Advancing Mobile Usability for Everyone

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IBM Mobile Accessibility Subcommittee
IBM Accessibility Architecture Review Board

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### Bios

**Brian Cragun:** Brian Cragun is a Senior Accessibility Consultant with IBM's AbilityLab. He has a broad background in Graphical User Interface development. He is an active inventor with over 130 filed and 80 issued patents, many in the areas of user experience and accessibility. He has been designated a master inventor, and chairs the Emerging Technology Invention Review Board in Rochester. His received his undergraduate degree in Computer Science from Utah State University in 1982 and his Masters in Manufacturing Systems Engineering from University of Wisconsin – Madison in 1986.

**David Dracoules:** I am David Dracoules, both a loving husband, father, and IT Systems Administrator/Developer/CTO with over 18 years of experience in the industry. I decided on this field after walking into my father’s office as a very young man and noticing him hammering away on a very sophisticated HP calculator. I asked him what he was doing and he said “calculating how much fuel it takes to land on the moon.” I was hooked from that day on. David Dracoules is an 8 time awarded Microsoft Most Valuable Professional in the area of user interaction and operating system integrity specializing in security and end user experiences. Over his 18 year career, Dave has been called an Educator, Confidant, Manager, Systems Administrator, Chief Technology Officer, and Vice President in Charge of Information Technology. Dave’s last company was recently acquired by IBM where he held the title of Vice President in charge of Information Technology. Now working for IBM, David now holds the title of Software Advisory Engineer working for the Systems Technology Group. His favorite quote is “Be nice to nerds. Chances are you'll end up working for one.” -Bill Gates

**Susan Keohane:** Susann Keohane has been a member of the IBM Human Ability and Accessibility Center's technical consulting team since 2006. Her focus is on the accessibility of documentation and software applications throughout IBM, with a primary role of providing guidance to the Learning, STG and SWG divisions. Susann joined IBM in 1997. She is an IBM Master Inventor and holds a Master of Software Engineering degree from the University of Texas at Austin.

**Matt King:** Matt King is the Information Technology Chief Accessibility Strategist for IBM and works in corporate headquarters providing strategic and technical direction to programs supporting compliance to accessibility standards of IBM’s internal IT solutions and IT accommodations for employees with disabilities. He is graduate of the University of Notre Dame. Matt’s interest in accessibility extends well beyond his 15-year IBM career as he is blind from retinitis pigmentosa and has been utilizing and working on assistive technologies since the 1980s. Matt is also an athlete having won 12 national titles competing in the field of American blind cyclists as well as earning fourth and second place finishes in international Paralympic competition. His mantra is we need not expect less from someone just because they have a disability. Low expectations are easily learned and are one of the most common cripplers of success.

**Richard Schwerdtfeger:** Richard is the Chief Technology Officer Accessibility for Software Group, a IBM Distinguished Engineer and Master Inventor. His responsibilities include overall accessibility architecture and strategy for Software Group and chairs the IBM Accessibility Architecture Review Board of the SWG Architecture Board. Richard participates in numerous W3C standards efforts including HTML 5, WAI Protocols and Formats, and Ubiquitous Web Applications. Richard created and chairs the W3C WAI-ARIA accessibility standards effort for Web 2.0 applications as well as the IMS GLC Access for All accessibility standards efforts. He also formed and co-chairs the Open Ajax Alliance Accessibility Tools Task Force which is leading the the industry in establishing new WCAG 2 accessibility rule sets and reporting best practices needed to support Web 2.0 applications. Richard is a steering committee member of the Accessibility Interoperability Alliance and a member of Raising the Floor's team of experts working on a National Public Inclusive Infrastructure focusing on cloud-based personalized access. Richard joined IBM at the Watson Research Center in 1993 where he helped design and develop Screen Reader/2. He, later, led numerous accessibility efforts at IBM, including; the collaboration with Sun on Java accessibility where he co-architected the Java Accessibility API and the IBM Self Voicing Kit for Java; the Web Accessibility Gateway for seniors; and the IAccessible2 strategy. Richard is an internationally recognized expert on accessibility with twenty years of accessibility experience.
Anywhere and Everywhere

Photo credit: Flickr/Pixel Addict
Everywhere

- 2011 – Nielsen predicts US Smartphones exceed feature phones
- 2011 – Smartphone WW sales exceed PC sales
- 2013 - Gartner predicts web access through smartphones exceed web access through laptops
  - Recommends: Re-evaluate sites for mobile access
  - Recommends: Design for device independence
**Smart Phone Platform Accessibility**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Platform:</th>
<th>iPhone</th>
<th>Android</th>
<th>RIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart phone market (US Aug 2010)</td>
<td></td>
<td>24%</td>
<td>20%</td>
<td>38%</td>
</tr>
<tr>
<td>Large text</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>High contrast</td>
<td></td>
<td>Y</td>
<td>-</td>
<td>Y</td>
</tr>
<tr>
<td>Screen reader (TTS)</td>
<td></td>
<td>Y</td>
<td>3P $$</td>
<td>3P $$</td>
</tr>
<tr>
<td>Basic web browser reading</td>
<td></td>
<td>Y</td>
<td>3P $$</td>
<td>3P $$</td>
</tr>
<tr>
<td>Web 2.0 reading (ARIA Support)</td>
<td>Partial</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HTML5</td>
<td>Partial</td>
<td>Partial</td>
<td>Partial</td>
<td>-</td>
</tr>
<tr>
<td>Camera (magnify, bar code, color recognition)</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Accessibility API</td>
<td></td>
<td>Y</td>
<td>Partial</td>
<td>Y</td>
</tr>
<tr>
<td>Haptic feedback</td>
<td></td>
<td>-</td>
<td>Y</td>
<td>some</td>
</tr>
<tr>
<td>GPS</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td>some</td>
</tr>
</tbody>
</table>

Table 1 Comparison of accessibility capabilities of major smart phone platforms. Table key: - (none), Y (yes), 3P (third party), $ (small additional cost), $$ (significant additional cost), some (some phone models), Partial (incomplete support)
Not a desktop
Desktop vs Mobile

- Desktop
  - Screen size
  - Keyboard
  - Power

- Mobile
  - Touch input
  - Sensors
  - Mobility
Mobile brings the Cloud along

- Big CPU when device doesn't have it
  - Voice recognition
  - TTS

- Cloud
  - Single data / multiple modality output

- Sensors back to cloud
  - You become a sensor in the network
We use mobile devices differently

- Information
- Monitor
- Triage and handle urgent problems
- Synchronization expected
Email Triage

- Assumption is people handle mail just like on desktop
- IBM Research showing people monitor and deal only with urgent matters, *Triage*, leaving common handling until desktop
- IBM Research tested specialized interfaces to help.
- We conclude also that contextual circumstances may affect *how* you interact
- Alternate modalities may influence your ability to interact
Environmental Limitations

Photo credit: Flickr/Gonzalo Baeza Hernández
Social Restrictions
Input & Output

Photo credit: Flickr/Abulic Monkey
Input & Output

- Multiple modalities
- Keyboards
- Gestures
- Monitors
- Voice recognition
- Virtualized peripherals
Voice

- Most vocabulary processing handled off device – (need to be connected)
- Many commands handled on device
- Great aid to illiterate, dyslexic, vision impaired
- Need read back, too
Personalization

- Mobile devices come in various shapes, sizes, features and capabilities
- One size does not fit for all software or people
- Mobile devices are used in places that make all of us impaired users
Automated User Preferences

Example: User text directions instead of visual map
Automated User Preferences (cont)

Example: Increased line spacing
Automated Personalization

- Accessibility becomes a preference
- Set your preference and forget it – the IT does the rest for you.
- IT automatically matches content and assistive technology to you
- Device user experience automatically changes to meet your needs.
Access For All

Photo credit: www.geograph.org.uk
Connect Users in Context

Resources

- Resource Capabilities
- Alternative Resources
- Device Specific Capabilities

Delivery Context

- User Preferences
- Device Capabilities
- Environmental Data
Situational Personalization

- Preferences + capabilities + circumstance = device settings

- Example: closed caption turned on because of noisy environment.
  Example: high contrast and larger font because of bright ambient lighting.
Needed: Better Tools
Better Tools Needed

- Accessible standard widgets
- Full smart phone browser accessibility
- Complete APIs on all platforms
- Device Independent interactions
- Cross-platform development environment
- Automated test tools
Needed: All the pieces
Smart Phone Accessibility APIs

<table>
<thead>
<tr>
<th>APIs</th>
<th>Platform:</th>
<th>iPhone</th>
<th>Android</th>
<th>RIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core accessibility:</td>
<td></td>
<td>Y</td>
<td>-</td>
<td>Y</td>
</tr>
<tr>
<td>role, state, properties, event notification, parent child, object from point, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationships</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Live regions</td>
<td></td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tables</td>
<td></td>
<td>Y</td>
<td>-</td>
<td>Y</td>
</tr>
<tr>
<td>Text</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Values</td>
<td></td>
<td>Y</td>
<td>-</td>
<td>Y</td>
</tr>
<tr>
<td>Notification / Events</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td>-</td>
</tr>
<tr>
<td>Custom properties</td>
<td></td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 2 Comparison of accessibility APIs of major smart phone platforms. Table key: - (none), Y (yes), Partial (incomplete support)
Full Browser Support

- Need full accessibility support in smart phone browsers
- HTML5 + WAI/ARIA
- Screen reader support
- All platforms

<table>
<thead>
<tr>
<th>Platform:</th>
<th>iPhone</th>
<th>Android</th>
<th>RIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAI/ARIA support</td>
<td>Partial</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>HTML browser support</td>
<td>Y</td>
<td>3P$$</td>
<td>3P$$ limited</td>
</tr>
</tbody>
</table>

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Needed: Device Independence
Device Independent Interactions

- W3C Proposal: *User Interface Independence for Accessible Rich Internet Applications*
- UI Change Request Events
  - Undo, Redo, Escape, Delete, Scroll
- Accessibility Events from the AT
  - Focus, Blur, Drag / Drop
- Assistive Technology Identification and Notification
  - Screen reader, magnifier
Needed: Cross Platform Tooling
Application Development Models

- **Native**
  - Fast, looks native, but costly to reproduce on each platform,

- **Web**
  - Low cost for each platform, mimics native with CSS, slower, missing some services,

- **Hybrid (native shell + hosted web application)**
  - Medium speed, low cost per platform, access to services, mimics native applications
Phone Gap

- Creates native applications using web technologies
- Hybrid - Wrappers web app in native shell
- HTML 5 / CSS3 / Javascript based
- Supports best Apple, Android, Blackberry, also Palm, Windows, Symbian
- Has access to most services
  - varies by platform
- Open source
  - Free
  - IBM contributes
Other Cross-platform

- **Appcelerator Titanium**
  - Hybrid model
  - IOS / Android / Blackberry
  - Inspection tool
  - Open source / also paid versions

- **Rhomobile Rhodes**
  - Recompiled code to Ruby interpreter microframework on each platform
  - Open source
Wholesale Application Community

– Consortium of Telcos and businesses (+IBM)
– WAC Specification 1.0
– Cross-platform applications written as widgets using HTML, CSS, and JavaScript
– Widget platform for each mobile platform
  • Opera has one for Android
– Access to system devices
– SDK for Eclipse
– Open source
– W3C Standards
Inspection and Testing
Weinre

- **Web Inspector Remote**
- WebKit browsers
- Based on WebKit Web Inspector
- Remotely attaches to device
  - Uses intermediate server
- Provides “Firebug” style debug
- Potential for automation
Weinre

- Webs Inspector Remote
- Based on WebKit Web Inspector
- Remotely attaches to device – Uses intermediate server
- Provides "Firebug" style debug
- Potential for automation

```
<html>
<head>
</head>
<body>
  <h1>this is a green h1 element</h1>
  <h1 class="blue">this is a blue h1 element</h1>
  <h1 style="color:red">this is a red h1 element</h1>
  <p>
    "Some text, 
    some italic text",
    and
    some bold text
  </p>
  <div id="metrics">a div</div>
</body>
</html>
```
User Agent Switching

- Browsers have a UserAgent identifier
- Browsers such as Firefox and Chrome have plug-ins which allow the browser to claim it is something else.
- Potential exists to use a plug-in to be mobile
- Expands testing immediately
- Testing assumes that mobile DOMs are the same.
Outlook
Outlook

- Accessibility enablement needs:
  - Full APIs
  - HTML5 + ARIA support in browsers
  - Screen reader support
  - Device independent browser access

- Practical accessibility needs:
  - Cross platform development that supports accessibility services
  - Automated testing tools
Outlook continued

- Personalization
  - Access for All specification is moving forward
  - It will take some time for this to trickle down and integrate

- Input and output
  - More voice recognition services
Questions
Acknowledgements

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- Patrick Mueller
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