User interface standardization

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Abstract. The UsiXML ITEA 2 project developed an innovative model-driven engineering method to improve the user interface design for the benefit of both industrial and academic end-users in terms of productivity and reusability. The goal of UsiXML was to define, validate, and standardise an open user interface description language (UIDL), increasing productivity and reusability, and improving usability and accessibility. The development efforts in UsiXML resulted in a draft submitted to W3C and were rewarded with the ITEA Excellence Award 2013 for standardization.

Key words: user interfaces, model-based engineering, meta-models, standardization.

Editorial to the special issue

Developing user interfaces (UI) is more and more difficult due to the complexity and the diversity of existing environments and to the amount of skills required. UIs account for more than 50% of the total application costs and development time. The difficulties are exacerbated when the same UI is to be developed for multiple contexts of use, such as user preferences, categories of users, computing platforms, and working environments.

The UsiXML ITEA 2 project developed an innovative model-driven engineering method to improve the user interface design for the benefit of both industrial and academic end-users in terms of productivity and reusability. Since a large proportion of today's infrastructure tools, software tools and interactive applications are implemented on top of XML platforms, this project focused on enhancing the XML-based user interface extensible mark-up language (UsiXML) by adding versatile context-driven

capabilities to take it far beyond the state of the art and lead to its standardisation.

UsiXML is intended for developers, as well as analysts, designers, human factors experts, etc. Thanks to UsiXML, non-developers can shape the UI of any new interactive application by specifying it in UsiXML, without requiring the programming skills usually found in mark-up and programming languages. UsiXML is a declarative language capturing the essence of what an UI is, or should be, independently of physical characteristics.

The goal of UsiXML was to define, validate, and standardise an open user interface description language (UIDL), increasing productivity and reusability, and improving usability and accessibility of industrial interactive applications using the μ7 concept: multi-device, multi-platform, multi-user, multi-linguality / culturality, multi-organisation, multi-context, multi-modality.
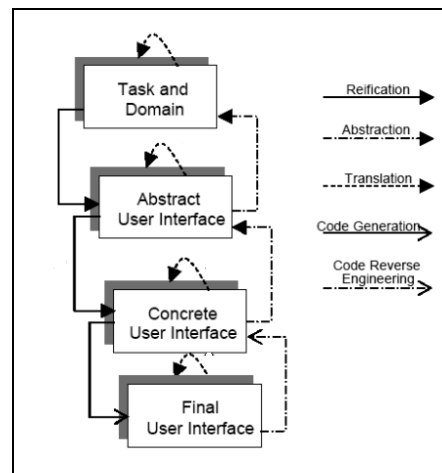

Figure 1. Different kinds of transformations steps of UsiXML

UsiXML is based on the Cameleon reference framework (Calvary et al., 2003 ; Limbourg et al., 2005) that describes a user interface in 4 main levels of abstraction: task & domain level, abstract user interface level, concrete user interface and final user interface (see Figure 1). On the basis of these 4 levels, UsiXML proposes a set of models (e.g. task model, domain model, abstract user interface model, etc.). The model-based engineering (MDE) approach allows developing the UsiXML UI by transforming progressively

the UsiXML models to obtain specifications that are detailed and precise enough to be rendered or transformed into code.

In this special issue four model-based approaches are presented that contributed to the development of the UsiXML framework.

The paper of Guerrero-Garcia and Gonzales-Calleros presents a comparative analysis of task models aiming to identify concepts which are underexplored in today's multi-user interaction task modeling. Merging the meta-models of the selected models creates a foundation for a broader meta-model that could be instantiated in most situations involving multi-user interaction, like workflow information systems, CSCW. This work served to the standardization of the UsiXML language.

Escolar, Cachon, Marin, Vanderdonckt and Motti are presenting a model-based approach to generate connection-aware applications for the mobile web. Their work is taking a specific challenge: to create applications able to work not only when connection is available but also when disconnected. In this paper the focus of model-based engineering is on the navigation models and the outcome is a state-chart-based navigation model and a specific notation to represent it. The notation has been defined by extending SCXML in order to incorporate custom elements and attributes intended to manage common challenges in online/offline development.

Beuvens and Vanderdonckt proposed UsiGesture – a method and tool fostering team collaboration. This paper reports on two experiments of gestural exploration for graphical interfaces and highlights some needs for gestural interfaces confection and evaluation. The main advantage brought by UsiGesture platform in these situations is the possibility to avoid spending time on recognition mechanisms and only focus on the most important: ergonomics of the interface. UsiGesture acts as repository of algorithms as well as data samples allowing setting the recognition system, but it does not assess the right gestures for the right actions.

Addressing cultural differences of use in designing User Interfaces (UIs) may improve usability and acceptance of these UIs and their corresponding information systems. In the last paper of this special issue, Khaddam and Vanderdonckt proposed a user interface architecture that enables designers to apply changes imposed by culture.

Last but not least, the standardization efforts resulted in a draft submitted to W3C and were rewarded with the ITEA Excellence Award 2013 for standardization.

References

Calvary, G., Coutaz, J., Thevenin, D., Limbourg, Q., Bouillon, L., Vanderdonckt, J., A Unifying Reference Framework for Multi-Target User Interfaces, *Interacting with Computers, Vol. 15, No. 3*, June 2003, pp. 289-308

Coyette, A., Faure, D., Gonzalez Calleros, J. M., & Vanderdonckt, J. (2011). *Proceedings of 2nd International Workshop on User Interface Extensible Markup Language UsiXML'2011*, September 6, 2011 – Lisbon, Portugal. Thales Research & Tehnology.

Faure, D., & Vanderdonckt, J. (2010). *Proceedings of 1st International Workshop on User Interface Extensible Markup Language UsiXML'2010*, June 20, 2010 – Berlin, Germany. Thales Research & Tehnology.

Limbourg, Q, Vanderdonckt, J., Michotte, B., Bouillon, L., López-Jaquero, V.. USIXML: A language supporting multi-path development of user interfaces. In *Engineering human computer interaction and interactive systems*, pp. 200-220. Springer Berlin Heidelberg, 2005.

USer Interface eXtensible Markup Language (UsiXML) Vanderdonckt, J., Beuvens, F., Melchior, J., Tesoriero R. (Eds) W3C Working Group Submission, 1 Fenruary 2012.

UsiXML website - http://www.usixml.eu/ USer Interface eXtensible Mark-ip Language