



TRANSPORTATION IN TRANSITION: TECHNOLOGY AND INNOVATION

NEW YORK METROPOLITAN TRANSPORTATION COUNCIL
ANNUAL REPORT 2015

About NYMTC

The New York Metropolitan Transportation Council (NYMTC) is a regional council of governments that is the metropolitan planning organization for New York City, Long Island and the lower Hudson Valley. NYMTC provides a collaborative planning forum to address transportation-related issues, develop regional plans and make decisions on the use of federal transportation funds. The NYMTC planning area covers 2,440 square miles and a population of 12.4 million, which was approximately 64% of New York State's population based on 2010 Census counts.



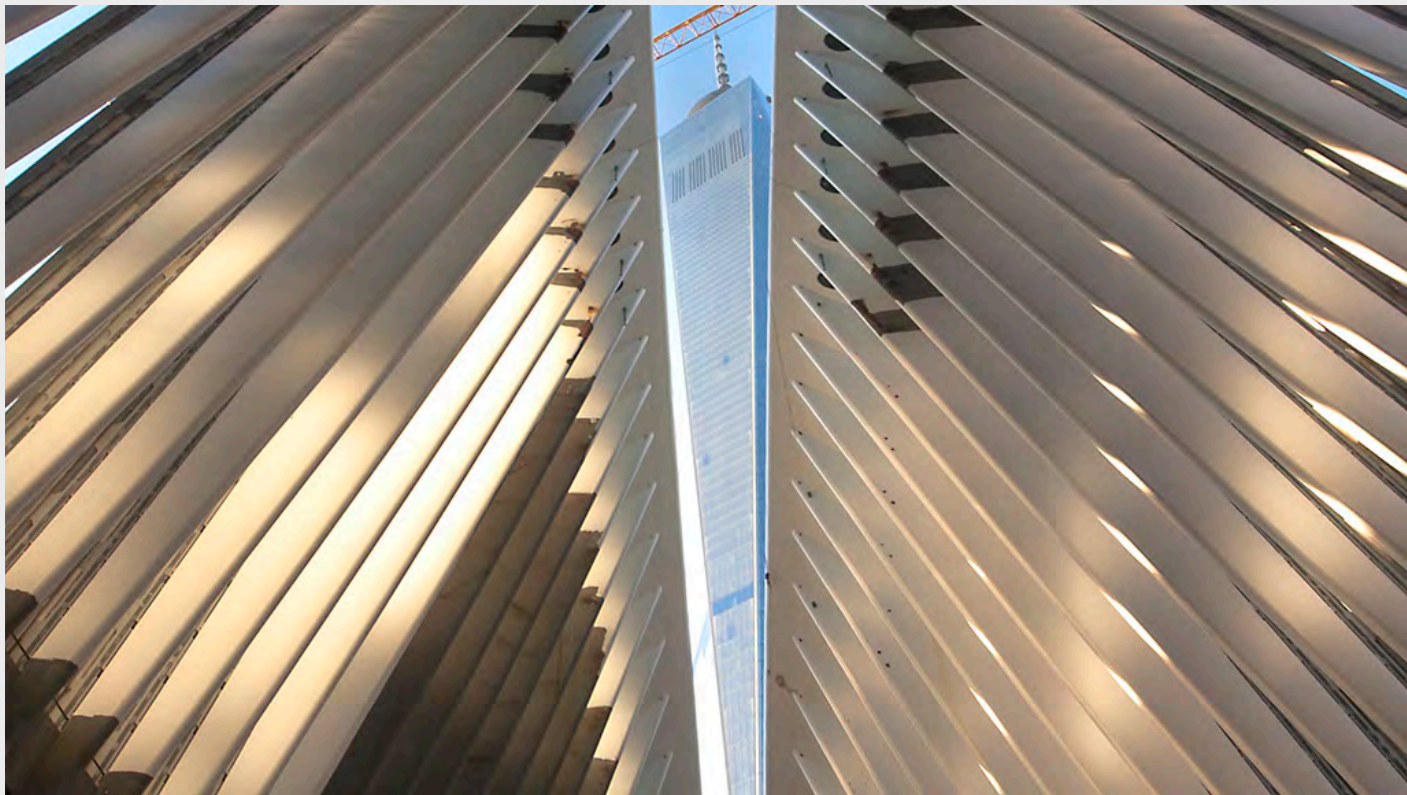
NYMTC Mission Statement

- ▲ To serve as the collaborative forum to address transportation-related issues from a regional perspective;
- ▲ To facilitate informed decision-making within the Council by providing sound technical analyses;
- ▲ To ensure the region is positioned to capture the maximum Federal funds available to achieve the goals of the Unified Planning Work Program, Regional Transportation Plan and Transportation Improvement Program; and
- ▲ To focus the collective planning activities of all Council members to achieve a shared regional vision

2014 in Review

A Year of Accomplishments

- ▲ Regional Household Travel Survey Final Report issued
- ▲ Regional Establishment Survey pre-test completed
- ▲ Implementation Plan for Regional Sustainable Development and final reports for place-based and area wide components of the HUD-funded New York-Connecticut Sustainable Communities Initiative were released
- ▲ Adoption of State Fiscal Year 2014-15 Unified Planning Work Program (UPWP)
- ▲ More than 100 Transportation Improvement Program amendments and administrative modifications
- ▲ First project solicitation and selection under Transportation Alternatives Program completed
- ▲ Regional emissions analysis performed and Transportation Conformity Determination was adopted under the Clean Air Act Amendments of 1990
- ▲ Transportation Information Gateway Phase I completed
- ▲ 2013 Hub Bound Travel and Quarterly Travel Patterns in New York Metro Area released
- ▲ Draft 2050 Socioeconomic and Demographic forecasts developed
- ▲ Commentary submitted on proposed federal rules that will govern the new federal Performance-Based Planning & Programming requirements under MAP-21
- ▲ Three Complete Streets and one Safe Routes to School community workshops were undertaken using UPWP funds
- ▲ Presentation of Plan 2040 to Westchester County Transportation and Planning Boards; Nassau County and Suffolk County planning commissions; Hudson Valley Regional Council and Long Island Regional Planning Council; and Mid-Hudson South Mobility Advisory Forum



TRANSPORTATION IN TRANSITION: TECHNOLOGY AND INNOVATION



Over the course of human history, a progression of technological developments and innovations has transformed the way people and goods move from place to place. The wheel, steam-powered ships and locomotives, internal combustion engines, electric motors and jet engines have all opened doors to greater travel, expanding commerce and increasing globalization.

This report will explore the technological developments and innovations that are driving change in travel and the management, operations and safety of the regional transportation system and what we might expect into the future.

A RAPIDLY CHANGING ENVIRONMENT FOR TRANSPORTATION

Many factors influence how the region's transportation system operates now and how it will look into the future. NYMTC's long-range regional transportation plan, *Plan 2040: A Shared Vision for a Sustainable Future*, identifies the next set of drivers of change that will likely impact the provision and use of transportation services and facilities in the long-term, including *Technological Innovations*. NYMTC and its member agencies have been increasingly integrating new innovations and technologies into the operation and management of the regional transportation system, changing the way services and facilities are both provided and used, and altering the system itself: how people use it and the way it operates, making travel safer and more effi-

cient, and enhancing the experience for all users.

Technological developments will continue to have a significant and transformative impact on the transportation system as they come into wider use, especially in the following areas:

- *Information and communications technologies*
- *Energy technologies*
- *Automation of goods production and delivery*

INFORMATION AND COMMUNICATIONS TECHNOLOGIES (ICT)

The Internet provides a powerful tool for communicating real-time information about the transportation system to its users, helping them make decisions about when, where and how to travel and even how often. Smart phones provide on-the-go access to the Internet, supported by computer applications - or "apps" - developed for the express purpose of sharing real-time transportation information.

Wireless networks are key to accessing data, and NYMTC's members are committed to expanding access. For

example, the Port Authority of New York & New Jersey is installing wireless infrastructure at the World Trade Center site and at area airports, as well as the Lincoln and Holland tunnels, and improving wireless service at the Port Authority Bus Terminal. Additionally, the Metropolitan Transportation Authority (MTA) has committed to providing wireless service in all of its underground stations, with dozens online to-date, while New York City offers free Wi-Fi hot spots in a growing number of public locations. NYMTC's members continue to integrate ICT to make travel around the region easier:

▲ *511NY*, the free, one-stop telephone and web service, gathers and provides information on transportation services and conditions throughout New York State and serves as a source for numerous transportation apps.

▲ The MTA offers *Train Time* apps for MTA Long Island Rail Road and MTA Metro-North Railroad customers; MTA *Subway Time* and the *Weekender* web apps include real-time train arrival information at 154 stations. The *Bus Time* app uses Global Positioning Systems (GPS) and wireless communications technology to track the location of buses.

▲ Westchester County launched SMART Initiatives in 2015, including Twitter feeds that provide up-to-date information on Bee-Line service and a redesigned county web site – Westchestergov.com – that makes information easier to find and more accessible on mobile devices.

▲ Rockland County plans to offer bus arrival times to passengers using real-time information, and has been using social media to provide bus service status advisories during weather events. The county will also offer onboard Wi-Fi.

▲ Putnam County developed an app to view transit schedules, which can also be accessed through its PutnamCountyCares.com website.

▲ Nassau County's NICE bus passengers will soon be able to see bus arrival times on their smart phones; the county's mobile ticketing app will mine data to fully gather travel and usage patterns.

▲ Similarly, a real-time bus app is under development for Suffolk County Transit, which will show bus arrival time and service alerts such as accident and road construction detours. Suffolk County Transit is also enhancing

The image shows a large digital display for the MTA LIRR Train Time app. The left side of the display features an advertisement for the app, which is described as "LIRR's official, FREE app – any train, any time, any place, in real time." The ad lists features: "PLUS... Train status and service advisories; Schedules, fares, station information and maps; LIRR's Social Media feeds, News, Deals & Getaways, Maps and Alternative Travel Information." It also includes a smartphone showing the app interface and the text "DOWNLOAD LIRR'S OFFICIAL APP TODAY! mta.info/lirr".

The right side of the display shows a real-time train schedule table. The current time is 01:47. The table lists train times, destinations, and service notices.

TIME	TRK	DESTINATION
12:00	21	West Side Yard
12:01	20	West Side Yard
1:48	14	Port Washington
1:51	17	Huntington
1:57	16	Babylon
2:12	--	Ronkonkoma
2:18	--	Port Washington
2:22	--	Huntington
2:25	--	Babylon

Below the schedule, there is a "LIRR SERVICE NOTICE" section. It states: "Martin Luther King, Jr. Day. There is no train service between Greenvale & Ronkonkoma on Monday, January 19, Martin Luther King, Jr. Day, as the LIRR will be running on a weekend schedule. Customers may wish to use the Montauk Branch as an alternative."



its online presence with an upgraded website and Twitter updates.

▲ Suffolk County's Bus Rapid Transit (BRT) initiative will include bus stations equipped with displays that will provide information on coordinated transfers to connecting buses, as well as advising passengers when the next bus is due to arrive.

▲ The New York City Department of Transportation's (NYCDOT) web-based iRideNYC.info allows users to obtain real-time travel information on

buses and subway, as well as *Citi Bike* information.

▲ The MTA's App Quest seeks privately-developed transit apps that will make the system better for every transit rider in the categories of Accessibility Innovation or Consumer/Transit Rider Apps.

Enhanced online capabilities also allow a vast array of information about the transportation system to flow not just to travelers, but also to transportation planners and providers as data is col-

lected through GPS and other technologies about how, when and where people travel. This information sharing enables better regional planning, more innovative transportation options and a smoother, safer, faster travel experience.

Organizations such as TRANSCOM, a coalition of sixteen transportation and public safety agencies in the New York - New Jersey - Connecticut metropolitan region, collect and share data related to the transportation system to provide a cooperative, coordinated approach to regional transportation management. TRANSCOM's free data feed offers users access to real-time events and travel time data, which is then made available to travelers to help them determine best routes to avoid accidents, congestion and construction.

The way that NYMTC itself gathers and shares data will dramatically change with the development of its *Transportation Information Gateway*, which will provide NYMTC, its members and the public with an extensive data warehouse to access visualize and download data related to NYMTC's planning process via a set of web apps and interfaces.

Through its *Vision Zero* program, NYCDOT is using a data driven approach to target priority locations for safety improvements. The Vision Zero Pedestrian Safety Action Plans released for each borough in 2014 analyzed demographics, accident histories and public input through online interactive maps and community meetings to determine priority locations for safety improvements. NYCDOT's *Safe Streets for Seniors* program combines demographic analysis with data on intersection and corridor crash histories to identify districts where senior pedestrians are most at risk, and implements safety improvements such as pedestrian safety islands and shortened crossing distances to make these areas safer for seniors.



Crowdsourcing information from transportation users, stakeholders and the general public is a rapidly expanding data source for transportation planners and operators alike. Crowdsourcing draws input from a large group of people, and especially from an online community. In the NYMTC region, NYCDOT crowdsourced information when it helped plan the *Citi Bike* bicycle sharing program and the expansion of the bicycle network throughout the city. On a different scale, NYMTC crowdsourced issues and ideas as it developed its *Plan 2040*, using the innovative MindMixer platform.

Other Approaches

Other forms of ICT are intended to increase the safety and efficiency of the transportation system. For example, in 2014, the U.S. Department of Transportation's National Highway Traffic Safety Administration announced that it began taking steps to enable **vehicle-to-vehicle (V2V) communication** technology for light vehicles. This technology would improve safety by allowing vehicles to "talk" to each other and ultimately avoid many crashes altogether by exchanging basic data, such as speed and position, ten times per second. On-board V2V and **vehicle-to-infrastructure (V2I) communica-**

tion technology has also shown potential to increase efficiency and reduce emissions.

An **autonomous and connected vehicle** – for example a driverless car – also has the potential to increase both the safety and efficiency of roadways and streets. Similarly, **Communications-Based Train Control (CBTC)** and **Automatic Train Control (ATC)** provide improved and safer service. The MTA has fully installed CBTC on the L subway line and is in the process of expanding it to numerous

other lines in Queens and Manhattan. The Port Authority is implementing ATC as part of its signal system replacement program for Port Authority Trans-Hudson (PATH) trains.

Intelligent Transportation System (ITS) technologies are increasingly being integrated into transportation systems management and operations to collect, store, process and distribute information related to the movement of people and goods. Using ITS as its foundation, **Active Transportation Demand Management**





(*ATDM*), provides the capability to monitor, control and influence travel, traffic and facility demand of the entire transportation system and over a traveler's entire trip chain to prevent or delay breakdown conditions, improve safety, promote sustainable travel modes, reduce emissions and maximize system efficiency.

Intelligent infrastructure applies a similar approach to the maintenance, management and operations of transportation facilities and services. Information about the structural and operational conditions of transportation facilities, equipment and services is routed to their owners, operators and managers in order to better maintain their effectiveness and physical condition. These technologies are integrated into the Port Authority's Replacement Goethals Bridge Project and the Bayonne Bridge "Raise the Roadway" project, both under construction.

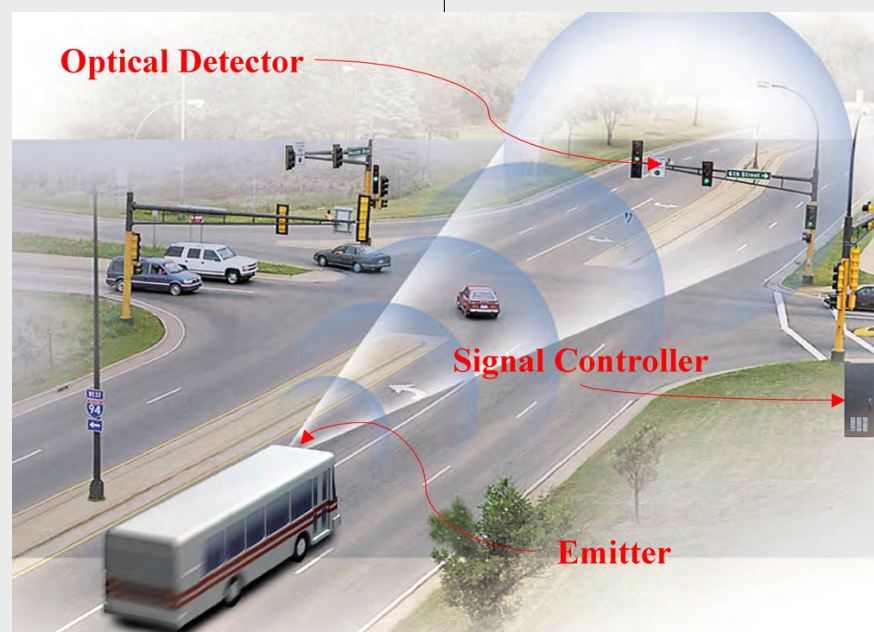
Integrated Corridor Management (ICM) is an example of a specific ATDM approach which analyzes transportation information in a defined transportation corridor from a multi-modal perspective, allowing technologies for traffic, transit, freight and other modes to work together in easing overall congestion. In the NYMTC region, transportation agencies applied for and received a \$200,000

grant for the planning component of ICM deployment along Interstate 495, from New Jersey to Long Island, through the Lincoln and Midtown tunnels, to improve overall performance in the corridor by providing better knowledge about real-time conditions and alternative travel options to users of those facilities. The effort was spearheaded by NYCDOT, in partnership with NYMTC, the North Jersey Transportation Planning Authority, the Federal Highway Administration and the New York State Department of Transportation (NYSDOT).

Two crucial elements must be in place before any ATDM or ICM approach can be effective: the comprehensive and integrated electronic monitoring and control of major roadways and the services they carry, along with Transportation Management Centers (TMCs) and traveler information systems such as 511 NY. Examples in the NYMTC planning area include:

▲ NYSDOT has established TMCs in New York City, on Long Island and in the Hudson Valley. Through the TMCs, the New York State Department of Transportation and the New York State Police and other agencies have entered into a partnership to implement a broad range of ITS strategies including information processing, communications control equipment and electronics.

▲ To prevent trucks from entering parkways and striking low clearance bridges, NYSDOT is installing infrared detection systems along certain parkway entrances in the Hudson Valley, New York City and on Long Island. The system detects when a truck enters the ramp, triggering electronic signs warning drivers not to proceed and sending notification to police and the TMC.





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BUS TRANSIT



▲ The MTA has outfitted 45 Select Bus Service (SBS) buses on the M15 route in Manhattan with Traffic Signal Priority (TSP) equipment that communicates real-time bus locations to the NYCDOT TMC, which remotely controls traffic lights along the route to make bus service faster and more reliable.

▲ The Port Authority uses variable message signs to display travel times to allow travelers and shippers to make better informed choices and adjust schedules to optimize trips.



▲ As part of implementing the recommendations of New NY Bridge Mass Transit Task Force, NYSDOT will be developing the "Route 59 Smart Corridor" in Rockland County to serve the BRT system proposed by the Task Force. New traffic signal technology will enable traffic to move more quickly and reliably. Transit priority measures are also planned, as well as improvements to access points along the New York State Thruway.

▲ Rockland County is proceeding with plans to install technologically-advanced equipment for its Transport of Rockland (TOR) and TAPPAN ZEEExpress (TZx) fixed-route services, including upgraded onboard computers and Computer-Aided Dispatch/Automatic Vehicle Locator (CAD/AVL) systems, and is using electronic fare-boxes to improve the fare collection process and enable the collection and use of electronic data.

▲ Putnam County will use *Route Match* software to perform the scheduling duties of its paratransit service and to locate all buses in real-time via GPS technology.

▲ Installation of TSP along the Route 100/Central Avenue corridor in Westchester County is scheduled to begin in 2015, with a goal of minimizing the time buses spend at traffic lights and speeding up services on the busiest route in the Bee-Line System.

▲ Data available through Westchester County's new AVL and Automated Passenger Counting (APC) systems has allowed for more robust diagnostic abilities for operations and service planning to determine the causes of delays, locations and duration of overcrowd-





ing and opportunities for more efficient service based on real time information.

▲ In Nassau County, the NICE system is nearing completion on an upgrade to its AVL and APC systems and its operations communication system, as well as its new Command Center. The upgraded AVL system and the APC system will both allow for easier operational information and problem-solving with regard to breakdowns, bus bunching and heavy traffic, resulting in improvements to on-time performance, as well as an understanding of the way passengers use the system. In addition, Nassau County's *Real Time Bus Status* transmits "bus health," allowing NICE maintenance staff to determine mechanical issues while the bus is in route and respond accordingly. The county's *Bus Trek* computer program uses GPS data to allow bus dispatchers and managers to improve dispatch and scheduling decisions.

▲ Nassau County is also incorporating more signalized intersections into its centralized TMC: more than 700 traffic signals have been converted to the new generation TMC, allowing the county to

more quickly adjust to changes in traffic flows.

▲ Suffolk County is developing an AVL system, which will provide more accurate timetables, comparing point to point travel times with those on current schedules.

ENERGY TECHNOLOGIES

Conventional energy technologies for transportation usually involve the use of fossil fuels for vehicle propulsion. Many auto and truck manufacturers are working to develop more sustainable vehicles in order to address emissions regulations, unstable fuel costs and uncertain supply in the longer run, and the harmful environmental effects of petroleum as a fuel source.

Fossil fuels create significant environmental impacts, including the production of carbon dioxide and other greenhouse gases. Cashless tolling in place on the Henry Hudson Bridge, and planned for the *New NY Bridge* help reduce vehicular congestion and attendant air quality issues. Public sector policies and programs in the region target reductions in the use of fossil fuels by increasing the

use alternative fuels at various levels; use of federal Congestion Management/Air Quality (CMAQ) funding directed at vehicle purchases for publicly-owned vehicle fleets; vehicle retrofits to reduce particulate matter emissions; and purchasing policies for municipal vehicle fleets. Other policies, such as *New York State Clean Pass*, allow alternatively-fueled and lower emissions vehicles to make use of premium transportation facilities such as High-Occupancy Vehicle lanes as an incentive for private ownership.

The *Charge NY* initiative will create a statewide network of up to 3,000 public and workplace charging stations over the next five years, and to put up to 40,000 plug-in electric vehicles on the road during that period. Rockland County is working with the New York Power Authority and the New York State Energy Research and Development Authority to include Electric Car Charging Stations with the expansion of existing Park & Ride facilities, such as the Thruway Exit 14 Park & Ride in Nanuet, or the construction of new facilities such as the new Monsey Park & Ride facility. Westchester County currently has 99 hybrid buses in use on the Bee-Line System, and Suffolk County will



Rendering of the New NY Bridge to replace the Tappan Zee Courtesy of the New York State Thruway Authority

add hybrid buses to its growing transit fleet, along with replacing larger buses with quieter, smaller and more fuel efficient buses on routes that traverse into smaller communities.

AUTOMATION OF GOODS PRODUCTION AND DELIVERY

According to the Regional Freight Plan component of NYMTC's *Plan 2040*, more than 405 million tons of freight moved into, out of and through the region in 2007, with 91% being carried by truck. A 46% increase, to 592 million tons, is expected by 2040. Accommodating this dramatic projected increase will be a major challenge for the transportation system in the NYMTC planning area and rest of the New York metropolitan region.

Technology is affecting how goods are produced and delivered, altering global supply chains, improving safety and reducing congestion, allowing real-time tracking of cargo and equipment, expanding trade, improving scheduling and more efficient fleet management, and allowing routing shifts in real-time to avoid incidents that have occurred and to prevent incidents from happening.

Robotics increases the speed of delivery and the productivity of equipment in warehouse settings, and **information systems** enhance inventory control and better manage products as they move through the supply chain. In addition, companies such as Amazon are developing automated systems for delivering goods; including using **airborne drones**. Such automated goods delivery introduces another dimension to the forecasted increase in the region's freight tonnage through 2040 involving the speed and reliability of goods movement to meet the demand of ever faster order fulfillment.

Technologies to make freight movements and deliveries safer, less impactful and more efficient in the New York metropolitan region are part of the regional Goods Movement Action Program (G-MAP) developed by the Port Authority and New York State and New Jersey departments of transportation. These agencies, along with NYCDOT, are also advancing a regional overweight truck enforcement effort and have begun to share Weigh-In-Motion (WIM) data and coordinate future WIM investments to leverage each agency's capital investments, increase compli-

ance and mitigate the damage to transportation infrastructure from overweight vehicles. Preliminary findings from NYC-DOT's WIM installation on the Alexander Hamilton Bridge affirm the technology's effectiveness in identifying overweight tractor-trailers on the George Washington Bridge/I-95 corridor, the region's busiest freight route.

At the same time, securing port facilities has been the single most important issue for Port Authority terminal operators. The Port of New York and New Jersey remains the top port on the East Coast in terms of volume, while John F. Kennedy International Airport is ranked among the top air cargo gateways in the country. In partnership with Sustainable Terminal Services, Inc., a consortium of terminal operators, the Port Authority has implemented radio frequency identification technology - wireless non-contact systems whose electromagnetic fields transfer information from tags to appropriate reader machines - at its port facilities. In addition to reducing the need for police resources, this technology has helped to reduce the environmental impact of port commerce by ensuring compliance with Port Authority clean truck initiatives.



Operators now know vital information about the trucks serving the port on a daily basis.

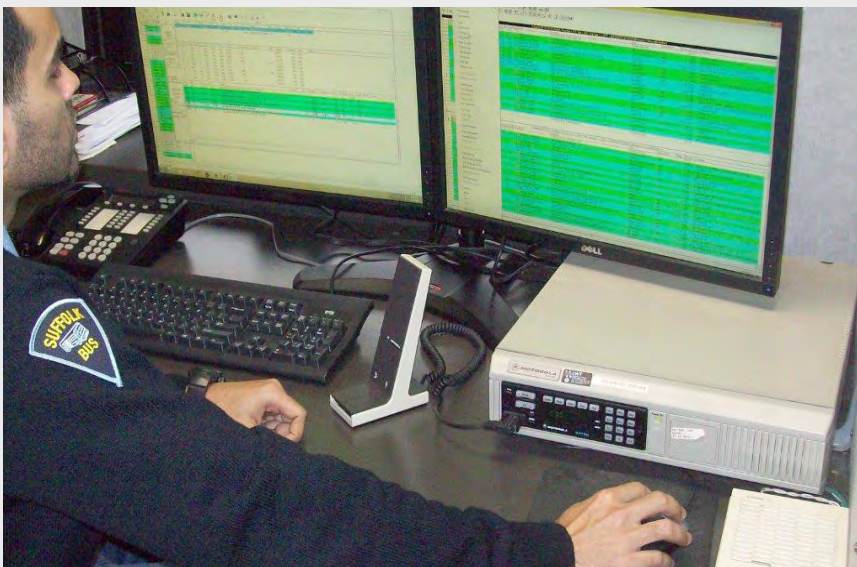
A Transformative Production and Delivery Technology?

Over the next several decades, the production and delivery of goods may be radically transformed by **3D printing**, also known as **additive manufacturing**, which has the potential to create an Internet of Goods to augment the existing Internet of Information and Internet of Things. In doing so, 3D printing could transform, in whole or in part, the manner in which goods are manufactured and delivered to consumers. The degree to which this technology matures over the next several decades could mediate to some degree the demand to physically move goods between locations by bringing the production of goods directly into homes and workplaces.

GENERATIONAL CHANGES AND TECHNOLOGICAL DEVELOPMENT

The coming of age of the generation dubbed *Millennials* – considered those born between 1980 and 2000 – has dramatically changed the way developing technologies are being used in daily life, including how people travel around the region. At the same time, the aging *Baby Boomer* population – those born between 1946 and 1964 – requires transportation operators and providers to consider their safety and mobility needs and how to best integrate them with these technologies. Both of these populations demand more and different things from the region's transportation system than previous generations in terms of availability of information and the role technology plays in getting them from place to place.

Millennials have grown up with the Internet and have a strong awareness of and comfort with modern information technology. They own fewer cars than previous generations and are super users



of the region's transportation – particularly transit – system. They expect those services to be state-of-the-art in terms of real-time information delivery, functionality, fare collection and comfort. Car and bike sharing, apps that provide instant travel information, the ability to use smart fare cards across systems, cashless technologies and increased off peak and reverse travel options appeal to Millennials.

The impacts of these generational changes are already evident in the NYMTC planning area, as evidenced by population shifts to and within New York City, which has seen a relatively flat trend in growth in vehicle miles of travel; unprecedented transit usage patterns; the expansion of car and bike sharing services such as *Zip Car* and *Citi Bike*; and the emergence of app-based transportation services such as *Uber* and *Lyft* (and attendant regulatory considerations in other NYMTC jurisdictions).

In response, the New York City Department of City Planning has amended zoning laws to encourage and support car-sharing, cycling and rental car usage as alternatives to auto ownership. The MTA has rolled out the next generation of handheld mobile ticketing devices for onboard ticketing via credit or debit cards using iPhone technology, and introduced smart card friendly Ticket Vending Machines for the MTA Long Island Rail Road and MTA Metro-North Railroad. The Port Authority, NJ Transit and MTA are evaluating technology for a contactless smart card that will allow commuters to transfer between various mass transit systems. Nassau County will soon install smart fare boxes that allow customers to pay via smart card, credit card, Apple Pay and student ID. Suffolk County will install a high speed electronic fare collection system that will allow multiple payment options including reusable stored value type cards, contactless smart cards, and cellphone ticket purchases.



Baby Boomers are more active than their predecessors and equate mobility with independence. However, as they age, their need for alternate transportation options increases. While their requirements and reasons for using the transportation network may differ from Millennials, Baby Boomers have similarly integrated technology into their travels as access to and use of the Internet and social media

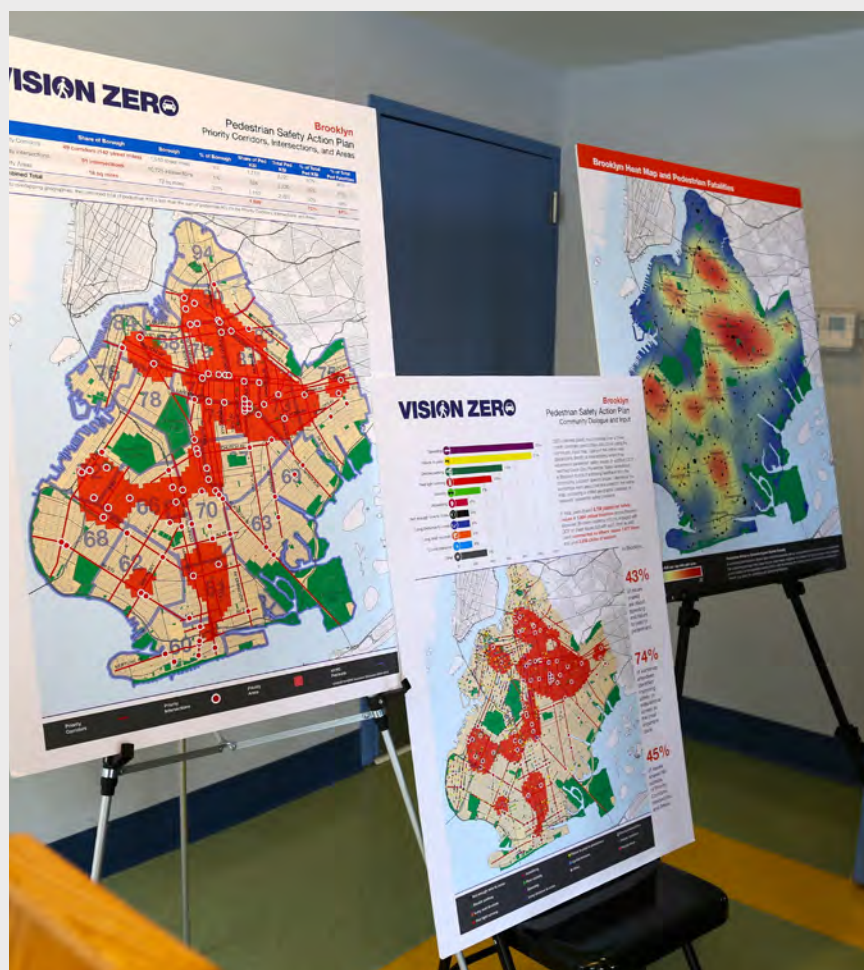
has increased across generations. As an example, passenger surveys conducted on Westchester County's Bee-Line System revealed that, while in 2010, only 43% of people 60 and older had Internet access, by 2013, that proportion had increased to 50%.

NYMTC's members are responding to these changing needs by using tech-

Millennials and Baby Boomer Population in New York City and the Region

Taken together, Millennials and Baby Boomers represent a considerable portion of the region's population. Both demand more and different things from the region's transportation system in terms of availability of information and the role technology plays in getting them from place to place.





nology to improve access to ridesharing and accessible transit options:

- ▲ The MTA's *Access-A-Ride* (AAR) system offers Interactive Voice Response with scheduling-dispatch software and an automatic vehicle location monitoring system, giving customers 15 minutes notice to prepare for timely boarding. New self-help features will allow customers to check trip status, manage subscriptions, cancel trips and perform other AAR transactions automatically by phone.

- ▲ Rockland County's TRIPS paratransit service will implement computer-aided dispatch and scheduling and upgraded mobile data terminals to support turn-by-turn navigation, replacing a radio communication system with a cellular data system, onboard cameras and an

automated/interactive ride information and confirmation call system.

- ▲ Westchester County also launched an online reservation for its paratransit service to allow for advance reservations and improve customer experiences.

- ▲ Suffolk County's new online paratransit reservation system will allow for 24/7 advance reservations for the Suffolk County Accessible Transit (SCAT) program. GPS-guided computer aided dispatching and manifest updates will increase routing efficiencies.

PLANNING FOR THE LONG-TERM

Across generations and across the region, technology and innovation are changing the way people travel, when they travel and why, as well as their expectations of and experiences with the

transportation system. New generations of technology support safer and more efficient operations and supply state-of-the-art information to travelers, changing how transportation services are provided and used, and how the system as a whole is managed.

However, these rapidly evolving changes present both a challenge and a quandary to the planners whose job it is to look at the long-term future and imagine the region's transportation needs. How will developing technology affect on the way people use the transportation system twenty-five years from now? How will the system adapt to meet those needs? And how will technology be used to mitigate the impact of that future transportation system on the environment and quality of life of surrounding communities?

To address these questions, planners must attempt to define the level of long-term technological development that may occur; the innovations that may result from that development; and the changes in the way people and goods are moved by the system. They must also attempt to forecast the changes in the demand placed on the system and potential changes to its capacity given expected technological development. Out of necessity, NYMTC's members will be called upon to make judgments about the long-range impacts of these futures in order to reasonably define long-term goals and directions and plan for the region's transportation future.



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