INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT

Project Results

UsiXML
User interface design in multiple contexts of use

The UsiXML ITEA 2 project developed an innovative model-driven engineering method to improve the user interface, or UI, 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.

MAJOR BREAKTHROUGH

The key innovation of this project could be described as the definition and standardisation of the UsiXML "µ7" concept and the development of the UsiXML language and model-driven method. The whole chain of different abstraction levels in user interface design is covered and a comprehensive set of tools has been developed. Using the µ7 concept – multi-device, multi-user, multi-culturality/linguality, multi-organisation, multi-context, multi-modality and multi-platform – not only increases productivity and reusability but also improves usability and accessibility of industrial interactive applications. This is a major breakthrough as it will no longer be necessary to develop individual unique interface solutions for each application.

Nine meta-models that incorporate new aspects, including UI Commons (for model description) and configuration (for versioning) as well as semantics, syntax and stylistics along with meta-models for method engineering have been defined. Implementations include ProDevelop's DashBoard (Eclipse Plug-in, Compatibility) and UJF's D2Flex (Online) and some UI development life cycles have been validated. Finally, an evolving software architecture compatible with MDE principles opens doors beyond Service Oriented Architecture (SOA).

IMPACT ON TECHNOLOGY AND COMMERCE

The success of the ITEA 2 project will reduce total application costs and development time by enhancing the UsiXML interface modelling language through the addition of versatile context-driven capabilities. UsiXML is an XML-compliant mark-up language that describes a user interface for multiple contexts such as character, graphical, auditory or multimodal interfaces. Thanks to UsiXML, non-developers can shape the user interface of any new interactive application by specifying it in UsiXML, without requiring the programming skills usually found in mark-up and programming languages. Innovations in UsiXML will help European software vendors and industrial systems makers to increase productivity in software development and reduce development costs. The results will reduce time to market, speed-up productivity, improve factorisation, speed change propagation and better assess usability and accessibility. A UsiFoundation will be setup to assure the continuation of the UsiXML results, in particular with the members of the UsiXML End User Club (more than 87 today, including Eclipse Foundation).

STANDARDISATION

Standardisation was achieved in the contexts of several actions: the OASIS Technical Committee on User Interface Modelling Language, the NESSI European platform, NEXOF-RA Reference Architecture, COST 294 Action "MAUSE" on Usability, ISO 24744 on Method Engineering (task and study) while standardisation efforts are ongoing in the W3C Group on Model-Based User Interface Design and OMG IFML (through Thalès). However, while standardisation is one of the key innovations of this ITEA 2 project, companies need to be shown that there is a real benefit for

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them, in their domain and with the constraints they face in their everyday business. The pertinent issues for business people revolve around the kinds of business model to deploy UsiXML solutions and the list of potential benefits of the UsiXML approach. Designers/developers need to know what the metrics are and how they must be computed/estimated. In the design of UI for specific end users, such as children and disabled people, it is crucial to determine the impact of a UsiXML-generated GUI. A large number of demos and technical presentations were given to reveal the tangible benefits of the project's results. Such demonstrations will encourage the build up of the momentum required for the adoption of UsiXML as a general-purpose, user-interface definition language throughout Europe.

IMPACT

Extensive communication and dissemination include exhibitions, demonstrations, an End User Club with over 100 members and scientific papers, theses, working papers, demonstrations and two journal special issues as well as workshops.

Furthermore, social media like facebook, LinkedIn and Twitter as well as automatic newsletter extended dissemination to a wider public. On 15 April, 2011, an UsiXML End User Club, a network of active players interested in UsiXML developments, was launched. One End User Club member, Barco, has already used UsiXML to cut 40% off its development time.

The added value of the European dimension was apparent in the excellent cooperation and technology transfer between academic partners and tool providers throughout the project. In addition, the UsiXML project had good connections with DIY Smart Experiences (ITEA 2) and FP7 projects as well as with different national initiatives. MiLab, a company established in Mexico, is already using the UsiXML concept. The impressive results will act as a user interface tool that moves the state-of-the-art forward and that will have a strong worldwide impact through standardisation. UsiXML will help industries address the European market as a whole, instead of remaining in local niche markets.

Major project outcomes

- A series of 9 meta-models that capture various aspects of user interface development: context of use (user, platform, environment), task, domain, abstract user interface, concrete user interface, transformation, mapping, commons and configuration, quality.
- A definition of UsiXML (User Interface eXtensible Markup Language), a user interface description language that expresses the related models according to a XML format (with semantics, syntax, and stylistics)
- A definition of a step-wise method based on these models to produce user interfaces in multiple contexts of use based on the Cameleon Reference Framework (CRF)
- A suite of software to support the method

DISSEMINATION

- Project web site at www.usixml.eu, language web site at www.usixml.org
- Several international workshops on UsiXML, Distributed User Interfaces, model-driven engineering
- Several books edited and 2 journal special issues
- More than 200 papers actually using UsiXML (not just quoting UsiXML in the related work) available at www.usixml.org
- More than 100 presentations (keynote addresses, conferences, fairs, exhibition, TV broadcast) available at www.slideshare.net
- A continuous dissemination update at www.facebook.com/usixml with more than 200 likes
- A YouTube playlist of more than 130 videos from the project (use "usixml" as keyword)
- Wikipedia entry of UsiXML and others sources of scientific knowledge
- Periodic newsletter available at http://www.usixml.eu/newsletters

EXPLOITATION

- More than 10 new softwares for supporting the model-driven engineering of user interfaces in different contexts of use (model editors, forward engineering, reverse engineering, transformations, model-to-model generators, model-to-code generators, interpreters)
- A UsiXML End User Club of more than 80 active members (not just downloading software for trial purposes). Members of the End User Club could belong to observer, participant or promoter

STANDARDISATION

- 7 significant contributions to standardisation bodies and actions
- The W3C Group on Model-Based User Interface Design
- The OMG initiative on interaction flow modelling language (IFML) through Thalès
- The OASIS Technical Committee on User Interface Modelling with UIML 4.0
- The ISO 24744 standard on method engineering with task and notation
- The NESSI European platform
- The FP7 Nexof project with NEXOF-RA Reference Architecture
- The COST 294 European Research Action "MAUSE" on Usability

SPIN-OFF

- 2/MiLab (Mexico)
- Uzagile (Belgium)
- UsiDistrib (Belgium)

■ ITEA 2 – Information Technology for European Advancement – is Europe's premier co-operative R&D programme driving pre-competitive research on embedded and distributed software-intensive systems and services. As a EUREKA strategic Cluster, we support co-ordinated national funding submissions and provide the link between those who provide finance, technology and software engineering. Our aim is to mobilise a total of 20,000 person-years over the full eight-year period of our programme from 2006 to 2013.

■ ITEA 2-labelled projects are industry-driven initiatives building vital middleware and preparing standards to lay the foundations for the next generation of products, systems, appliances and services. Our programme results in real product innovation that boosts European competitiveness in a wide range of industries. Specifically, we play a key role in crucial application domains where software dominates, such as aerospace, automotive, consumer electronics, healthcare/medical systems and telecommunications.

■ ITEA 2 projects involve complementary R&D from at least two companies in two countries. We issue annual Calls for Projects, evaluate projects and help bring research partners together. Our projects are open to partners from large industrial companies and small and medium-sized enterprises (SMEs) as well as public research institutes and universities.

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