Accessible Transit Passenger Communications

Research and Recommendations

For Oregon State University: Katharine Hunter-Zaworski

For The Carl and Ruth Shapiro Family National Center for Accessible Media at WGBH:

Marcia Brooks, Madeleine Rothberg, Geoff Freed, and Larry Goldberg

Executive summary

With funding provided by the US Department of Education's National Institute of Disability and Rehabilitation Research (NIDRR), Oregon State University (OSU) and The Carl & Ruth Shapiro Family National Center for Accessible Media at WGBH (NCAM) researched accessibility gaps within communication technologies used in transportation hubs and identified opportunities for universal and accessible design considerations to enhance the usability of travel-related information for all travelers.

This report summarizes the results of phone interviews, a national online survey of transit industry professionals[1], online research, and industry outreach to review the status of passenger communications technologies, policies, and practices, and the awareness and adoption of accessibility standards and specifications within transit hubs.

Key findings

Fundamental to these findings is recognition that the explosive growth of social media and the rapidly expanding availability of transit data have vastly heightened travelers' expectations for the availability of timely and accurate transit-related communications, Web sites and mobile apps.

Though this research was originally focused on identifying gaps for accessible communications in transit industry standards, initial research revealed that *accessibility gaps are in the awareness of accessibility needs and the implementation of transit standards – not in the standards themselves*.

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[1] Survey report and related project research available at
http://ncam.wgbh.org/experience_learn/media_home_work/ncat

Therefore, this research identifies recommendations to advance the availability of accessible transit communications using the standards that are most commonly used now. Key opportunities for the transit industry include:

- Training: Improve communications staff's training in accessible web and mobile delivery of information.
- Delivery: Provide dual mode communications to the traveling public at all times (not just audio with no text, or text with no audio).
- Accessible apps: Require transit agency developers to create accessible mobile applications, or if agencies provide raw data to app developers, that the developers provide accessible apps.
- Quality: The disparity of quality control at different organizational levels is a critical issue that can ultimately impact traveler safety and well-being, and the transit industry has a responsibility and accountability to the traveling public to adhere to a commonly understood definition of what "quality" means, to include: accuracy and timeliness of transit-related information for travelers; and accessible user interfaces (including mapping).

Further research results and recommendations follow.

Project overview

The rapid growth and adoption of social media and the increased availability of transit data has vastly heightened travelers' expectations for the availability of timely and accurate transit-related communications, Web sites and mobile apps. This paper focuses on identifying opportunities within the transit industry to increase the availability of accessible travel-related communications by taking advantage of the ubiquitous data sources and the connectivity provided by travelers' mobile devices. Additionally, this paper summarizes this project's research and recommendations, which are the results of phone interviews, a national online survey of transit industry professionals, online research, and industry outreach to review the status of passenger communications technologies, policies, and practices, and the awareness and adoption of accessibility standards and specifications within transit hubs.

Research

Interviews

In July and August of 2010, NCAM project staff Madeleine Rothberg and Marcia Brooks conducted phone interviews with transit industry professionals and related standards experts, including leaders at: American Public Transit Association (APTA)[2]; The National Transit Institute, at Rutgers, The State University of New Jersey (NTI) [3]; the Rehabilitation Engineering Research Center on Accessible Public Transportation (RERC APT)[4]; and the Common Alerting

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[2] APTA: http://www.apta.com/Pages/default.aspx

[3] NTI: http://www.ntionline.com/

[4] RERC APT: http://www.rercapt.org/

Protocol (CAP) OASIS standard[5].

This series of conversations helped inform one of the project's key conclusions: that accessibility gaps are due to a lack of awareness of accessibility needs and implementation of transit standards – not in the standards themselves.

The interviews were also instrumental in informing how questions were structured in the project's national transit industry survey about standards awareness and the application of the standards.

This project's research revealed that accessibility gaps are in <u>awareness</u> of accessibility needs and <u>implementation</u> of transit standards – not in the standards themselves. The existing transit standards have what is most critically needed – the capability to store data in transformable formats -- but data must have the right interface, including presenting non-visual alternatives to maps. Maps are great ways to visualize data for some users, but impossible to use for others.

(For further results, see "National transit industry online survey results" section below.)

Transit industry mobile apps research

Since late 2010, NCAM has followed the development of transit-related applications ("apps") that provide travelers with information to aid their trips. In May 2012, NCAM published "Accessibility Review of Transit-Related

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[5] CAP: http://docs.oasis-open.org/emergency/cap/v1.2/CAP-v1.2-os.html

Applications"[6] which reviewed of a broad sampling of apps for iOS to determine their accessibility capabilities for people with sensory disabilities, including travelers with visual impairments who rely on the use of screen readers. At that time, about half of the apps tested were somewhat usable with a screen reader on iOS. (Support for accessibility on Android OS was too limited to warrant testing Android apps for accessibility in 2012.)

Additional review in Fall 2014 showed some improvement in app accessibility. For the most recent tests, project staff analyzed transit app accessibility in two key comparisons: transit-agency provided apps vs. third party apps, and iOS apps vs. Android apps.

iOS testing was carried out on an iPhone 5c and on an iPad retina, both using iOS 7.1.2 with VoiceOver screen reader software. Android testing was carried out on a Nexus 7 using Android 4.4.4 with TalkBack screen reader software.

Results suggest that apps provided by transit agencies are slightly more likely to be accessible to screen reader users. Android apps are far less accessible with TalkBack than iOS apps are with VoiceOver; this reflects in part a lower level of accessibility support in Android OS and less well-known techniques and tools for creating accessible apps. However, one of the transit agency apps was somewhat usable on Android, while the third party apps were not at all usable, often due to freezing when the screen reader was using, suggesting that with further attention Android apps could be made usable for blind users.

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[6] Reference "Accessibility Review of Transit-Related Applications", published by the Carl and Ruth Shapiro Family National Center for Accessible Information, and available at: http://ncam.wgbh.org/experience_learn/media_home_work/ncat

These results suggest that when transit agencies develop informational apps themselves or directly contract for their development, some emphasis on accessibility influences the quality of the apps. When third party developers create apps using the open data sources provided by transit agencies, results are poor.

It is difficult to reach the large community of app developers; many are creating free apps as a side project outside of an established job. These developers are probably less aware of accessibility needs and that is clear in the results of this review. Transit agencies which set out to create an app are working more carefully and may be aware of accessibility requirements in general for their agencies, resulting in somewhat more accessible apps for iOS and significantly more accessible Android apps.

As a result of this testing, the project recommends that transit agencies offer at least one transit information app over which they have direct control. They should ensure that this app is as accessible as possible on the platforms where it is offered. This should not preclude offering a public data stream that third party developers can use to create their own apps; innovation can arise from these open data policies. However, to ensure that their travelers with disabilities have equal access to transit information through mobile devices, transit agencies must take some responsibility for providing accessible apps.

National transit industry online survey results

Informed by research into transit industry standards and interviews within the transportation industry, OSU and NCAM developed a Web-based survey[7] for transit specialists involved in the development, delivery, maintenance or management of transit related communications. The Oregon State University Survey Research Center (OSU-SRC) conducted the survey from January 12, 2012 to March 27, 2012.

The survey was designed to measure gaps and barriers within communication technologies used in transportation and to identify opportunities for universal accessible design within transit industry communications standards. The survey was designed for transit industry professionals, and not for consumers.

Rapid shifts in the technology sector, as well as within the transit industry, have occurred throughout this funded period of research. Notably, when this survey was being developed, Google and Apple had not yet publicly pursued separate paths for the provision of mapping and transit information.

Key findings from the survey include:

- There is a lack of training in accessible web or mobile delivery for transit agency staff.
- Transit providers must be pushed to provide dual mode communications to the traveling public. (Often audio is provided but no text, and text with no audio).
- There are no requirements to force transit providers that provide raw data to app developers to require apps to be accessible.

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[7] "National Transit Communications Accessibility Survey Report", published by the Carl and Ruth Shapiro Family National Center for Accessible Media, and available at:
http://ncam.wgbh.org/experience_learn/media_home_work/ncat

- There is a lack of awareness that all mobile devices must be accessible.

- Many transit agencies are relying on 3rd party developers and don't check the accuracy or accessibility of the applications using their data.

Transit-related standards awareness and adoption

During the time that this research was carried out, the transit industry began making wide use of the General Transit Feed Specification (GTFS) created by Google. Prior to this, transit agencies used internal data standards, including the American Public Transportation Association's Transit Communications Interface Profiles (APTA/TCIP) to manage information. APTA/TCIP is a multi-faceted standard with applications in all phases of transportation management, but was not widely used for communication with travelers. GTFS, in contrast, is a lighter-weight data model, designed to inform travelers of transit schedules and for use in creating trip planning tools.

In August 2011, Google released GTFS-Realtime, which adds up-to-the-minute information on the location of trains and buses to the GTFS standard. Another similar service, NextBus, has been providing realtime bus information since 1998 to travelers in a growing number of cities. A third option for realtime data is Service Interface for Real Time Information (SIRI). Our survey found that, at the time of the survey in early 2012, of the 20 agencies surveyed, 3 were using GTFS-Realtime, 3 were using SIRI, and 8 were using NextBus.

Travelers have benefited from this huge growth in available data by using web and mobile apps created by transit agencies and by third party developers. But unless those applications and websites are accessible to people with disabilities, they will not share those benefits. The fragmentation in this area, with each city providing a different application and in some cases several independent applications, has made it difficult to track and improve the

accessibility of transit communications. As noted above, the mobile apps currently available vary widely in their accessibility.

Our survey results suggest the need for additional outreach and training for transit agency staff. We found that half of survey respondents were aware of accessibility standards for electronic information, showing a substantial gap in knowledge of this important area. With the widespread trend of releasing transit data for third-party developers to build apps (in our survey, 14 of 20 agencies provide links to third-party apps on their websites), the lack of requirements for those developers to ensure the quality and accessibility of their apps leaves a further gap in the information pathway. While all application developers would ideally be trained in accessible programming techniques, transit agencies may provide a way to begin encouraging them: use of the raw data provided by transit agencies could come with a requirement to ensure the accessibility of the apps produced. Agencies could provide links and publicity only for those apps that meet that requirement.

Accuracy of transit information in apps is another concern. All riders want accurate information, of course. But travelers with disabilities, who may have more difficulty reaching their transit stops and may be less able to tolerate extreme temperatures while waiting for transit, may be more seriously impacted by errors in travel information. Transit agencies should develop quality control protocols to be used in deciding which third-party apps they will publicize.

Because most agencies aren't developing their own apps (only 1 out of 20, in our survey), the 3rd party apps are often the only way consumers have mobile access to agency transit data – and lack of accurate, accessible information poses a risk, especially to those people with disabilities for whom waiting excessively for their vehicle may pose undue burden.

Encouraging more accessible transit applications

Purpose-built accessible apps

Creating accessible apps intentionally for users with disabilities is one approach to ensuring they have access to transit information. While "separate but equal" is not always a good solution, with freely available data streams of transit information, it is possible to create a useful tool for both users with disabilities and those without a disability.

Case study: Tiramisu

The need for accessible transit apps has led one research group, the Rehabilitation Engineering Research Center on Accessible Public Transportation (RERC-APT) at Carnegie Mellon University, to create their own app, Tiramisu Transit. Using data from their local transit provider as well as the University shuttle service, they built an app that relies on crowd-sourcing to provide realtime information. Each user who logs the trips they take adds more data to the collective set, allowing the app to become more useful over time. Tiramisu does not market itself exclusively to people with disabilities; it aims to create a tool so useful that it will be widely used and therefore have more value for every user, while being accessible to those using assistive technology. It was launched in 2011 and in early 2014 it is still adding users and expanding its reach to new transit systems.

Legislation as an influence on marketplace adoption of accessible technology and best practices

With the limited accessibility offered by current transit apps, it may be that some additional incentive is needed to encourage transit agencies to improve this situation. There is long-standing evidence that legislation is the surest way of

successfully influencing the marketplace to offer products and services for people with disabilities.

In 1990, Congress passed the Television Decoder Circuitry Act[8] as an amendment to the Communications Act of 1934. The law required the Federal Communications Commission (FCC) to develop rules that would result in all TV receivers with picture screens 13 inches or larger manufactured or imported for use in the United States have built-in decoder circuitry to display closed captions. Previously, closed caption users had to buy a separate set-top box (at around $250) and connect it to their TV sets. It is estimated that no more than 300,000 such boxes were ever sold, from 1980-1990.

While the consumer electronics industry initially opposed the Congressional mandate, once it became a unavoidable requirement, they embraced the new feature as their own, rebranding closed captioning as "CaptionVision" and promoting the service as beneficial not only for deaf and hard-of-hearing people, but also for people learning English as a second language and as a way to expose children to reading while watching TV. The slogan, "Your child's new reading teacher has arrived," headlined a major marketing campaign.

By the end of the first year of the phase-in of the new requirement (1993), more than 20 million TV sets had been sold with closed caption display capability, dramatically increasing the number of people who were able to experience closed captioning. Bars, health clubs, offices - all began to turn on the captions and turn off the volume, establishing a new mainstream market for a previously narrowly focused assistive technology. In 2000, the FCC amended its rules[9] to

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[8] The Television Decoder Circuitry Act: http://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-telecommunications-act-guidelines/background

[9] Amended rules of The Television Decoder Circuitry Act: http://transition.fcc.gov/Bureaus/Mass_Media/News_Releases/2000/nrmm0031.html

require closed captioning display capability in digital television receivers, to ensure the availability of closed captions in the transition from analog to digital broadcasting.

Legislation continues to influence the marketplace to the benefit of people with disabilities. In 2010, President Obama signed The Twenty-First Century Communications and Video Accessibility Act, which "*contains groundbreaking protections to enable people with disabilities to access broadband, digital and mobile innovations -- the emerging 21st century technologies for which the act is named*".[10]

Currently, there is no transit specific legislation that requires transit agencies to provide real time passenger information or that it be provided in accessible formats. Under the provisions of the Transportation services section of the ADA, transportation entities are required to make available to individuals with disabilities adequate information concerning transportation services. This obligation includes making adequate communications capacity available, through accessible formats and technology, to enable users to obtain information and scheduled service {ADA section 37.167 2.(f)}. The regulations do not address real time communication and information systems. In addition the USDOT is working to harmonize requirements for web accessibility across transportation modes. There are provisions under the revision to the Air Carrier Act for Web accessibility. It is anticipated that these provisions will be adopted by passenger rail and public transport entities as well.

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[10] The Twenty-First Century Communications and Video Accessibility Act:
http://www.fcc.gov/encyclopedia/twenty-first-century-communications-and-video-accessibility-act

It may be that future legislation or regulation can improve the accessibility of transit applications as it has improved the accessibility of other aspects of transit operations.

Recommendations

Quality: The disparity of quality control at different organizational levels is a critical issue that can ultimately impact traveler safety and well-being. The transit industry has a responsibility and accountability to the traveling public to adhere to a commonly understood definition of what "quality" means, to include accuracy and timeliness of transit-related information for travelers, and accessible user interfaces (including mapping). Transit agencies must consistently define who has responsibility and accountability for the specific definitions of quality – especially regarding the use of 3rd party apps and social media since the consumer reliance on the availability and integrity of travel information is at an all-time high. The lack of quality control at different levels can seriously impact travelers with disabilities and people who are highly dependent on accurate travel information.

Transit apps: Agencies must insist on having accessible mobile apps. It is the ultimate responsibility of the transit agencies to ensure mobile app accessibility whether they develop the apps in house, outsource development to a company they choose, or release data for public use.

Developers of mobile apps should ensure that all elements are accessible by a screen-reader, including the search field. For apps with maps:
- Information read aloud by a screen-reader should be in linear order.
- Provide all the information (e.g., routes, bus stops, etc.), so that access to maps is not a necessity for screen-reader users.
- Ensure that screen-readers will identify icons (e.g., bus stops).

- Ensure good color contrast so that interface elements and text are easy to see.
- If audio alerts are used, ensure there is a visual alert as well.

Legislation: While the impact of legislation to require the marketplace to provide more accessibility solutions for travelers with disabilities must not be underestimated, every proactive opportunity to inform and partner with device manufacturers and developers should be encouraged. Vendors who are informed about universal design considerations for all passengers can more readily and economically incorporate them into their product lines when the accessibility requirements are identified earlier on in the design phase. Agencies that hire vendors should insist on accessibility features as a matter of policy, regardless of existing or pending legislation.

Training: Make it explicit policy that any transit professional involved in communicating with the traveling public must be trained in accessible communications, to include: signage and videos in transportation hubs; and web/mobile delivery.

Staffing: It is critical to identify specific staff that are responsible for accessibility, and to ensure all staff are aware of policies on accessibility.

Conclusion

The project results highlight several key findings. The underlying architecture and related standards incorporate the elements that provide for accessible transit information. The world of social media has undergone a revolution since the project started. Transit agencies in general provide real time vehicle location data. The real time vehicle location data is in a text-based format. Many transit agencies make these data streams publicly available to third party application developers. In some cities and regions, there are transit agencies that also have

their own real time passenger information systems as well as third party applications. For many transit operations, the challenge is that there is a

disconnect between the transit agency and the end user and this creates problems in quality control and accuracy. The lack of oversight of the third party applications creates challenges for passengers with disabilities. Third party application developers use the real time vehicle location data and process it to provide next bus arrival information to the general public on a wide range of end user devices. Most of the transit information is provided in a graphical format on a hand held device such as a smart phone. Many of the third party developers provide the applications in an open source environment and are not bound by any contractual requirements. A consequence is that most of the applications do not consider the needs of users with disabilities.

Acknowledgements