NEXT GENERATION PLANNING:

PILOT PROJECTS TO TEST & SCALE INNOVATION

AUGUST 5 & 6, 2019

COMPASS EDUCATION SERIES

WGI

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COMMUNITY PLANNING ASSOCIATION
of Southwest Idaho

Why Pilot Projects?

Managing change in changing times

The reason to initiate a pilot, or small test, is to try out something new on a small scale before investing time, energy, money and trust in a larger project. Seems reasonable – right?

But often the mere process of piloting new ideas can be controversial. Without proper groundwork and design, pilots lose the ability to gain critical feedback, build consensus and scale valuable new ideas and approaches. This is as true for technology pilots as it is for testing new program design or using demonstration projects to reshape streets (or all three at once). Pilots also provide insight as to whether technologies will add value and utility.

Pilots also, by their nature, involve two ideas that are not always popular: (1) embracing change and (2) learning through adaptive testing. Pilots need to address change drivers of most importance to the community and strive to limit those missteps through thoughtful pilot project design.

This Guide

What are Pilots?
The Benefits of Conducting Pilot Projects & Programs
Summary Pilot Project Design
Examples
Success Factors in Designing & Scaling Pilots
Emerging Issues

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Summary of Pilot Project Design

Pilot project design is critical for ruling out avoidable process mistakes. In general, pilot projects contain a universal set of steps:

1. Goals: Set clear goals & define success
2. Pilot scope: Length of time, geographic area, phasing, budget, staffing
3. Critical Success Factors: Proof of concept, regulatory-readiness, partners, funding, feasibility factors, potential disruptions, potential pilot scaling, pilot close out
4. Testing Group: Initial focus group, feasibility, pilot audience, user journeys, product-market fit
5. Marketing: Marketing plan, On-boarding procedures, feedback
6. Data: Collection, and Ownership; Reporting requirements
7. Pilot implementation: Draft, scenarios; impact assessments, contingency planning; fees and bonding requirements, activities by week/day; initial input from pilot participants; customer support; emergency pilot response
8. Training: Pilot staff Training, dry runs
9. Tracking & Performance (scenarios, metrics, tracking system
10. Evaluation: metrics, action triggers
11. Decision to Proceed (expand, pivot, halt)
12. Close out: Report, equipment removal, asset transfer or sale

The Whole Product Wheel

For stakeholders involved in planning pilots and new services, it's helpful to use a "whole product wheel" to determine the range of success and support factors both (1) during the pilot, and (2) for eventual market and/or service adoption. The example below is a snapshot of success factors related to shared, electric scooters:

Many of the problems associated with shared scooters (safety, careless parking) are likely associated with the fact shared scooters are a new mode and that success factors may not even be evident until a pilot is underway.

One of the more vexing aspects of micromobility like scooters is their "grab and go" appeal. To meet this mobility desire, however, they need to be readily available, or ubiquitous. On the other hand recharging and reducing "scooter clutter" call for a more a orderly parking system. This is, perhaps, the biggest tension and challenge for future pilots and service design.

Through documenting success factors, cities and shared scooter companies can understand better points of intervention and partnerhips to build safe, convenient, financially sustainable mobility models, including pilots.

Scenario & Anticipatory Planning

Pilot project design often only includes steps for a first testing phase. This is a reasonable approach since a pilot is, by design, testing an untested idea or technology.

Emerging technologies are challenging this "wait and see" process, since many smart city and mobilty technologies are delivering immediate benefits. However, these new modes are not easily configured into feasibility studies, travel demand modeling, and transportation impact decisions.

This is an important point. Transportation Network Companies (TNCs) such as Uber and Lyft are fundamentally changing travel and parking patterns, particularly for airports, entertainment districts, and hotels. Transportation and urban planning need new tools to understand and incorporate trends and uncertainty.

The planning profession is developing or modifying processes to better incorporate trends. Here are three new planning approaches:

Evaluating change drivers: Communities can begin to look at change drivers and their impacts. For technologies, this can include a wide range of smart city and transportation technologies such as shared-use and autonomous vehicles. For AVs, it's important to separate out the various vehicle types since autonomous transit will have different impacts than autonomous cars;

Exploratory scenario planning: Traditional normative scenario planning used by MPOs sought to define discrete alternative futures in order to pick a preferred scenario. With disruption, instead of seeking what's preferred, the objective is exploring the range of "What ifs;" and

Anticipatory planning: Also referred to as predictive planning, this type of planning uses foresight techniques to predict the anticipated evolution of a change driver. This is helpful for pilots where a stakeholder group can chart out how to test and manage that likely evolution.

MPOs, Pilots and Long-Range Planning

The potentially largest sources of disruption will arise from automated and connected vehicle technologies, which could bring both benfits and risks. The United States Department of Transportation (USDOT) is actively fine tuning its guidance on planning, policy setting and support, including pilot programs.

States and Metropolitan Planning Organizations (MPOs) are already required or encouraged to modify planning processes to incorporate change into forecasting. This includes next generation plans such as exploratory scenario planning, predictive planning, performance-based planning, and transportation pilots. In adopting innovation, USDOT see four models:

Many, if not all, state Departments of Transportation have initiated programs to study and integrate automated and connected technologies. For MPOs, the main channel for integration is the Long Range Transportation Plan. Within these plans, MPOs will need to consider both existing elements and emerging trends:

Infrastructure: Community and transportation system goals, operations, preservation, maintenance, and Complete Streets

What's changing: digital upgrades, aerial rights of way, job retraining, transportation funding, impacts from shared-use mobility, increased traffic from e-commerce, potential ridership changes with autonomous transit

Services: Agency capacity, mobility, availability, social/economic trends, navigation and wayfinding

What's changing: Agency retraining, new ownership models and vehicle types, increased attention to cybersecurity, potential new services, digital wayfinding, use of augemented reality for wayfinding, and Mobility-as-a- Service (or MaaS)

Congestion Management Process: Identify and monitor congested locations, travel time, shifts in travel patterns, work zone management, roadway usage

What's changing: Data gathering, real time information, dynamic tolling, and changes in travel demand forecasting techniques

Goods Movement: Ports, rail corridors, highway freight, distribution networks, just-in-time supply chains, overnight delivery

What's changing: E-commerce and increase in deliveries, distributed warehousing, ground and air drones, 30-minute delivery, courier network services. mobile retail vehicles, and services

Travel Demand Modeling: Normative scenario planning, four-step travel modeling, multi-modal trip generation, mode splits, population and job growth/loss, VMT, and model calibrations

What's changing: unknown trajectories, exploratory scenario planning, assumptions (Vehicle Miles Travelled (VMT), parking, mode splits, zero-occupancy vehicles), local logistics

Transportation Improvement Program: Project selection criteria according to: safety, mobility, accessibility, efficiency, reliability, land use, urban design, equity, air quality

What's changing: Local goals will not change, however, forecasting and monitoring impacts related to untested and evolving trends/technologies will become more common> Time lines, priority ranking criteria, and projcet delivery are all likely to change.

A 2016 USDOT study surveyed Florida MPO readiness to incorporate innovative technologies into long range transportation plans and found the following needs:

- Potential impacts on travel demand patterns
- A plausible list of AV/CV scenarios to plan for
- Timeline(s) of availability of various technologies
- Adoption timeline(s) of various technologies
- Funding Sources and Private-Public-Partnerships
- Cost of technology (to government and private)
- Recommended investment strategies for local infrastructure
- Infrastructure needs and costs
- Local agency liability responsibility
- Operational impacts and benefits (measurable)
- Addressing Privacy Concerns
- System architecture (Cloud, SRDC, etc.)
- Architecture like the Intelligent Transportation Systems (ITS)
- Architecture that we can start incorporating designs into plans

MPOs and Regional Planning Associations (RPAs) are beginning to augment traditional activities with new approaches for piloting technologies. Several ideas are:

Data: Supply data to determine where pilots would serve a need
Funding: Provide funding or a cost matching pool of funds for pilots.
One Stop Resource and Single Point of Contact: Host a one-stop resource to track multiple pilot projects, including permitting, MOUs, data collection, reporting, and pilot analysis
Coordinate Public-Private Partnerships: Most pilots involve assets and resources from multiple sources. Coordinating roles, responsibilities and resources is a critical aspect in pilots.
Plans: Include pilot activities in Long Range Transportation Planning
Pursuing Pilots: MPOs can themselves pursue pilots with widely applicable outcomes, products and services
Analysis: Use Pilots to stress test and enhance forecasting and planning models
Next Generation Planning Support: provide training in Exploratory Scenario Planning, Performance-Based Planning and Pilot Project Design
Monitoring: Start data collection initiatives to monitor emergent trends in technology/services adoption and shifts in travel behavior patterns
Planning "Triggers:" Establish potential "dates of decision" for making policy changes to planning/forecasting procedures once technologies reach a certain point of adoption or if there is a noted trigger event.

City of San Jose California Demonstration Policy

In 2008, San Jose adopted an overarching policy framework for pilots and demonstrations "with the aim of developing, testing and demonstrating innovative solutions in San José in support of the City's Economic Development Strategy and City operations."

The policy gives the City the ability to: (1) Make available temporary use of City-owned land, facilities, equipment, right of ways and data, (2) Provide financial assistance and/or absorb some costs for project implementation, (3) Agree to non-disclosure statements, (4) Request City Council to exempt the project from certain City policies, and (5) Where appropriate, consider extended use of City assets that provide opportunities to demonstrate the return on investment provided by a particular innovation.

Demonstrations and pilots must contribute towards several city goals:

- Create new markets and new jobs and/or supports existing local innovators
- Improve quality and efficiency of City services and operations
- Advance the City's Green Vision and Economic Development Strategy; or
- Educate the public about innovative solutions.

Parking and Curbside Pilots

With the increase in ridehailing, deliveries, parking, and demand for urban living, curbsides are experiencing large and growing demand. As concerns over safety and conflicts among users increases, cities are seeking ways to better regulate curbs.

Seattle Washington is on the forefront of reassessing streets and curbs for adaptive uses. This includes policies, pricing, incentives, and street redesign. They also are working on flexible use zones that vary curb usage by time of day and day of week.

Mobility	Moves people and goods	• Sidewalks • Bus or streetcar lanes • Bike lanes • General purpose travel lanes - includes freight • Right-or left-turn only lanes
Access for People	People arrive at their destination, or transfer between different ways of getting around	• Bus or rail stops • Bike parking • Curb bulbs & ADA ramps • Passenger load zones • Short-term parking • Taxi zones
Access for Commerce	Goods and services reach their customers and markets	• Commercial vehicle load zone • Truck load zone • Courier Network Services parking • Curbside utilities
Activation	Offers vibrant social spaces	• Parklets and streateries • Food trucks • Public art • Seating • Street festivals
Greening Plantings	Enhances aesthetics and environmental health	• Boulevards • Street trees • Planter boxes • Rain gardens and bio-swales
Storage	Provides storage for vehicles or equipment	• Bus layover • Long-term parking • Reserved spaces (e.g. for Police or other government use) • Construction

Examples:

ParkDC -The District Department of Transportation (DDOT) useS technology to provide real-time parking availability information, as well as manage the costs of parking in certain areas at certain times in two neighborhoods: Penn Quarter and Chinatown.

Why the service

- Reduce time to find an available parking space;
- Reduce congestion and pollution, improve safety, and encourage use of other modes; and
- Develop parking management solutions through a cost-effective asset-lite approach.

Funding/Finance

Pilot enabled by FHWA grant to DDOT in August 2012.

Cameras and sensors cost of $2.5 million and $4.5 million, respectively. The annual operation cost for these was $1 million and $2 million, respectively.

Summary of Design

Date: The project started late 2014 and lasted four years

Key Performance Indicators

- Increased parking availability and increased use of low demand parking;
- Reduced double parking and circling for parking;
- Encouraged travel by other modes; and
- Improved operations of commercial loading zones.

Evaluation

DDOT measured performance through various parking statistics, as well as through statistics about other modes of transit. For example, the number of bikeshare trips increased by about 50,000 from 2015 to 2017 in the test area. This demonstrates the success in meeting one of their key performance indicators, encouraging travel by other modes. To overcome the lack of sensor data for each individual parking space, they experimented with fused data sets to eventually find the right collection of data points that would allow the city to most accurately predict parking demand and occupancy.

Marketing and Outreach

Signs explaining the project and how it works were placed near meters. People with questions were given information to contact the DDOT. Parking rules and regulations were made clearer. Surveys indicated a positive trend in customer service in the area.

Was there a pivot?

ParkDC changed the price of parking five times over the course of the project. During these changes, prices were decreased on seven percent of parking spaces, increased on 31 percent, and remained the same on 62 percent.

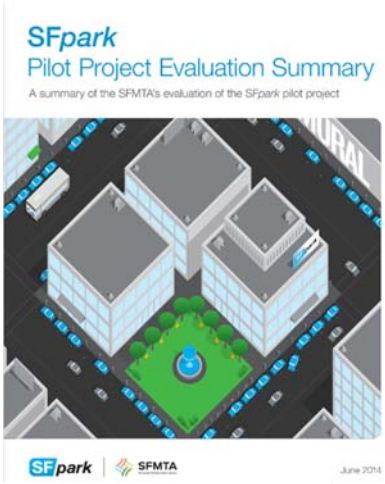
Current Status

ParkDC is currently implementing another pilot involving curbside management. In the Dupont Circle neighborhood, a pilot is implementing techniques to enforce and improve pick-up drop-off zones in the bust entertainment district. The pilot is intended to improve conditions for the nightlife in the area, as well as for commercial vehicles and mobility on demand, such as Uber and Lyft. The Golden Triangle Business Improvement District (BID), DDOT, the Office of Planning, Public Works, Parking Enforcement, and Metro Police, partnered on the restricted parking pilot, which operated between the hours of 10PM and 7AM from Thursday night to Sunday morning. In a three-block area with the highest concentration of nightlife venues. These blocks were identified using data supplied by

ridehailing companies (e.g. Lyft, Uber), which agreed to share anonymized data of pick-ups and drop-offs in the area.

This pilot freed the curbside for pick-up and drop-off activity so that instances of walking into the street to meet their vehicle could be reduced. This pilot began in late 2017 and will be evaluated at both six and 12 months to determine next steps

Other examples:



SFPark – Dynamic parking meter rates
SFPark was a federally-funded demonstration of dynamically-priced public parking. The 2014 pilot project used real-time data on parking availability, and to set demand-responsive parking pricing**.** The goal of SFPark was to open parking spaces on each block to reduce circling and double-parking. The top pilot lessons were:

- Because parking is a controversial topic, the city gave hundreds of presentations to community and merchant groups.
- Surprisingly, meter rates fell on average, as did parking infractions. Traffic flow also improved in the study area.
- The pilot was expensive (close to $49 million) due to the technology needed to track parking occupancy in real time, and the first-time nature of using technology to establish dynamic rate setting. Subsequent pilots for demand-responsive parking are seeking "device-light" methods of collecting information.

The Final 50 Feet Research Program: The Last Leg of the Urban Goods Delivery System

The University of Washington's Freight Lab is conducting research and pilots on urban deliveries. The main topics include reducing truck dwell times in loading zones and on streets and reducing failed deliveries.

Shared Electric Scooters (Scooter share) & Micromobility

In 2017, several companies introduced a new model of shared-use mobility that did not depend on stations, or docks. The first deployments were controversial since companies parked vehicles in rights of way without first notifying local governments, mostly in large cities. This eventually led to negotiations between cities and scooter vendors on terms of initial pilots.

These first pilots were generally governed through a permit process. Some of the early provisions and expanded regulations in second generation permits include:

Pilot Element	First Generation Regulations	Second Generation Regulations
Program and Permit Development	• Pilot Goals • Core Team & Budget • Oversight • Schedule & Launch • Emergency Action	• Equity & deployment in transit deserts • Integration into other programs (bicycle, transit) • Reinvesting fees into infrastructure • Termination (Nashville TN)
Customer Interface	• Registration Process • Reporting Problems • Pre- and Post- Survey	• In-App training & notifications • Gamification • Non-smartphone access • Dashboards
Hardware & Equipment	• Geofencing • Top Speeds • Location Accuracy	• Required maintenance • Required GPS check-in intervals • Lock-to parking requirements • Vehicle durability/loss reduction
Legal	• Scope • Fee & Penalty Structure • Data Sharing • Liability, Insurance & Indemnification • Right of Removal • Immediate Termination	• Certification (w/ national organization) • Performance bonds • Termination fees • Restricted areas (e.g., downtowns) • State level pre-emption on local regulations
Operations	• Number of Vendors • Fleet Size & caps • Data Analysis • Pricing & Strategies • Placement & rebalancing plans • Response times for vehicle retrieval • Recharging	• Pricing for low-income users • Performance goals • Integration with 311 reporting • Automatic speed reduction outside allowed areas • Data standards (Mobility Data Standard)
Land Use	• Parking in public rights-of-way • Integration with Transit	• Designated parking zones
Safety	• Vehicle standards • Safety equipment • Helmet requirements	• Removal of helmet requirements • Enhanced vehicle design • Enhanced lighting and reflective gear

Example

Austin Texas Micromobility program

Type of Tech: Austin defines vehicles as "Dockless Mobility Units," which includes small electric vehicles available to the public and does not require a receipt
Summary: Austin was one of the first cities to experience dockless bike share. A Chinese bike share company deployed dockless bikes during the annual South-by-Southwest conference. Since then, the city has methodically developed programs for both dockless bike and scooter share programs.

Why the service: Austin is experiencing rapid growth and related traffic congestion. The city wants to expand non-automobile options to feed riders to transit and to accomplish short trips. For micromobility, the city includes bicycles, tricycles, scooters and evolving low speed, shared modes.

Funding/Finance; The dockless mobility companies must pay $30 per vehicle. During the first permit cycle, these fees totalled $700,000 from 10 companies. In addition, the city's revised permit includes repayment of fees the city inccurs addressing or abating any violations of law, including impound dollars, impound fees, costs to recover a unit from a waterway and other ancillary costs, including repair or maintenance of public property, Dockless companies must also post a $100/vehicle performance bond

Summary of Design
Date: Austin passed its first micromobility ordinance March 2018 and updated in May of 2019

Evaluation: The city's Public Health Department, teaming with the Centers for Disease Control, conducted a first of its kind study of scooter-related injuries.
Key Performance Indicators

- Ride duration & distance
- Census tract for ride origin or destination
- Injuries (including whether a first-time rider, wearing a helmet, degree of injury)

Marketing and Outreach: In addition to a website and mobile app:
• Flyering and outreach for every change to the street or to rates
• Press event at launch of program

Was there a pivot? Yes- the city updated rules in 2019 to regulate scooters in the same way it regulates bicycles. This includes rules against texting while riding, bans multiple riders on a single device, and requires operators to not block sidewalks or building entrances when they park. During the second permit testing period, the city will examine scooter use in parks and on trails where they are now prohibited.

Current Status:

The city has an extensive open data system to track ridership patterns. Components include:

- The Dockless Vehicle Trips dataset updates trips taken in the city daily (over two million, and counting).
- The Dockless Data Explorer is an interactive tool that visually displays heatmaps where trips start and end.
- The Dockless Reporting Dashboard provides monthly summaries for statistics, such as trip numbers, miles traveled, average distance traveled, average trip duration, and number of devices.

Other examples

Portland Oregon 2018 E-scooter Findings Report

- 120 day pilot, 700,369 trips covering 801,887 miles on 2,043 e-scooters
- Companies were required to provide data that included real-time availability, trip starts and destinations, routes, and safety information as a condition of the permit. Each company was also required to have a helmet distribution plan.
- From surveys, Portland found E-scooters replaced driving and ride-hailing trips
- Top complaints were illegal sidewalk riding and incorrect scooter parking.
- The 2nd permit throughout 2019 will specifically focus on improving equitable access across the city and ensuring safe and legal riding and parking.

San Francisco Midpoint Evaluation for Scooter Share Pilot

- Demand for powered shared scooters is high in San Francisco
- Complaints about sidewalk riding and improper parking were significantly reduced under the pilot
- While State law no longer requires riders over the age of 18 to wear helmets, helmet use should be encouraged to prevent injuries
- The lock-to design addresses major issues with sidewalk clearance
- More robust equity engagement is needed to ensure powered scooter share programs effectively serve historically disadvantaged communities, especially low-income individuals
- Powered scooter share systems can serve the public interest when properly regulated

Ridehailing & Microtransit

Ridehailing (or TMC) services such as Uber and Lyft have become mainstream in most large and mid-sized cities. In some cases, these services have expanded mobilty while in others they are poaching transit riders and causing congestion. Microtransit describes on-demand, dynamically-routed shuttles that use technology similar to TNCs, but for shuttle passengers.

In order to garner the benefits while limiting problems with TNCs, cities, counties and transit agencies are developing pilot programs for specific use cases. These include serving high cost paratransit trips, first-last mile access to transit, and rides for late night workers when transit ceases operation for the

Summit New Jersey Rideshare Pilot to Transit Stations

Type of Tech: Partnership with ridehailing companies
Summary: In 2016, Summit faced a parking shortage at commuter lots for commuter rail in and out of Manhattan. Rather than construct additional expensive garages, the city decided to test a program offering ridehail subsidies to parking pass holders at rail stations. This example is a good case study of using microtransit and ridehail since it (1) feeds to transit and (2) solves a discernable pain point (parking).

Why the service: To free up parking and avoid the costs of constructing a garage.

Funding/Finance: Enrolled participants with prepaid parking permits are eligible for free rides and those without prepaid parking are eligible for $2 rides (since the cost of daily parking is $4). Costs to users are the same as parking costs ($4 a day). Subsidies made up the difference, costing the city $167,000, compared to construction costs of a typical garage (estimated $10 million).

Summary of Design
Date: The first pilot was launched in 2016, and an extension ran from 2017-2018
Evaluation: The main evaluation came from interviews with users.
Key Performance Indicators

- Costs and cost/user;
- Parking occupancy rates; and
- Conversion: parking patrons to transit users

Marketing and Outreach: Distributed to park and ride parking pass holders
Was there a pivot? Yes. In the second phase testing, the city switched from using Uber to Lyft. This shift came about because Lyft offered the capability to schedule rides in advance, a factor important to train commuters on a schedule.

Current Status: In 2018 Summit also extended the program to include rides for to up to 50 residents to and from the downtown business district.

Pinellas Suncoast Transit Authority "Direct Connect" Pilot

Type of tech: "Direct Connect" is a solution to the first-mile-last-mile dilemma. Through the use of Uber, subsidized rides were offered to anyone connecting to public transit in certain areas.
Summary: The Pinellas Suncoast Transit Authority (PSTA) created Direct Connect to replace a poor performing, fixed route bus line.
Partners: Pinellas County Transit Authority, Uber, United Taxi, Wheelchair Transport Service, and Care Ride (dropped out after phase I)
Funding/Finance: Cutting the ineffective bus lines saved the agency $360,000 in bus capital costs and $422,000 a year in net operating costs. Phase I of the pilot cost around $15,000, less than the $40,000 it was allotted. Direct Connect only cost about $120,000 through Phase II. The initial passenger subsidy was $3, later increased to $5. The eventual subsidy for wheelchair accessible rides has risen to $25.

Summary of Design
Dates: Direct Connect was conceived in 2015 and is still running as of July 2019.
Key performance indicators:

- Money saved;
- New and returning riders;
- Ridership growth; and
- retention of providers.

Uber was largely unwilling to share more data than necessary, so almost all data taken for evaluation had to be done by the agency. PSTA kept track of the number of trips taken by riders based on the service they chose (Uber, United Taxi, or Wheelchair Transport). They also kept track of new and returning users, which allowed them to learn that most riders were repeat users that made it part of their daily routine. For others, the service was a one-off or infrequent amenity.
Marketing and Outreach: Phase I marketing was challenged by the program's complexity, and lack of cell phone access for target low income riders. Phase II made up for some of these shortcomings : (1) Uber updated their app for better visibility, (2) Flyer distribution on how to use the service, (3) E-mail alerts, (4) continued use of email blasts, brochures, and physical signage at eligible bus stops.
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Was there a pivot?
Phase I: From February to August 2016, there were only 202 trips, total. Less than two per day. Despite this, the PSTA endorsed the pilot's continuation and increased the budget. The trip subsidy was changed from $3 to $5. PSTA also expanded the pick-up and drop-off zones at each designated intersection, and coverage was expanded from two small service areas to a countywide patchwork of eight zones.
Phase II: By increasing the scale, Direct Connect's average daily ridership increased from less than three rides per day in February 2017 to nearly ten in March. This continued to grow to around 40

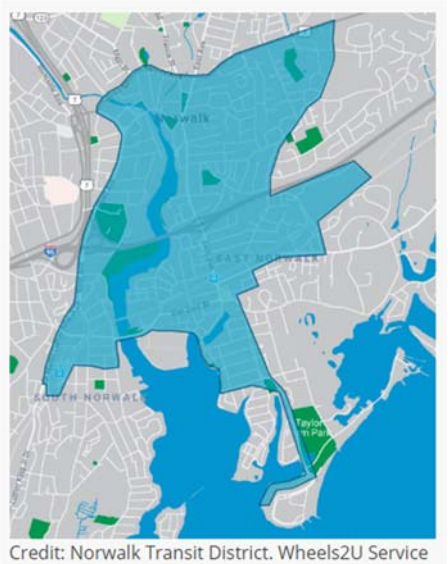
rides per day in October. Uber was shown to be significantly more popular than United Taxi, and no rides were taken through Wheelchair Transport.

Phase III: The PSTA allocated an additional $60,000 to the project in 2018 and voted to launch phase III in April of the same year. The WAV subsidy increased from $5 to $25, and the "zones" were removed altogether. Instead, 16 stops were added to the original eight. Ridership reporting was overstated because of a glitch in Uber's reporting.

Current Status Direct Connect is profiled in a Shared Use Mobility Center case study and covered in a July 2019 articles in Streetsblog and on TransitCenter's blog .

PSTA voted to pursue contract renewals with Uber, United Taxi, and Direct Connect through 2021. However, the program still struggles with obtaining data from providers to correctly evaluate the pilot.

Other examples



Credit: Norwalk Transit District. Wheels2U Service Area

Norwalk CT Wheels2U

The Norwalk Transit District Wheels2U service was a public-private partnership piloting microtransit to increase mobility options within its downtown and several adjacent neighborhoods. Some of the key success factors:

- There was a tightly defined service area, which was expanded twice during 6-month pilot.
- Working with promotional partners, there was heavy focus on branding and marketing in its downtown and several adjacent neighborhoods.
- The pilot ran existing off-peak paratransit vehicles from 5 PM to 12 AM Thursday, Friday, and Saturday, and from 12 PM to 9 PM on Sundays
- Service was timed (1) when regular transit service is reduced & (2) to match entertainment district hours with higher density neighborhoods
- In June the pilot service was made permanent

DC MicroTransit

D.C. MicroTransit operates in the Northeast and Northwest neighborhoods. The pilot, which runs until September 2019 has several notable features:

- The service area is poorly served by transit though contains several of the region's highest-ridership bus lines.
- Riders must be 18
- A single rider is charged $3, though additional people in the same party are only charged $1 more. This is intended to incentivize additional, shared ridership.
- Provides wheelchair accessible vehicles
- There is a $2 fee for cancelling a ride or not showing up. Repeat no-shows can be terminated
- Offers referral bonuses and weekly passes

Interview with a Microtransit Service Provider - VIA

Via provides the technology, vehicles, and operations for on-demand, dynamic microtransit. Some of the first providers (Bridj, Chariot) ceased service, unable to sustainably provide coverage and reliable service. In an interview, WGI asked for more information on critical success factors for creating a pilot and scaling services. In addition to leadership and funding, the following are essential components.

Use cases: VIA focuses on three services: (1) First/Last Mile to transit, (2) upgrading existing dial a ride and paratransit, and (3) replacing underperforming bus routes.

Using data to optimize routes: VIA is constantly fine-tuning its ability to minimize distance and time when deploying vans to pick up and drop off customers as they summon rides. The company uses data, interviews and simulation tools for dispatch modeling.

Marketing: Marketing is often overlooked and/or under-budgeted. While each new pilot includes customized marketing, there needs to be a discrete marketing budget and partnerships that can access target riders and potential drivers with information on how the service works (e.g. you can use cash or sign up for a mobile app). **The most powerful messages are stories from riders on how the new service is transforming their lives.**

Carsharing

Car share was among one of the first shared-use mobility modes, beginning in 2001 with City Car Share in San Francisco California. Early models, which continue today, require subscribers to pick up and return a car to a designated, on-street space. In 2008, a second direct model (point to point or free-floating) emerged, allowing a driver to up and park a car anywhere within a designated zone.

Recent variations include:

- Carshare for affordable/mixed income housing developments
- Rural carsharing schemes
- Amenity car share fleets (cars and other vehicles offered within individual development projects for the sole use of tenants)

For pilots, typical performance metrics followed include:

- Number and types of subscribers;
- Utilization (per car, per parking location(s));
- Origin-destination;
- Vehicle downtime (theft, vandalism, mechanical breakdown); and
- User feedback (car condition, availability, ease of use, parking)

Victor Valley Car Sharing Pilot

Type of Tech: Car Sharing in a rural area

Pilot Summary: The Victor Valley Transit Authority (VVTA) serves rural San Bernardino County. In 2014, they initiated a small car sharing program with Enterprise Car Share.

Why the service: Conventional car sharing systems typically work best in dense urban areas served by transit. Car share allows non-automobile owning residents an additional mobility option. However, there are many residents in rural areas without access to an automobile. Needles is on the California/Nevada/Arizona border. Most grocery, retail and services are located in neighboring towns.

Pilot Funding/Finance: VVTA subsidizes membership fees and hourly rates. Renters pay $5 per hour or $40 a day for a sedan or minivan. VVTA underwrites the cost of signing up for the program.

Summary of Pilot Design: The pilot was designed to provide low cost access to a small fleet of cars. Designated parking is available at the Desert Communities Federal Credit Union in downtown Needles

Date: Launched August 2016 and is now a permanent service

Evaluation: Utilization rates are high, in particular for the minivan. Program managers observed that several families often chip in to split the cost of a minivan to shop for groceries. Revenues cover 70% of program costs (the rest borne by VVTA).

Key Performance Indicators

- Number of members;
- Revenue; and
- Trip purpose.

Marketing and Outreach: Marketing was achieved by VVTA and program partners. A local financial institution created debit cards for customers without credit cards.

Was there a pivot? No

Current Status: Permanent program (link here).

Transportation-as-a-Service (TaaS) - Do-it-Yourself Turnkey Fleets

One intriguing trend is the rise of customizable platforms for shared-use mobility. These companies provide the technology backbone for creating ridehailing, ride sharing, and vehicle sharing programs. These services can be sponsored by any variety of organizations: private developments, campuses, fleet managers, transit agencies, or non-profit organizations seeking to expand mobility for their constituents.

Services can be as basic as a mobile app, while others provide full "turn key" solutions that include the technology, vehicles, drivers, customer support, and operations. Since most of the initial projects were with private entities, there is less data available on early projects. However, agencies should watch these companies closely for several reasons:

- Transit agencies may want to build (or purchase) a TaaS platform to provide shared-mobility services as part of public transit. This would also simplify integration for trip planning and payment.
- TNCs have not yet proven to be financially successful; as travelers increasingly rely on TNCs, TaaS platforms would enable transit agencies to quickly replicate services if private mobility companies cease operations.
- Transit agencies own real estate that can serve as mobility hubs, for example, room to park and recharge e-bikes and scooters at transit stations and stops.

This graphic shows how omoove builds a platform for fleet providers. Other companies include Ride Cell, and goUrban. These platforms can support mixed fleets and delivery fleets as well. With a proliferation of fleets, cities may want to accelerate and streamline curbside management programs.

Washington DC launched a curbside management pilot project starting August 1, 2019. Parking will be removed for 12 weeks in nine locations to create loading zones for commercial activities. The zones will be used by both commercial vehicles and private vehicles operating in a commercial manner such as picking up for an online food delivery service or other online delivery platforms. Participants will use an app free of charge. curbFlow staff will monitor how the app works and collect data to look at safety, utilization, bike lane blockage, productivity, and equitable access. From the data, the city will determine how to translate the data into management programs and, if needed, regulations.

Automated Shuttle Pilots

Among automated technologies, low speed electric shuttles are gaining early traction. Several companies (Easy Mile, May Mobility, Navya, Local Motors) are participating in early pilots. These pilots were on campuses or in master planned communities where the shuttles operated on private roadways. On public roads, Las Vegas hosted an early trial, and currrently shuttles are serving passengers in Lake Nona FL. Grand Rapids MI, Detroit MI, Providence RI, and Columbus OH. These early service pilots feature simple routes and free rides in exchange for answering surveys. Most of these rides are serving campus travel, are downtown circulators, or provide access to transit stations.

Shuttles have also been in the news for crashes. In Las Vegas, Nevada, Navya shuttle was hit by a truck driver. In Austria, an autonomous shuttle collided with a 30-year-old woman as she crossed the street. She was relatively unharmed, but both cases illustrate the additional work needed to deliver on promises of increased safety.

Nonetheless, low speed autonomous shuttles appear to be one of the most promising driverless technologies. They fit a service distance that is too long to walk, but infeasible for larger transit vehicles.

The use cases currently operated by both private companies and public transportation agencies include:

- Circulators – Detroit Michigan, University of Michigan
- Shuttles (A-B) – Las Vegas, Nevada
- First/Last Mile – Providence, Rhode Island
- Paratransit - Texas Southern University

The use cases listed above can provide access to home, jobs, services, and recreation serving trip purposes such as:

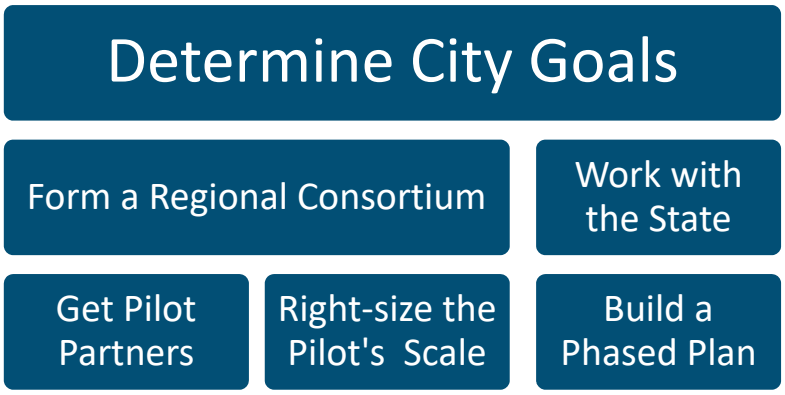
- Educational Campuses
- Health Care Services
- Employment
- Entertainment and Recreation
- Retail and Restaurants/Downtown Business Centers
- Parking Shuttles
- Residential Developments including Retirement Communities

Service types that could be used for various use cases include:

- Fixed route and schedule
- On-demand
- Pre-arranged route or zone-based

- Flexible route-based services
- Private property services

For most cities, this next phase of pilots will be less about testing the technology, and more on finding viable shuttle routes and operations. This will require a phased partnership approach shown below:



Feasibility: Even without the cost of a driver, shuttle companies are not keen on operating empty shuttles. As such, cities vying to attract shuttle pilots will be expected to conduct route feasibility and ridership studies ahead of time.

Financial: Early pilot sponsors often paid nothing for the pilots outside of an investment of staff time. Others, such as Arlington TX, cover the entire cost or a portion thereof. Chandler AZ even profits from leasing facilities to Waymo. Most recent shuttle pilots required some sort of financial commitment.

Pilot Length: The existing pilots run for anywhere between one year (Arlington's Phase I) to an indefinite period (Chandler, Tempe, Pittsburgh). Other cities have not denoted a timeframe, but rather allow the pilot evaluation to direct the pilot's length. Note that unexpected events such as a crash or software problem will influence the duration of a pilot.

Geographic: The first pilots occurred on closed campuses. Over time, shuttles have made the jump from private settings to public roadways where the requirements are much more stringent. As pilots shed more light on operations, cities will see more openness to operating shuttles on public roadways to serve transit stations and downtown routes. For other cities and regions, shuttles may become part of a larger, more complicated corridor planning effort considering a variety of automated technologies.

Technical Requirements: In addition to state rules, cities may want add pilot requirements for safety and consumer acceptance. To date, all pilots have thus far have required a safety operator and some are operated within protected, separate lanes.

Operating Domains

The Operational Design Domain (ODD) is the set of characteristics under which an automated vehicle can operate in terms of road conditions and other factors. Considerations include (1) whether the shuttle is on public or private roadways, (2) whether the shuttle is operating in mixed-speed traffic, (3) whether there are unprotected left turns, (4) whether there is a segregated lane and (5) weather conditions.

This table shows various configurations for roadways:

Exclusive off-street guideway	Completely constrained to operate in dedicated guideway	Jacksonville Ultimate Urban Circulator (U2C)
Off-street multi-use pathway	Largely constrained environment. No light-duty vehicle traffic; Pedestrians, bicyclists, and scooters present	Arlington Milo shuttle
On-street pathway, with dedicated lane for LSAVs	Dedicated lane, although on a street/ROW with other traffic in other lanes and no physical barrier	Jacksonville (JTA) Bay Street Corridor (news site)
On-street pathway, with dedicated lane for LSAVs and other transit vehicles	Dedicated to specific types of vehicles and transit.	Tampa downtown shuttle
On-street, mixed-traffic	ROW/street in mixed traffic	Bedrock Detroit shuttle (news site)

Example:

Arlington, Texas: Autonomous Vehicle Pilot Program

Type of Tech: Autonomous Shuttles/Vehicles (AV)

Summary: The city of Arlington Texas embarked on an early autonomous vehicle pilot, citing several objectives: (1) Explore potential for AVs to reduce fuel consumption, decrease insurance costs, and increase safety, (2) Increase public awareness of AV technology, (3) Collect data and develop guidelines for AV technologies to be shared across the country and (4) Highlight Arlington nationally as an innovative testing ground for research and deployment.

Partners: The City of Arlington, EasyMile, First Transit – Milo Vehicle

Funding/Finance: The lease for the two vehicles for one year cost $265,213, including vehicle set up, route programming, and operator training. The program was funded through the City's Convention and Event Services account using tourism-based revenues. Arlington citizens have historically voted against using sales tax to fund transit.

Rides are free to the public, though in exchange, were asked to take a survey. The city plans to go ahead with on-street testing based off of the success of the pilot. The city used funds from a Federal Congestion Mitigation Air Quality (CMAQ) grant to issue a competitive RFP to bring AV to the streets in a geofenced part of the city.

Summary of Design

Dates: The pilot ran from August 2017 to August 2018.

In its first stage. Milo did not run on public roadways, but connected remote parking areas to key destinations within Arlington's Entertainment District. Also, the shuttle was wheelchair accessible to improve access to events for handicapped individuals. A certified operator was always on board to take control of the vehicle if necessary.

Milo served 113 total events: 78 stadium events, 17 public demos, 18 public interest group rides, and 3 events where Milo was static. 99% of riders surveyed that they felt safe and happy riding Milo, and 97% surveyed that they support AV technology more broadly.

Marketing and Outreach: The events were designed for public outreach, where the public could ask questions, take rides, and complete surveys with Milo and staff. The program was also covered by a number of selected media outlets.

Was there a pivot? No.

Current Status: The initial pilot ended, but the City of Arlington is now partnered with the company Drive.ai to bring autonomous shuttles to public roadways. Even more shuttles are coming to Arlington since Drive.ai's contract recently ended in the city of Frisco TX.

Rhode Island Department of Transportation Little Roady Shuttle

Type of Tech: Autonomous Shuttles/Vehicles (AV)
Summary: Little Roady is a downtown circulator linking destinations and transit stations.
Partners: Rhode Island Department of Transportation (RIDOT), May Mobility, Inc., the Rhode Island Transportation Innovation Partnership (TRIP), RIPTA (including Amalgamated Transit Union members), City of Providence, Quonset Development Corporation

Funding/Finance: The cost of the project, including the research component, is approximately $1.2 million, which includes funding for an $800,000 public-private partnership with May Mobility, a $500,000 grant awarded by the Rhode Island Attorney General's Office as part of a settlement with Volkswagen, federal research funds through the Federal Highway Administration, and matching state funds.

Summary of Design
Dates: May 2019 - May 2020
Five vehicles will operate 6:30 a.m. to 6:30 p.m. seven days a week. The route is 5.3 miles long between Providence Station and Olneyville Square and includes 12 stops. Headways are approximately 10-15 minutes and rides are free. In partnership with 3x3 Design, Brown University, Stae, and Bits and Atoms, the pilot will track:

- Ridership trends;
- Workforce opportunities/impacts;
- Customer satisfaction/technology adoption;
- Environmental impacts; and
- State and local policies.

Marketing and Outreach: **T**he Little Roady has a dedicated website and live shuttle feeds. The city of Providence participated in first-responder engagement and education, public engagement, and research for future land-use planning. During the pilot, the city is encouraging school field trips.

Was there a pivot? No assessments have been conducted as of August 1, 2019
Current Status: On-going pilot

Partners:

Other examples

Denver Colorado's Regional Transportation District (RTD) launched a first-of-its-kind pilot project (61AV) in Colorado: a first-, last-mile connection to a rail station using a driverless shuttle. Key points from this pilot include:

- Because of the transit feeder service, the number and complexity of stakeholders required detailed discussions around each organization's goals, champions, critics, and concerns.
- Transit service also meant federal, state and local (public & private) were involved:
  - There were unexpected costs: the ribbon cutting, safety operators, and customer service ambassadors;
  - Bus stop infrastructure;
  - Signage (both for other road users and for vehicle localization); and
  - Vehicle storage and charging location.

What's Coming

Several technologies are in very pilot stages, represent vehicle improvements, or may require significant public policy changes.

Improved Micromobility

With the rise in scooter-related deaths, cities and companies are mobilizing for action.

Companies are responding with more durable vehicles. Bird, for example, is debuting new e-bikes with room for two riders. Lyft is expanding with e-bikeshare and Ford is developing adaptive e-bike share for people with disabilities.

Moped Share

After an initial pilot of 68 mopeds in Brooklyn last summer, Revel moped share is scaling to 1000 vehicles. The expansion also included an Equitable Access Program, offering riders on public assistance with a 40% discount off standard pricing. Feedback showed riders needed a free 'safety minute' to adjust mirrors, fasten helmets and review training materials. One main objective in subsequent pilots will be reviewing operations on roads with higher speed vehicles (moped speeds are capped at 30 mph). For more information see gorevel.com/new-york

Autonomous Deliveries

Autonomous deliveries are expected to grow to solve the "first last 50 feet" challenge of delivering packages, groceries and take-out food orders diestly to customers. Several companies are using two types of automated drones: (1) air and (2) ground or deliverybots.

Air drones are currently in use for aerial photography, post disaster reconnaissance and medical uses. While many companies have plans for deliveries, air space is heavily regulated by the Federal Aviation Administration. Two delivery drone crashes in Switzerland due to mechanical and emergency back-up failures have slowed further package delivery deployments.

The ground drones are now in early testing phases. One of the first pilots was on the George Mason University campus in Fairfax Virginia. Starship Technologies partnered with the University's meal plan provider, Sodexo to deliver meals to students. At the end of the pilot, the University noted a change in students' eating habits, notably more student began to eat breakfast.

Modular Infrastructure and Quick Build

Pilots also apply to placemaking where a community seeks to test new designs before making larger investments. The first era of pop-ups or "living preview" projects were short-term demonstrations that also served as public art and community outreach.

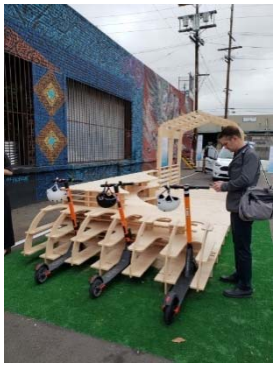
The idea of short-term trials has evolved to include longer pilots (up to a year) and more durable, though inexpensive installations (up to 5 years). Here are a couple of examples:

Modular infrastructure: Several companies (Dero, DezignLine) offer modular infrastructure such as parklets and components for separated bicycle lanes.

Quick Build: The idea behind quick build is an alternative project delivery model for roadway infrastructure. The idea is to use a series of demonstrations, pilots, and interim design that ultimately is constructed as a permanent installation.

A quick-build street project described by People for Bikes is:

- Led by a city government or other public agency;
- Installed roughly within a year of the start of planning;
- Planned with the expectation that it may undergo change after installation; and
- Built using materials that allow such changes.



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