



U.S. Department of Transportation

# Accessible Transportation

## ITS Benefits, Costs, and Lessons Learned: 2018 Update Report

### Accessible Transportation

#### Highlights

- The USDOT ATTRI Program has funded six application development projects in three application areas; safe intersection crossing, wayfinding and navigation, and pre-trip concierge and virtualization.
- NIDILRR, a USDOT ATTRI partner, has awarded a seventh award in the robotics and automation technology area.
- Increased access to transportation options for people with disabilities helps not only people with disabilities but everyone as more people are able to gain access to jobs, healthcare, and participate in the economy.



### Introduction

*This factsheet is based on past evaluation data contained in the ITS Knowledge Resources database at: [www.itskrs.its.dot.gov](http://www.itskrs.its.dot.gov). The database is maintained by the U.S. DOT's ITS JPO Evaluation Program to support informed decision making regarding ITS investments by tracking the effectiveness of deployed ITS. The factsheet presents benefits, costs and lessons learned from past evaluations of ITS projects.*

In 2010, the U.S. Census reported that approximately 56.7 million people in the U.S. (18.7 percent of the U.S. population) had some type of disability. One study found that over 6 million people with disabilities have difficulties obtaining the transportation they need<sup>1</sup>; nearly one-third of people with disabilities reported having inadequate access to transportation.<sup>2</sup> Transportation is critical to enhancing access to education, jobs, healthcare, and independent living within communities. Individuals with disabilities currently suffer a 63 percent unemployment rate, with half of the household income and three times the poverty rate of people without disabilities.

A user needs assessment on transportation challenges faced by people with disabilities, veterans with disabilities, and older adults, conducted by the United States Department of Transportation's Accessible Transportation Technology Research Initiative (ATTRI), concluded that needs and barriers vary by sub-population and type of disability. The assessment identified mobility concerns as barriers to employment, recreational and retail opportunities, and other meaningful lifetime activities.<sup>3</sup> "Independent mobility" refers to the ability of an individual to travel to a destination without being accompanied by a family member or caregiver, regardless of functional ability.



The USDOT ATTRI program has awarded six projects for application development in the four application areas defined by the program. The Federal Transit Administration and Intelligent Transportation Systems Joint Program Office (ITS JPO) are jointly funding work in the Smart Wayfinding and Navigation, Pre-trip Concierge and Virtualization, and Smart Intersection Crossing applications areas. The USDOT is collaborating with the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR) to fund the Robotics and Automation application area. Below are the awarded projects:

## Wayfinding and Navigation:

- City College of New York – Smart Cane for Assistive Navigation (SCAN), a wayfinding solution for those with low vision integrated with a smart phone application
- AbleLink – An open wayfinding media standard and related infrastructure to create geographically-specific, cloud-based libraries of routes in metropolitan or rural areas
- Pathways Solutions – A wayfinding tool for wheelchair users and people with visual impairment that guides users along routes tailored to their preferences
- TRX Systems – A smart wayfinding and navigation system to obtain real-time location, en-route assistance, and situational awareness.

## Pre-Trip Concierge and Virtualization:

- AbleLink – A suite of assessment, self-directed learning, and trip execution technologies to support pre-trip planning for individuals with cognitive disabilities

## Safe Intersection Crossing:

- Carnegie Mellon University – A tool to connect pedestrians with disabilities to the traffic signal systems infrastructure (and nearby connected vehicles and infrastructure) and create situational awareness to improve the safety of intersection crossing and increase independent mobility.

## Robotics and Automation

- Carnegie Mellon University – This project researches and develops seamless transportation assistance from cloud-based autonomy and shared robots located in and around transportation hubs.

As the ATTRI projects develop their technologies and provide demonstrations, the USDOT will perform detailed evaluations for each project and make the evaluation results available in the ITS Knowledge Resources database.

While these technologies are currently in the development stage, the ITS Knowledge Resources databases contain several examples of the application of advanced technology to improve mobility of people with disabilities. Many of these transportation projects are focused on providing information in different formats (audio, visual and haptic), as well as using shared used mobility solutions enabled by smartphone technology to increase access to paratransit. Finally, while still in the development phase, the US Army is piloting semi-autonomous vehicles to address mobility needs of veterans with disabilities. This research has promise to fulfil first mile last mile needs of all travelers, especially those with disabilities.

## Benefits

The ITS Knowledge resource database contains several examples of successful accessibility-enhancing deployments. Located in Williamsport, PA, River Valley Transit (RVT) provides real-time customer information at its transit center. River Valley Transit uses a combination of automatic vehicle location (AVL) and mobile data terminals (MDT) technology to provide real-time in-terminal customer information. The Traveler Information System (TIS) informs customers both visually and audibly as to which of the 10 loading bays buses will arrive at and depart from. It also gives customers a 20-second notification before buses depart on their next trip. The system even notifies drivers when they have pulled into the wrong bus bay.

The successful implementation of the TIS demonstrated a number of benefits for customers. The transit agency increased accessibility for persons with disabilities including to the customer information systems that include visual and audio announcements are especially helpful to people with disabilities. In addition to these technology-specific benefits, the research team identified a number of benefits.

- Increased community confidence – ITS deployments have the potential to increase community confidence in the agency's ability to operate an efficient, effective transportation system.
- Potential for increased ridership and revenue – ITS increases the attractiveness of the transit service, which could potentially increase ridership and farebox revenues.

# Case Study – RideKC Freedom On-Demand (Kansas City, MO) [2018-01244](#)

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In May 2017, the Kansas City Area Transportation Authority (KCATA) rolled out its app-based public transit service called RideKC Freedom On-Demand. The one-year pilot project enabled riders to use a cellphone app to book taxi rides through private taxi companies any day, at any time without reserving a trip 24 hours ahead of time. Customers had the option of using their iPhone or Android smartphones to download an app to summon the taxis. They could then use the smartphone to track their rides in real-time. Customer also had the option to book a taxi by telephone.

**“We are seeing some customers move away from using traditional paratransit services in favor of the new on-demand option.” – Tyler Means, KCATA**

The cost for riders who qualify under the American with Disabilities Act (ADA) was \$3 for the first eight miles and \$2 for each additional mile. The cost for the general public was \$10 for the first five miles and \$2 for each additional mile. A portion of regularly priced fares on non-ADA trips was returned to KCATA to reinvest in transit service.

A comparison of Freedom On-Demand and traditional paratransit is shown below.<sup>4</sup>

**Table 2: Comparison of Freedom On-Demand and Traditional Paratransit**

Freedom On-Demand	Freedom (Previously Share-A-Fare)
No advance reservation required	Schedule at least 24 hours in advance
Curb-to-curb service	Door-to-door service
To book a trip: use app or call 816.842.9070	To book a trip: call 816.842.9070
Pay with cash, credit or debit card, or through the app	Pay cash
ADA: \$3 for the first 8 miles & \$2 each mile after Ages 65+: \$5 for the first 8 miles & \$2 each mile after	ADA \$3 per trip
Up to 4 trips per day	Unlimited daily trips
Book a trip for a friend or family member	Book a trip for a friend or family member
Up to three guests	No guests



Source: RideKC

After five months, KCATA recorded more than 15,500 trips on RideKC Freedom On-Demand. The new service cost \$15.80 a trip compared to the traditional paratransit trip which cost \$27.13. In the five months since launch, RideKC On-Demand saved the Authority about \$166,000.

KCATA surveyed 300 Freedom On-demand users, and 75 percent to 80 percent viewed the service favorably.

# Case Study – Applied Robotics for Installation and base Operations (ARIBO)

The ARIBO program is run by the U.S. Army Tank Automotive Research Development and Engineering Center (TARDEC) with the objective to coordinate development, investment, and operational use to accelerate fielding automated technologies. ARIBO seeks to improve the safety and efficiency of vehicles on roadways and fully understand the most advantageous and cost-effective applications that will accelerate the widespread adoption of (semi)autonomous systems. The ATTRI program has been in partnership with the ARIBO program for several years to affordably leverage federal investments in automated ground systems for common goals.

ARIBO is conducting a series of pilot projects specifically focused on personal mobility for veterans with disabilities. Users are continuously interacting with the technologies, identifying improvements and discovering new uses at the same time they are becoming more comfortable with the technology. Throughout this agile feedback loop, valuable data is being collected documenting operational, maintenance, and reliability factors which, in turn, improve the veracity of the business case and help target future system improvements. Users come to understand the technology, its capabilities, and its potential. Developers come to understand the real uses and required tweaks to the systems, their real costs, and their real benefits.<sup>6</sup>

ARIBO has three primary strategic objectives:

1. Socialize users and non-users with automated systems
2. Identify operational issues and help with development of mitigation strategies to increase use of automated systems
3. Generate empirical data (e.g. performance, reliability, maintenance, etc.)

Currently, ARIBO is piloting its Autonomous Warrior Transport On-base (AWTO) project that is addressing the real-world needs of the Warrior Transition Battalion (WTB) at Fort Bragg, NC. The soldiers in this battalion, some of whom have mobility difficulties, often require transportation assistance from the barracks to the Womack Army Medical Center (WAMC). TARDEC is utilizing robotic technology to provide an unmanned transport system and reservation/reminder system for these soldiers and their caretakers. The AWTO transportation system is an on-demand service, where users can request a ride from their mobile phone or on-site kiosks. The shuttle transports participants over a roughly one square mile area with five pickup/drop-off locations.<sup>5</sup> ARIBO expects the automated shuttles to save \$20 million over the next seven years based on the reduction in vehicles the Army would need to maintain and operate.<sup>7</sup>



## References

[1] U.S. DOT Bureau of Transportation Statistics, Issue Brief: Transportation Difficulties Keep Over Half a Million Disabled at Home, 2003

[2] National Organization on Disability, N.O.D./Harris Survey of Americans with Disabilities, 2000. Available at: <http://www.nod.org/content.cfm?id=798>

[3] Accessible Transportation Technologies Research Initiative (ATTRI), User Needs Assessment Report, U.S.DOT, Final Report — March 2016, FHWA-JPO-16-354. <http://ntl.bts.gov/lib/60000/60100/60128/FHWA-JPO-16-354.pdf>

[4] RideKC Freedom On-Demand, 2018. <http://ridekc.org/mobility-services/ridekc-freedom-ondemand>

[5] Applied Robotics for Installation and Base Operations (ARIBO), Robotic Research, 2018. <https://www.roboticresearch.com/programs/aribo/>

[6] ARIBO Overview Presentation, U.S. Army. February 23, 2016. [https://www.army.mil/article/162818/aribo\\_overview\\_presentation](https://www.army.mil/article/162818/aribo_overview_presentation)

[7] ARIBO: Overview. Straub, Edward. January, 2016. <https://www.army.mil/e2/c/downloads/424379.pdf>

All other data referenced is available through the ITS Knowledge Resources Database, which can be found at <http://www.itsknowledgeresources.its.dot.gov/>.