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POSITION PAPER: ENABLING THE MOBILE WEB THROUGH SEMANTICALLY-DRIVEN USER EXPERIENCES

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ABSTRACT

The Web has become ubiquitous in people's lives in many respects. It follows that the Web in your pocket should be even more widely used, but the reality is that the Web is not used nearly as much on mobile handsets as on fixed terminals. There are many reasons for this, some of which have been explored in the Mobile Web Initiative workshop[1] held by W3C in Barcelona last November and which are being explored further in the Mobile Web Initiative W3C activity under development. This paper focuses on the specific issues of semantics and how to harness the potential of the Semantic Web set of technologies in order to deliver more compelling user experiences for Mobile Web users.

THE STORY SO FAR

The Web as it is today is a primarily visual medium. Pages of information are navigated using clicks, mouse-movements and interface cues all largely accessible only to the eye. One need look no further than the W3C's Web Accessibility Initiative[2] to find evidence of how difficult it can be to claw the Web back from this visual emphasis in order to make information and services accessible to those with visual deficits.

Conversely, use of mobile phones is not primarily visual. The mobile phone form factor has evolved from an audio-only industrial-design. Furthermore, aspects of mobility, such as limited attention bandwidth, one-handed operation through multiple pointing technologies, and small and varied screen size and shape further complicate these issues. Current efforts at driving Web-like user experiences onto the Mobile form factor have faltered in many respects because visual Web experiences do not easily translate into this qualitatively different medium.

MOVING TOWARD SEMANTIC NIRVANA

The Semantic Web vision developed by Tim Berners-Lee and given life by the World Wide Web consortium is one where machine-interpretable data (not visual cues) becoming the underlying framework on which the Web is based, and visual (or other) interfaces become an abstraction on top of this fundamental layer of semantics. The Semantic Web activity[3] has brought us the RDF model and XML syntax as well as the OWL language for ontology definition and most recently the SPARQL query language for searching RDF data stores.

However, there are some fundamental road-blocks to realizing the Semantic Web vision on the Web as it exists today. Because the Web has grown up as a visual medium, the language of creating Web experiences is also visual and the people that create these experiences for a living come from a visual tradition and think primarily in a visual way. There is a huge installed base not only of software but of users and mindset that needs to be torn down and built back from the ground in order to affect this kind of sea-change.

In the Mobile platform, however, there is an opportunity to take a leap forward into Semantically-driven user experience because the user expectations of experience of mobile data services are not yet fixed. This leap is not only opportune; it is a necessity if the Mobile Web is going to succeed.

VODAFONE CASE STUDY: VODAFONE LIVE! SEARCH

WHAT'S SPECIAL ABOUT SEARCH ON MOBILE?

The user experience of searching provides an accessible example of how semantic

1 Mobile Web Initiative workshop: http://www.w3.org/2004/09/mwi-workshop-cfp.html

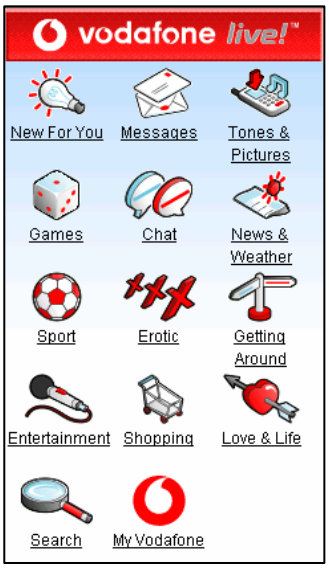
2 Web Accessibility Initiative: http://www.w3.org/WAI/

3 Semantic Web Activity: http://www.w3.org/2001/sw/

technologies could become important on the Mobile platform.

Consumers are used to the search user interface metaphor and are used to the different user experiences connected with search (such as suggestions of "related items" based on usage patterns or item selection). There is nothing radical about search and search itself can be successfully deployed without the Semantic Web.

The mobile user interface factors of immediacy, lower attention threshold and limited screen real-estate are a challenge when deploying a search user interface. On the Web, users are used to wading through pages of search results or tuning their query to find the results most relevant to them. The Mobile user needs accurate results, now.



On the Web, you don't mind if you get garbage results, either. If you search for headlines on "Virgin Atlantic" and you get an article on a sailing expedition around the Atlantic Ocean ending in the Virgin Islands, you can laugh it off. If in a movie review of The Matrix Reloaded you find a hyperlink for the character "The Oracle" actually points to a financial profile of Oracle Corporation, you can shrug, click the back button and move on. But if either of these scenarios happened on your mobile phone, you might think about chucking the phone out the window. Why? Because you've spent 5-10 times the amount of time retrieving the garbage information and you've more than likely paid for the privilege.

THE SOLUTION FOR VODAFONE LIVE!

The Vodafone Live! service is a "mobile portal" developed and maintained by Vodafone and provided to network customers which provides a unified user experience and access to content and servers from a number of providers.

In the Vodafone Live! service, the search application, which uses a combination of RDF and crawling, is used to provide an alternative (to visual icons) mechanism to find digital assets across a number of content providers. Ability to leverage existing schemas, interoperability between metadata from different content providers, tool support and ease of integration into current portal architecture (XML-over-HTTP request-response) were factors in choice of RDF.

When ringtone, game and picture search using RDF metadata was launched in one Vodafone operating company, page views per download decreased significantly (on the order of 50%) and revenue from asset consumption (in this case, ring tones) increased substantially (on the order of 20%) over a 2 month period. User behavior shifted from use of the browsing-based user interface for finding ring tones to the search UI.

What factors were at work here? Deploying search allowed users to find assets across different content providers in one single action. The search also decreased the average "click-distance" required for a sale of a ring-tone from four "clicks" to two (measured from the start of the task). This reduction in browsing suggests that users found what they were looking for more quickly. Although we can only infer user behavior from these numbers, the indication is fairly strong that this combination of factors led to increased service usage and increased sales. In plain terms, bringing the goods closer to the customer increased sales, and the use of RDF metadata was a key factor in making this possible.

DEVICE INDEPENDENCE THROUGH SEMANTICS

In a W3C-run workshop on the topic of Metadata for Content Adaptation[4], topics relating semantics to content adaptation (for both device independence and accessibility) were discussed. One issue on which there was strong consensus was the need for semantically rich markup to achieve the goal

4 Metadata for Content Adaptation Workshop: http://www.w3.org/2004/06/DI-MCA-WS/

of adaptation of content across user interface modalities. For example, if a list of links is intended to be a navigation menu, it may be advantageous to annotate it as a navigation menu using inline semantic markup. This could enable downstream processors to render the menu differently than another type of list.

This type of semantic enrichment of content is already in use today in the Vodafone Live! portal. Since Vodafone Live! is a "closed world" implemented on top of proprietary mark-up, this is a relatively easy task. Use of this type of Semantically rich content markup has greatly enhanced the content adaptation capabilities of the Vodafone Live! portal.

A standardized approach to embedding semantics in markup is required. Standard ontologies that address user interface elements (such as menus), which can be differently adapted on different interface modalities, are also required.

Work is going on in the Device Independence and HTML working groups in the W3C to meet these goals. A general mechanism annotation for HTML is a planned feature for HTML 2.0 and a Language Profile for Device Independence is planned, which will incorporate HTML 2.0 modules (including annotation) with X-Forms and may incorporate specific metadata ontologies as well.

WHAT IS REQUIRED TO MOVE FORWARD

How can this semantically-aware be "jump started?" It takes more than the work of hundreds of computer science and logic PhD candidates. We need to bridge the gap between the Semantic Web body of work and the commercial world. The way to do this is through development of specific applications, use cases, and ontologies that address specific industries and problem domains.

In many cases, suitable vocabularies are already in use by many organizations but have not yet been translated into suitable form. An example is the work currently underway within the Internet Content Rating Association (ICRA)[5] to develop a next-generation content labeling mechanism based on RDF. The widely successful Dublin Core[6] and derivatives (such as PRISM[7]) have also successfully adapted RDF to meet the needs of specific problems areas and industries.

Through adoption of the Semantic Web architecture and across industries (tools vendors, platform vendors, content providers, handsets manufactures, browser vendors, network components, etc…) an ecosystem of semantically aware components and standard ontologies will emerge that can bring down the cost of implementation.

At the same time, the use of RDF in industry to solve real-world problems must be encouraged. The W3C Device Independence activity W3C Mobile Web Initiative can be instrumental in driving Semantic Web technology into the mainstream, to the extent that these efforts are supported by industry.

CONCLUSION

Clearly, semantically-driven user experiences have a role to play in making the Web more accessible to users on mobile platforms. Semantic Web technologies will be key building blocks for these experiences.

For the Semantic Web vision to become reality, it needs to be taken out of the laboratory and be given life through a painful trial and error process, akin to the birth of the current Web. The Mobile Application space is likely going to be one space where this process will take place. It is on Mobile platforms that the Semantic Web can begin to drive user experiences which touch (and hopefully enrich) millions of people's lives.

5 Internet Content Rating Association: http://www.icra.org

6 Dublin Core: http://www.dublincore.org

7 Publishing Requirements for Industry-Standard Metadata: http://www.prismstandard.org