W3C MMI WORKSHOP POSITION PAPER

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In the following, we describe ongoing research activities in the area of mobile and ubiquitous computing at the Chair for Computer Networks of Dresden University of Technology and its relationship to the objectives of the W3C Multimodal Interaction Workshop.

Currently, we are involved in a number of projects that tackle the issues of dynamic user interface adaptation, adaptive software behaviour with focus on resource constrained environments, and the adaptation of multi-media based communication services towards the heterogeneous network infrastructures and device capabilities in beyond 3G wireless networks.

In the user interface adaptation project, we focused on the device independent representation and adaptation of web application UIs. The project was conducted together with SAP Global Research & Innovation. Based on the findings of our research, we have successfully developed the Dialog Description Language (DDL, [1]) that allows device independent authoring of web content based on the single source approach. It supports semantic adaptation through inline meta-information provided at authoring time. A modular adaptation engine applies semantic and syntactic transformations to DDL dialogs to generate device-specific dialog representations at runtime. The experience and knowledge we gained in this project also influenced the EU FP5 CONSENSUS [2] project. Within this project a Render Independent Markup language (RIML) was developed, which is based on several W3C standards (e. g. XHTML, XForms and SMIL). The project also the single source approach and adopted several adaptation concepts from our DDL research. Recently, SAP has indicated a strong interest in extending the concepts and scope of further research towards the support for multiple input and output channels. These extensions shall cover dynamic interaction channel selection, the mapping of content to different I/O channels as well as technologies for the synchronization and fusion of parallel interaction events. While we already have experiences in supporting mixed text-and-speech interfaces based on the X+V, we want to gear our research activities towards more generic scenarios of multimodal user interaction. Furthermore, we participate in the preparation of a project proposal to the EUREKA-ITEA [3] cluster. The proposed project, ENABLE, will encompass the integration of context-awareness, adaptation and multimodality into software engineering and application platforms. One of the project's focal points will be to provide the prototype of an application platform for ambient applications that supports multimodal interaction.

Other goals of our future research activities in ubiquitous computing scenarios will be focused on adaptation at application level. Today's automatic and semi-automatic adaptation is mainly focused on the cost-efficient and device-independent authoring

of mostly static web content and on-the-fly adaptation at runtime. While most of the existing solutions for device-independent authoring today yield high quality results, it has shown that complex web application GUIs are infeasible to handle by approaches that are limited to widget- and UI-level adaptation. Thus, new problems arise from the necessity to adjust application functionality according to the applications' context of use. We see functional adaptation at runtime as one of the key issues for the success and acceptance of mobile applications. It introduces new requirements that span the whole application lifecycle and can't be separated from UI description based on web-technologies. Functional adaptation must already be considered in requirements specification and all subsequent phases of ambient-aware application software engineering. The new design methodologies and software engineering tools needed to address these issues will be subject to our future research activities. Furthermore, the availability of novel hardware equipment such as Bluetooth or WiFi transceivers in mobile platforms allows for ad-hoc connectivity between several mobile devices, creating the need for more sophisticated context information systems. In turn, complex context information represents a plethora of additional parameters to adaptation algorithms. The extension of adaptation algorithms towards these new challenges will play a major role in our future activities. We also propose to fully exploit the capabilities of modern mobile platforms by distributing application logic between the mobile clients and application servers through extensive client-side scripting. Client-side logic reduces network traffic, decreases the dependency on network availability and reduces server load. Low-end platforms with restricted computing resources will be supported by fully-fledged server-side application logic. Therefore, we follow a descriptive approach based on web technologies. While standard conformance is a key requirement for a wide adoption of our research results, W3C standards will strongly influence our research work in this area.

Attending the W3C Workshop on Multimodal Interaction we would like to learn and discuss about the current and future activities of W3C in that area and influence it by presenting our experience in the area of adaptive and device independent web applications and the ideas for extending our solutions towards multimodality.

References

[1] Göbel, S., Buchholz, S., Ziegert, T., Schill, A.: Device Independent Representation of Web-based Dialogs and Contents; Proc. of the IEEE Youth Forum in Computer Science and Engineering (YUFORIC ´01), Valencia, Spain, Nov 2001.

[2] http://www.consensus-online.org/

[3] http://www.itea-office.org/