Connecting North Texas Communities with Emerging Transportation Technologies

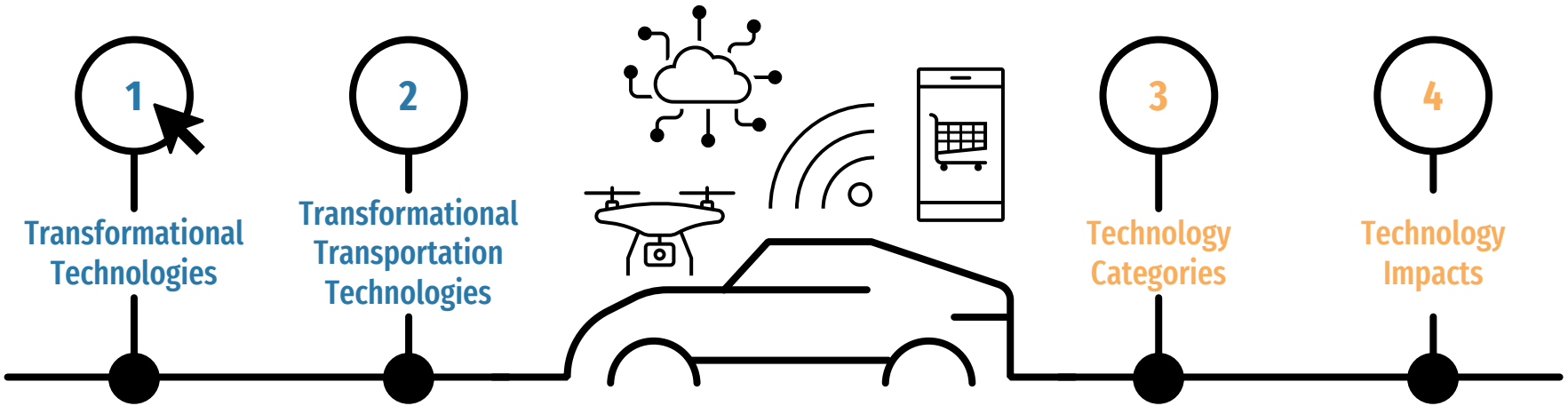
An Overview of Emerging Transportation Technologies

August 2021

North Central Texas Council of Governments

Emerging Transportation Technologies

Click on the numbers to learn more.



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Transformational Technologies

Learn what makes a technology “transformational”.

2

Transformational Transportation Technologies

Learn about transportation technologies.

3

Technology Categories

Learn about the four categories of the various transportation technologies.

4

Technology Impacts

Learn about the potential impacts that these technologies will have.

Slide design by slidesgo.com; Slide content from NCHRP Report 924, Foreseeing the Impact of Transformational Technologies on Land Use and Transportation, Transportation Research Board, Washington, DC, 2019. https://doi.org/10.17226/25580

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What makes a technology transformational?

Transformational. The technology must be successful in the marketplace. The technology has to sell!

Successful. The technology has to be better than and/or cheaper than the technology we already have.

Sustainable. Sustainable price range for tech applications.

Examples of transformational technology:

- Wireless communication
- Smart phones
- Social networking
- 3D printing
- Blockchain

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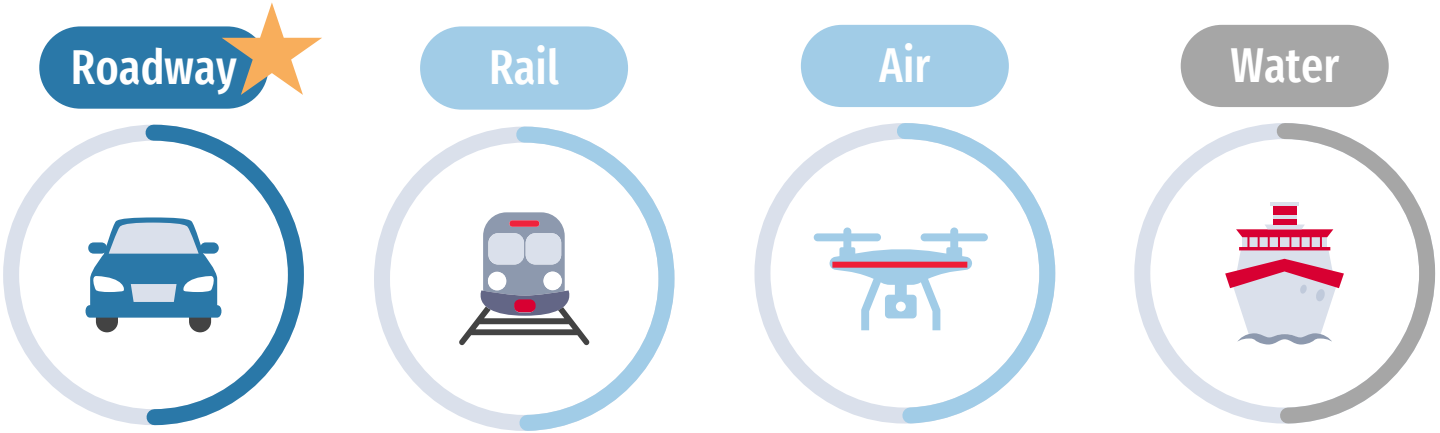
What are transformational transportation technologies?

- Cheaper, quicker, more reliable, and higher quality than existing transportation options
- The graphic below shows examples of technologies by mode of transportation.
- **This project focuses primarily on roadway technologies.** North Central Texas Council of Governments (NCTCOG) is also doing work related to rail and air technologies.



NCTCOG Initiatives:

Connecting North Texas Communities with Emerging Transportation Technologies

HIGH-SPEED NORTH TEXAS

UAS

Click to learn more about North Texas UAS

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UAS Safety and Integration Initiative

- NCTCOG created the UAS Safety and Integration Initiative in response to the growing interest in Unmanned Aircraft Systems (UAS).
- The goal of the initiative is to **foster and safely integrate the use of unmanned aircraft systems** within the North Central Texas region.
- The initiative includes
  - UAS workshops
  - UAS working group meetings
  - other planning activities

For more information, visit www.northtexasuas.com

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Technology Categories

Learn more about combining technology across categories.

Internet of Things (IoT)

Connected digital communications and information sharing

Learn more

Vehicle Technologies

Technology applications used in motor vehicles

Learn more

Infrastructure Technologies

Technology for transportation infrastructure and operations

Learn more

Logistics Technologies

Technology used to support goods movement, operations planning, and government services

Learn more

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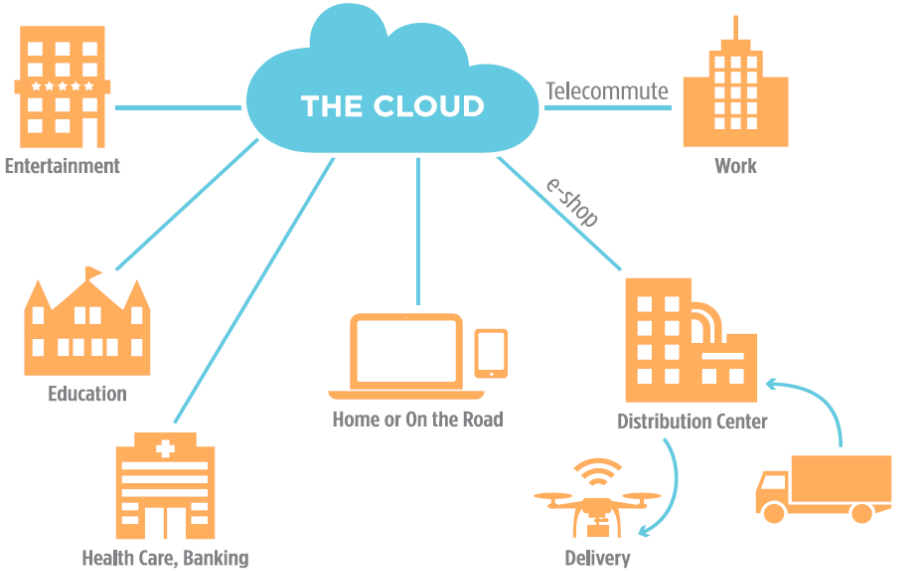
Internet of Things (IoT)

Equipment that connects and shares information with other devices over the internet



Graphic: Kittelson & Assoc., Inc.

IoT can…

Replace the need to travel

- Work-from-home
- Online shopping

Assist us in using technology and transportation in more effective and efficient ways

- Phone apps for directions and best route
- Mobility as a Service (MaaS)

Manage the transportation system more efficiently

- Traffic signal performance monitoring
- Crowd-sourced navigation apps

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Vehicle Technologies

Connected

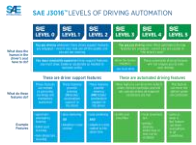
Allows vehicles to wirelessly communicate with other vehicles and infrastructure

Click to view

Automated

Takes over one or more driving tasks and uses communication technologies to improve Automated Driving Systems (ADS) capabilities

Click to view



Electric

Electric vehicles (EVs) run partially or fully on battery power, as compared to another fuel source like gasoline. There are generally two types of EVs:

- All-electric
- Plug-in hybird electric

Shared

A shared vehicle system consists of a fleet of vehicles that are used by multiple people. Here are some examples:

- carshare
- ridehailing
- bikeshare
- carpooling services

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Automated Vehicle Technology

Source: SAE J3016 Levels of Driving Automation, https://www.sae.org/

Some examples of automated vehicle technology being tested in Texas include:

Drive.ai - Frisco
Drive.ai – Arlington
EasyMile
May Mobility

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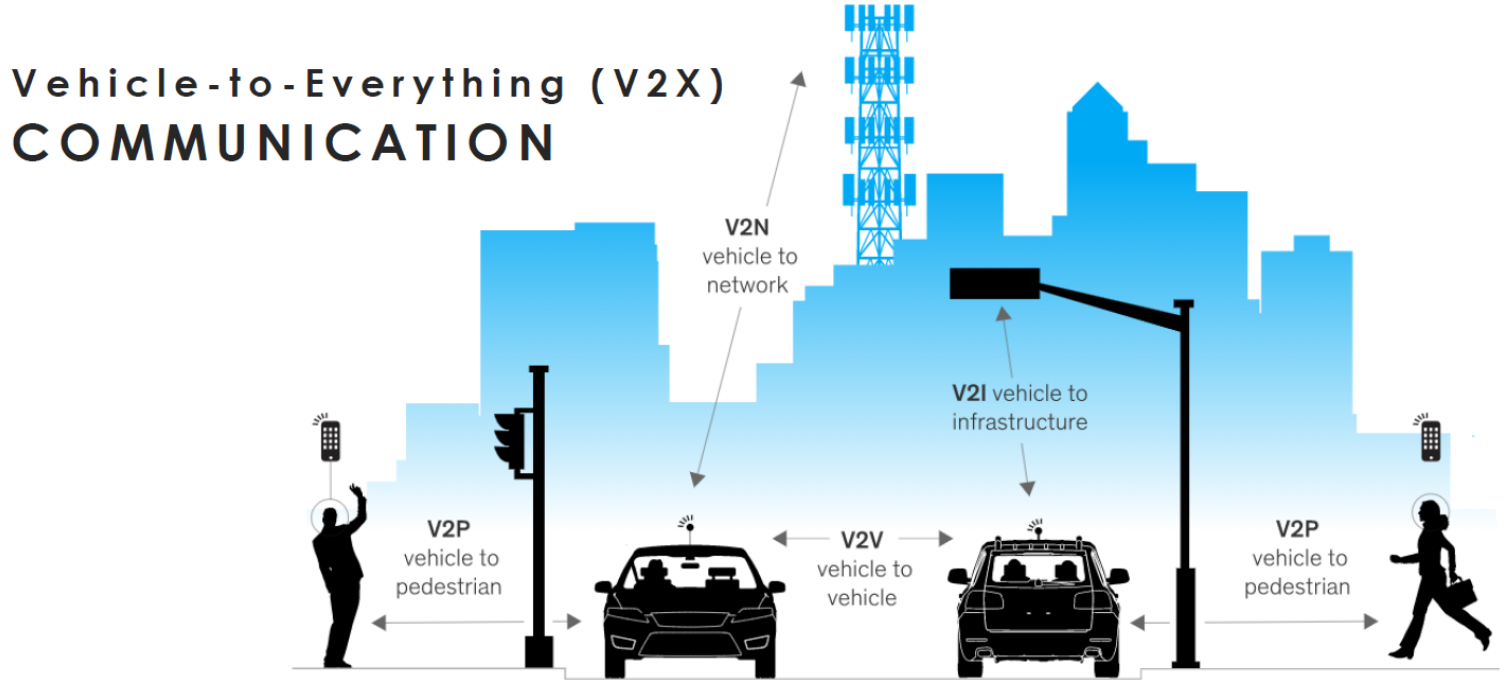
Connected Vehicle Technology



McKinsey & Company

Graphic: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/development-in-the-mobility-technology-ecosystem-how-can-5g-help

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Infrastructure Technologies

	Roadway System Technologies	Parking System Technologies
Sensors	Track personal wireless devices (like cell phones and Bluetooth devices) to count vehicles and estimate roadway speeds	Monitor parking availability
Control Devices	Allow for use of dynamic speed signs and traffic signals that adapt to the weather and traffic conditions	Set and collect parking fees
Informational Devices	Provide information to drivers through dynamic, remote-controlled signs	Inform travelers about parking availability and prices

Data from connected vehicles and infrastructure can be used to:

- Adjust signal timing to improve the flow of traffic
- Adjust signal timing to allow specific vehicles, like buses or emergency vehicles, to get priority as they approach a signalized intersection
- Collect information on how well the transportation system is performing

Source: NCHRP Report 924, Foreseeing the Impact of Transformational Technologies on Land Use and Transportation, Transportation Research Board, Washington, DC, 2019. https://doi.org/10.17226/25580

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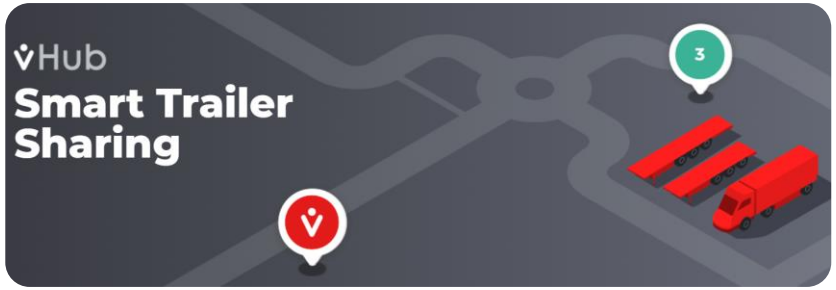
Logistics Technologies

See an example of combining technology applications that may involve logistics technologies.

Support better management of systems

- Parking management systems
- Data integration systems
- Truck or trailer sharing apps



vhubapp.com/

Enable better use of system resources

- Drone crash investigation
- Crowd-sourced navigation apps

uavcoach.com/drones-accident-reconstruction/

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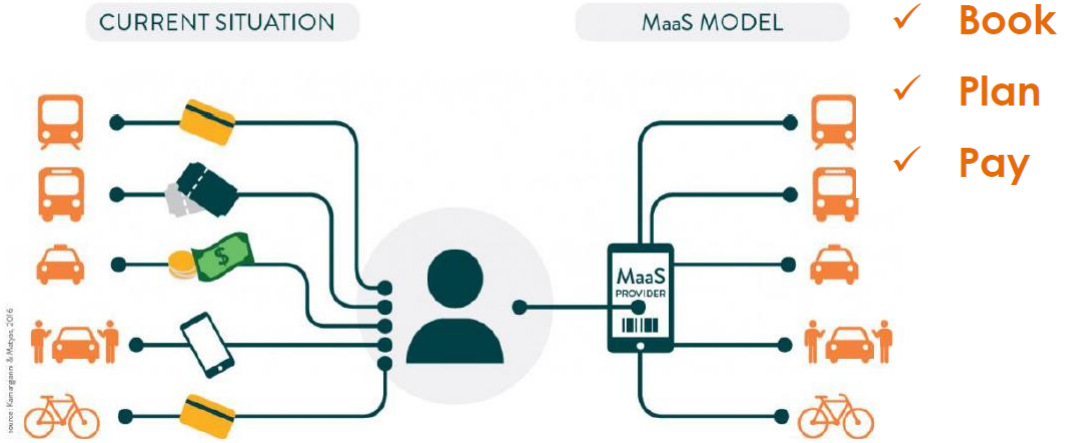
Combining Technologies Across Categories

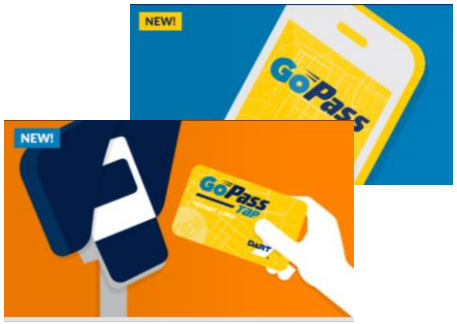
The technologies with the greatest impacts usually overlap 2 or more categories.
Here is an example:

Internet of Things + Shared Vehicles = Mobility as a Service (MaaS)

- MaaS uses online technology to let travelers plan, book, and pay for multiple travel options.
- Example: If a person rides a shared scooter from their house to the train station, rides the train into the city, and then gets off the train and rides a shared bike to their job, a mobility service app could allow that person to plan for and pay for all of those services in one place.



The region is moving in this direction. Check out Dart's GoPass – gopass.org



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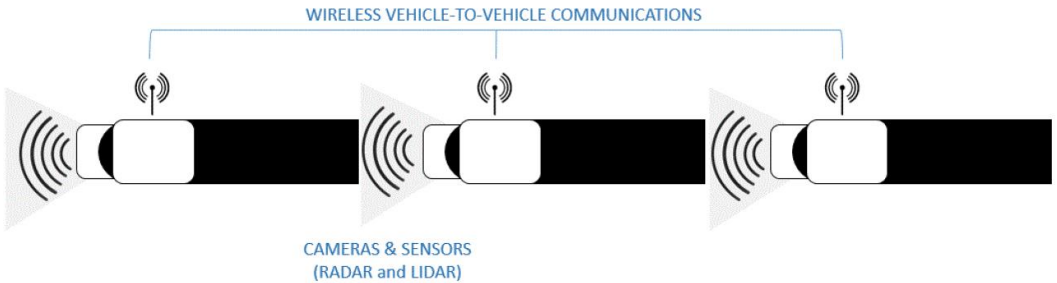
Combining Technologies Across Categories

The technologies with the greatest impacts usually overlap 2 or more categories.
Here is an example:

Vehicle Technologies + Logistics Technologies = Truck Platooning

- Using automated and connected vehicle technology, a chain of trucks can travel closely spaced while matching the lead truck's travel speed, braking, and steering.
- A driver is in the rear trucks to steer and take control in emergency situations.
- Truck Platooning can increase a truck's fuel efficiency and decrease the amount of space trucks take up on the highway.
- Logistics technologies can integrate data to help carriers choose the best routes.

transportation.gov, NHTSA AV 3.0



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Technology Impacts

Goals of emergency transportation technology…

- Enhance Safety
- Improve Mobility
- Support Data Management
- Support Curbside Management
- Complement Transit
- Reduce Congestion
- Make better use of Land Use

The impacts of the technology may not be fully clear early on.

To fully benefit from the technologies, we have to plan for them.

Applications of the new technology have the potential to

- Replace the need to travel
- Facilitate travel (by decreasing travel costs or increasing awareness of available travel options)
- Introduce new options for using underutilized land uses