



OVERVIEW

Background

The Capital District Transportation Committee (CDTC) is the Metropolitan Planning Organization (MPO) for the Albany-Schenectady-Troy and Saratoga Springs metropolitan areas. New Visions 2040, the long range regional transportation plan developed by CDTC, was adopted in 2015 and is the basis for which CDTC allocates planning funds and programs federal transportation funds for capital projects in the Transportation Improvement Program (TIP). In other words, all federally-funded or federally-approved transportation actions, such as highway or transit projects, must derive from the priorities and principles in the regional plan.

New Visions 2040 includes a set of planning and investment principles as well as short- and long-term actions to help achieve the plan’s goals. These investment principles are:

1. Investing in a quality region
2. Economic development
3. Regional equity
4. Bicycle and pedestrian transportation
5. Transit
6. Complete Streets
7. Infrastructure
8. Safety & security
9. Travel Reliability
10. Freight
11. Environment
12. Technology

Developing New Visions 2040 was a multi-year process and included several subcommittees and a series of public outreach events. The Environment and Technology Subcommittee collaborated to create a white paper which was released in September 2015. This paper proposes a planning and investment principle that supports the environment:

Technology – We must plan for new, smarter, better, and rapidly-changing transportation technology.

Advancements in technology, such as self-driving cars, self-adjusting traffic signals, smart phone apps, ridesharing, carsharing, and bikesharing will have tremendous and wide-reaching impacts on future transportation. These impacts include, but are not limited to, decreasing congestion, providing transportation to more seniors and people with disabilities, reducing traffic crashes, and more.

The paper goes on to outline a series of strategies and programs consistent with planning for new, smarter, better, and rapidly-changing transportation technology. These included the following:

1. Electrification
2. Automated Vehicles
3. Traffic Signal Technology
4. ITS Technologies
5. Travel Demand Management
6. Smart Growth and Land Use Planning
7. Protecting Environmental Systems



The full Environment and Technology Task Force White Paper, as well as other subcommittee reports, can be viewed at <http://www.cdtcmpo.org/documents-reports/new-visions-regional-transportation-plan>.

Shortly after New Visions 2040 was adopted by CDTC, the USDOT announced the Smart Cities Challenge. The Capital Region was one of the 78 applicants that submitted a proposal in late 2015. The vision elements outlined in the proposal are below:

1. Urban Automation
2. Connected Vehicles
3. Intelligent, Sensor-Based Infrastructure
4. Urban Analytics
5. User-Focused Mobility Services & Choices
6. Urban Delivery & Logistics
7. Strategic Business Models & Partnering Opportunities
8. Smart Grid, Roadway Electrification, & Electric Vehicles
9. Connected Transportation Services
10. ITS Architecture & Standards
11. Low-Cost, Efficient, Secure, & Resilient Information &
12. Communications Technology
13. Smart Land Use

The Capital Region’s proposal was not chosen but the vision of leveraging new technologies to improve mobility for all remains. Since then, Schenectady and Saratoga Springs have forged ahead in developing their own Smart Cities plans and convening local task forces. Mobility options continue to expand with the recent launch of a regional bike share system and legislation to allow the operation of transportation network companies (TNCs), like Uber and Lyft, in Upstate New York. CDTC continues to explore new transportation technologies and strategies and evaluate their potential impact on the Capital Region transportation network. To support this continued effort, CDTC has included a SMART Communities task in its 2018-20 Unified Planning Work Plan (UPWP), and budgeted \$100,000 for the effort, including \$75,000 for consultant services. To assist in the development of a regional SMART Cities “roadmap” and policy framework, CDTC has established the SMART Communities Task Force.

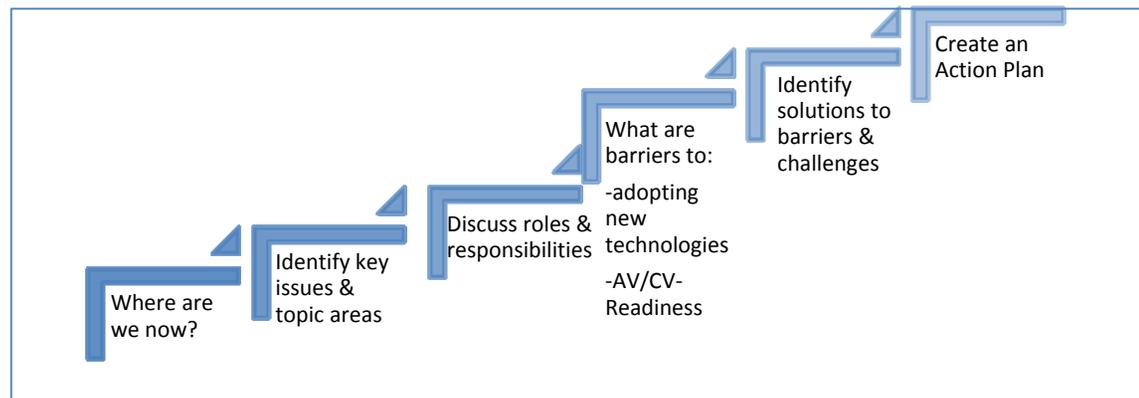


Goals

The CDTC SMART Communities Task Force will meet as needed to develop a regional “roadmap” that includes short-term action items. The first meeting was held on Wednesday, March 14th and focused on the status of ongoing SMART City and mobility projects in the region, and a discussion on what the key issues and topic areas are. Future meetings will identify partners in the region and define the role and responsibility of CDTC, and MPOs in general, in implementing SMART City plans and policies; discuss barriers to autonomous vehicle readiness; recommend solutions to barriers and challenges to become a SMART and autonomous vehicle-ready region; and development of a plan that includes action items. The Task Force and its plan should aim to increase interest in SMART City concepts, emerging technologies and smart mobility services, among cities, towns, and villages, but also users of the transportation system.

The roadmap, or plan, should include:

1. Regional vision for technology and transportation
2. Identify technology needs for transportation network
3. Identify project investment priorities, funding strategies
4. Identify private sector, university, and public agency partners

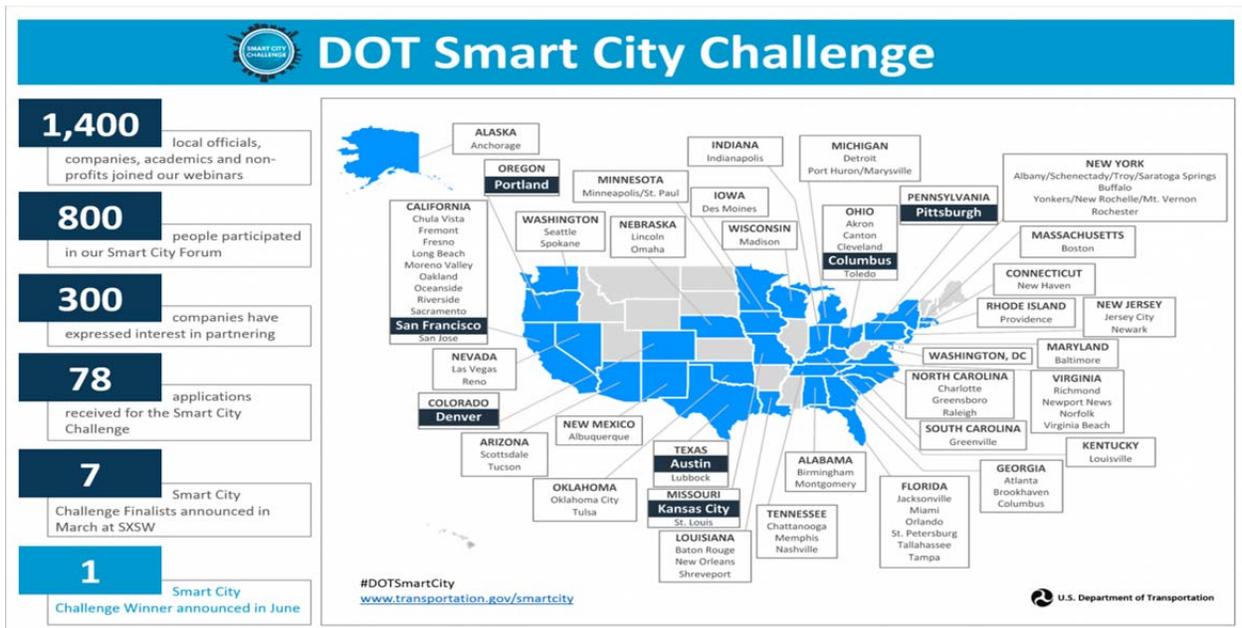


The anticipated timeline for developing the roadmap and action items is Summer 2018. At least one action item/project should be completed by April 2019.



USDOT Smart City Challenge

As previously mentioned, the Capital Region was one of 78 applicants that submitted proposals to the 2015 USDOT Smart City Challenge. Applicants competed for up to \$40 million pledged by DOT to define what it means to be a “Smart City” and “become the first city to fully integrate innovative technologies – self-driving cars, connected vehicles, and smart sensors – into their transportation network.”



USDOT named 7 finalists – Austin, Columbus, Denver, Kansas City, Pittsburgh, Portland, and San Francisco – and worked closely with them, their residents, and each other to develop detailed Smart City plans and visions. The finalists each received \$100,000 for public outreach, production of pitch videos, and technical assistance from Federal experts and private partners to further concept development.

Applicants faced similar mobility challenges:

1. Providing first-mile and last-mile service for transit users to connect underserved communities to jobs.
2. Facilitating the movement of goods into and within a city.
3. Coordinating data collection and analysis across systems and sectors.
4. Reducing inefficiency in parking systems and payment.
5. Limiting the impacts of climate change and reducing carbon emissions.
6. Optimizing traffic flow on congested freeways and arterial streets.

The following page shows the common strategies proposed by the 7 finalists to address their mobility challenges.



Strategies	Austin, TX	Columbus, OH	Denver, CO	Kansas City, MO	Pittsburgh, PA	Portland, OR	San Francisco, CA
Partnership with research institutions/Universities	•	•	•	•	•	•	•
Crowdsourcing data from public, managing data by research institutions or organizations, and open access to all	•	•	•		•	•	•
Leveraging the data by research institute and building apps according to the needs of the population	•	•	•	•	•	•	•
Develop smart corridor and transit services to demonstrate the capability of intelligent infrastructure to improve transit service and efficiently	•	•	•	•	•	•	•
Implementation of electric vehicles and charging stations	•	•	•	•	•	•	•
Connecting visitors and citizens by providing information using the available data	•	•	•	•	•	•	•
Technology friendly policies to be introduced and mitigated to facilitate testing, demonstration, and deployment of smart city technologies	•	•	•	•	•	•	•
Implementation of car share and bike share	•	•	•	•	•	•	•
Development of App for easy access to connecting people for car shares	•	•	•	•	•	•	•
Intelligent Vehicles for smarter, safer and more environmentally friendly: Autonomous Vehicles	•	•	•	•	•	•	•
Affordable public transportation (Package mobility service) and multimodal connection	•	•	•	•	•	•	•
Connecting suburbs to the urban core or the city through car share, or Connected and automated vehicles from transit to home/work and vice versa	•	•	•	•	•	•	•
Development of apps or availability of information for ease in delivery process by terminal queue status and load matching and mobility on demand services for real time travel decision making for alternating routes		•	•	•	•	•	
Smart Land Use: Reduction of sprawl, or by dynamic pricing of parking space and garages, or corridor improvements through road diet, green design, walkable, bike-able, transit hub, etc.	•		•	•	•		•
Implementation of Mobileye Shield + to increase safety and reduce collision		•	•				
Strategies focused on improving accessibility to job centers	•	•		•			•



The Capital District shares other characteristics in addition to similar mobility challenges with the finalists. The finalists vary in size and population density and are larger than any single Capital Region City but similar in population size to the Capital Region as a whole. Many of the finalist cities are current or emerging megacities. The Capital Region is growing relative to Upstate New York but is not in the top tiers of growing metropolitan regions.

	Austin	Columbus	Denver	Kansas	Pittsburgh	Portland	San Francisco
Population	790,390	787,033	600,158	459,787	305,704	583,776	805,235
Density	2653/Sq. Mile	3384/Sq. Mile	3923/Sq. Mile	1,460/Sq. Mile	5522/Sq. Mile	4375/Sq. Mile	17,818/Sq. Mile

The Capital Region is unique from most metropolitan areas in that it lacks a central city. The four largest cities in the region, Albany, Schenectady, Troy and Saratoga Springs, are interconnected socially, culturally, and economically, but have distinctive characteristics as well as their own transportation challenges. Regionally, there are a large number of colleges and universities, a growing technology sector, strong transit ridership, growing electric vehicle ownership and a publicly-accessible charging network, existing and planned bus rapid transit corridors, and relatively new smart mobility services like car sharing, bike sharing, and ridehailing (i.e. Uber).

	Albany	Schenectady	Troy	Saratoga Springs	Total for 4 Cities	Region
Population	97,856	66,135	50,129	26,586	240,709	837,967
Density	4,468/Sq. Mile	6,012/Sq. Mile	4,516/Sq. Mile	920/Sq. Mile	3,979Sq. Mile	372/ Sq. Mile

Source: 2010 U.S. Census

Columbus, Ohio was the winner of the USDOT Smart City Challenge. The City’s proposal was characterized by USDOT as a “holistic vision for how technology can help all residents move better and access opportunity.” Columbus received \$40 million from USDOT and an additional \$10 million from Vulcan Inc. specifically for electric vehicle deployment. A key part of the SMART Columbus project is providing better access to healthcare, through connected vehicles, multimodal trip planning and a common payment system, mobility assistance for people with cognitive disabilities, smart mobility hubs, and prenatal trip assistance. Project details can be found on the [City of Columbus website](#).



WHERE ARE WE NOW?

Defining a “SMART City”

The USDOT described Smart Cities as strategies for an “integrated, first-of-its-kind smart transportation system that uses data, applications, and technology to help people and goods move more quickly, cheaply, and efficiently.” There are other suggested definitions of “Smart City,” including a suggestion by The Atlantic that there is no such thing and its merely a “snazzy political label.” For the purposes of the CDTC SMART Communities Task Force, “Smart City” includes strategies that improve *how* we move, how we move *things*, how we adapt, how we move *better*, how we grow opportunity for all, and align decisions and dollars in an efficient, connected, sustainable, and equitable manner. The Task Force will develop a roadmap that provides guidance and tools to Capital Region communities so that they can embrace technology and encourage innovation in a way that is consistent with New Visions 2040.



Above is a word bubble created through a poll questions: “What one word best describes a “Smart City” for you and your organization?” Task force members submitted their answer via text.

SMART Capital Region

CDTC has supported new smart mobility services since 2011 when it planned and hosted a Car Share Summit. Since then new, mobility services and programs have begun operating throughout the region. In 2014, Capital CarShare launched, with assistance from CDTC and CDTA, with a fleet of six vehicles in the City of Albany. Today it operated in Albany and Troy with a fleet of eight vehicles and plans to begin adding electric vehicles. Transportation Network Companies (TNCs) like Uber and Lyft hit the pavement of the Capital region in June 2017. Shortly after, the Capital City Trolley and CDPHP Cycle! bike share also rolled out. This winter, CDTA phased out its old swiper cards and introduced smart cards called the



Navigator. The Navigator can be replenished online, via the app, or in-person at several locations throughout the region. CDTA and its smart mobility partners are working to integrate the Navigator with other modes like bike share and taxis.



In addition to new mobility services, two Capital Region cities have released their own Smart City plans. In 2016 Saratoga Springs assembled a Smart City Commission and started the process of developing a roadmap. Their plan contains ideas for integrating technology into staff services and operations, tourism, and community services that benefit residents. The City of Schenectady also established a Smart City Advisory Commission and released a report in 2017 that outlines how the City is using technology and data throughout the city to save money, improve operations, and become more sustainable.

Smart Communities Task Force members were polled on what the key issues in the Capital Region are. The following issues were discussed:

Connectivity – not having a central city creates a sense of being disconnected from other parts of the region. For example, residents in Saratoga Springs feel disconnected from Albany, not just geographically.

Parking perceptions – most cities in the region are confronted with the perception that there isn't enough parking but the real problem might be a lack of information about where parking is available and when.

Lack of EV infrastructure – existing electric vehicle charging stations are publicly-accessible but not always visible, which may discourage residents from purchasing a plug-in vehicle.

Access – not all Capital Region residents have the same access to mobility choices.

Transit – fixed-route transit does not serve all residents and there is opportunity for enhanced or express transit services in some locations and along select corridors.

Isolation – an aging population that predominantly resides in the suburbs of the Capital Region is increasingly becoming isolated because of their lack of access to mobility. Older residents should be able to age in place, no matter what type of community they live in.



Priorities

The CDTC planning and investment principles can be compressed to energy and the environment, mobility, equity, health, safety, and the economy, or economic development. CDTC uses these principles to prioritize projects and investments in the programming of the Transportation Improvement Program (TIP) and in developing projects and programs included in the Unified Planning Work Program (UPWP) which functions as CDTC's annual budget and task list.

Below is a description of each principle:

Energy: CDTC should prioritize investments in transportation programs or projects that reduce energy use, are sustainable, and do not have adverse impacts on the environment, especially sensitive habitats or natural resources.

Economy: Investments in transportation programs or projects should create economic development – create jobs, support business innovation and/or improve the economic well-being and quality of life for a community by growing incomes and the tax base.

Mobility: Investments in transportation programs or projects should improve the ability to move between spaces, seamlessly and affordably. CDTC recognizes that access to mobility is essential to economic and social mobility, and is a priority in creating a transportation system that works for all.

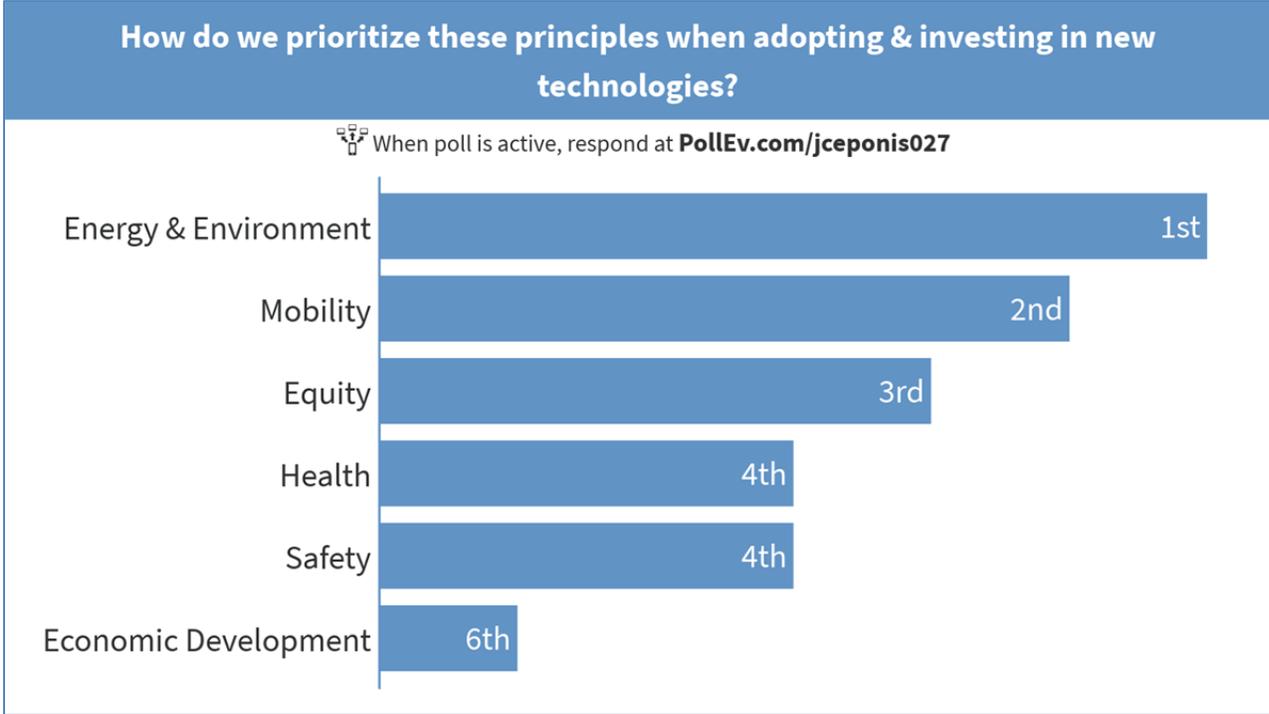
Health: Health is always considered in the goals of CDTC's planning and programming policies, programs, and projects. Transportation projects and programs that help reduce air pollution; prevent traffic injuries and deaths; and lower obesity, diabetes, cardiovascular disease, and cancer rates and priority investments.

Safety: Safety is integrated into all surface transportation decision-making. It means investing in transportation programs and projects that reduce transportation fatalities and serious, and improve safety within communities.

Equity: CDTC refers to equity as the fairness with which the impacts of transportation programs and projects (benefits and costs) are distributed. It is a priority of CDTC to avoid investments in programs or projects whose adverse impacts fall hardest on the most vulnerable communities.



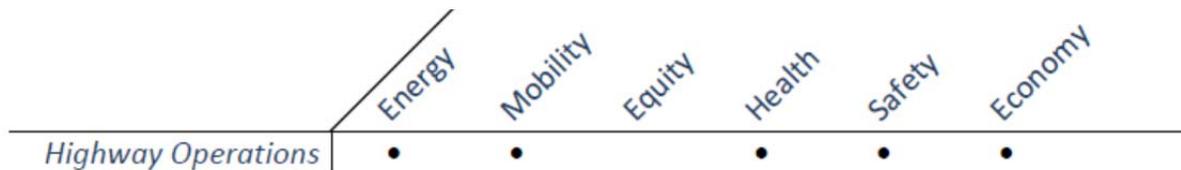
The CDTC investment principles relate to different modes of transportation and investment areas in different ways. Task Force members were asked to rank the investment principles in order of importance. Those poll results are below. Task Force members indicated that energy and environment should be the most importance investment principle guiding CDTC’s planning. It was suggested that the investment principles would be prioritized different from community to community.





Modes

The Task Force then reviewed the different modes, or investment areas, and how SMART City projects fit into them.

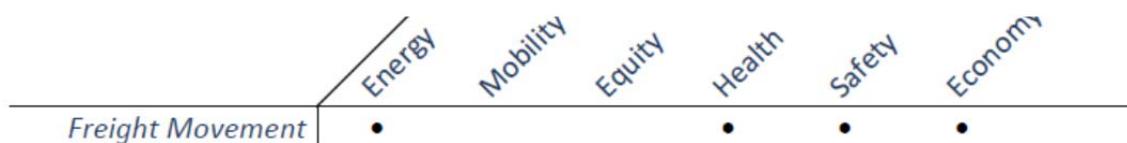


High-Occupancy Toll Lanes (or HOT lanes) is a lane on a roadway available to high-occupancy vehicles without charge while other vehicles that choose to use it would be required to pay a fee or toll, which could be adjusted in response to demand.

Congestion Pricing requires vehicles to pay a fee or toll, adjusted in response to demand, to enter and drive in a specific area of a city. New York City has proposed congestion pricing and London implemented congestion pricing in 2003.

Variable speed limits change based on road, traffic, and weather conditions and have the potential to improve safety and reducing congestion and travel times.

In the era of on-demand transportation services, like Uber and Lyft, how will highway operations and capacity be impacted? How can we **design for the Uberization of transportation?**



Automation will include freight vehicles, such as trucks.

GPS Fleet Management Systems can help truck fleets reduce operating expenses, save time, optimize operations, save money, increase the number of trips, improve safety and increase competition.

Truck **Platooning** is the linking of two or more trucks in a convoy using connectivity technology and automated driving support systems. These trucks can maintain a set, close distance between each other, reduce fuel consumption and emissions, and make vehicles drive at a constant speed with less braking and accelerating.

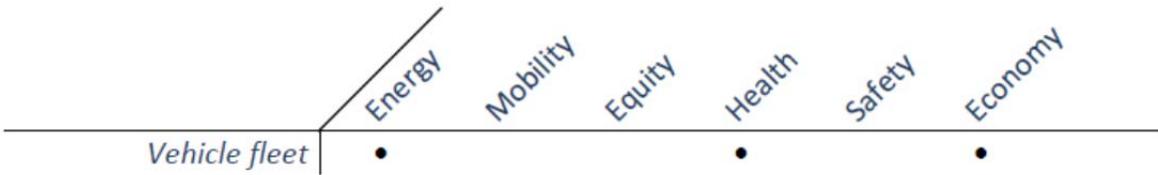


Delivery **Drones** are unmanned aerial vehicles utilized to transport packages, food, or other goods. Drones have the potential to reduce energy use in freight transport and the time it takes to receiving packages.

The **Electrification** of trucks can significantly reduce fuel use and emissions from freight transport. Electric trucks will require new charging infrastructure.

Urban freight delivery, or last mile freight transport, can utilize alternative modes, such as bicycles. An example of this operation is B-Line in Portland, Oregon. The company owns warehouse space which serve as small-scale distribution centers on the edge of urban areas which they use as staging areas to load cargo bicycles which deliver goods and packages to downtown businesses.

Container on Barge in the Capital Region would use the canal system and Mohawk and Hudson Rivers to transport freight via barge, moving products away from railways or roadways and onto waterways. This can potentially improve safety and reduce fuel use and emissions.



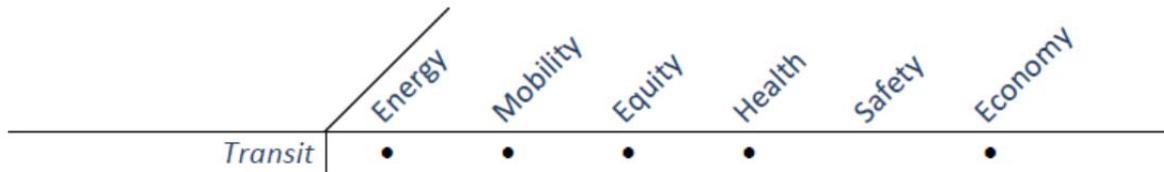
Automation, or driverless cars, are unmanned ground vehicles that are capable of sensing their environment and navigating without human input. Automated technology is currently being tested in various U.S. Cities. The technology promises the potential to improve safety and reduce fuel consumption and greenhouse gas emissions (especially if it is also electrified). Automation can also change the vehicle ownership model, pushing towards a shared vehicle fleet, and unknown impacts to land use.

Electrification is encouraging the deployment of electric vehicles (EVs) in the vehicle fleet. This can be done through expanding the EV charging network through workplace charging, publicly accessible multi-family housing charging, and highway fast charging.

Telematics is a method of monitoring a vehicle by combining a GPS system with on-board diagnostics. This technology collects data that can improve safety, reduce emissions, and reduce transportation costs (insurance, maintenance, and fuel).



Alternative Fuels such as hydrogen, propane, natural gas and biofuels should be part of a diverse vehicle fleet, as part of a strategy for resiliency and energy independence. Alternative fuels are generally cleaner than other petroleum fuels and some biofuels can be made from renewable resources.



BusPlus Expansion will improve transit service and accessibility in the Capital Region. CDTA’s “40 miles of bus rapid transit” (BRT) includes implementing express, limited stop service along the Washington and Western Avenue Corridors between downtown Albany and Crossgates Mall and the River Corridor from downtown Albany to downtown Troy. BRT includes transit signal prioritization, designated lanes, real-time travel information and other amenities.

Electrification of transit can help reduce fuel use and emissions in the region. Electric buses will require new infrastructure to support the fleet.

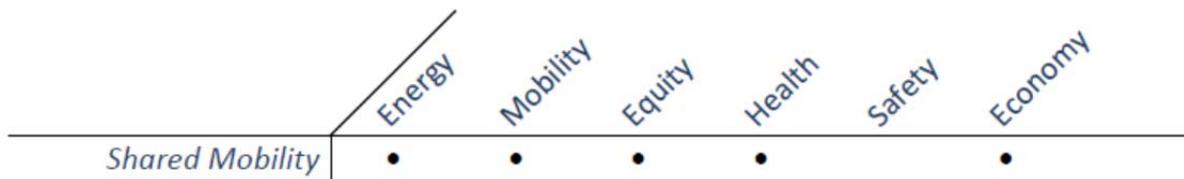
A mobility trend is transit’s **integration with other modes**. Not only meaning close proximity between transit and alternative modes like bike share and car share, but the ability to use a single media for the user’s choice mode.

Multi-modal hubs are areas designed to allow for the easy transfer between modes. A commuter would be able to exit a bus and pick up a bike share bike, hail a cab, reserve a car share vehicle, or get into their personal vehicle nearby.

Real-time information provides customers the current status of vehicles, including approximate locations and predictive arrival times so they can use their time more efficiently.

Transit **signal prioritization** improves transit service and reduces delays for mass transit vehicles at intersections through controlled traffic signals. The traffic signal can communicate with arriving transit by holding green lights longer, shortening red lights, or giving a transit vehicle a leading green signal.

Human Service Transportation refers to enhanced mobility for individuals with disabilities. CDTC and CDTA work with local service providers, such as senior centers, to coordinate public transit-human services, to improve efficiencies, save money, and enhance service.



Rideshare is carpooling, or an arrangement where passengers agree to share a ride in a private vehicle driven by its owner for free or for a fee. CDTC works with 511NY at NYSDOT to manage iPool2 in the Capital Region, software that helps people find carpool matches.

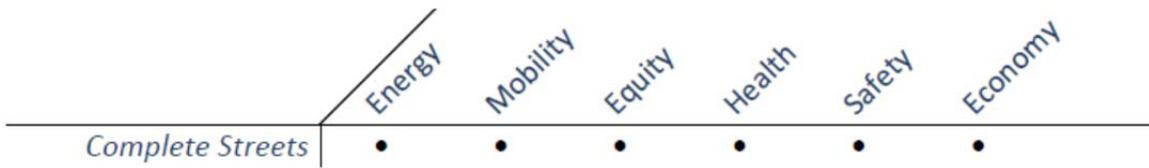
Carsharing is short term model of car rental. Members of a carsharing organization can reserve vehicles for short periods of time, usually by the hour, and pick the vehicle up in their own neighborhood or close to an activity center. Currently, ZipCar holds agreements with most local colleges and universities to provide service on campuses and Capital CarShare, a nonprofit carsharing organization, operates in the Cities of Albany and Troy.

Peer-to-peer and **one-way carsharing** are types of services that have emerged in some cities as mobility services have evolved. Peer-to-peer allows private vehicle owners to rent out their personal vehicle by the hour and collect payment whereas one-way carsharing is the short-term rental of a vehicle that does not require the member to return the vehicle to the same spot they picked it up.

Bikesharing is a service that makes bicycles available for a very short term basis for a price. CDPHP Cycle!, a regional bikesharing service, launched in 2017 in the Capital Region and plans to double its system in 2018.

Integrated mobility refers to smartphone applications and other “smart” media that allows users to access a variety of mobility options for your route, including bikeshare, carshare, taxi, etc. It consolidates billing and payment.

Transportation Network Companies (TNCs) are mobility service providers that pair passengers via websites and smartphone applications with drivers who provide such services. TNCs in the Capital District currently include Lyft and Uber.



Mobility hubs, or multi-modal hubs are areas designed to allow for the easy transfer between modes. A commuter would be able to exit a bus and pick up a bike share bike, hail a cab, reserve a car share vehicle, or get into their personal vehicle nearby. Complete Streets design should be updated to include guidelines for how to integrate mobility hubs into landscape and roadways.

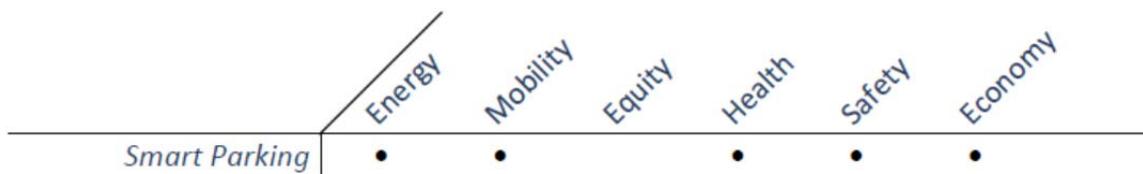
Accommodation of all modes is the principle objective of Complete Streets. It’s the design of a roadway to allow for safe access for all users.

Greenway and trail connections are an integral part of developing a multi-modal network. They are off-road, paved paths for non-motorized transportation.

Traffic-calming slows vehicles, improving safety for pedestrians and bicyclists. Slowing vehicle speeds on local streets is essential to creating a safe, accessible, multi-modal network that encourages people to use alternative modes rather than driving alone.

Smart traffic signals are traffic control devices that use sensors and artificial intelligence to intelligently route vehicle and pedestrian traffic. They may communicate with road users and/or other nearby signals to optimize safe, traffic flow.

Smart Enhanced Multi-modal Arterials (SEMAs) take Complete Streets a step further by integrating connective technology.



Smart parking is a parking management strategy that uses technology to save fuel, time, and space and achieve faster, easier, and denser parking for vehicles. Smart parking can employ various technologies such as:



Occupancy sensors can be mounted on the pavement surface of individual parking spots to detect vehicle presence and send that information to a central server which can be used to guide motorists to available parking spaces, to increase traffic flow in cities and reduce emissions.

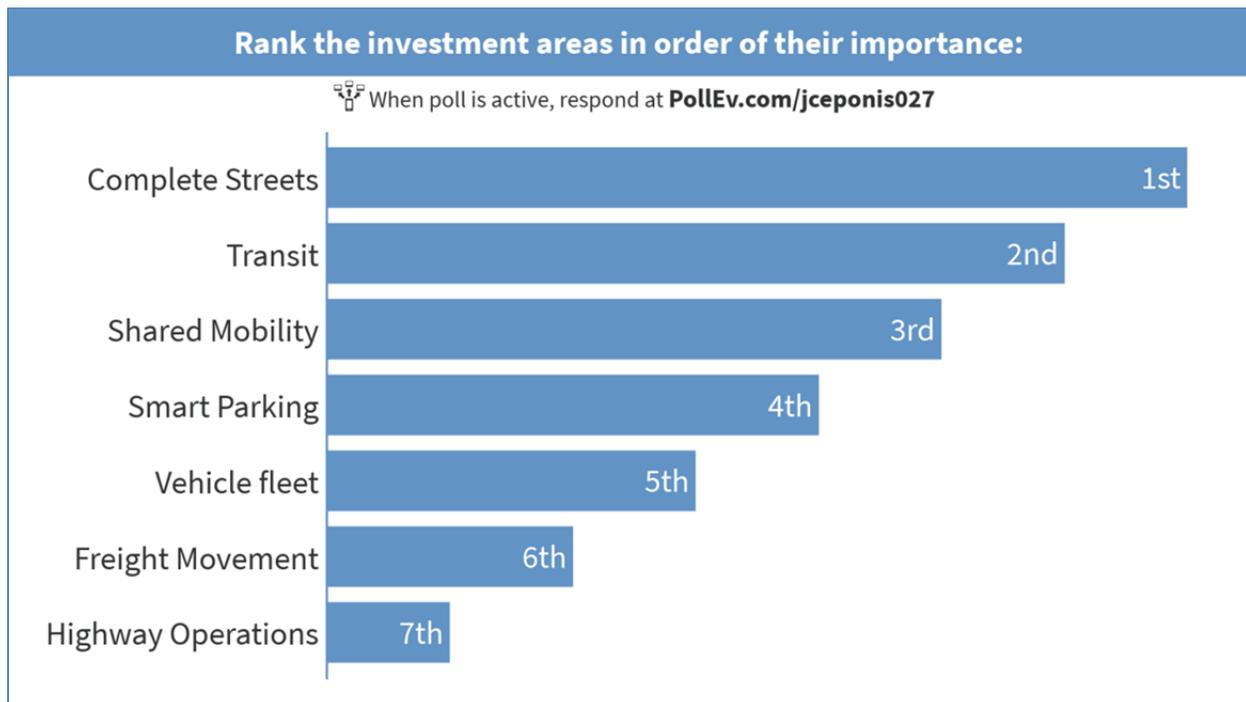
Smart meters allow parking customers to pay for parking using cash or credit cards. They can be solar-powered, have real-time communication and a web-based management system, and make parking rules fees visible and easy to understand.

Parking reservations allow drivers to effectively find and reserve vacant parking spaces, online or through a smartphone application. This reduces emissions and improve traffic flows in cities.

Wayfinding signage directs parking customers to available parking.

Parking management can help reduce emissions by installing and proving **electric vehicle (EV) parking**. EV parking provides plug-in vehicle owners with a space prioritized for their use where they can plug their vehicle in to re-charge their vehicle.

After reviewing the modes or different investment areas, Task Force members were polled and asked to prioritize modes, and the SMART City projects that could fit into each mode, for investment. Below are the results from the poll.





These principles will help shape new policies and processes related to the investments and adoption of new technology and mobility in the Capital Region. As illustrated below, transportation has significant and profound impacts on energy use, health, and the economy. It is vital that as new technologies are explored, piloted, and implemented, project sponsors be thoughtful of how they fit into the overall regional vision and what impact they have to individual communities and the region’s transportation system as a whole.

	Energy	Mobility	Equity	Health	Safety	Economy
<i>Complete Streets</i>	•	•	•	•	•	•
<i>Transit</i>	•	•	•	•		•
<i>Shared Mobility</i>	•	•	•	•		•
<i>Smart Parking</i>	•	•		•	•	•
<i>Vehicle fleet</i>	•			•		•
<i>Freight Movement</i>	•			•	•	•
<i>Highway Operations</i>	•	•		•	•	•

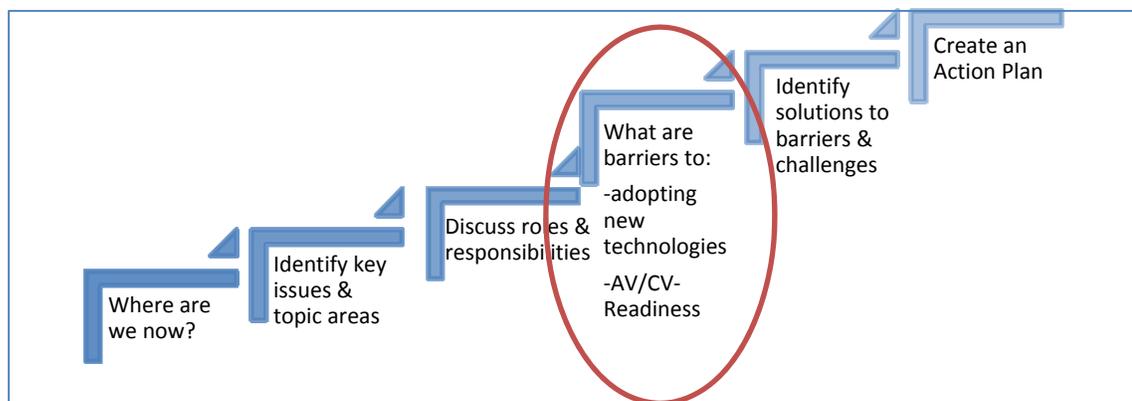
Discussion Items

The Task Force concluded the meeting discussing what, if anything, is missing from the areas of investment, or modes and available technologies that may fit into them. There was also discussion about how different modes relate to each other and often overlap, such as smart parking and Complete Streets, and Transit and Shared Mobility. There was a lot of interest in Complete Streets and developing guidance on how to implement them successfully.



NEXT STEPS

Autonomous Vehicles (AV) and Connected Vehicles is an emerging issue that warrants its own meeting. The CDTC SMART Communities Task Force will schedule a meeting to focus on AV-Readiness. Questions like what infrastructure is needed for successful AV deployment, how to leverage the benefits of AVs and minimize negative externalities, and how the Capital Region can act as a living laboratory to autonomous and connected vehicle technologies? Who are our partners?



The next Task Force meeting will be scheduled for Wednesday, May 9th at 3:00pm at the CDTC office and will feature presentations and discussions on AV-Readiness.