The Bus Renaissance

RESEARCH PAYS OFF

Assessing the Impacts of Real-Time Transit Information

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Suggestions for Research Pays Off topics are welcome. Contact Stephen Maher, Transportation Research Board, Keck 486, 500 Fifth Street, NW, Washington, DC 20001 (202-334-2955; smaher@nas.edu).

To attract more riders, transit must offer high levels of service in frequency, travel time, and reliability. Transit agencies constantly work to improve reliability, but the cost is often substantial. Real-time transit information can improve perceived and actual wait time and rider satisfaction inexpensively—and even may increase ridership.

Problem

Transit agencies can improve service reliability by providing dedicated right-of-way and signal priority on routes, adding slack to schedules, applying other service planning approaches, and implementing vehicle holds and other control strategies. Although effective, these measures either yield only minor improvements or prove costly. An inexpensive solution is needed to combat transit users' perception that service is unreliable.

Solution

Unknown wait times present a difficulty for many transit riders—riders want to know when the transit vehicle actually will be arriving. By empowering riders with some degree of confidence about their trips, transit agencies can increase ridership and retain riders who have a choice of modes.

Several technology enhancements have made the provision of real-time transit information easier, less costly, and more effective for transit agencies:

◆ In 2000, the federal government deactivated the selective availability restrictions on GPS for civilian applications. This increased the usefulness and availability and decreased the cost of GPS devices. More transit agencies were able to equip their vehicles with automatic vehicle location systems.

◆ In 2005, Google and TriMet in Portland, Oregon, collaborated to standardize transit schedule data. The General Transit Feed Specification (GTFS) that emerged has enabled transit agencies to share their data, which can be used to populate Google's transit trip planner. This application has raised awareness and has sped adoption of the transit data standards. New standards, such as GTFS-Realtime and the Service Interface for Real-time Information, or SIRI, allow agencies to share real-time data feeds with developers.

◆ The ubiquity of smartphones throughout the United States has facilitated mobile access to information by the majority of transit riders, and third-party software developers are interested in creating applications. As more transit agencies release their data feeds in response to the push for open data, developers can gain access to transit data feeds from across the nation.

These technological advances catalyzed the development of OneBusAway, a mobile real-time transit information platform.[1]

Application

OneBusAway was developed in 2008 at the University of Washington. By 2011, more than 100,000 unique users in the greater Seattle region consulted OneBusAway each week on a range of platforms, including native applications on iPhone, Android, and Windows phones, as well as through a website, text messaging, a voice recognition system, and public displays in store windows.
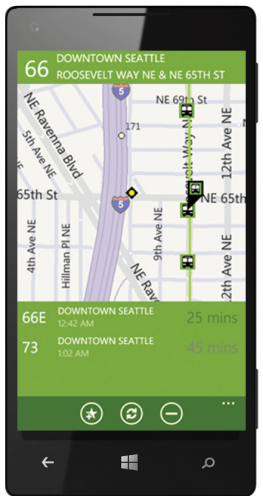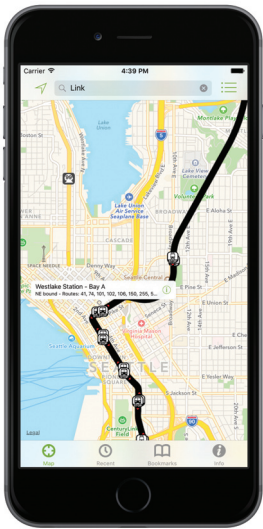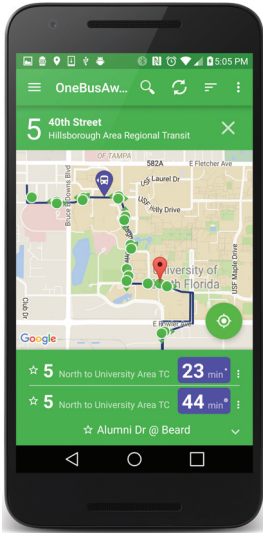
OneBusAway is an open-source system that allows developers, researchers, and transit agencies to adapt

A real-time bus and streetcar arrival kiosk in Seattle, Washington.

Photo: Seattle DOT

[1] http://onebusaway.org.

the code to their own systems and to build on the initial implementation. In 2013, improvements to the OneBusAway mobile apps allowed data from several regions to feed the apps, enabling deployment in several cities, including New York City; Tampa, Florida; Atlanta, Georgia; Washington, D.C.; and York, Ontario, Canada. Additional technology demonstrations have been implemented in Detroit, Michigan; Washington, D.C.; Boston, Massachusetts; and Lappeenranta, Finland.

Transit agencies have initiated some of the development; in other cases, local developers have sought to fill a gap in available rider information with the intention of supporting the application in the long term or attracting the interest of the local transit agency for adoption.

Benefits

The OneBusAway research project evaluated the effect of this informational tool on ridership levels and on rider perceptions. Surveys of OneBusAway users in Seattle in 2009 and 2012 found that 92 percent of riders reported increased or greatly increased satisfaction with public transportation, as well as an increased sense of safety, among other benefits.

Wait Times

Another study conducted in Seattle focused on users' perceived and actual wait times. The results showed that for riders without real-time information, the perceived wait time was much greater than the actual, measured wait time; but when real-time information was available, the respondents' perceptions were in line with reality. Moreover, the study observed that mobile real-time information users actually waited almost 2 minutes less than those who used traditional schedule information.

An evaluation of OneBusAway in Tampa in 2013 included an experiment—some bus riders received access to OneBusAway for three months. Changes in behavior were assessed with before and after web-based surveys. Analysis of "usual" wait times revealed a significantly larger decrease—nearly 2 minutes—for real-time transit information users compared with the wait times of the control group. In addition, real-time users reported significant decreases in levels of frustration when waiting.

Ridership

In some cases, real-time information may have contributed to an increase in transit ridership. The studies conducted in Seattle showed that riders reported an increase in trips, particularly in the off-peak periods when the transit system has additional capacity. Studies conducted in Tampa and Atlanta, in con-

trast, did not find a substantial change in transit travel associated with use of real-time information; the study methodologies in Tampa and Atlanta, however, did not consider completely new transit riders.

A recently published study evaluated bus ridership in New York City for three years during which real-time information gradually was made available on bus routes throughout the city. Econometric methods controlled for other factors that affect bus ridership levels, and the models suggested that real-time bus information was associated with a median increase of 1.7 percent in weekday route-level bus ridership.

Positive Outcomes

In summary, the OneBusAway project has enabled testing of the impacts of real-time transit information, and the findings have revealed positive outcomes: increased satisfaction, decreased wait times, and even increased ridership. As more transit agencies adopt open data policies and more transit riders use mobile devices, these benefits are likely to continue to accrue.

Resources

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OneBusAway smartphone displays on a variety of devices.