Pervasive Accessibility: The Fluid Project

Jutta Treviranus, Jess Mitchell and Colin Clark

Abstract – The Fluid Project is an international community of academic institutions, community source software projects and corporations working together to address the precarious values of usability, accessibility, internationalization, quality assurance and security within web and mobile applications [1].

The project is developing a living library of robust, usable, accessible UI components that can be contributed to and evolved by the community. The components are designed by skilled interaction designers, reviewed by usability and accessibility testers, and integrated into an expanding number of community source applications. To enable the creation and consistent use of these modular, reusable, and swappable user interface components Fluid has created a user interface architecture based on existing standards.

The project is also developing and implementing tools and resources to improve the knowledge, expertise, coordination, design and development of accessible user interfaces and user experience within software communities. When Fluid is applied, accessibility becomes a naturally integrated characteristic of the host Web application.

I. INTRODUCTION

How do we infuse accessibility into emerging information and communication technologies from the very beginning? This is the challenge addressed by an international community of academic institutions, open source software projects, corporations, cultural institutions and volunteers that form the Fluid Project (http://fluidproject.org).

II. PROJECT DESCRIPTION

The project addresses accessibility in concert with other precarious values in information and communication technology (ICT) development including good user experience design, usability, internationalization and quality assurance. Accessibility is delivered in the context of addressing a common problem faced by many software projects: how do you provide a coherent, consistent and seamless user interface in a development environment that increasingly relies on the mashup of numerous tools, widgets or applets, while at the same time accommodating the very

Jutta Treviranus is Director of the Adaptive Technology Resource Centre and PI of the Fluid Project, Jess Mitchell is the Fluid Project Manager and Colin Clark is the Technical Lead on the Fluid Project, at the University of Toronto.

diverse needs of users. Fluid achieves this balance by providing a user interface that both works across applications and platforms and that can be transformed at run time or during configuration to specific user needs or preferences. Thus each user can have a consistent, personally-optimized user experience that suits their diverse needs and works across tools. At the same time the software project or the implementing institution can meet the diversity of preferences of its users without having to prioritize one community over another or compromise the design of one group for the requirements of another.

Given that the user interface is reconfigurable, and that one of the primary user experience goals is to transform the user interface to address a diversity of users and user needs without compromising usability, Fluid has been the testing ground for novel usability and user experience design methods. Traditional methods rely upon user testing with a controlled set of users, and results are based on statistically significant findings. Neither the configuration of the interface nor the characteristics of the user can be controlled when testing Fluid components, nor is it appropriate to do so. Usability is best measured by the ability of the interface to adapt to a variety of user needs and contexts. Each configuration must be highly usable by the user it is configured for [2].

Fluid also challenges common accessibility metrics which require that each configuration or instance of a Web page or site meet all accessibility requirements. Using this common model the application or site is accessible to all but frequently optimized for no one. Fluid provides accessibility by transforming the interface to meet the needs of each user. Thus an application or Web page may be accessible to the current user who has a learning disability but completely inaccessible to someone who is blind. When the individual who is blind uses the application it will reconfigure to be optimally accessible to the needs of that individual. Although highly accessible, each instance of the Fluid Web application or site would not meet traditional accessibility criteria. Awareness and acceptance of this new approach is slowly gaining ground [3].

Fluid initially focused on Web applications and through the project Fluid Engage is now extending the approaches refined in the first 2 years to 3D environments, mobile systems, location-based services, social networking tools and pervasive or ubiquitous computing [4]. Fluid Engage is an international open source community working to provide curators and educators within cultural institutions the necessary tools and resources to create engaging and

accessible visitor experiences. These tools bridge the gap between the online, mobile and in-house computer-mediated user experience. In the process Fluid Engage is extending the Fluid component toolkit to mobile systems, location based services, social networking tools and 3D applications. Fluid was established in the academic open source software community but is applicable and implemented much more broadly by a variety of Web applications.

Fluid is part of a larger accessibility roadmap led by the Adaptive Technology Resource Centre (ATRC) and its many multi-sector partners (http://atrc.utoronto.ca). The roadmap emphasizes integrating accessibility into popular authoring environments, development tools and ICT application building blocks so that even developers or authors who are not knowledgeable or motivated to develop accessibly are prompted, nudged and supported in creating accessible applications and content by virtue of using the development tools [5]. The roadmap also harnesses the software trend toward personalization or mass customization and the increased acceptance of a model-view-controller approach to software design. Accessibility is framed as the ability of the system to match the individual needs of the user, in many cases dynamically. This accessibility approach is supported and forms the basis of an IMS Global Learning Consortium specification and ISO standard referred to as AccessForAll or ISO 24751 [6] [7] [8]. This multipart standard provides a common language for describing user needs and preferences in different contexts and a common language for describing resources, so that systems can match needs to resources. This offers the possibility of an individual portable preference profile that can be taken from application to application such that the systems will automatically reconfigure to an individual's accessibility needs.

The overall ATRC effort is multiplied well beyond the initially invested resources by adopting an open source approach and nurturing an ever-growing open source community. The effort is also multiplied by collaborating with other initiatives in the domain. Fluid and other ATRC projects are part of AEGIS, Raising the Floor and coordinate with EU-4All and ICT accessibility projects internationally.

Consistent with this larger roadmap, Fluid takes a multi-faceted, proactive approach to the challenge of pervasive accessibility. The primary vehicle for propagating accessible design is through a rich living library of broadly implementable UI components. Fluid provides the software architecture (and associated APIs) to enable UI transformation. Fluid is quickly becoming recognized as a viable solution for creating a seamless user experience layer over a mashup or integration of heterogeneous applications and tools in the open source software domain and beyond. The benefits of Fluid components and the Fluid light weight, loosely coupled, flexible interoperability approach are seen as welcome solutions for a host of usability, accessibility

and implementation challenges. The Fluid framework provides an easy way to build JavaScript-based user interfaces that are highly flexible and reusable. Built using Web standards and the jQuery toolkit, Fluid Infusion provides a lightweight application development framework supporting simple Model View Controller (MVC) techniques. It provides support for common client-side development patterns, making it easier to write components with less code.

The project also promotes accessibility through design resources that include a persona library, use cases, user testing protocols, user experience walkthroughs, a design pattern library and evaluation tools that unobtrusively integrate accessibility. Fluid builds upon the AccessForAll standard (ISO 24751), ARIA (Accessibility for Rich Internet Applications) and the TransformAble project. Part of the Fluid roadmap is to extend international standards such as ISO 24751 and ARIA to address gaps discovered in implementing Fluid Infusion.

IV. CONCLUSION

Fluid has a very ambitious research agenda highly dependent on open source communities and propagation patterns inherent in distributed software development. By infusing inclusive design into foundational building blocks that are reused and reapplied throughout the "software food chain" Fluid hopes to achieve pervasive accessibility that benefits all users and supports other precarious, yet important values such as internationalization, device independence, usability and quality assurance in the bargain.

REFERENCES

[1] http://fluidproject.org
[2] Treviranus, J. (in press, 2008) You Say Tomato, I Say Tomato, Let's Not Call the Whole Thing Off. On the Horizon: Distributed Learning Environments.
[3] Treviranus, J. & Roberts, V. (2007), Disability, Special Education and IT in International Handbook of Information Technology in Primary and Secondary Education. Editors: J.M. Voogt, G. Knezek. Springer, Hamburg.
[4] http://fluidproject.org/projects/fluid-engage/
[5] Treviranus, J. (2008), Authoring Tools, in Web Accessibility: A Foundation for Research..Editors: Yeliz Yesilada and Simon Harper. Springer, Hamburg
[6] "Individualized Adaptability and Accessibility in ELearning, Education and Training." ISO/IEC JTC1/SC36 International Standard 24751, parts 1 2 and 3, (2007).
[7] Jackl, Alex, Treviranus, J. Roberts, A. (2004) IMS AccessForAll Meta-data Overview. (http://www.imsglobal.org/accessibility/accmdv1p0/imsaccmd_oviewv1p0.html).
[8] Norton, M. & Treviranus, J. (2003). IMS Learner Information Package Accessibility for LIP Conformance Specification.