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INDUSTRY INITIATIVES ON MOBILE DEVICES REPORT

Georgia Tech Center for Advanced Communications Policy

CACP Collaborative

About Us

The Georgia Institute of Technology (Georgia Tech), **Center for Advanced Communications Policy** (CACP) is the primary research center that focuses on policy issues that influence the evolution of technology, especially those impacting people with disabilities and those with access and functional needs. Research and development activities span such diverse areas as emergency communications, next generation technologies and devices that contribute to cutting edge advanced communications policy. CACP operates as an impartial, fact-based expert to help inform regulatory rule makings, technology development by industry, and most critically qualitative and quantitative data analysis which results in reports that enhance knowledge of accessible emergency communications options. CACP collaborates with government, industry and academia at the international, national, state and local level to provide insights on a wide range of topics to ensure a clearer understanding of the ever changing technology landscape. CACP is the home the Rehabilitation Engineering Research Center for Wireless Technologies (Wireless RERC), funded by the U.S. Department of Education's National Institute on Disability and Rehabilitation Research (NIDRR) since 2001. The CACP Collaborative that guides the progress and outcomes of this project have combined expertise in disability research and development and includes research specialists, emergency management specialists, focus group and survey technicians, designers and engineers to create prototypes.

The research produced in this summary report was performed by the principal investigator (PI), Helena Mitchell, Ph.D., and researcher Laura Levy. The research was funded by the Department of Homeland Security (DHS) Federal Emergency Management Agency's (FEMA) Integrated Public Alert and Warning System (IPAWS)

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Purpose of review

The following review identifies, describes, and assesses industry initiatives in mobile device accessibility, focusing on existing hardware and highlighting available software APIs. The majority of this review was referenced from industrial, governmental, organizational, and end user compliance documents and similar materials. Links to relevant and suggested references are provided.

Additionally, found on page 3, an academic literature review features several key studies with methods and research questions similar to our own. These referenced papers are excellent resources for methods and materials review.

Industry and regulatory resources

Mobile Manufacturer's Forum Global Accessibility Reporting Initiative (GARI)

- http://www.mobileaccessibility.info/
- Perhaps the best and most frequently updated resource on accessibility features
- Allows for filtered search of phones, tablets, and mobile apps in terms of accessible need and region
- Also provides developer resources for accessible design

CTIA - The Wireless Association

- Policy initiatives
    - Accessibility and Assistive Technology
        - http://www.ctia.org/policy-initiatives/accessibility-and-assistive-technology
        - Encourages collaboration between industry, the disabled community, government, and independent developers
        - Provides Voluntary Guidelines and further resources
            - http://www.ctia.org/policy-initiatives/voluntary-guidelines
- Industry campaign
    - AccessWireless
        - http://www.accesswireless.org/
        - Provides resources for industry, the disabled, and developers
        - Allows for mobile search, through GARI, as well as resources on learning to use GARI
        - Focuses on hearing, vision, mobile/manipulation, speech and cognition

Making Mobile Phones and Services Accessible for Persons with Disabilities Report

- http://www.itu.int/ITU-D/sis/PwDs/Documents/Mobile_Report.pdf
- Excellent resource, from which much has been highlighted below
- A report of the International Telecommunication Union (ITU) and the Global Initiative for Inclusive ICTs (G3ict)
- Resource for implementation and design of successful accessibility services, features, business practices, and policy as of 2012

Academic literature relevant to our user needs studies

Kane, S. K., Jayant, C., Wobbrock, J. O., & Ladner, R. E. (2009, October). Freedom to roam: a study of mobile device adoption and accessibility for people with visual and motor disabilities. In *Proceedings of the 11th international ACM SIGACCESS conference on Computers and accessibility* (pp. 115-122). ACM.

- Mobile devices provide people with disabilities new opportunities to act independently in the world. However, these empowering devices have their own accessibility challenges. We present a formative study that examines how people with visual and motor disabilities select, adapt, and use mobile devices in their daily lives. We interviewed 20 participants with visual and motor disabilities and asked about their current use of mobile devices, including how they select them, how they use them while away from home, and how they adapt to accessibility challenges when on the go. Following the interviews, 19 participants completed a diary study in which they recorded their experiences using mobile devices for one week. Our results show that people with visual and motor disabilities use a variety of strategies to adapt inaccessible mobile devices and successfully use them to perform everyday tasks and navigate independently. We provide guidelines for more accessible and empowering mobile device design.

Leonard, V. K., Jacko, J. A., & Pizzimenti, J. J. (2005, October). An exploratory investigation of handheld computer interaction for older adults with visual impairments. In *Proceedings of the 7th international ACM SIGACCESS conference on Computers and accessibility* (pp. 12-19). ACM.

- This study explores factors affecting handheld computer interaction for older adults with Age-related Macular Degeneration (AMD). This is largely uncharted territory, as empirical investigations of human-computer interaction (HCI) concerning users with visual dysfunction and/or older adults have focused primarily on desktop computers. For this study, participants with AMD and visually-healthy controls used a handheld computer to search, select and manipulate familiar playing card icons under varied icon set sizes, inter-icon spacing and auditory feedback conditions. While all participants demonstrated a high rate of task completion, linear regression revealed several relationships between task efficiency and the interface, user characteristics and ocular factors. Two ocular measures, severity of AMD and contrast sensitivity, were found to be highly predictive of efficiency. The outcomes of this work reveal that users with visual impairments can effectively interact with GUIs on small displays in the presence of low-cost, easily implemented design interventions. This study presents a rich data set and is intended to inspire future work exploring the interactions of individuals with visual impairments with non-traditional information technology platforms, such as handheld computers.

Plos, O., & Buisine, S. (2006, April). Universal design for mobile phones: a case study. In *CHI'06 extended abstracts on Human factors in computing systems* (pp. 1229-1234). ACM.

- In this paper we describe a case study of Universal Design applied to mobile phone physical devices. Using a user-centered design process, we tried to integrate visually-impaired, hearing-impaired and elderly peoples' needs to design mock-ups adapted in terms of usability and design style.

Watanabe, T., Miyagi, M., Minatani, K., & Nagaoka, H. (2008). A survey on the use of mobile phones by visually impaired persons in Japan. In *Computers Helping People with Special Needs* (pp. 1081-1084). Springer Berlin Heidelberg.

- The present state and future needs of visually impaired mobile phone users were surveyed. The results showed that many visually impaired users, even print enabled persons, were making use of speech output to e-mail and to access the Internet, and, accordingly, improvements of speech output were requested. Additionally, GPS navigation was on the high priority request list. It was revealed that many visually impaired users, even print enabled persons, were making use of speech output to e-mail and to access the Internet. Accordingly, improvement in speech output was hoped for by many users. Besides, improvement in functions other than speech and the addition of useful features were expected. For better usability and accessibility of mobile phones to visually impaired users, we keep on circulating the results of this survey by distributing the survey reports, posting the data on the Web, scientific presentation, and other means.

Kane, S. K., Bigham, J. P., & Wobbrock, J. O. (2008, October). Slide rule: making mobile touch screens accessible to blind people using multi-touch interaction techniques. In *Proceedings of the 10th international ACM SIGACCESS conference on Computers and accessibility* (pp. 73-80). ACM.

- Recent advances in touch screen technology have increased the prevalence of touch screens and have prompted a wave of new touch screen-based devices. However, touch screens are still largely inaccessible to blind users, who must adopt error-prone compensatory strategies to use them or find accessible alternatives. This inaccessibility is due to interaction techniques that require the user to visually locate objects on the screen. To address this problem, we introduce Slide Rule, a set of audiobased multi-touch interaction techniques that enable blind users to access touch screen applications. We describe the design of Slide Rule, our interaction techniques, and a user study in which 10 blind people used Slide Rule and a button-based Pocket PC screen reader. Results show that Slide Rule was significantly faster than the button-based system, and was preferred by 7 of 10 users. However, users made more errors when using Slide Rule than when using the more familiar button-based system.

Kurniawan, S. (2008). Older people and mobile phones: A multi-method investigation. *International Journal of Human-Computer Studies*, *66*(12), 889-901.

- This paper investigates issues related to the use of mobile phones by people aged 60 years and over and characteristics of an ageing- friendly mobile phone. This study combines qualitative and quantitative analysis methods of Delphi interviews, focus group discussions, and online survey. The expert interviews and the focus group discussions covered usage patterns, problems, benefits, and desired and unwanted features. The issues raised in the discussions were translated into an online survey of 100 people. This study revealed that older people are passive users of mobile phones, that they experience fear of consequences of using unfamiliar technology, and that most preferred design features are aids for declining functional abilities. Gender differences in preferred design features were observed, with women focusing on haptic aids and men on perceptual aids.

Dawe, M. (2007, October). Understanding mobile phone requirements for young adults with cognitive disabilities. In *Proceedings of the 9th international ACM SIGACCESS conference on Computers and accessibility* (pp. 179-186). ACM.

- Mobile phones have transformed the way we communicate with friends and family, coordinate our daily activities, and organize our lives. For families with children with cognitive disabilities there is widespread hope, though not always fulfilled, that personal technologies – particularly mobile phones – can bring a dramatic increase in their children's level of safety, independence, and social connectedness. In this research, we conducted semi-structured interviews with five families to understand the current patterns of remote communication among young adults with cognitive disabilities and their parental caregivers, and the role that remote communication played in increasing independence and safety. While some of the young adults used mobile phones and some did not, we identified common themes in requirements, patterns of use, and desires for an accessible mobile-phone based remote communication system. Requirements include the need for a simplified navigation menu with fewer options and a rugged handset and charger input. Families used mobile phones for safety check-ins and help getting *un-stuck*. While parents desired increased social involvement for their children, they observed that their children did not often chat with friends on the phone.

Brandt, J., Weiss, N., & Klemmer, S. R. (2007, April). txt 4 l8r: lowering the burden for diary studies under mobile conditions. In *CHI'07 extended abstracts on Human factors in computing systems* (pp. 2303-2308). ACM.

- We present and evaluate a new technique for performing diary studies under mobile or active conditions. Diary studies play an important role as a means for ecologically valid participant data capture. Unfortunately, when participants are asked to capture data while mobile or active, they are often unwilling or unable to invest time in thorough, reflective entries. Ultimately, this leads to lowered entry quality and quantity. The technique presented here suggests the capture of only small snippets of information in the field. These snippets then serve as prompts for participants when completing full diary entries at a convenient time. We describe how this system automates collection of snippets via text (SMS), picture (MMS) and voicemail messages and later presents these snippets for full entry elicitation. We then present results from a preliminary evaluation of this technique.

Kane, S. K. (2009). Context-enhanced interaction techniques for more accessible mobile phones. *ACM SIGACCESS Accessibility and Computing*, (93), 39-43.

- Modern mobile phones enable users to access a wide variety of information and communication services anytime and anywhere. In order for people with disabilities to benefit from these services, mobile devices must provide accessible user interfaces. Currently, users with motor and visual impairments often have difficulty using mobile devices due to issues such as screen readability and small controls. These problems may be exacerbated when attempting to use such devices in crowded, noisy or otherwise distracting environments. We are developing accessible mobile interaction techniques that adapt the mobile device interface to the user by leveraging information about the user's current location, activity, and level of ability.

Sohn, T., Li, K. A., Griswold, W. G., & Hollan, J. D. (2008, April). A diary study of mobile information needs. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 433-442). ACM.

- Being mobile influences not only the types of information people seek but also the ways they attempt to access it. Mobile contexts present challenges of changing location and social context, restricted time for information access, and the need to share attentional resources among concurrent activities. Understanding mobile information needs and associated interaction challenges is fundamental to improving designs for mobile phones and related devices. We conducted a two-week diary study to better understand mobile information needs and how they are addressed. Our study revealed that depending on the time and resources available, as well as the situational context, people use diverse and, at times, ingenious ways to obtain needed information. We summarize key findings and discuss design implications for mobile technology.

Examples of handset manufacturers and operating system organizations engaged in serving persons with disabilities

Nokia

Finnish mobile manufacturer Nokia has set up the Nokia accessibility initiative an umbrella range of activities which includes development of internal product design standards, initiating research, and training employees to provide services to customers with disabilities. Nuance Text-to-speech software is available for Nokia Series 6067 and Series 80 phones on Symbian operating systems.

- Dished keys to facilitate the use of a mouth stick or other devices to dial
- Grips for improved stability
- Audio/voice interaction with user interface through voice dialing/response and third party apps
- Voice dialing, voice recorder, and voice commands with an integrated hands-free speaker
- Push to talk where speaker's voice is automatically played through the phone's loudspeakers
- Dial-out buffer memory that gives more time to complete a process
- Pre-recorded voice command facility for popular functions

Apple

While the accessibility of its touch screen interface was initially perceived as a potential challenge among online communities covering accessibility, it has since become one of the most popular handsets among persons with disabilities including visually impaired persons. Apple has worked at making the iPhone disabled-user friendly with many accessibility features embedded in all its models. Its design philosophy for handsets and tablets is built upon the design philosophy of the Macintosh computer which has included free embedded accessibility features, such as a screen reader, since 2004. Apple seeks to maintain the consistency of its user experience across different product lines: an iPod Touch user will find the same Voice Over commands on an iPhone or iPad. A significant breakthrough with Voice Over is that it is the world's first fully accessible touch screen technology. It lets users know via speech synthesis what's under their fingers and what the various menus and operating system functions are doing.

- Same device video calling with the FaceTime app over Wi-Fi
- Support for Bluetooth Braille displays and 30 international Braille tables
- Touch typing for visually impaired or print impaired users through text-to-speech
- Magnification and zoom functions up to 500 per cent
- Option to display text with larger font sizes instead of Zoom
- Option to use white on black and other contrast inversions for color blind users
- Optional mono audio for users with hearing limited to one ear
- Support for closed captioning and subtitling, built in to iTunes, for content searches
- A "lite" version of Voice Over which allows users to read aloud only the text they select in a given application. This can be most helpful for situations when users want help to read content

for a variety of reasons ranging from situational (driving for example) to vision challenges, dyslexia, or for auditory learners
- "Assistive Touch" provides more functionality for someone with minimum mobility. Assistive Touch adds several functionalities, the first of which is hardware-based. It allows for the connection of assistive devices to the iOS 5 touch screen technology. It can be a switch or a joy stick, allowing a person to use the iOS touch screen interface with minimal motor skills. The other elements are software-based. One allows users to control the few physical switches and buttons of the device with a touch screen command. Another important functionality of Assistive Touch allows users to program single-finger gestures where the default setting requires two or more fingers (such as pinching a photo)
- Voice Over support for the camera tells the user how many persons are in the picture
- Option to label unlabeled apps buttons

Additional resources

- https://developer.apple.com/technologies/ios/accessibility.html
- https://developer.apple.com/accessibility/
  - Zoom - magnifies the entire device screen
  - White on Black - inverts the colors on the display
  - Mono Audio - combines the sound of the left and right channels into a mono signal played on both sides
  - Speak Auto-text - speaks the text corrections and suggestions iPhone makes while users type
  - Voice Control - allows users to make phone calls and control iPod playback using voice commands
  - In addition, visually impaired users can rely on VoiceOver to help them use their devices

- Apple third party accessibility
  - http://www.apple.com/accessibility/third-party/
    - Focuses on vision, hearing, physical/motor skills, learning/literacy, and speech

Samsung

Samsung offers several mobile phones that are hearing aid compatible. The company adheres to technical specification ANSI C63.1971 to measure the interference experienced by hearing aid users when using hearing aids with wireless handsets. It rates its products accordingly, allowing customers to know which of the company's handsets are optimally suited for use with hearing aids.

- Tactile keys
- Nibs on or around the "5" key
- Soft key
- Bright backlit and LED display
- Voice recognition
- One-and two-touch dialing
- Adjustable volume control
- Icon/graphic menus

- Quick access menus
- Teletypewriter (TTY) capability
- External audio output (via ear bud)

Motorola

All mobile phones of the US-based mobile phone company Motorola are engineered to create a magnetic field that can be coupled with a telecoil equipped hearing aid for users with hearing impairments. In addition, the following accessibility features are available on the company's products:

- Hearing/Speech
  - CrystalTalk™, a mobile device technology that compensates for background noise
  - Telecoil speaker for hearing aid wearers
  - Speakerphone
  - VibraCall® Alert and Video Chat capability
  - Text Messaging
  - Support for video chat
- Vision
  - Verbal readouts of screen information including caller ID, voicemail alerts, and battery level
  - Keypad depression feedback (haptics for touchscreen)
  - Brightly backlit displays and high contrast
  - Bluetooth® headset with MotoSpeak™ technology that reads out text messages in real time
- Mobility and Manipulation
  - Easy to open clam shells or sliders
  - Predictive Text Entry
  - Bluetooth compatibility
  - Auto redial when system is busy (carrier dependent)
- Cognition
  - Voice recorder
  - Picture caller ID
  - Time-independent user responses
  - Customized ringer alerts to identify incoming callers

Additionally:

- Speakerphone
- Relay service
- Vibrating call alert
- Keypad depression feedback
- Audible alerts/feedback
- Bright backlight displays
- High contrast
- Ease of opening for clam shells or sliders
- Automatic answer
- Auto redial when system is busy

- Voice recorder
- Time-independent user responses

Additional resources

- http://responsibility.motorola.com/index.php/consumers/accessibility/
  - Provides and describes resources and design guidelines for industry, developers, and end users

Google-Android

Android's open source project for accessible apps is called "Eyes-Free". Screen readers from Android like Spiel and Talkback enable the platform to be accessible to persons with disabilities. Apart from screen readers, there are a few applications which cater to different accessibility needs, like Eyes Free Shell, which provides access to the touch screen without having to look at the screen; Google Voice which is a speech recognition-based search application; Gesture Search, etc.

The Vilingo app (available for free on the Android market) aims to provide access to all phone services without having to touch the device using voice feedback from both the user and the device itself.
In addition, the Android platform also has accessible GPS applications like WalkyTalky and Intersection Explorer as well as mainstream GPS applications based on Google Maps that are usable with Talkback.

An important decision taken by Google with Android 4.0 and above will be to ask handset manufacturers to take into account the accessibility component of its CDD – Compatibility Definition Documents – or to offer alternatives of their choice. This will likely promote the accessibility features for a number of mobile handsets and tablets operating with Android, a very positive move given Android's increasing market share of the global mobile market.

Additional resources

- http://developer.android.com/guide/topics/ui/accessibility/index.html
  - TalkBack is a pre-installed screen reader service provided by Google. It uses spoken feedback to describe the results of actions such as launching an app, and events such as notifications
  - Explore by Touch is a system feature that works with TalkBack, allowing you to touch your device's screen and hear what's under your finger via spoken feedback. This feature is helpful to users with low vision
  - Accessibility settings let you modify your device's display and sound options, such as increasing the text size, changing the speed at which text is spoken and more
- An example of KitKat (latest Android running version) and its accessibility features for the blind
  - https://www.youtube.com/watch?v=8Qf-LwUnAzs

Windows Phone 8

Unfortunately it appears that Windows phones have a poor reputation with the disabled community. Having relied on 3rd party vendors to create the accessibility app, Mobile Accessibility, has reduced its

ability to apply accessible features throughout the system. Additionally, Windows does not have a support line for those requiring assistance with accessibility. The expected accessible features are listed below:

- Voice guided, simplified interface for those with visual impairments
- Contrast customization
- Magnification
- Speech recognition
- Text read back
- Not system wide
- Does not retain a good reputation in either the deaf and/or blind communities

Additional Resources

- Demonstration for some of the accessibility features in the Windows phone
    - https://www.youtube.com/watch?v=bZKLPMsb2g0

Blackberry

Standard and expected accessibility features include (also refer to Figure 1 for device comparison):

- Hearing aid capability
- Closed captioning
- Visual, audible and vibration notifications
- TTY support
- Tactilely discernable keyboard
- Assignable notifications
- Voice control
- Adjustable fonts
- Magnification
- Screen Reader

Additional Resources

- http://www.blackberry.com/developers/docs/6.0.0api/net/rim/device/api/ui/accessibility/package-summary.html
    - Developers documentation and interface summaries
- http://us.blackberry.com/legal/accessibility.html
    - Accessibility feature overview by model

BlackBerry 10 Features

	Z10	Z30	Q10	Q5
Accessibility Menu	✓	✓	✓	✓
BlackBerry Magnify	✓	✓	✓	✓
BBM™ Video[2]	✓	✓	✓	✓
Voice Control	✓	✓	✓	✓
Hearing Aid Capability[1]	✓	✓	✓	✓
BlackBerry Messenger[2]	✓	✓	✓	✓
Tactilely Discernable Keyboard[3]			✓	✓
Identifiable Keyboard 'Nib'[3]			✓	✓
Customizable Fonts	✓	✓	✓	✓
Hands-free Communications	✓	✓	✓	✓
Assignable Notifications	✓	✓	✓	✓
Alerts and Notifications	✓	✓	✓	✓
Instant Messaging[2]	✓	✓	✓	✓
Vibrations and Visual Notifications	✓	✓	✓	✓
Closed Captioning[4]	✓	✓	✓	✓
TTY Support	✓	✓	✓	✓
BlackBerry Screen Reader[4]		✓		
BlackBerry Keyboard	✓	✓	✓	✓
Voice Notes	✓	✓	✓	✓
Personal Telephone Book	✓	✓	✓	✓
Customizable Display	✓	✓	✓	✓
Shortcuts and Speed Dial	✓	✓	✓	✓

Figure 1: BlackBerry 10 accessibility features by model

Doro

Doro is a publicly traded Swedish company specialized in telecommunications and assistive products for the elderly and persons with disabilities. Its design processes incorporate detailed input and testing by elderly persons with a focus on ease of use and safety at home or on the go. It has developed a comprehensive product line of accessible handsets and peripherals available to persons with disabilities. Its PhoneEasy 410gsm and HandleEasy 330gsm have been popular choices among senior users. These

phones, which are hearing aid compatible, feature large buttons and text, bright displays, clear, audible sound and include an emergency call button, vibrating ringer, text messaging, a phonebook for storing numbers and a two-way speakerphone.

Doro relies on a detailed market segmentation of the elderly population which includes attitudes towards technology and impairments. This approach allows Doro and its distributors, including mobile service providers, to better address users' needs.

Emporia Telecom

Austrian manufacturer Emporia Telecom has built a successful business practice by targeting a niche market of seniors and persons with disabilities. The Linz- based company sells, to various service providers, handsets and mobile accessories suitable for older users who may have visual, hearing or motor impairments. The mobile phones are equipped with features such as large display with a magnifier function, tactile keys, a hearing aid compatible speaker and black on orange backlight for visually impaired users or users with cataracts.

Sagem

In February 2010, French company Sagem Wireless unveiled the Cosyphone, a handset device targeted exclusively for persons aged 50 years and above. Designed ergonomically, the device uses contactless NFC technology (near-field communications), which allows users to access the features on their phones without having to scroll through menus. The Cosyphone is equipped to set pre-configured and customized shortcut cards for family or emergency contacts, so users can wave their device over the cards to initiate a call or send a text message. In addition, the phone has a large keypad with raised and separated dialing keys and comes with micro-vibration feedback that confirms if the user has pressed the correct digit. This phone was made available commercially in November 2010 in France, Ireland and the UK.

National Center for Accessible Transportation

http://ncam.wgbh.org/invent_build/web_multimedia/ncat/ncathwsw

Survey of accessible mobile telecommunications hardware and software

This chart provides a representative overview of the types of smartphones, cell phones and third-party software or hardware in use today that provide support for people who are blind, visually impaired, deaf or hard of hearing. Many phones, including those not listed here, come with features voice dialing, screen magnifiers or enlargers, adjustable fonts, adjustable contrast settings, etc.

Table 1: Accessible mobile hardware and software survey

Device	OS	Accessibility support	Send/receive calls	Send/receive text	Browse Web	Play video/audio	Display closed captions	Recive mobile TV	Misc.
BlackBerry® Bold 9700	BlackBerry 5.x	Voice dialing; screen zoom;TTY support. Learn more about BlackBerry accessibility.	Yes	Yes	Yes	Yes	Yes	No	--
BlackBerry Curve 8530	BlackBerry 5.x	Voice dialing; screen zoom;TTY support. Learn more about BlackBerry accessibility.	Yes	Yes	Yes	Yes	Yes	No	--
BlackBerry Curve 8520	BlackBerry OS 4.6.1.297 or greater	Voice dialing; screen zoom;Oratio screen reader; TTYsupport .Learn more about BlackBerry accessibility.	Yes	Yes	Yes	Yes	No	No	Oratio available on models from AT&T models (US) only.
BlackBerry Storm II	BlackBerry 5.x	Voice dialing; screen zoom;TTY support. Learn more about BlackBerry accessibility.	Yes	Yes	Yes	Yes	Yes	No	--
G1	Android	Voice dialing;text-to-speech support	Yes	Yes	Yes	Yes	No	No	See Eyes-Free Project for information onTalkback(screen reader),Kickback(haptic feedback) andSoundback(auditory cues).

iPhone (3G, 3G S)	OS X	Voice Control, VoiceOver screen reader, Zoom screen magnifier.Learn more about iPhone accessibility.	Yes	Yes	Yes	Yes	Yes	No	--
iPod Touch	OS X	Voice Control, VoiceOver screen reader, Zoom screen magnifier.Learn more about iPod touch accessibility.	No	Yes	Yes	Yes	Yes	No	Wireless device only
Jitterbug	Unknown	Voice dialing; large screen; oversized keys; voice dialing	Yes	Yes	No	No	No	No	n/a
Mobile Magnifier	• Windows Mobile 6 and higher • Symbian S60 3rd Edition or S60 5th Edition	Screen magnifier	n/a	n/a	n/a	n/a	n/a	n/a	Phones that support Mobile Magnifier
Mobile Speak	• Windows Mobile 6 and higher • Symbian S60 3rd Edition or S60 5th Edition	Screen reader	n/a	n/a	n/a	n/a	n/a	n/a	Phones that support Mobile Speak
Nuance TALKS&ZOOMS	Symbian S60	Text-to-speech and screen-magnifier software that works with contact	n/a	n/a	n/a	n/a	n/a	n/a	Phones that support Nuance TALKS&ZOOMS

		directories, caller ID, text messages, help files, Nokia web browser, others.							
Phone Monocle	n/a	Clip-on magnifier for cell phones.	n/a	n/a	n/a	n/a	n/a	n/a	Phones that are compatible with Phone Monocle
SlingPlayer Mobile	BlackBerry, iPhone, Windows Mobile, Palm, Symbian (also Windows and OS X)	Can transmit video with captions to compatible handheld devices.	n/a	n/a	No	Yes	Yes	Yes	Relays television signal from stationary unit to mobile devices.
Samsung Moment	Android	Voice dialing;text-to-speech support	Yes	Yes	Yes	Yes	Yes	Moment with mobile DTV available in early 2010	See Eyes-Free Project for information onTalkback(screen reader),Kickback(haptic feedback) andSoundback(auditory cues).
Talkback	Android	Screen reader	n/a	n/a	n/a	n/a	n/a	n/a	Pre-installed on some Android phones, includingMotorola Droidand Nexus One.

Examples of third party assistive technology applications

Application	Platform	Need Addressed/Problem Solved	Developer/Download link	Approx. Price
Mobile Accessibility	Android	Suite of applications that allow people who are blind or have low vision to use an Android phone in an intuitive, easy and simple way.	www.codefactory.es/en/products.asp?id=415	USD 89
Mobile Speak	Symbian and Windows Mobile	Text-to-speech as well as Braille device plugin support	www.codefactory.es/en/products.asp?id=318	Paid
Mobile Geo	Windows Mobile	Navigation aid for people with visual impairment (Separately licensed from Mobile Speak, but integrated and dependent on it)	www.codefactory.es/en/products.asp?id=336	
Mobile Magnifier	Symbian and Windows Mobile	Screen Magnifier	www.codefactory.es/en/products.asp?id=312	USD 89
Mobile DAISY	Symbian	DAISY format e-book reader	www.codefactory.es/en/products.asp?id=314	Paid
Oratio	Blackberry	Screen reader	www.humanware.com/en-usa/products/blindness/oratio_for_blackberry_smartphones/_details/id_131/oratio_for_blackberry_smartphones.html	USD 449
Nuance TALKS&ZOOMS	Symbian	Text-to-speech and Large-print for blind/ low-vision users	www.nuance.com/for-individuals/by-solution/talks-zooms/index.htm	USD 295
Color Identifier	iPhone	Color identifier for blind/low-vision users	www.greengar.com/apps/color-identifier/	USD 1.99
Dragon tools	iPad/ iPhone/ iPod Touch/ Blackberry	Voice recognition based applications for people with physical disabilities who have difficulty typing	www.nuance.com/for-business/by-industry/dragon/Accessibility/index.htm	Paid
Looktel	Windows Mobile	Object Identifier (Needs to be paired with a PC for processing power) for blind/ low-vision users	www.looktel.com/	USD 1.99
IDEAL Item Identifier	Android	Open Source Talking Barcode-Reader and Talking Barcode-Maker	www.apps4android.org/?p=1243	Free
Web Access Plugin	Android	Android Browser plugin for blind users	www.apps4android.org/?p=1238	Free
ClearCaptions	iPhone/ iPad/ iPod Touch	Near-real-time captions of telephone calls on Web browsers for the hearing impaired	www.clearcaptions.com/	Free
Teledroid	Android	Health monitoring application designed to provide individuals with print and other disabilities better access to health monitoring devices. Integrated with Google health.	http://code.google.com/p/teledroid/	Free

Figure 2: Examples of third parties assistive technology mobile applications