



Cloud Computing

“Cloud Computing - Accessibility for all?”

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There are 280 million blind or partially sighted people in the world.

Acknowledgements'

We would like to thank RNIB for many helpful discussion and provision of links to visually impaired groups. However, the view expressed here are those of the author, not necessarily endorsed by RNIB.

We would also like to thank all the organisations who helped distribute the survey (Annexe 1) and all the respondents who gave their valuable time & thoughtful opinions.

Cloud Accessibility Project Summer 2012

Overview

This report comprises a summary and details of a survey on the use of cloud applications by visually impaired & sighted people, followed by some comments on commercially available survey software and suggestion for ways forward to improve cloud accessibility.

Survey Summary

Respondents

- 100 informative responses from 22 blind, 8 partially sighted & 70 sighted people from 18 countries. 95% were working and/or studying and appeared internet savvy

Technology: Visually Impaired use Tablets & Smartphones - not only Windows

- All blind respondents used a Windows machine with Internet Explorer for the survey
- However, more than half of each group also used a smartphone or tablet
- Jaws was the most used Windows screen reader, easier than NVDA for users of both
- Apple Voiceover (free) was used by half the blind users, with similar performance to Jaws
- More than half of all used gesture input, but Rotor was mainly used by blind respondents

Cloud Applications: More difficult for Visually Impaired Respondents

- Dropbox storage hard or very hard for 40% visually impaired, 19% sighted users
- Google storage hard or very hard for 47% visually impaired, 5% sighted users
- Google word process hard or very hard for 72% visually impaired, 10% sighted users
- Social software hard or very hard for 32% visually impaired, 4% sighted users
- Cloud worse than PC? 'yes' 77% visually impaired, 29% sighted users

Cloud Implications: Not all bad

- Cloud was thought to make work *easier* by 37% blind and 51% sighted respondents!
- Security & accessibility of more concern to visually impaired than sighted respondents
- Internet access of less concern to visually impaired than sighted on

Wish list: Could do better

- Everyone: interface, more user testing, conformance to guidelines
- Visually impaired respondents: also attention to screen readers and keyboard only access

Survey & HTML Production Software

Reasonably accessible surveys could be produced in surveygizmo [this survey], surveymonkey and questionpro. However, all failed some RNIB recommended automated tests. Responsive, html5, css3 compliant generators were key to accessibility.

Future Progress: A Three Way Partnership

- Users Active feedback and passive monitoring
- Accessibility Tools Creators Screen readers & enlargers to enable ARIA guides
- Cloud/Web Application Designers Responsive templates & design environments

Background

Cloud computing is an increasingly important part of life for both work and leisure. It is obviously important that visually impaired people are not disadvantaged by accessibility problems. Consequently ensuring cloud accessibility is high on the RNIB agenda. Hence the University of Hertfordshire in collaboration with RNIB initiated a 5 week pilot project, sponsored by the Nuffield foundation for an A level student, Jacob Kent-Ledger, <http://www.kentledger.com/> to investigate current cloud usage and accessibility.

The project produced a survey, using the commercial package SurveyGizmo, that was distributed via the web and email to various organisations maintained by and for visually disabled people. Choosing a package and design that was accessible to screen readers was an object lesson in the difficulties of making the cloud accessible. Hence this report comprises three parts: the results of the survey, advice on making survey screen reader accessible, and suggestions for further investigations. Both Kornbrot and Kent-Ledger are sighted, so experiences with screen readers and other tools will be different from those of visually impaired users. This report contains graphs, but they are always preceded by numeric & word descriptions.

Survey Results

Respondents

There were 100 usable results with 343 people abandoning at the preamble or welcome page. These comprised 22 blind, 8 partially sighted and 70 sighted individuals. All but one of the partially sighted respondents had been visually impaired for more than five years. SurveyGizmo *automatically* picked up the location of 94 respondents (we could in drop by helicopter as longitude & latitude is thoughtfully provided). The other 6 six might have set 'privacy' (four were blind). Given the distribution lists, it was not surprising that 72% of sighted and 38% of visually impaired were from the UK, 18 countries are represented.

About half of the respondents were age 18-35 years and half 36-65 years, with only two over 65, both sighted. The percentage of people in full time work was 57% for visually impaired respondents and 60% for sighted respondents. The remainder were mostly in part-time work and/or students. There were just three blind and two sighted respondents who were unemployed and not students or voluntary workers. So this report covers about working age adults most, of who work or study.

Technology use

Hardware and Browsers

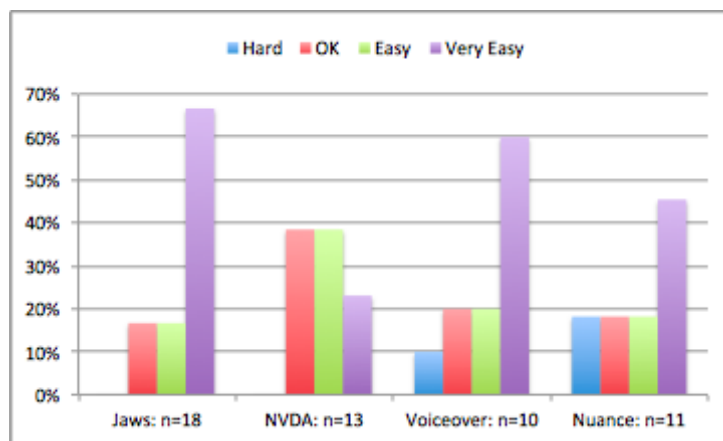
Operating system and *actual* browser use for the survey was automatically recorded. All blind respondents used Windows machines, 19/22 with IE. For partially sighted respondents, usage was: 3 Windows/IE, 3 Windows/Firefox, and 1 iphone, 1 Android. Sighted respondents were: 51 Windows, (19 IE), 13 Mac (9 Gecko/Safari), 4 iphone, 1 ipad, 1 IE tablet. Other sighted respondent browser use was: Chrome 8, Windows/SafariChrome 9, and Firefox 19.

Nevertheless, survey responses showed most people using more than one machine. There were 9/27 visually impaired and 8/67 sighted respondents who used Nokia or Blackberry at work. However, since these phones are probably not used for cloud applications other than email they are not classed as additional cloud machines. With this proviso, 12/27 visually impaired respondents used more than one machine at work and 14/29 used more than one for leisure. For sighted respondents, more than one machine for work was 34/67 and more than one for leisure was 58/68.

- At work, more than half of all respondents used more than one machine - similar proportions for sighted & visually impaired respondents.
- At play more than half of visually impaired respondents and more than 85% of sighted respondents used more than one machine.

Accessibility Tools: Screen Readers

Screen reader users were asked what tool(s) they used and how easy they found each tool. Results are reported only for blind respondents. For Windows, Jaws appeared easier to use than NVDA; while Voiceover appears better than Nuance for phones & tablets. (Voiceover can be used for MAC computers, but this was not happening for blind respondents). Further analysis shows that out of 13 people who used both Jaws and NVDA, 5 rated them equally easy, while 8 rated JAWS easier. This is strongish evidence favouring Jaws (no surprise). For the 10 people who rated both Jaws and Voiceover, four rated them both 'very easy', three favoured Jaws, while three favoured Voiceover. Figure below summarises these findings



Accessibility Tools: Enlargers

There is insufficient data for analysis, but some blind respondents managed to use them!

Input tools

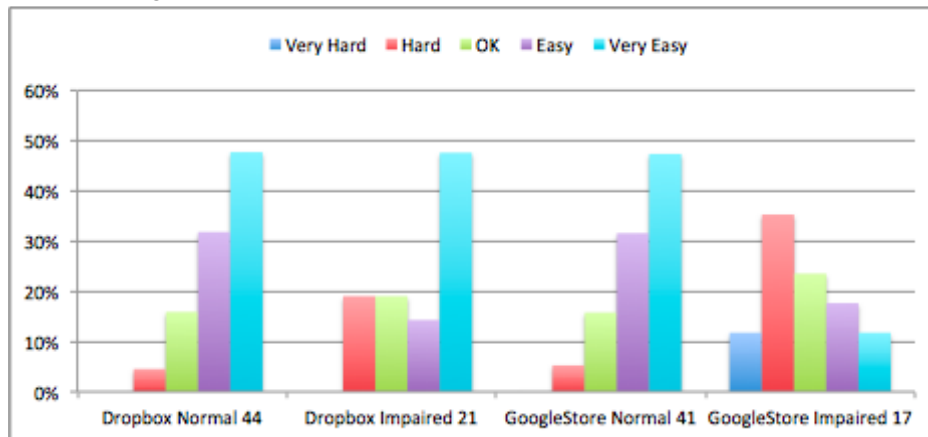
Gestures were used by 16/30 (53%) of visually impaired and 40/70 (57%) of sighted respondents. The difference came in use of the rotor: 11/16 (69%) of visually impaired, but only 9/40 (22%) of sighted respondents use the ipad/iphone specific rotor.

Speech was less used: 8/30 visually impaired, 14/70 sighted. Interestingly, considering the preponderance of windows, only 3/18 used Windows text to speech; 9 used Apple Speech (free), 6 used Dragon (free on iphone/ipad), 2 Google, 1 Android, and 1 Macspeech.

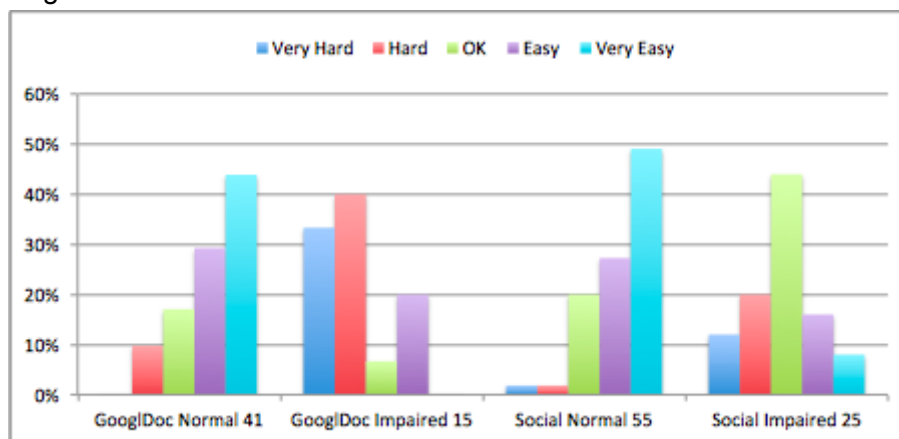
Cloud Applications

Storage

Blind and partially sighted respondents are combined as visually impaired respondents. Most blind respondents found their screen readers easy to use, nevertheless, visually impaired respondents found using either prevalent storage system (Dropbox or Google) a lot harder to use than sighted respondents. 40% of visually impaired contrasted with 19% of sighted rated Dropbox hard or very hard. Google storage is even worse, with 47% of visually impaired contrasted with only 5% of sighted rating of hard or very hard. However, visually impaired respondents (21/30=70%) use cloud storage just as much, if not more, than sighted respondents (44/70 = 63%). Figure below summarises these findings.



The contrast is even greater for more complex applications. The Google word processor app was rated hard or very hard by 73% of visually impaired respondents, contrasted with 10% of sighted respondents. Social media applications, used by 78% of sighted and 62% of visually impaired respondents, were easier for everyone. Nevertheless, 32% of visually impaired respondents contrasted with 4% of sighted respondents rated them as hard or very hard. These findings are summarised in Figure below.



Respondents were asked to compare ease of use of cloud applications with equivalent applications on their PC. The cloud version was found harder to use by 77% of visually impaired respondents, contrasted with 29% of sighted respondents. Thus cloud applications are tough for everyone, but even tougher for visually impaired individuals.

Implications of Cloud Computing

Concerns and Work Impact

Visually impaired respondents were *more* concerned than sighted respondents about security and privacy, 67% contrasted with 51%; and about accessibility of applications, 59% contrasted with 13%; but *less* concerned about Internet connection failure, 33% contrasted with 49%.

In spite of all the difficulties, on the key question of impact of the cloud on work, no less than 37% of blind respondents thought work would be easier, contrasted with 51% of sighted respondents. Worryingly, 53% of blind, but 10% of sighted respondents thought work would be harder.

Opportunities and Threats

Respondents gave their main reasons for using the cloud in free text. Reasons were similar for all groups and included: storage, sharing (particularly large files), and social interaction.

Respondents also reported problems in free text. These included poor interface design, security and Internet connection. Blind respondents also highlighted screen reader problems.

Respondents were also asked for their 'wish list' for cloud improvements and for any general comments. Issues raised included: conformance to standards, user testing, accessibility by keyboard alone, and by screen readers. Syncing also featured as an issue. Some respondents were enthusiastic and found syncing useful. Others were concerned that syncing can delete valuable information from the base, non-internet machine, this might happen more easily for screen reader users who had inadvertently chosen inappropriate settings. Finally, customizability was mentioned as an important feature for all applications.

Commercial Survey Software

Constructing a survey that is generally accessible on all platforms is no easy task. The software needs to supply accessible templates that

- have EVERY component accessible to at least one screen reader in Windows, Mac, Linux, and mobile device platforms in commonly used browsers
- Responsive Web Design (RWD) that provides easy reading and navigation, with a minimum of resizing, panning, and scrolling, across a wide range of screen resolution, whether PC, mobile or tablet, see http://en.wikipedia.org/wiki/Responsive_Web_Design
- can be used with keyboard alone
- conform to CSS3 and Web Content Accessibility Guidelines version <http://www.w3.org/TR/WCAG/>

In addition, the survey designer needs to use accessible question types and note that what is most appealing to sighted users may not work well with screen readers. Vertical multiple choice & text box entry works well for all. Dropdown menus for 4 - 10 items can be accessible to screen readers. However, a read out of all the UN countries is over the top. Here either hierarchical menus [choose region, then country], or single line free text may be preferable [even though this will need post-processing]. Graphical calendars may also be problematic. A graphical html editor is also desirable, since in the last resort users can write accessible input themselves.

In the end we chose SurveyGizmo. None of the visually impaired respondents complained about accessibility. However, many people abandoned the survey or quit on the welcome page. We do not know if accessibility was a cause. Median time to complete survey was 19.2 mins for blind respondents, 11.0 mins for partially sighted respondents, and 7.8 mins for sighted respondents. Diagnostics supplied by Surveygizmo estimate 9 mins for completion.

Other software explored included: SnapSurvey [rejected as seemed to require software downloaded to windows machine], Opinionmeter [accessible, but rejected because too few question types] surveymonkey [had negative personal reports, but may be earlier version or poor question design] and questionpro [successfully used by experienced group at York], e.g. <http://surveys.questionpro.com/a/TakeSurvey?id=3190559>

Automatic testing

We tried some tools recommended by RNIB, (Wave, W3C HTML5 markup, W3C CSS3). http://www.rnib.org.uk/professionals/webaccessibility/testingtips/Pages/automated_testing.aspx No surveys were completely problem free (like the RNIB referring page); with roughly similar performance for SurveyGizmo, Surveymonkey and Questionpro. None were perfect on simple surveys generated to test accessibility and all were poor on the survey design pages. We did not find any automatic tools for semantic or navigational factors. Obviously, pages may well fail automatic tests and still be accessible. Conversely, pages may pass automatic tests and be hard to use (In the unlikely event that one can find sites that fully conform to guidelines).

- Page and site testing by visually impaired users is essential.

We also tried the RNIB recommended tools on Kornbrot's Wordpress site. The original design [chosen for visual appeal] generated many errors. Switching to a 'responsive' template [Oxygen] substantially reduced, but did not completely remove, errors found by the automatic tools. HTML editors embedded in: Wordpress, Blogspot, GoogleDocs, SurveyGizmo and WORD, while not identical, ALL generate html5 and css3 that does NOT conform to guidelines.

Specialist and In House Survey Tools

RNIB uses a specially adapted version of Snapsurvey, while WebAIM uses its own software for its well screen reader survey, <http://webaim.org/projects/screenreadersurvey/>. However, this approach while it can ensure compliance with standards, makes sharing best practice difficult.

The Accessibility Community

As part of the project I signed up to several very useful fora, including: The British Computer Association of the Blind (BCAB), and WhatSock on LinkedIn, UKVISE United Kingdom Vision Impairment Small Enterprise and Self-Employment group. Several themes emerged. The most notable, is that after a supposedly 'improved' upgrade, key components are no longer working. Keyboard shortcuts are essential for visually impaired users, but can be hard to find. So responses to several questions on discussion fora is a sequence of keystrokes that looks like a string of bleeped out expletives to the uninitiated.

The role of the accessibility community cannot be underestimated. Unfortunately, it is very difficult for them to reach the people who most need them. What is striking about these fora, is that members are very good at knowing what questions to ask, unlike the general community.

Emerging Themes

Tools to Generate Accessible Sites & Apps

Designers need tools that generate clean accessible code 'out of the box'.

The legacy of inaccessible apps and sites cannot realistically be changed. We should concentrate on generating accessible sites for the future, which will then supersede less accessible sites & apps by natural selection.

Monitoring Performance not Conformity

Unless users opt out, ISPs monitor 'media' used, e.g. to provide responsive sites that are device aware. This enables Google analytics to provide a lot of information about page visits and length of stay etc. If, with consent, visually impaired users permitted automatic monitoring of their accessibility tools [screen readers, enlargers, speech and gesture input] then the analytics could provide data on what works, as well as what conforms to guidelines.

Consult Visually Impaired Users

The accessibility community has the potential to build a list of people who would be willing to test pages or sites on a pay per site basis, e.g. students or retired people. This would be like volunteering to be a [paid] guinea pigs in medical research, and much cheaper, and more realistic than a full usability report. It could also draw on the recently blind a poorly served group.

Current Resource Situation

There is a wealth of good stuff out there, but it is still quite hard to find most appropriate tool

Future Directions: A 3-way Partnership

Users

Visually impaired people, of all ages, need more knowledge on cloud & web usage. This can come from active user groups such as fix the web, www.fixtheweb.net/. In addition, there is currently untapped potential for passive monitoring that could be extended from simply noting hardware, OS and browser to also monitoring accessibility tools in use. This would require collaboration among browser creators, Microsoft, Google, Apple, Mozilla, etc.

Providers of Tools by and for Web Creators

This includes blogging hosts such Wordpress and Blogger and survey creators and web hosts. They need to routinely ensure that html5/css3 compliant editors and templates are easily available. Certification by W3C could be useful.

Providers of Accessibility Tools

These need to be able to read or enlarge all html5/W3C compliant documents and applications on all common platforms. This is currently not the case for any tool. Providing usable tools would require collaboration between providers of accessibility tools (screen readers, enlargers, voice and gesture input) and providers of browser, html editors and apps.

Annexe 1: Distribution List

Organisations for Visually Impaired & for Human Computer Interaction

ageing@jiscmail.ac.uk

w3c-wai-ig@w3.org

BCS-HCI@jiscmail.ac.uk

london_usability@yahoogroups.com

ukvise-feed@ukvijobs.com

bcab@lists.bcab.org.uk

University of Hertfordshire

Students: Managed Learning Environment, StudyNet News

Staff: staffq@herts.ac.uk

Annexe 2: Key Organisations

<http://www.rnib.org.uk>

Royal National Institute of Blind People

<http://www.w3.org/Consortium/>

World Wide Web Consortium, W3C All users

<http://webaim.org/>

Web Accessibility in Mind Resource

<http://www.accessifyforum.com/>

Web Accessibility forum

<http://www.ukseable.co.uk/>

UKusable for disabled entrepreneurs

<http://www.bcab.org.uk/>

British Computer Association of the Blind

<http://www.linkedin.com/>

Accessible Innovators group

<http://www.magill.co.uk/ukvijobs/ukvise.html>

Visual Impaired Small Enterprise/Self-Employment

Annexe 3: Key Resources

Automatic Testing

[Automated testing - RNIB](#)

RNIB

[WAVE - Web Accessibility Evaluation Tool](#)

[The W3C Markup Validation Service](#)

[The W3C CSS Validation Service](#)

Guidelines

see also automatic testing

<http://www.w3.org/TR/wai-aria/>

Accessible Rich Internet Applications

<http://www.w3.org/TR/WCAG/>

Web Content Accessibility Guidelines

http://html5.komplett.cc/code/index_en.html

HTML5 guidelines

<http://www.css3.com/>

CSS3

Tools to Generate Accessible Sites/Apps

<http://whatsock.com/>

generates accessible code, see ARIA

<http://www.ssa.gov/accessibility/bpl/default.htm>

US social security

<http://www.tinymce.com/index.php>

free good editor

<http://ckeditor.com/>

free good editor

<http://blog.teamtreehouse.com/>

good tips, especially social & responsive