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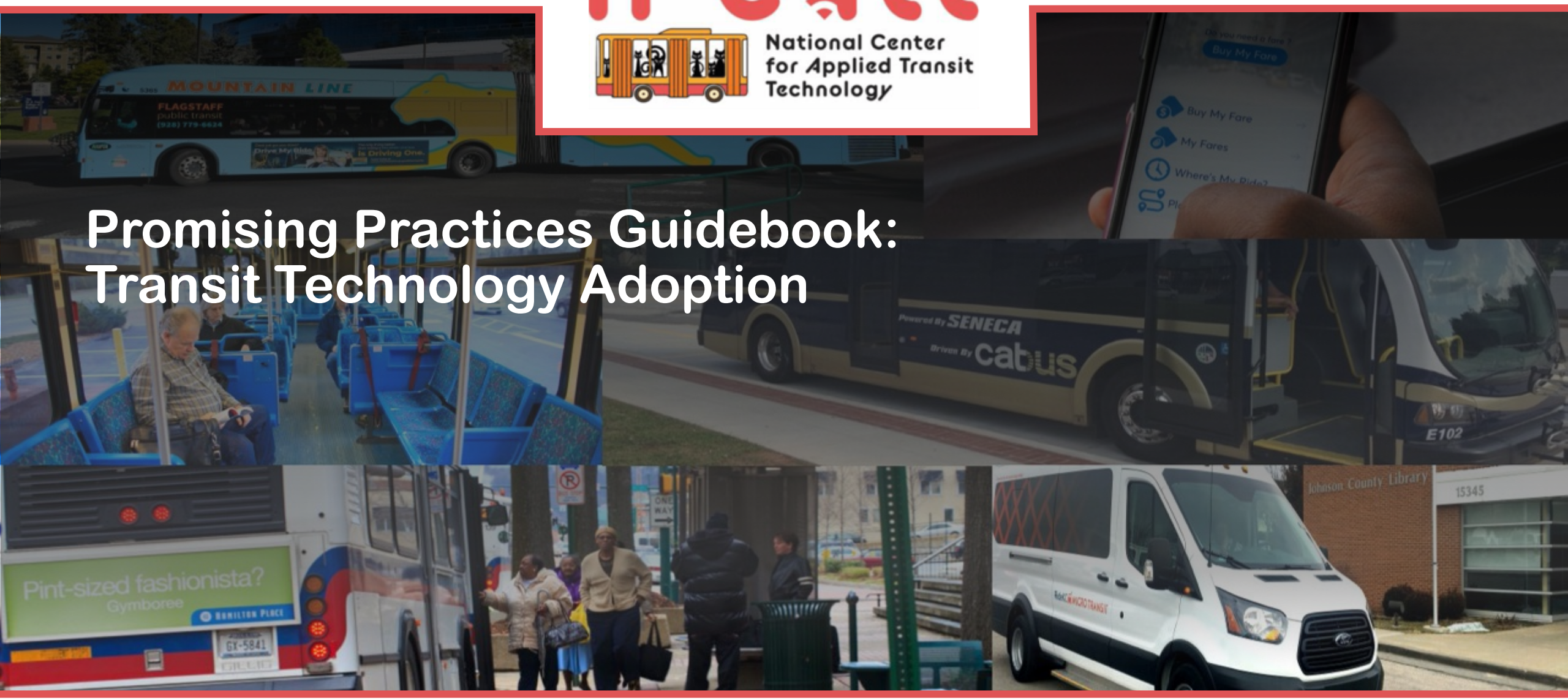
National Center for Applied Transit Technology



Promising Practices Guidebook: Transit Technology Adoption

Contents

What is the Promising Practices Guidebook?

- Many **technology-based innovations** in transportation have been largely restricted to large-urban systems or dense urban areas.
- The Promising Practices Guidebook: Transit Technology Adoption is intended to be a resource to assist **small-urban**, **rural**, and **tribal transit** agencies in **understanding**, **selecting**, and otherwise **planning to incorporate new technology** into service.

A "Promising Practice" has worked within at least one organization and shows promise during its early stages for becoming a recommended practice with long term sustainable impact.

Types of Promising Practices

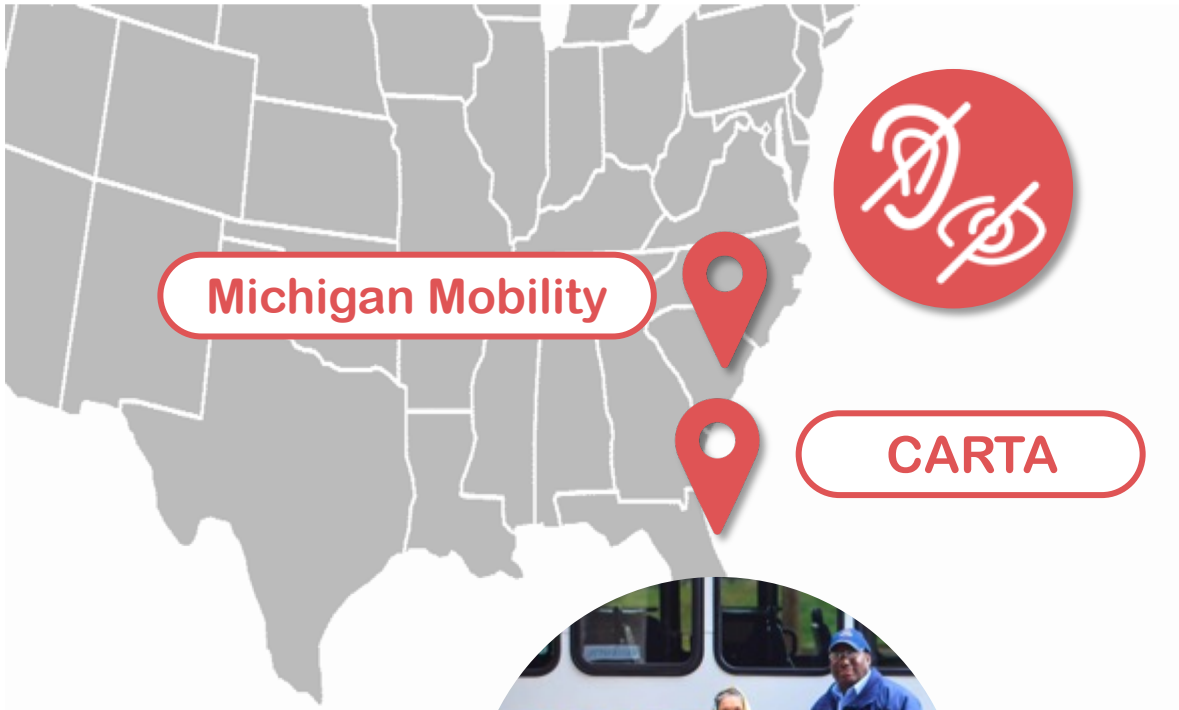
- Accessibility
- Computer-Aided Dispatch and Automatic Vehicle Location
- Alternative Fuels
- Fare Payment
- Asset Management
- Microtransit
- Passenger Information and General Transit Feed Specification
- Mobility Hubs

Promising Practices

- The Guidebook profiles **ten promising practices** across North America
- Profiles include not only **tribal**, **rural**, and **small-urban** transit systems, but also practices at **large-urban** contexts with potential for replication in smaller contexts

Accessibility

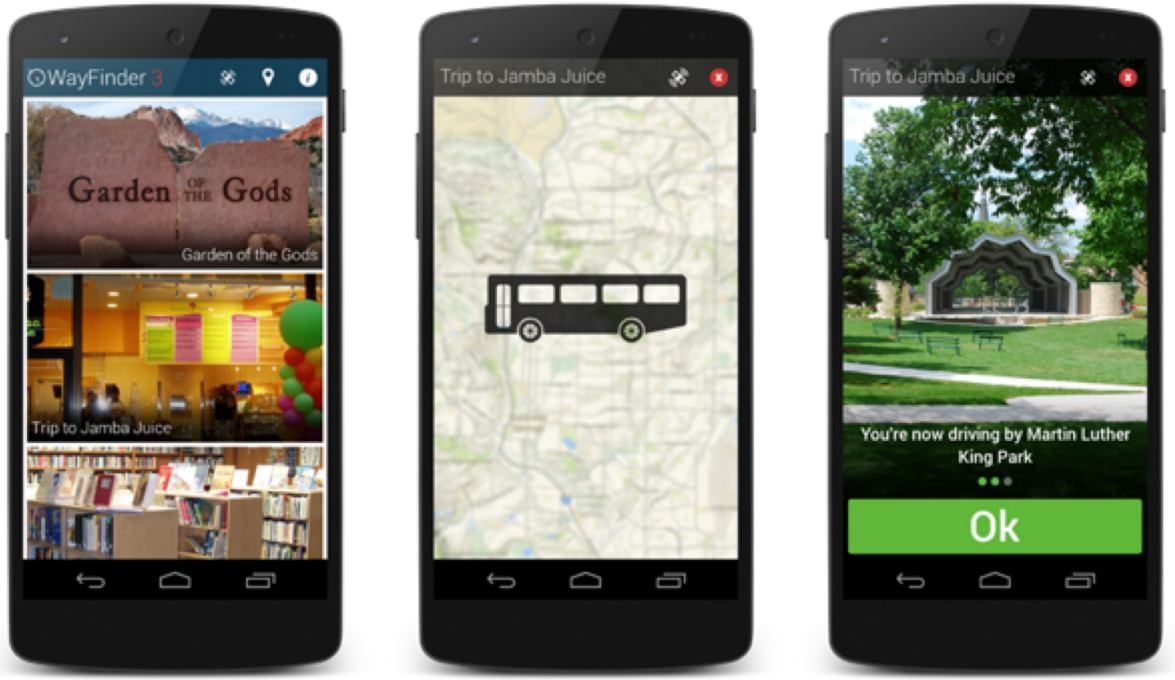
- Accessible transit options impact **many groups of riders**, each with their own unique needs that may necessitate different types of accommodations.
- The **transit industry can harness technology to improve access, ease of use, and inclusion** for these populations.



CARTA's WayFinder SMART Travel System

PROMISING PRACTICE: A CUSTOMIZABLE APP WITH VISUAL CUES AND RECORDED AUDIO DIRECTIONS TO HELP INDIVIDUALS WITH INTELLECTUAL DISABILITIES TRAVEL.

- CARTA, the Tennessee Department of Intellectual and Developmental Disabilities (DIDD), the City of Chattanooga, the non-profit Orange Grove Center, and AbleLink Smart Living Technologies, LLC, formed a public-private partnership to help individuals with intellectual disabilities navigate public transit independently.



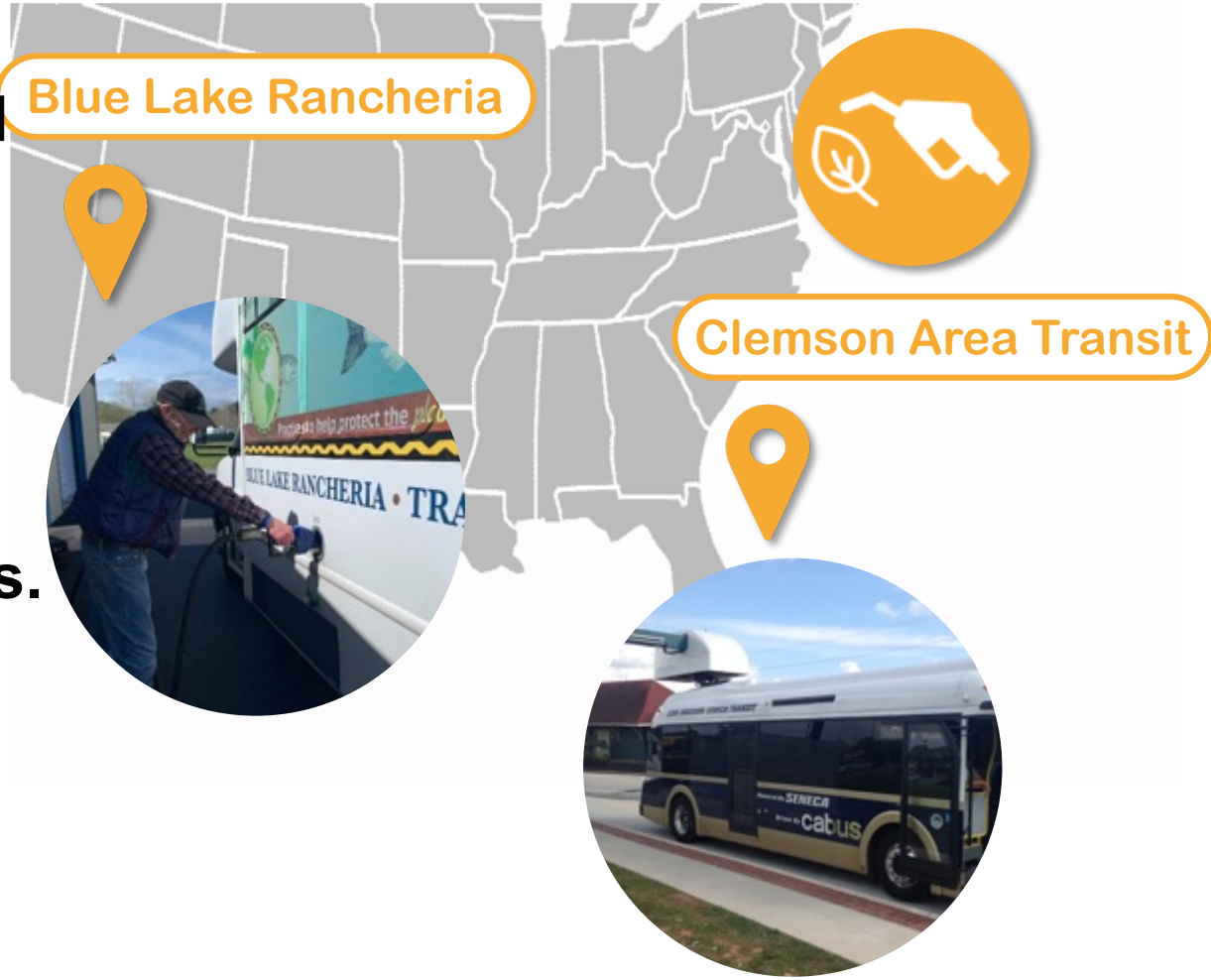
Michigan Ride Paratransit: Improving Paratransit On-Demand Booking Experience

PROMISING PRACTICE: Web-based booking and trip management platform to create a "one click" experience for users of the three public transportation systems that incorporates technology make it easy for the visually- and hearing- impaired to access services.

- After receiving a Michigan Mobility Challenge Grant, TheRide selected Feonix Mobility Rising to develop the Connect app, which helps riders with visual and hearing impairments navigate public transit using What3Words.

Alternative Fuels

- Interest in alternative fuel options such as **electricity, biofuel, hydrogen, and natural gas** is increasing.
- Adoption of alternative fuels can contribute to helping to meet goals to **reduce energy consumption and decrease greenhouse gas emissions.**
- Electricity and biofuels have **reduced fuel costs** for public transportation agencies.



Blue Lake Rancheria Transit System Waste Oil to Fuel

- California's Blue Lake Rancheria Transit System constructed a biodiesel conversion apparatus that takes waste cooking oil from the Tribe's hotel and casino kitchens and converts it into biodiesel.
- Locally-produced biodiesel has been in use by the system since 2015.

PROMISING PRACTICE: INNOVATIVE USE OFCONVERSION OF ON-SITE WASTE OIL TO FUEL PROGRAM DEVELOPED THROUGH UNIVERSITY PARTNERSHIP

Clemson Area Transit - Electric Bus Fleet

- In 2014, CATbus started operating electric buses.
- In 2017, CATbus added an additional 10 Proterra buses to its electric fleet, which brings the total **electric fleet for CATbus** to **50 percent of its total bus fleet**.

CATBUS ELECTRIC BUS FLEET REPRESENTS HALF OF ITS ENTIRE FLEET SHOWING SUBSTANTIAL OPERATING SAVINGS

Asset Management

- Asset management software allow staff record asset condition information and repair needs through mobile applications that allow agencies to **prioritize and optimize repair and maintenance operations.**
- Emerging Internet-of-Things solutions incorporate the **use of sensors and predictive analytics** to monitor asset condition

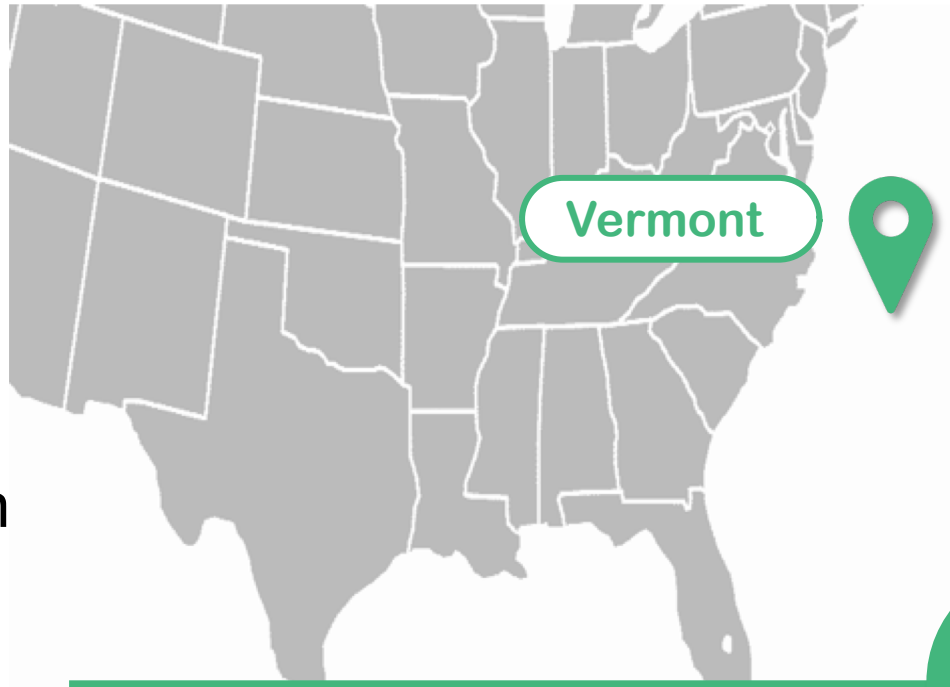
SHIFTING WORK ORDERS FROM A PAPER-BASED TO A SMARTPHONE APP AND CLOUD-BASED SYSTEM

Mountain Line – Transit Asset Solution

- Mountain Line of Flagstaff, Arizona uses an IoT-enabled Transit Asset Management (TAM) system, ThingTech, to improve the maintenance work order process by reducing manual data entry. The system has 78 bus shelters, ten of which are shared with Northern Arizona University, as well as two connection centers and one maintenance shop.

Passenger Information and General Transit Feed Specification (GTFS)/GTFS-Flex

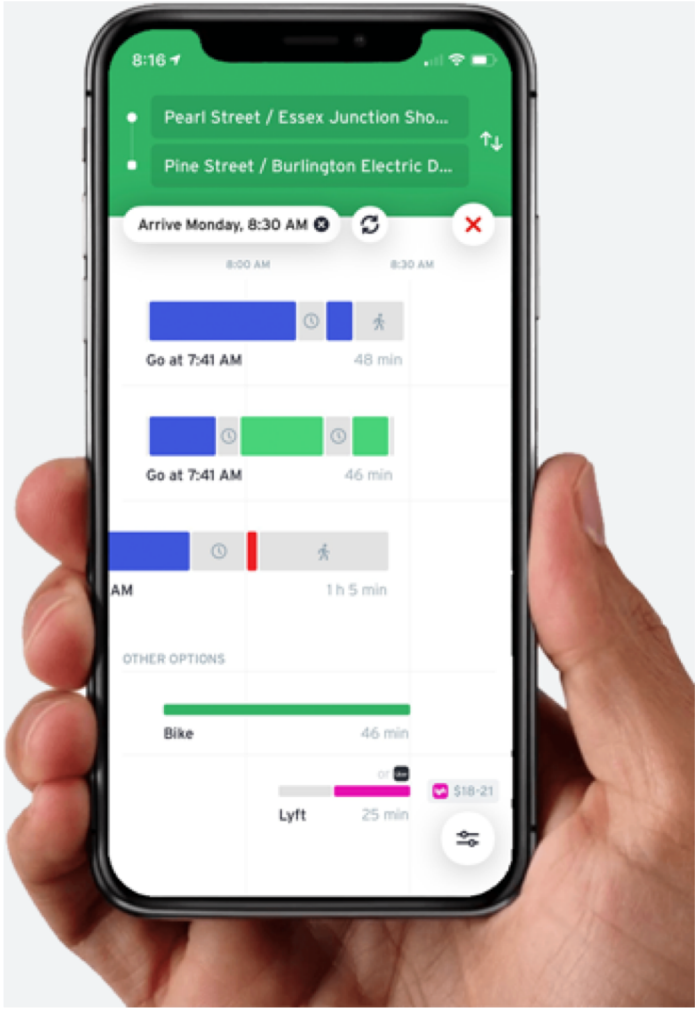
- Passenger information can be accessed via a number of devices and agency and third-party applications.
- General Transit Feed Specification **(GTFS) is used as a standard format for making trip planning accessible for public use on interactive web and mobile applications.**



IMPROVING ACCESS TO TRANSIT INFORMATION TO INCLUDE DEMAND-RESPONSE AND VOLUNTEER-RUN SERVICES

Go Vermont! Trip Planner

- In 2018, Go! Vermont launched a trip planner that incorporated both GTFS and GTFS Flex, allowing the trip planner to provide more options than private-sector counterparts. The GTFS Flex function is especially useful in the rural parts of the state, where fixed-route bus services are less common than demand-response services.



Computer-Aided Dispatch and Automatic Vehicle Location (CAD/AVL)

- Emerging CAD/AVL innovations with reduced capital investments are helping to expand CAD/AVL capabilities to smaller agencies.
- Vehicles equipped with off-the-shelf GPS hardware, such as smartphones or tablets and Software as a Service (SaaS) business models are among these innovations.

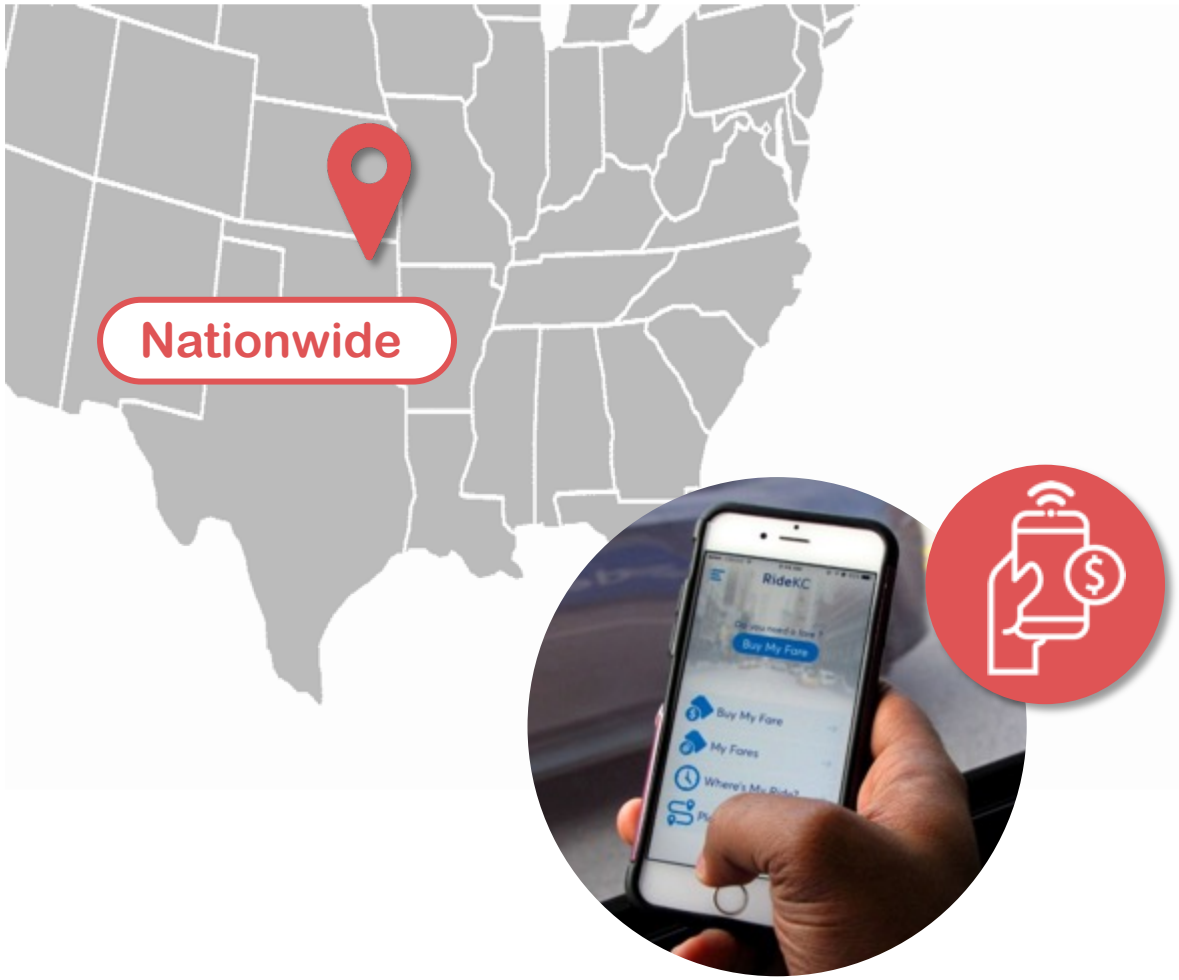
USING A SMARTPHONE TO GEOLOCATE VEHICLES, A CAD/AVL MODULE INTEGRATED WITH A FARE COLLECTION SOLUTION ALLOWS A PROVIDER TO SEE FROM ONE WEBPAGE OPERATIONAL AND RIDERSHIP DATA IN REAL-TIME

Portneuf's Smartphone CAD/AVL and Fare Collection System

- Portneuf, Quebec, Canada's CRTP uses an **off-the-shelf smartphone** or tablet-based software to facilitate **dispatching, vehicle location** and to provide passengers with real-time information on vehicle location.
- The same software suite facilitates on-board fare payment with smartcards.

Fare Payment

- Mobile fares payment technologies allow riders to pay transit fares with the use of mobile applications.
- Transit agencies can choose from a wide **variety of payment and validation methods, business models, and Fare Payment as a Services (FPaaS)** companies to implement mobile fare payment systems.



Microtransit

- Microtransit is a **technology-enabled demand-response service** that provides on-demand access to transit via requests from mobile applications, as well as **via phone or internet trip requests.**
- Like other types of demand-response service, microtransit is typically operated with smaller vehicles, however, **specialized microtransit software** is used to **dynamically generate routes** that **respond to rider requests in real-time** with wait times measured in minutes from trip requests.

USING FLEXIBLE SERVICE TO MAKE FIRST AND LAST-MILE CONNECTIONS TO FIXED-ROUTE TRANSIT

Johnson County, Kansas Flex Service Pilot

- In 2019, Johnson County, Kansas, located in the Kansas City metropolitan area, implemented a **demand-response service to connect** residents **to fixed-route transit**.
- The **service experienced rapid growth**, followed by a need to rapidly modify operations in response to COVID-19 in 2020.

Source: RideKC Twitter

Mobility Hubs

- Mobility Hubs are **centers where access to shared mobility modes such as carsharing, bikesharing, ridesharing, and other shared mobility modes are located near public transit stops and centers of population and employment** to facilitate transfers between modes and access to services.

Minneapolis Mobility Hubs Pilot

- Implemented in September of 2019, the **original pilot covered 12 locations** marked by specially designed wayfinding signs.
- Mobility hubs include **seating, bikeshare docks, transit stops** (often on high-frequency routes), and designated **parking locations for dockless shared bikes and scooters**.

Source: Minneapolismn.gov

Common Themes Among Promising Practices

- Profiled **Promising Practices** are **varied in nature and the types of benefits** accrued to transit providers.
- However, **several common themes** identified that helped to facilitate practice adoption.
- The common themes speak to agencies that are **resourceful** in seeking out not only new practices but **in finding ways to fund and implement** new **practices** that are **cost-effective** and **practical** for smaller agencies.

Partnerships

Vendor Research and Engagement

Stakeholder Involvement

Planning

Partnerships

- Several practices profiled **were made possible via partnerships** that contributed to bring a practice to fruition with:
  - Funding
  - Staff hours
  - Technical expertise
- Many partnerships engaged with organizations **outside of the transportation industry.**
- **State governments** also played key roles in realizing practices.

Johnson County and RideKC

Blue Lake Rancheria and Humboldt State University

Michigan's Mobility Challenge and Ann Arbor and Detroit

South Carolina DOT and CATbus

CARTA and Tennessee Department of Intellectual and Developmental Disabilities

Vendor Research and Engagement

- Many of the practices profiled were the result of or benefited from **extensive vendor research.**
- **Engagement with vendors** to communicate small and rural agency needs and constraints allowed for **context-specific product adaptations**

CATBUS WORKED CLOSELY WITH PROTERRA TO RESOLVE TECHNICAL ISSUES WITH FIRST GENERATION ELECTRIC BUSES

Stakeholder Involvement

- Engagement from key **external and internal stakeholders throughout the development and implementation** of practice was also common.
- Organizations representing **key community stakeholders** helped to shape the development of several of the promising practices implemented.
- Similarly, engagement with **internal stakeholders** helped create **practices that met the needs and expectations** of all involved internal divisions.

- Go Vermont! and Vermont Association of the Blind and Visually Impaired and the Vermont Center for Independent Living
- CARTA and Chattanooga's Orange Grove Center
- Minneapolis' Mobility Hubs extensive engagement process
- Mountain Line's internal stakeholder involvement

Planning

- Lessons learned shared by interviewees often related to **additional elements of planning or implementation** that would have been beneficial, such as:
  - The establishment of measures of success and program evaluation.
  - Planning for adequate time for the implementation period and staff training.
  - Planning for program expansion.

PORTNEUF HIGHLIGHTED THAT TRAINING STAFF ON USING NEW TECHNOLOGY CAN BE TIME CONSUMING

Learn More!

Visit n-catt.org to download the Promising Practices Guidebook and learn more!

Promising Practices Profiles include:

- Context of the Practices
- Resources Needed
- Barriers and Challenges
- Results
- Lessons Learned
- Links and Agency or Vendor Contacts for More Information