

Web 2.0 and the Semantic Web: Hindrance or Opportunity?

W4A – International Cross-Disciplinary Conference on Web Accessibility 2007

Conference Report

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Abstract

The World Wide Web (Web) is in transition; a fundamental evolution of the model which underpins the traditional Web. This new Web, Web 2.0, is a mesh of enhanced semantics, push application widgets, and embedded scripting languages and was developed to pursue the promise of enhanced interactivity. The possible benefits of Web 2.0 are great, but it seems that without timely and prompt action disabled users will be barred from these benefits. Indeed, using sites such as: Flickr, YouTube, MySpace, Google Maps, and Google Portal will rapidly become 'offlimits' to disabled users. Semantic Web technologies have already shown themselves to be useful in addressing some issues of Web Accessibility. However, this new technology has not yet started to make its way into mainstream applications. Without change, will the benefits of the Semantic Web be lost? Will the promising enhanced interactivity of Web 2.0 technologies become increasingly inaccessible to disabled users? We pose the question:

“Web 2.0 and the Semantic Web: Hindrance or Opportunity?”

The conference was held on Monday the 7th and Tuesday the 8th of May 2007 at the Fairmont Banff Springs Hotel in Banff National Park. We welcomed 65 attendees pursuing research on Web accessibility. We accepted 40.3% of all submissions, each paper was peer reviewed by the three of our programme committee. In brief, the conference proceedings brought together a cross section of Web design, engineering and Web accessibility research. The papers included report on developments on the Web 2.0 and Semantic Web, discussed the issues regarding the evolution of the Web, and suggested cross-pollinated solutions. Comments from our attendees suggested that they enjoyed the conference and would be participating again next year. Our social programme also attracted almost all of our delegates, which was a great fun. Overall we judge the conference to be a great success.

Discussion highlights

This year was the first time that W4A was held as a colocated conference as opposed to being a workshop with the World Wide Web conference (WWW). The paper presentations were organised into five technical sessions supported by our keynote speakers: Becky Gibson - “Enabling an Accessible Web 2.0” (IBM Human Ability and Accessibility Center), Mary Zajicek - “Web 2.0: Hype or Happiness?” (Oxford Brookes University, UK), Michael Cooper “Accessibility of Emerging Rich Web Technologies: Web 2.0 and the Semantic Web” (WAI, W3C) and Ian Horrocks “Semantic Web: The Story so Far” (University of Manchester, Manchester, UK). Throughout the conference, there were a lot of discussions, thus many research questions addressed and raised. The following sections summarise these discussions.

Web 2.0 – Technical Perspective

What is Web 2.0? How does it differ from the Web we all know and use? What are the characteristics that turn an ordinary Web page into a Web 2.0 page? Which technologies are involved in Web 2.0? And how accessible are these technologies? These were some of the questions raised throughout the conference that aim to look at the Web 2.0 from a technical perspective. Our first keynote speaker, Gibson, B. [1] gave an excellent keynote addressing technical issues involved in Web 2.0. She began by defining Web 2.0 and highlighted that Web 2.0 pages have three major characteristics; they are dynamic (e.g., incremental updates), interactive (e.g., maps) and they support collaboration (e.g., wikis, blogs). All other presentations related to Web 2.0 also agreed that Web 2.0 technologies include a number of preexisting Web technologies (e.g., Javascript, CSS, AJAX, Multimedia). Technically speaking, the Web 2.0 accessibility can be addressed in different ways:

Updated Web Technologies New technologies can be introduced to make dynamic content updating accessible to assistive technologies (AT) such as ARIA (Accessible Rich Internet Applications). Thiessen and Chen [2] presented a very good example application where ARIA is used to make a chat application accessible. Existing APIs can also be improved to make applications accessible (e.g., IAccessible2). In fact, Shelly and Young [10] from Microsoft Research demonstrated how existing APIs can be used to make moderately complex pages accessible.

Development Tools We also need to ensure that tools used to design Web 2.0 pages generate accessible content. As an example, Gibson, B. [1] presented her work on Dojo which is a toolkit widely used for developing Web 2.0 applications. Similarly, Power and Petrie [17] showed that toolkits used by nonprofessional designers have high impact on the Web 2.0 accessibility.

Testing Tools Existing evaluation tools need to also evolve to support evaluation of Web 2.0 pages (e.g., evaluating server side dynamic content).

Collaborative Authoring This can be a technique to increase the awareness of accessibility among designers. Bigham and Ladner [4] presented their work on a collaborative scripting framework that aims to bring together designers and users to work together on creating accessible content.

Assistive technologies ATs play a crucial role in ensuring the Web 2.0 accessibility. They also need to be evolved and catch up with the new Web technologies.

Web 2.0 – Social Perspective

Besides the papers that looked at Web 2.0 from a technical perspective, we also had papers and presenters that look at it from a social perspective. Especially, Zajicek, M. [5]'s provided an excellent discussion on "what does accessibility really mean?" and looked at it from four different perspectives: physical disability and Web 2.0 view, visual impairment and accessibility, general public's view on disability, and how older people view Web 2.0. Although her examples were UK specific, she presented a number of good examples of Web sites that aim to support Web accessibility (e.g., BCAB, BBC OUCH). But then she highlighted that there is a danger of ghettoism or isolation where a community of disabled people is created whose culture is unlikely to reach the outside world. She stressed the importance of reaching the general public and making them aware of the issues and such specific cultures.

We also discussed a number of social factors that affect the accessibility of the Web. Especially, Zajicek, M. [5] presented a view from the ageing population. She highlighted that they form a special group because many have lived their lives in a world without the Web. They do not usually see the benefits of the Web, they lack resources, they prefer to socialise in a non Web ways, they are not interested in investing in new relationships and they are not so much worried about the others view on them. These are some of the social factors that affect the accessibility of the Web, but unfortunately they are usually neglected when we talk about the Web 2.0 accessibility.

Semantic Web and Web Accessibility

Horrocks, I. [18] from the University of Manchester presented a broad overview of the Semantic Web. He gave a number of very good examples of where Semantic Web is really successful and a number of examples where it is still developing. As an example Semantic Web application, Lopes and Carrico [12] presented their work on creating a framework based on the Semantic Web technologies to profile users and create custom, rich accessible content to better meet users' needs. Although we had papers like that, from the overall presentations, it was very clear that the Semantic Web is not an area that is very well explored for supporting Web accessibility. This was also highlighted by Cooper, M. [13]. He also stressed that instead of thinking about how developments such as Web 2.0 is not accessible, may be we can start to think how we can use these developments to create accessible content. He gave an example of a "Mashup" that is actually based on a dynamic content (e.g., Web services), to create an accessible shopping site. He also mentioned that technologies such as Microformats in fact provide lightweight semantics that could be used for the benefits of accessibility, but unfortunately the way they are currently used make them inaccessible.

Understanding Web Accessibility

Although Web accessibility is a well established field, we still continue to seek to understand issues, users and technologies involved with Web accessibility. This year, we had a number of papers that looked into the foundations which include accessibility evaluations of Web sites, designing guidelines to support accessibility and experimental research.

Evaluation Vigo et al. [14] presented their work on creating a set of quantitative metrics for measuring Web accessibility. Kane et al. [26] showed that many top universities continue to have accessibility problems and the accessibility varies greatly across different countries and geographic regions.

Guidelines Cooper, M. [13] talked about the components of Web accessibility. He highlighted that content, developers and users are the three main parts of the accessibility and indicated that guidelines are actually required for each of these. Kelly et al. [25] also highlighted that a holistic view is required to achieve Web accessibility and criticised that as the Web accessibility community we have not achieved that yet.

Experimental research This year we also had papers presenting experimental research results. For example, Watanabe, T. [27] presented his work that aims to show that sites marked appropriately with heading elements improve accessibility. His work was excellent and actually won the best paper award.

Best Paper Award Takayuki Watanabe, Experimental Evaluation of Usability and Accessibility of Heading Elements[27]. Watanabe [27]'s experiments show that blind users benefit a lot from

the from the appropriately marked up heading elements and demonstrates that this reduces the overall difference in response time between sighted and blind users.

Web accessibility challenge

The Web Accessibility Challenge was organised for the first time this year and was based on the theme "Innovative voice access interfaces for the Web: including browsers, techniques, and transcodings". It was organised by Chieko Asakawa and Hironobu Takagi from the User Experience and Accessibility technology group in IBM Tokyo Research. It was a session that seek to receive applications towards achieving Web accessibility and the aim was to choose the best, innovative applications. The call was for new, innovative voice access interfaces for Web contents. The aim was to gather various types of next generation voice browsers, and demonstrate the future of more usable voice access systems. Judges scored each system by novelty and achieved usability, and decided on a best access interface award for the submissions. The judges were Brian Charlson (The Carroll Center for the Blind), Jay Leventhal (American Foundation for the Blind) and Simon Harper (University of Manchester). This year we had five submissions ranging from standalone voice browsers, content management systems, natural language interaction with graphical representation of data and making multimedia content accessible. Two prizes were given: one decided by the judges and one decided by the conference participants. It was a great success and the prizes went to:

Judges Award Leo Ferres, Petro Verkhogliad, and Louis Boucher. (Natural language) Interaction with Graphical Representations of Statistical Data [22];

Delegates Award Yevgen Borodin, Jalal Mahmud, I. V. Ramakrishnan, and Amanda Stent. The HearSay NonVisual Web Browser [20].

Research challenges

Here we list some of the research challenges that were highlighted during the conference:

1. Most of the existing accessibility evaluation tools cannot evaluate the accessibility of Web 2.0 pages; How can we create more sophisticated evaluation tools? Do we need to focus on new paradigm for evaluating dynamically updated microcontents or serverside applications?
2. Most of the assistive technologies (AT) cannot handle Web 2.0 pages or other new related technologies. Why AT's are always behind the mainstream tools? Why do they always need to catch up with the new developments or changes on the Web? How can we ensure that they are more up to date as with the other mainstream browsers?
3. Tools and toolkits that professional designers use to create pages play a crucial role in accessibility; How can we ensure that they generate accessible content? Similarly, the number of nonprofessional designers is increasing tremendously either through the usage of templates, blogs or wikis; how can we ensure that they actually generate accessible content?
4. Accessibility APIs play an important role in the development of assistive technologies; how can we ensure that they enable access to Web 2.0 applications? What can be done with the existing APIs? How can we ensure that the designers have easy access to the capabilities of the existing APIs?

5. Do we need to revisit the description of the “Web accessibility”? What does really accessibility mean? What about social aspects? Have we been focusing on the technical aspect and somehow forgot about the social aspects? We need to think about issues like ghettoism, isolation and mainstreamism.
6. People tend to have the view that “Web 2.0 is just for young people”; How can we ensure that that is not the case? What about ageing population? How can we socially include those people? Web 2.0 has a lot of socialphenomons associated with it, but ageing population does not see the benefits and cannot associate themselves with these social-phenomons.
7. Sometimes designing for accessibility can be expensive, how can we design costeffective design methodologies for accessibility? How can we reduce the cost? Do we need to educate designers better or design better ATs or design better authoring tools and toolkits? Are we getting into an era where specialised knowledge is required to design for accessibility?

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Abstracts

Here we list all the technical, communication and keynote papers which were presented at the conference.

Enabling an Accessible Web 2.0 Becky Gibson

<http://doi.acm.org/10.1145/1243441.1243442>

The next generation of the Web is relying on new technologies to build rich interfaces and applications which enable community, collaboration, social networking and enhanced interactions. This has implication for people with disabilities who have come to rely on the Web to provide more independence, work opportunities, and social interactions. New specifications such as Accessible Rich Internet Applications (ARIA) are being developed which provide more semantic information about Web components and can enable enhanced accessibility. In addition, toolkits and testing tools are making it easier to reach the nirvana of accessibility by default in Web 2.0 projects.

AJAX Live Regions: Chat as a Case Example Peter Thiessen and Charles Chen

<http://doi.acm.org/10.1145/1243441.1243450>

Web 2.0 enabled by the Ajax architecture has given rise to a new level of user interactivity through web browsers. Many new and extremely popular Web applications have been introduced such as Google Maps, Google Docs, Flickr, and so on. Ajax Toolkits such as Dojo allow web developers to build Web 2.0 applications quickly and with little effort. Unfortunately, the accessibility support in most toolkits and Ajax applications overall is lacking. WAIARIA markup for live regions presents a solution to

making these applications accessible. A chat example is presented that shows the live regions in action and demonstrates several limitations of ARIA live regions.

Web Browser Accessibility Using Open Source Software

Z. Obrenovich and J. van Ossenbruggen

<http://doi.acm.org/10.1145/1243441.1243451>

A Web browser provides a uniform user interface to different types of information. Making this interface universally accessible and more interactive is a long term goal still far from being achieved. Universally accessible browsers require novel interaction modalities and additional functionalities, for which existing browsers tend to provide only partial solutions. Although functionality for Web accessibility can be found as open source and free software components, their reuse and integration is complex because they were developed in diverse implementation environments, following standards and conventions incompatible with the Web.

To enable the integration of existing partial solutions within a mainstream Web browser environment, we have developed a middleware infrastructure, AMICO:WEB. This enables browser access to a wide variety of open source and free software components. The main contribution of AMICO:WEB is in enabling the syntactic interoperability between Web extension mechanisms and a variety of integration mechanisms used by open source and free software components. It also bridges the semantic differences between the high level world of Web XMLbased APIs and the low level APIs of the device-oriented world.

We discuss the design decisions made during the development of AMICO:WEB in the context of Web accessibility, using two typical usage scenarios: one describing a disabled user using a mainstream Web browser with additional interaction modalities; another describing a non-disabled user browsing in a suboptimal interaction situation.

Accessmonkey: A Collaborative Scripting Framework for Web Users and Developers

Jeffrey P. Bigham and Richard E. Ladner

<http://doi.acm.org/10.1145/1243441.1243452>

Efficient access to web content remains elusive for individuals accessing the web using assistive technology. Previous efforts to improve web accessibility have focused on developer awareness, technological improvement, and legislation, but these approaches have left remaining concerns. First, while many tools can help produce accessible content, these tools are generally difficult to integrate into existing developer workflows and rarely offer specific suggestions that developers can implement. Second, tools that automatically improve web content for users generally solve specific problems and are difficult to combine and use on a diversity of existing assistive technology. Finally, although blind web users have proven adept at overcoming the shortcomings of the web and existing tools, they have been only marginally involved in improving the accessibility of their own web experience.

As a first step toward addressing these concerns, we introduce Accessmonkey, a common scripting framework that web users, web developers and web researchers can use to collaboratively improve accessibility. This framework advances the idea that Javascript and dynamic web content can be used to improve inaccessible content instead of being a cause of it. Using Accessmonkey, web users and developers on different platforms with potentially different goals can collaboratively make the web more accessible. In this paper we first present the Accessmonkey framework, describe three implementations of it that we have created and offer several example scripts that demonstrate its utility. We conclude by discussing future extensions of this work that will provide efficient access to scripts as users browse the web and allow nontechnical users be involved in creating scripts.

Web 2.0: Hype or Happiness?

Mary Zajicek

<http://doi.acm.org/10.1145/1243441.1243453>

Web 2.0 has initiated a new age of Web interaction. Countless everyday activities such as seeking information, shopping, filling in forms and making appointments can be done effectively and often more cheaply on the Web. However many of the new community sites, and other Web 2.0 sites, do not promote accessibility in terms of inclusivity. They are built for, and are of most benefit to, young socially integrated people who own their own laptop and live in a world of readily available radio LAN and fast access broadband. However many older or disabled people are living on low budgets and do not have access to such things.

Those for whom the Web is inaccessible for whatever reason will become increasingly excluded from mainstream life if it is not made accessible to them. This paper argues for a holistic approach to accessibility which addresses all aspects of the user's life. It tracks the impact of the advent of Web 2.0 on Web accessibility in its widest sense. It starts with a definition of accessibility, which in this context means apart from physical access, inclusion and acceptability. Through the use of case studies it examines worrying trends brought about by Web 2.0, and positive signs of improvement in accessibility, due to Web 2.0.

Accessible Image File Formats: The Need and the Way (Position Paper)

Sandeep R Patil

<http://doi.acm.org/10.1145/1243441.1243455>

Accessibility is one of the key checkpoints in all software's products, applications & websites. Accessibility with digital images has always been a major challenge for the industry. Images form an integral part of certain type of documents & most of the Web 2.0 compliant websites. Audience challenged with blindness and many dyslexics only makes use of screen readers/ text readers/narrator software programs to access the computer and computer displayed information. Such audience cannot view digital images/pictures. Hence drafting accessible documents or designing accessibility enhanced websites containing digital images representing figures, diagrams, map, snaps etc is a challenges. There are various published best practices for accessibility of documents or website containing images so that they can be better understood by the visually impaired users. But these are truly not enough to cover all kind of practical scenarios and this paper positions a need for a more innovative solutions. The paper also proposes accessibility enhanced image formation technique with relevant modification required in screen readers/narrator software programs and positions its edge over the existing methods.

Capability Survey of Japanese User Agents and Its Impact on Web Accessibility

TL. Coetzee and N. Govender and I. Viviers

<http://doi.acm.org/10.1145/1243441.1243456>

The National Accessibility Portal initiative is a large initiative aimed at improving the quality of life of people living with disabilities in South Africa. The initiative has several functional components, including the National Accessibility Portal, National Accessibility Portal Centers, research into developing localised client side assistive technologies and devices, advocacy as well as the development of a methodology allowing for replication in other developing countries with similar needs.

The focus of this paper is on the research and development of the portal in the bigger National Accessibility Portal initiative.

The portal's differentiating elements measured against other content portals is the ability to provide a configurable platform (based on the user's profile) for information sharing and communication in an accessible and usable fashion within the constraints of today's technologies, in the user's language of choice and in the most cost effective and sustainable fashion.

In this paper we describe the process involved in developing version 1.0 of the National Accessibility

Portal; from gathering user requirements, addressing the issue of multilingualism, accessibility and usability challenges. We present initial user feedback comments and highlight ongoing challenges. In addition we present the technology stack and implemented functionality.

A Preliminary Usability Evaluation of Strategies for Seeking Online Information with Elderly People
Sergio Sayago and Josep Blat

<http://doi.acm.org/10.1145/1243441.1243457>

This short paper describes an experimental study with elderly users comparing three strategies for seeking online information, Google basic search, the Yahoo! Directory and Google advanced search. The effect of three general usability criteria for the elderly, simplicity, difficulties using the mouse and cautious clicking and reading, on the total search time older people spend seeking complex online information with the three strategies has been studied. The hypothesis that basic search is the fastest strategy because it meets the three usability criteria, unlike the other two strategies, is confirmed. Older people were 3 times faster in basic search than in either advanced search or directory. Advanced search was slower than basic search due to information overload but faster than the directory, which was the slowest strategy primarily due to difficulties using the mouse and information overload.

Personalization of User Interfaces for Browsing XML Content Using Transformations Built on End-User Requirements

Benoît Encelle and Nadine Baptiste-Jessel

<http://doi.acm.org/10.1145/1243441.1243459>

Personalization of user interfaces for browsing content is a key concept to ensure content accessibility. In this direction, we introduce concepts that result in the generation of personalized multimodal user interfaces for browsing XML content. Users requirements concerning the browsing of a specific content type can be specified using userfriendly description languages. According to these specifications, transformation rules are generated in order to produce personalized user interfaces for browsing specific content types. With the emergence of the semantic Web and connected XML applications, such customized multimodal user interfaces can be useful for many kinds of users, especially individuals with various type of impairment.

Accessibility for Simple to Moderate Complexity DHTML Web Sites

C. C. Shelly and G. Young

<http://doi.acm.org/10.1145/1243441.1243460>

In this paper, we describe specific design and coding techniques for the creation of simple to medium complexity Dynamic HTML and AJAX applications, which are accessible to people with disabilities using mainstream user agents and assistive technology available at the time of this writing.

Leveraging rich accessible documents on the web

Rui Lopes and Luis Carrico

<http://doi.acm.org/10.1145/1243441.1243461>

This paper presents a new approach on leveraging accessibility for rich document delivery to the Web. The proposal entails a profile modeling task, where multidisciplinary teams can discuss users, devices, and usage scenarios, in order to grasp and synthesise the different document delivery scenarios. A document production framework is presented, which can be configured according to modeled profiles. By using this approach, documents are tailored to users in such a way that rich interaction capabilities are maintained, without sacrificing content accessibility.

Profiling Learners with Special Needs for Custom e-learning experiences, A Closed Case?

Paola Salomoni and Silvia Mirri and Stefano Ferretti and Marco Rocchetti

<http://doi.acm.org/10.1145/1243441.1243462>

Contrary to what commonly thought, profiling users and devices is still a complex issue, especially in the case of learners with special needs, who deserve a customized access to elearning platforms. A

plethora of languages, protocols and tools have been proposed which can be exploited to create users' and devices' profiles, separately. Unfortunately, none of them is really effective in capturing the fundamentals of a learner profile, when used in isolation. Here we discuss a practical approach we devised to profile elearners, which is able to meet the variety of requirements providing educational experiences. Our approach is based on the idea to put together the strengths of ACCLIP and CC/PP protocols, while avoiding specification conflicts. A few examples are provided which show the efficacy of the approach.

Accessibility of Emerging Rich Web Technologies: Web 2.0 and the Semantic Web

Michael Cooper

<http://doi.acm.org/10.1145/1243441.1243463>

Web 2.0 is a new approach to Web content, making it more interactive and allowing sites to combine features in new ways. This change in paradigm brings new challenges to people with disabilities. Accessibility advocates must develop solutions rapidly. Semantic Web technologies address some of these requirements, and accessibility innovation may be part of a convergence of the Web 2.0 and Semantic Web.

Quantitative Metrics for Measuring Web Accessibility Markel Vigo and Myriam Arrue and Giorgio Brajnik and Raffaella Lomuscio and Julio Abascal

<http://doi.acm.org/10.1145/1243441.1243465>

This paper raises the need for quantitative accessibility measurement and proposes three different application scenarios where quantitative accessibility metrics are useful: Quality Assurance within Web Engineering, Information Retrieval and accessibility monitoring. We propose a quantitative metric which is automatically calculated from reports of automatic evaluation tools. In order to prove the reliability of the metric, 15 websites (1363 web pages) are measured based on results yielded by 2 evaluation tools: EvalAccess and LIFT. Statistical analysis of results shows that the metric is dependent on the evaluation tool. However, Spearman's test produces high correlation between results of different tools. Therefore, we conclude that the metric is reliable for ranking purposes in Information Retrieval and accessibility monitoring scenarios and can also be partially applied in a Web Engineering scenario.

Mathematics on the Web: Emerging Opportunities for Visually Impaired People Cristian Bernareggi and Dominique Archambault

<http://doi.acm.org/10.1145/1243441.1243466>

This paper discusses the state of the art of mathematics on the Web in the context of its accessibility to visually impaired people. It goes on to explain how the use of the MathML markup language to embed mathematical expressions in Web pages could improve the accessibility and usability of Web published scientific documentation when consulted with speech synthesis and/or Braille devices. This work was carried out as part of the @Science project. @Science is a thematic network funded by the European Commission eContentPlus Programme. Its goal is the preparation of guidelines and best practices for production and use of digital scientific documentation accessible to visually impaired university students.

Iconic Communication System by XML language: (SCILX) Nathalie Cindy Kuicheu and Laure Pauline Fotso and Francois Siewe

<http://doi.acm.org/10.1145/1243441.1243467>

Traditional iconic systems establish direct iconic communication between a user and his environment by translating iconic sentences in sentences of a natural language, or by translating them into SQL (Structured Query Language) queries for relational data bases. This approach is limited because it is not suitable for communicating through the Internet which allows users of diverse background and culture to communicate all over the world. This paper presents SCILX, a XMLbased iconic communication system which in addition to the functionalities of existing iconic systems enables communication through the Internet using the World Wide Web and the XML technologies. The

approach has a formal foundation based on formal grammars of icons. A case study of an iconic interface for a multimedia database in traditional medicine (MEDITRA) is presented.

Accessibility in Nonprofessional Web Authoring Tools: A Missed Web 2.0 Opportunity?

Christopher Power and Helen Petrie

<http://doi.acm.org/10.1145/1243441.1243468>

The advent of Web 2.0 technologies, and the increased participation of users in personalized web experiences, has created a need for new web authoring tools intended for use by nonprofessional web authors. These tools represent a prime opportunity for including accessibility features early in the tool design process. The results from an accessibility evaluation of one of these tools demonstrates that such opportunities could be easily missed.

Semantic Web: The Story so Far

Ian Horrocks

<http://doi.acm.org/10.1145/1243441.1243469>

The goal of Semantic Web research is to transform the Web from a linked document repository into a distributed knowledge base and application platform, thus allowing the vast range of available information and services to be more effectively exploited. As a first step in this transformation, languages such as OWL have been developed; these languages are designed to capture the knowledge that will enable applications to better understand Web accessible resources, and to use them more intelligently. Although fully realising the Semantic Web still seems some way off, OWL has already been very successful, and has rapidly become a de facto standard for ontology development in fields as diverse as geography, geology, astronomy, agriculture, defence and the life sciences. An important factor in this success has been the availability of sophisticated tools with built in reasoning support. The use of OWL in large scale applications has brought with it new challenges, both with respect to expressive power and scalability, but recent research has also shown how the OWL language and OWL tools can be extended and adapted to meet these challenges.

Making Multimedia Content Accessible for Screen Reader Users

Hisashi Miyashita and Daisuke Sato and Hironobu Takagi and Chieko Asakawa

<http://doi.acm.org/10.1145/1243441.1243443>

Rich and multimedia content is increasing rapidly on the Web. It is very attractive for sighted people, but it brings severe problems to screen reader users. Once the audio starts playing, it becomes hard for blind users to listen to the screen reader because there is physically only one volume control that cannot control the separate audio streams. Though there are often softwarecontrolled buttons to control the audio, they are often controllable only with a mouse and are not associated with alternative text. Because of the audio conflicts and inaccessible control buttons, the multimedia content is often inaccessible to blind users. In addition, the use of dynamically changing interactive user interfaces is also a critical issue, since existing screen readers cannot detect such dynamic content changes.

We developed an accessible Internet browser for multimedia to address these problems and offer multimedia content as an information resource for the blind. It is characterized by three major features. First, it allows users to control the audio, such as the volume, play/stop, pause, and even the speed. Second, a dynamically adaptable metadata function is added to simplify complicated multimedia pages and to track dynamic changes and effectively inform users about the changes. Third, an audio description function supports Internet movies with a text format described by the metadata. In this paper, after briefly discussing the existing accessibility problems of multimedia content, we describe our accessible Internet browser for multimedia.

The HearSay nonvisual web browser

Yevgen Borodin and Jalal Mahmud and I. V. Ramakrishnan and Amanda Stent

<http://doi.acm.org/10.1145/1243441.1243444>

This paper describes HearSay, a nonvisual Web browser, featuring contextdirected browsing, a unique and innovative Web accessibility feature, and an extensible VoiceXML dialog interface. The browser provides most of the standard browsing functionalities, including flexible navigation and formfilling. The paper also outlines future work aiming to make the Web more accessible for individuals with visual impairments.

Using a CMS to Create Fully Accessible Websites

Sebastien rainvillepitt and JeanMarie D'Amour

<http://doi.acm.org/10.1145/1243441.1243445>

This session demonstrates how a content management system (CMS) can facilitate the creation of fully accessible websites for people with disabilities. Throughout this lecture, the participants will access an indepth view of the technical components and solutions adopted by Netic Hypermedia Inc for the development of the content management system Edimaster Plus which supports the highest Web Accessibility standards. The speakers will demonstrate navigation, dynamic content management and search function tools adapted to different users as well as a wide range of other tools offering advanced functions of text, image, forms, and data table editing. The demonstration will be conducted using assistive technology such as screen reader and screen magnifier software.

(Natural Language) Interaction with Graphical Representations of Statistical Data

Leo Ferres and Petro Verkhogliad and Louis Boucher

<http://doi.acm.org/10.1145/1243441.1243446>

Numerical information is often presented in graphs to take advantage of the human ability to quickly find visual patterns. Unfortunately, this medium is problematic for people who are blind or otherwise visuallyimpaired. To provide accessibility to graphs published in The Daily (Statistics Canada's main dissemination venue), we have developed iGraph, a system that provides short verbal descriptions of the information depicted in graphs and a way of also interacting with graphical information.

The status of using "Big Eye" Chinese screen reader on "Wretch" blog in Taiwan

YuiLiang Chen and YungYu Ho

<http://doi.acm.org/10.1145/1243441.1243447>

The "Wretch" Blog (<http://www.wretch.cc/>) is one of the most popular blogs in Taiwan. Through the Chinese screen reader "Big Eye", visual impaired users are able to interact with ordinary people on the "Wretch" Blog. They can share their experience and feeling via their personal space and forum. In general, most functionality of the "Wretch" Blog works well for visual impaired people except some perception transferred by pictures only. However, originally blog systems are developed for ordinary people, and do not concern the usability for visual impaired users. Lack of the concept of accessibility design brings some obstacle to visual impaired people.

When a blog system is designated, the principles of designing web accessibility should be included. Therefore, visual impaired users are able to surf blogs easily. Many suggestions from visual disability are illustrated below to provide the critical issues for designing blogs by referencing "Wretch" Blog. It is hoped that the suggestions are useful for developing new blogs and/or revising existing blogs.

Ajax Live Regions: ReefChat Using the FirevoX Screen Reader as a Case Example

Peter Thiessen and Charles Chen

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Web 2.0 enabled by the Ajax architecture has given rise to a new level of user interactivity through web browsers. Many new and extremely popular Web applications have been introduced such as Google Maps, Google Docs, Flickr, and so on. Ajax Toolkits such as Dojo allow web developers to build Web 2.0 applications quickly and with little effort. Unfortunately, the accessibility support in most toolkits and Ajax applications overall is lacking. WAIARIA markup for live regions presents a solution to

making these applications accessible.

To address this problem we developed an Accessible Ajax chat application called ReefChat and the Fire Vox screen reader. Features include, chat message notification through live regions to notify the AT. As well as keying up and down messages to navigate through chat messages, and keying left and right to filter messages from specific users. In this paper after briefly discussing the problem of Web 2.0, we describe our accessible chat application and screen reader.

Accessibility 2.0: people, policies and processes

Brian Kelly and David Sloan and Stephen Brown and Jane Seale and Helen Petrie and Patrick Lauke and Simon Ball

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The work of the Web Accessibility Initiative (WAI) is described in a set of technical guidelines designed to maximise accessibility to digital resources. Further activities continue to focus on technical developments, with current discussions exploring the potential merits of use of Semantic Web and Web 2.0 approaches. In this paper we argue that the focus on technologies can be counter-productive. Rather than seeking to enhance accessibility through technical innovations, the authors argue that the priority should be for a userfocussed approach, which embeds best practices through the development of achievable policies and processes and which includes all stakeholders in the process of maximising accessibility.

The paper reviews previous work in this area and summarises criticisms of WAI's approach. The paper further develops a tangram model which describes a pluralistic, as opposed to a universal, approach to Web accessibility, which encourages creativity and diversity in developing accessible services. Such diversity will need to reflect the context of usage, including the aims of a service (informational, educational, cultural, etc.), the users' and the services providers' environment.

The paper describes a stakeholder approach to embedding best practices, which recognises that organisations will encounter difficulties in developing sustainable approaches by addressing only the needs of the end user and the Web developer. The paper describes work which has informed the ideas in this paper and plan for further work, including an approach to advocacy and education which coins the "Accessibility 2.0" term to describe a renewed approach to accessibility, which builds on previous work but prioritises the importance of the user. The paper concludes by describing the implications of the ideas described in this paper for WAI and for accessibility practitioner stakeholders.

A Web Accessibility Report Card for Top International University Web Sites

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University web pages play a central role in the activities of current and prospective postsecondary students. University sites that are not accessible may exclude people with disabilities from participation in educational, social and professional activities. In order to assess the current state of university web site accessibility, we performed a multimethod analysis of the home pages of 100 top international universities. Each site was analyzed for compliance with accessibility standards, image accessibility, alternatelanguage and textonly content, and quality of web accessibility statements. Results showed that many top universities continue to have accessibility problems. University web site accessibility also varies greatly across different countries and geographic regions. Remaining obstacles to universal accessibility for universities include low accessibility in nonEnglishspeaking countries and absent or lowquality accessibility policies.

Experimental Evaluation of Usability and Accessibility of Heading Elements

Takayuki Watanabe

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Task completion times of sighted and blind users were measured with two kinds of Web sites: sites marked up appropriately with heading elements and sites with the same visual appearance but with

no heading elements marked up. The experiment was carried out with user agents that could navigate through heading elements. The results showed that 1) task completion time was reduced by as much as one half with marked up heading elements, 2) the benefits of markup on task completion time were greater for blind users, and 3) the overall difference in response time between sighted and blind users diminished with sites that were appropriately marked up.

About the authors



Simon Harper has been a Lecturer in the Information Management Group of the School of Computer Science at the University of Manchester since 2006, and Research Lead for the Human Centred Web Laboratory since 2001. He is interested in how disabled users interact with the Web and how the Web, through its design and technology, enables users to interact with it. He believes that by understanding disabled--users' interaction we enhance our understanding of all users operating in constrained modalities where the user is handicapped by both environment and technology.



Yeliz Yesilada is a postdoctoral research associate in the School of Computer Science at the University of Manchester. Her research interests include human centred Web, Web accessibility, mobile Web and Semantic Web. She is currently working on the EPSRC funded RIAM (Reciprocal Interoperability between the Accessible and Mobile Webs) project which aims to investigate ways in which to integrate research into the Accessible and Mobile Webs. She received a PhD in computer science from the University of Manchester. She is a member of the ACM (SIGWeb and SIGACCESS)