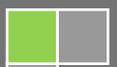




# Module 17: Accessible Transportation Technologies Research Initiative (ATTRI)

## Table of Contents

Module Description .....	2
Introduction/Purpose.....	2
Reference to Other Standards .....	5
Case Studies .....	6
Glossary .....	7
References .....	8
Study Questions .....	8
Icon Guide.....	9



## 1. Module Description

This module provides an overview of the Accessible Transportation Technologies Research Initiative (ATTRI). It will provide the background and scope of the ATTRI and specific activities. The module will discuss the five technology focus areas of the initiative and the four application areas selected for prototype development. Discussion will include the ITS standards relevant to the four application areas. Transit agencies engaged or considering use of technologies to serve mobility needs of people with disabilities, veterans with disabilities and older adults will benefit from the information provided by this module.

## 2. Introduction/Purpose

ATTRI is a joint U.S. Department of Transportation (USDOT) initiative, co-led by the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), with support from the Intelligent Transportation Systems (ITS) Joint Program Office (JPO) and other Federal partners. ATTRI is conducting research into the use of ITS and other advanced technologies to improve the mobility of travelers with disabilities. ATTRI will enhance the capability of travelers to reliably and safely execute independent travel. ATTRI research focuses on the needs of three stakeholder groups: people with disabilities, veterans with disabilities, and older adults.

ATTRI leverages recent advances in vehicle, infrastructure, and pedestrian-based technologies, as well as accessible data, mobile computing, robotics, artificial intelligence, object detection, and navigation. The technology is enabled by wireless communications that connect travelers and their mobile devices; vehicles; and infrastructure. The technologies used by ATTRI provide almost ubiquitous access to wealth of Realtime situational data sources, including data specific to transportation, municipalities, point of interest, crowd-sourced information, and accessibility data. Five (5) technology areas have emerged as ATTRI focus areas: wayfinding and navigation, assistive technologies, automation and robotics, data integration, and enhanced human service transportation.

The following discussion provides further background on worldwide efforts relating to persons with disabilities and their transportation issues.

The user needs among persons with disabilities, Veterans with disabilities, and older adults vary greatly and are individualistic in nature. Nevertheless, there are commonalities among these population segments, which are also recognized and incorporated into those “best practices” that have been adopted by the transit industry in an attempt to meet those needs. These best practices can be found among transit agencies in the U.S. and throughout the world. These practices were launched in the U.S. by the passage of the Americans with Disabilities Act (ADA) in 1990, and other countries have adopted similar standards and conventions to enable equal opportunities for people with disabilities. In particular, The United Nations (UN) adopted the following guidelines and standards:



- World Programme of Action Concerning Disabled Persons, adopted in 1981
- Standard Rules on the Equalization of Opportunities for Persons with Disabilities, adopted in 1993
- Declaration on the Rights of Disabled Persons, adopted in 1995
- Convention on the Rights of People with Disabilities (CRPD), adopted 2006.

The CRPD is the first legally binding instrument with comprehensive protections of the rights of persons with disabilities. It not only clarifies that people with disabilities should not be discriminated against, it also lays out steps that must be taken to create an enabling environment for people with disabilities to experience equity in society.

In more recent history, 20 European organizations united to establish the first Mobility as a Service (MaaS) Alliance (October 2015). This new initiative will work towards a common approach to MaaS through public and private stakeholder collaboration, providing the basis for the economy of scale needed for successful implementation in Europe. MaaS is a mobility distribution model that services a customer's transportation needs over a single interface by a service provider. In addition to the MaaS Alliance, the European Congress has developed another program that serves as an information system to assist in the travel and transportation of individuals with disabilities and older adults. The Transport Using Technologies Leads to Economic Efficiency (TURTLE) Program provides real-time transportation service information including location of the service, route information and the physical accessibility of the mode of transportation to any traveler, with or without a disability. In Japan, a cross-ministerial Strategic Innovation Promotion Program (SIP) was established in June 2013 followed by the Automated Driving for Universal Services (ADUS) project in 2015. Other Asian countries have followed suit, most notably in Singapore with the 2014 initiation of the Autonomous Vehicle Initiative (SAVI).

In 2013, the Transit Cooperative Research Program (TCRP) developed a Strategy Guide[3] that offers guidance to transit agencies to fulfill the primary goals set out by the Americans with Disabilities Act of 1990 (ADA). The strategies suggested include:

- Improved access to bus stops for all passengers;
- Marketing, public information, and travel training for people with disabilities;
- Fare incentives for using fixed-route transit rather than complementary paratransit;
- More inclusive transit service designs for all riders; and
- ADA paratransit eligibility determination.

To complement the initiatives taken by government agencies and transit authorities, many research centers have been actively investigating ways of improving safety and convenience of transportation for people with disabilities through integrated applications of different disciplines including: ITS, robotics, human factors, ergonomics, rehabilitation, human-computer interaction, ubiquitous computing and others. As an example, the research group of Dr. Aaron Steinfeld in the Rehabilitation Engineering Research Center on Accessible Public Transportation, within the Robotics Institute at Carnegie Mellon University, is an example of the initiatives taken by institutions for investigating the problems of and



solutions to the transportation needs of people with disabilities. Dr. Steinfeld and his associates have been working on examining the accessibility of urban transportation system by people with special needs and developing assisting-robots for people with disabilities. In this regard, the research group has conducted numerous projects and published articles related to mobility of persons with disabilities and their work includes: development of a citizen science (crowd-source) method as a tool to improve and promote public transit accessibility and engage passengers with disabilities in the public transit system; provision of a set of design guidelines for developing assistive technology targeting visually impaired riders; design of a relatively inexpensive Electronic Orientation Aids (EOA) for vision impaired individuals; development a device, known as “NavPal”, that combines a variety of technologies including robots, crowdsourcing, advanced path-planning and multi-modal interfaces to support safe and independent navigation by visually impaired people; and also examination of the first impression of human-robot interaction and how different people (e.g., caregivers and sighted experts) would describe an assistive robot to a blind or visually impaired person.

In December 2015, the European Commission (EC), which is the independent executive arm of the European Union (EU), drafted a proposal for an Accessibility Act. The European Accessibility Act (EAA) proposes to make products and services more accessible to people with disabilities by removing barriers created by divergent legislation. The EAA will cover the several services and products, the following are related to ATTRI:

- Computers and operating systems;
- ATMs, ticketing and check-in machines;
- Telephones and smartphones;
- TV equipment related to digital television services, and

Finally, one of the major activities of the ATTRI project was a set of user need webinars. Below are some key points from the webinars.

External Factors deal with barriers where the underlying factors are elements that are influenced by the decisions of the regional planning agencies. These factors include variables such as headways and schedules based on the demand, service area, etc. Such factors typically function as proxies for larger issues that affect planning, such as population and employment density, capital improvement programs (CIPs), transportation improvement programs (TIPs), and statewide transportation improvement programs (STIPs). External factors also include planning and deployment efforts that would require collaboration and consensus of transportation and transit agencies in the region, regional agencies such as Metropolitan Planning Agencies (MPOs), as well as other interest groups. Standardization of accessibility features and technologies, integration of data among multiple agencies, etc. are examples of such efforts that would require regional collaboration. Several best practices from CTAA studies on public transit and older adults included:



- Utilize coordination and integration software, which coordinates transportation among multiple agencies;
- Use computer-aided dispatch (CAD) combined with an automatic vehicle location (AVL) system to coordinate passenger trips and transfers;
- Use of vehicles with global positioning system (GPS) to transmit vehicle locations in real-time;
- Incorporating inclusive and accessibility planning strategies for accessibility in local and regional transportation plans including:
  - Infrastructure (e.g., sidewalks) and transportation options to essential services;
  - Planning for rural populations, and
  - Appropriate signalization and traffic control devices (e.g., increased timing for pedestrian crossing, more “pronounced” road markings, and larger signage);
- Provide transportation outreach and education, such as travel training programs for older adult passengers on transit services available use those services;
- Provide awareness of existing Federal, state, and local grant programs available for transit agencies to access and utilize existing resources strategically, and
- Provide mobility management services, which include person-centered counseling on transportation alternatives to driving such as one-call, or one-click services.

### 3. Reference to Other Standards

Some of the Standards referenced in the Module Presentation were:

TCIP - Transit Communication Interface Profile. APTA standard for Transit ITS.

<http://www.aptatcip.com/>

- The following modules which discuss TCIP are found at :
  - [https://www.pcb.its.dot.gov/stds\\_modules\\_transit.aspx](https://www.pcb.its.dot.gov/stds_modules_transit.aspx)
  - MODULE 3 Transit Communications Interface Profiles (TCIP), Part 1 of 2: Introduction to the Standard and Transit Architectures
  - MODULE 4 Transit Communications Interface Profiles (TCIP), Part 2 of 2: Structure and Elements of TCIP—Accessing TCIP via TIRCE and TCIP Tools

TMDD- Traffic Management Data Dictionary. ITE/AASHTO standard for Traffic Management Centers

- The following modules which discuss TMDD are found at :
  - [https://www.pcb.its.dot.gov/stds\\_modules.aspx](https://www.pcb.its.dot.gov/stds_modules.aspx)
  - MODULE 12 Understanding User Needs For Traffic Management Systems Based On TMDD v3 Standard
  - MODULE 16 Specifying Requirements For Traffic Management Systems Based On TMDD v03 Standard
  - MODULE 30 Applying Your Test Plan To The TMDD Standard



GTFS – General Transit Feed Specification. Static transit schedule data.

<https://developers.google.com/transit/gtfs/>

- Transit Standards PCB Module 14 Part 1 covers GTFS in much greater detail.

GTFS-realtime- Real time transit information. <https://developers.google.com/transit/gtfs-realtime/>

- Transit Standards PCB Module 14 Part 2 covers GTFS-realtime in much greater detail.

SIRI- Service Interface for Real Time Information. CEN technical Specification.

<http://user47094.vs.easily.co.uk/siri/>

- Transit Standards PCB Module 7: *Traveler Information Standards, Part 2 of 2* covers additional details about deploying SIRI

ISO 9241-900 series Ergonomics of human-system interaction – Tactile and haptic interactions

SAE J2735 Dedicated Short Range Communications (DSRC) Message Set Dictionary

SAE J2945 Dedicated Short Range Communication (DSRC) Common Performance Requirements

- The following module which discusses SAE 2735 and J945 are found at:

[https://www.pcb.its.dot.gov/stds\\_modules\\_transit.aspx](https://www.pcb.its.dot.gov/stds_modules_transit.aspx)

- MODULE 11 Transit and the Connected Vehicle Environment/Emerging Technologies, Applications, and Future Platforms

NTCIP 1202: NTCIP Object Definitions for ASC.

<http://www.ntcip.com/library/standards/default.asp?documents=yes&qreport=no&standard=1202>

Wayfindr: Open Standard for audio based navigation

<https://www.wayfindr.net/>

## 4. Case Studies

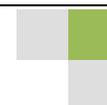
There have not been many case studies done, but one old case study Accessibility of Automated Fare Vending and Collection for Customers with Disabilities from 1998 is relevant and can be found at the following link:

<http://www.tcrponline.org/PDFDocuments/TCRP%20RRD%2032.pdf>



## 5. Glossary

Term	Definition
ASC	Actuated Signal Controller
AASHTO	American Association of State Highway Transportation Officials
ATTRI	Accessible Transportation Technologies Research Initiative
BAA	Broad Area Announcement
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GTFS	General Transit Feed Specification. This is a specification for creating static schedule data.
IEEE	Institute of Electronic and Electrical Engineers
ITS	Intelligent Transportation System
ISO	International Organization for Standardization
JPO	Joint Program Office
NIDILRR	National Institute on Disability, Independent Living, and Rehabilitation Research
NTCIP	National Transportation Communications for Intelligent Transportation System (ITS) Protocol
ORAV	On-Road Automated Vehicle Systems
RLSB	Royal London Society for Blind People
SAE	Society of Automotive Engineers
SAV	Shared Autonomous Vehicles
SIRI	Service Interface for Real Time Information. CEN technical Specification
TCIP	Transit Communication Interface Profile



Term	Definition
TCRP	Transit Cooperative Research Program
TMDD	Traffic Management Data Dictionary

## 6. References

There are many references relating to the ATTRI Program. The list below provides a few key ones used in the development of the module. The best place to access the full set of is the USDOT’s ATTRI website which can be found at: [http://www.its.dot.gov/research\\_archives/attri/index.htm](http://www.its.dot.gov/research_archives/attri/index.htm)

The following are two key TCRP reports that are relevant to ATTRI:

1. TCRP Synthesis 115 "Open Data: Challenges and Opportunities for Transit Agencies -- a Synthesis of Transit Practice."
2. TCRP Web-Only Document 62: "Standardizing Data for Mobility Management"

**Some of the key presentations that describe ATTRI are:**

[http://www.its.dot.gov/research\\_archives/attri/pdf/ATTRI\\_SxSW.pdf](http://www.its.dot.gov/research_archives/attri/pdf/ATTRI_SxSW.pdf)

[http://www.its.dot.gov/research\\_archives/attri/pdf/16TRB\\_ATTRI.pdf](http://www.its.dot.gov/research_archives/attri/pdf/16TRB_ATTRI.pdf)

[http://www.its.dot.gov/research\\_archives/attri/attri\\_appworkshop.htm](http://www.its.dot.gov/research_archives/attri/attri_appworkshop.htm)

## 7. Study Questions

The quiz/poll questions and answer choices as presented in the PowerPoint slide are included here to allow students to either follow along with the recording or refer to the quiz at a later date.

1. Which one is NOT a key population meant to be served by ATTRI?
  - a) Older Adults
  - b) Children
  - c) Persons with Disabilities
  - d) Veterans with Disabilities

2. Which area was NOT identified as one of the ATTRI Technology Areas?



- a) Wayfinding and Navigation Solutions
  - b) Integrated payment
  - c) Automation and Robotics
  - d) Data Integration
3. Which of the following standards, relevant to ATTRI is NOT a formal standard?
- a) Google GTFS
  - b) APTA TCIP
  - c) CEN SIRI
  - d) SAE J2735

## 8. Icon Guide

The following icons are used throughout the module to visually indicate the corresponding learning concept listed out below, and/or to highlight a specific point in the training material.

- 1) Background information:** General knowledge that is available elsewhere and is outside the module being presented. This will be used primarily in the beginning of slide set when reviewing information readers are expected to already know.



- 2) Refer to Student Supplement:** Items or information that are further explained/detailed in the Student Supplement.

