple codalities and ways, including multimedia applications. The emergent utility of those applications is based

on the flexible coupling the business the logic of applications with multiple interaction devices and styles (Nah, Siau, Sheng, 2005). Consequently, developers have to:

1. Construct multiple user interfaces to applications
2. Ensure user-perceivable quality (usability) for each user interface

The first objective means for multimedia applications not only the development of stationary user interfaces, but also the provision of user interfaces for a diverse set of devices and related styles of interaction. A typical example for this setting is the access to public information systems via mobile devices (WAP (wireless application protocol)-based cell phones, palmtops, PDAs (personal digital assistants), tablet PCs, handhelds, etc.), as well as stationary user-interface software, such as kiosk browsers at public places (airports, cine-plexes, malls, railway stations, etc.). Hence, the same data (content) and major functions for navigation, search, and content manipulation facilities should become available through various presentation styles and interaction features.

This kind of openness while preserving functional consistency does not only require the provision of different codalities of information and corresponding forms of presentation, such as text and audio streams for multimedia applications, but also different ways of navigation and manipulation. For instance, WAP is designed to scale down well on simple devices, such as the mobile phone with less memory and display capacity. Due to the nature of the devices and their context of use, it is not recommended to transfer Web application directly to WAP applications without further analyses. For WAP applications, it is highly recommended to use menus as much as possible to save the

user from using the limited keypad facilities. In addition, any text should be short and consistent in its structure. Wording should be easy to understand, and fit within the display. Finally, obligatory user-typed data input, such as providing telephone numbers through touch-typing, should be avoided, since entering text or numbers on a phone keypad is a difficult and error prone operation (Arehart et al., 2000). Besides these usability issues, accessibility matters (e.g., to support aging users) (Ziefle & Bay, 2005)

Here the second objective comes into play: It is the set of users that decide primarily whether a product is successful or not. In more detail, it is the user-perceived quality (in terms of usability principles, such as adaptability) that has to be ensured through development techniques and tools. They have to comprise or include some measurement of usability principles at design time to avoid time- and cost-consuming rework of coded user interfaces based on the results of a posteriori evaluation.

When setting the stage to meet both objectives, we have to define design representations (i.e., models) that include application context. The design knowledge represented in this way can then be processed to check the implementation of generic properties of usability principles. Such an approach recognises, both, the need for:

- Techniques and tools ensuring the openness of the application logic towards various interaction devices and styles while preserving functional consistency
- Early usability testing—focusing on algorithms checking design representations against generic characteristics of quality parameters. For instance, the shortest paths (from the organizational perspective) in a menu-tree should be specified in

Related Content

Metamorphic Testing of Image Classification and Consistency Analysis Using Clustering
Hemanth Gudaparthi, Prudhviraj Naiduand Nan Niu (2022). *International Journal of Multimedia Data Engineering and Management (pp. 1-20).*
www.irma-international.org/article/metamorphic-testing-of-image-classification-and-consistency-analysis-using-clustering/304390

Evaluating Learning Management Systems: Leveraging Learned Experiences from Interactive Multimedia
Katia Passerini (2008). *Multimedia Technologies: Concepts, Methodologies, Tools, and Applications (pp. 57-76).*
www.irma-international.org/chapter/evaluating-learning-management-systems/27073

Default Reasoning for Forensic Visual Surveillance based on Subjective Logic and Its Comparison with L-Fuzzy Set Based Approaches
Seunghan Hanand Walter Stechele (2011). *International Journal of Multimedia Data Engineering and Management (pp. 38-86).*
www.irma-international.org/article/default-reasoning-forensic-visual-surveillance/52774

Virtual Learning Environments for Manufacturing
Hamed F. Maneshand Dirk Schaefer (2011). *Gaming and Simulations: Concepts, Methodologies, Tools and Applications (pp. 1597-1618).*
www.irma-international.org/chapter/virtual-learning-environments-manufacturing/49469

Communication and Media: Types, Functions, and Key Concepts
Bradley Freeman (2018). *Handbook of Research on Media Literacy in Higher Education Environments (pp. 25-40).*
www.irma-international.org/chapter/communication-and-media/203989