



Using Real-Time Mass Transit in First-/Last-Mile Solution

Project ID: TI104

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Ford
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Overview

Timeline

- October 1, 2018
- December 21, 2021
- 25% complete

Budget

- Total project budget: \$2,500,000
 - DOE share: \$2,000,000
 - Cost share: \$500,000
- Funding for FY 2019: \$26k
- Funding for FY 2020: \$31k (Q1)

Barriers

- Lack of first/last mile mobility services connected with real time trunkline transit feeds
- Limited microtransit simulations calibrated to local user surveys
- Limited quantification of microtransit energy efficiency gains

Partners

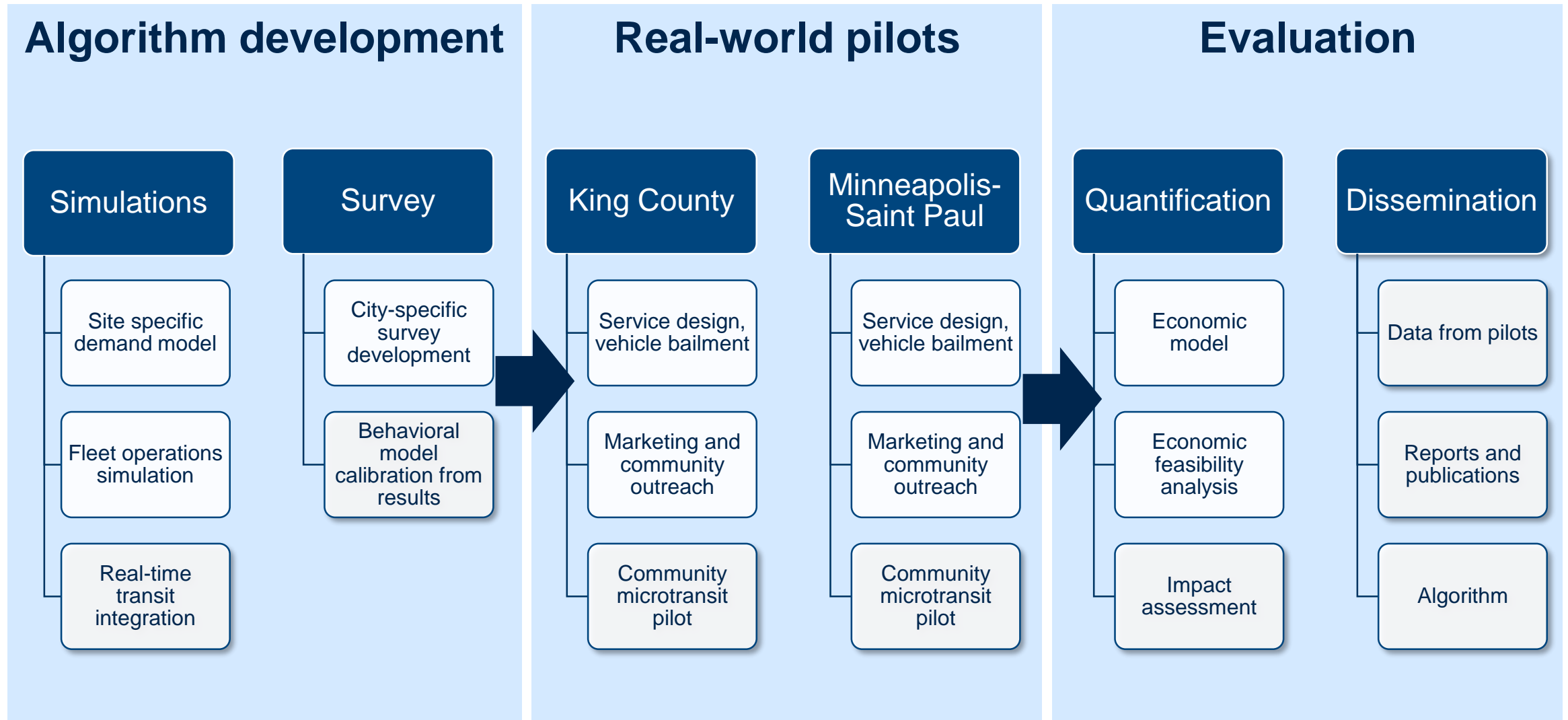
- Cornell University
- TransLoc
- King County Metro
- Minneapolis-Saint Paul Metro Transit

Project Objectives

Project Objectives	Impact for VTO TI Goals	Barrier Impact
<p>To research, develop, and demonstrate that a first/last mile mobility service, integrated with transit agencies' real-time transit and user data, works seamlessly in a simulation environment and a real-world pilot</p> <p>To provide greater accessibility to communities in need to affordable transportation services</p>	<p>National Security Project decreases reliance on fossil fuel-based passenger vehicles</p> <p>Economic Growth Project increases access to jobs and other resources</p> <p>Affordability Project provides a low-cost, high quality alternative to driving</p> <p>Reliability / Resiliency Project diversifies the transportation landscape and improve utilization of stations</p>	<ol style="list-style-type: none"> 1. A microtransit simulation environment that is integrated with real-time transit data and calibrated via user surveys and field tests 2. A microtransit pilot service connecting to major transit stations in King County, Washington and in the Minneapolis-Saint Paul, Minnesota region 3. A quantification of the potential for energy efficiency and mobility gains

Project Approach

Simulation coupled with behavioral survey could uniquely improve microtransit service



Project Milestones

Budget Period 1	Milestone	Progress
	TransLoc collaboration, post Chariot shuttering	Complete
	Collaboration with Metro Transit, in addition to King County Metro	Complete
	Integrating real-time transit data with dispatch/routing algorithm, creating API	In Progress
	Behavioral survey deployed in two cities	In Progress

Go/No-Go: The microtransit and route planning algorithms extended and working in the simulation environment.

BP 2	Tech stack integration, model calibration	Future
	Dispatch/routing algorithm development, advanced features	Future
	Behavioral survey, model integration	Future

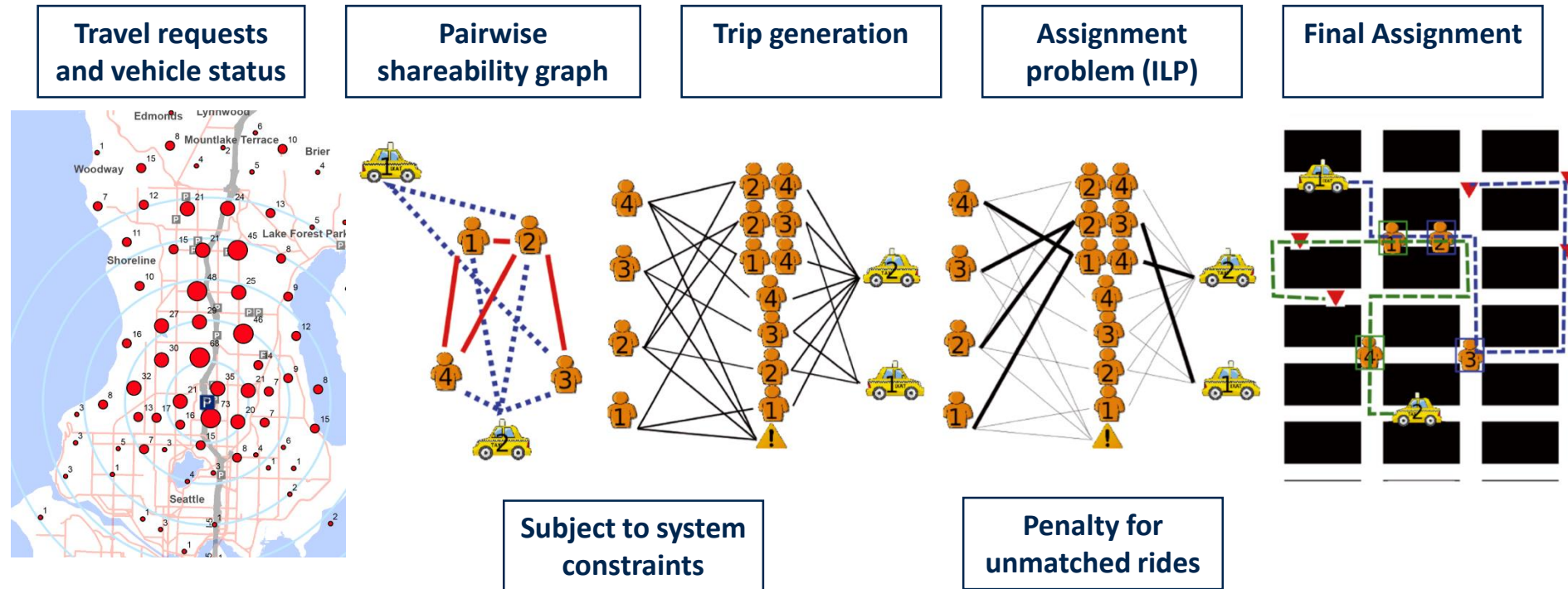
Go/No-Go: The simulation system performance demonstrates readiness to progress to field experiment planning.

BP 3	Algorithm adjustment based on pilot experience	Future
	Field experiments, data collection	Future
	Impact assessment, economic model	Future

Go/No-Go: Deployment testing demonstrates performance metrics within levels acceptable for field experiment.

Accomplishments and Progress (1/4)

Simulation Environment Development



A general simulation framework for pooling trips for people and goods
Can incorporate pricing, advance bookings, predictive routing, EV fleets etc.

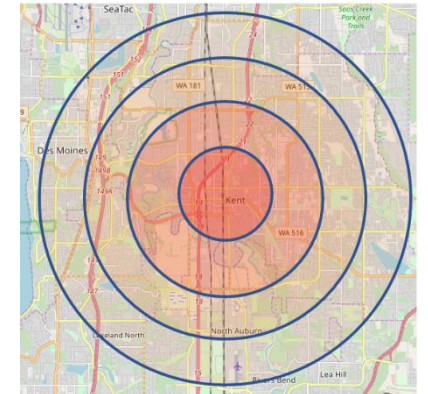
Microtransit: First/Last mile setting

- Integration of real-time transit vehicle position (GTFS feed) to handle moving deadline problem
- Handles travel time uncertainty in both microtransit and public transit vehicle trips
- Allows for advance bookings, e.g. night before, solving offline scheduling problem

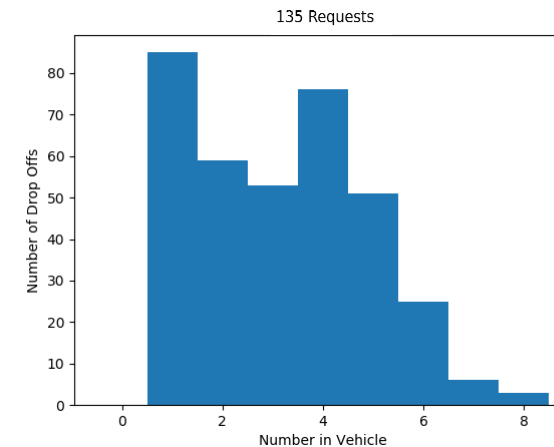
Accomplishments and Progress (2/4)

Simulation Environment Development

- Simulation environment has been updated to import maps and configurations efficiently
- New capability added to algorithm to allow asking passengers to walk a short distance for vehicle pickup, increasing efficiency.
- In collaboration with King County
 - For first mile service, report distribution of vehicle utilization at the central drop off point. This helps evaluate the merits of various vehicle capacities for the pilot.
 - Performance metrics, including location of requests that are typical served or not served, help guide design of potential service areas.



(Above, left) Two service area designs studied around Kent train station.



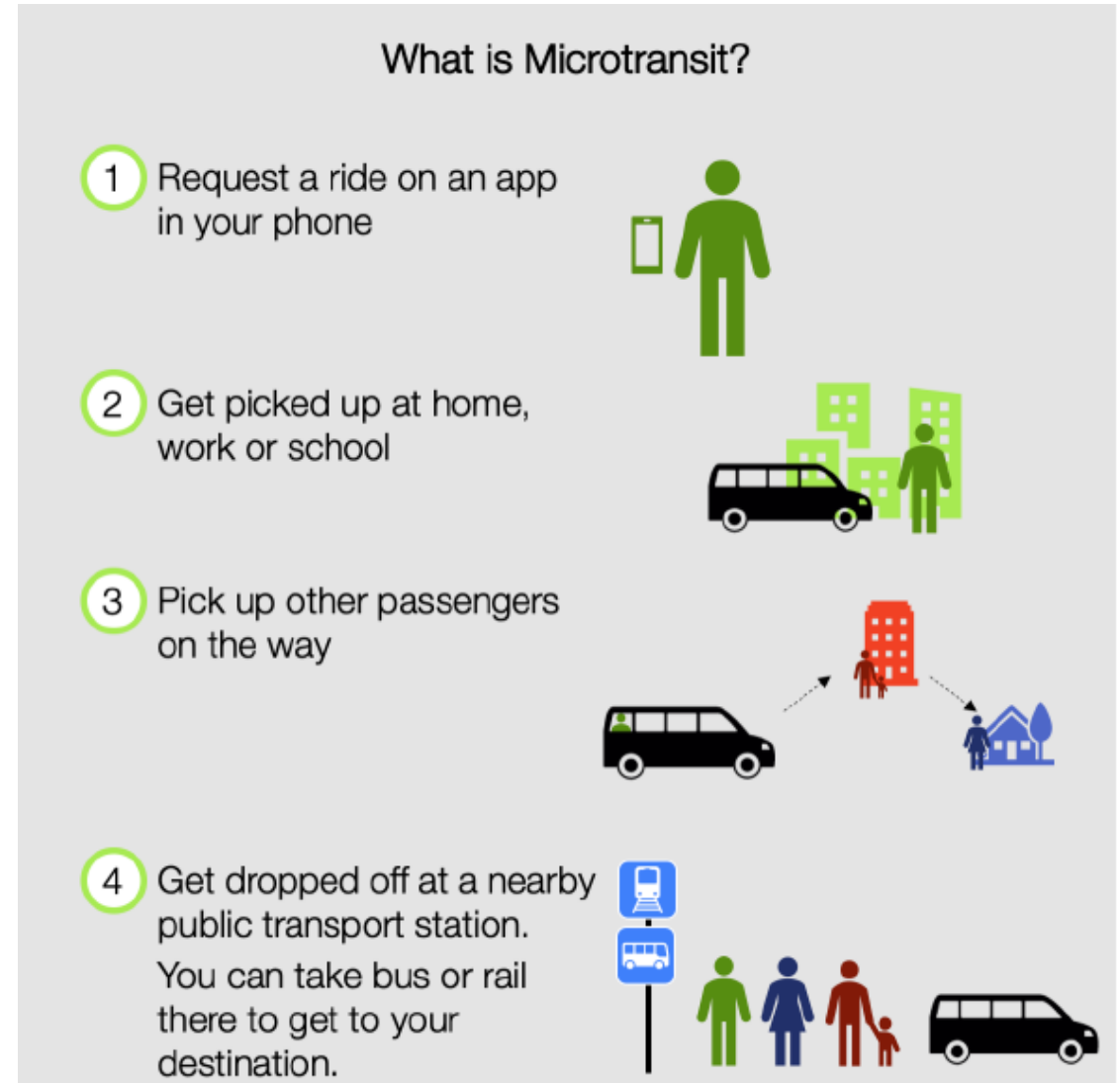
Analysis of vehicle utilization for set of simulations in Kent East Hill.

Accomplishments and Progress (3/4)

Survey

- **Survey development**
 - IRB approved, beta tested
- **Survey deployment**
 - Targeting 1,000 respondents each city
 - Planned launch May 2020
- **Highlights**
 - General interest in microtransit
 - Behavioral choice experiment to quantify willingness to wait, walk, share, etc.
 - Price sensitivity experiments for different booking options

Global pandemic will impact survey results, even with modifications.



Accomplishments and Progress (4/4)

City Collaborations

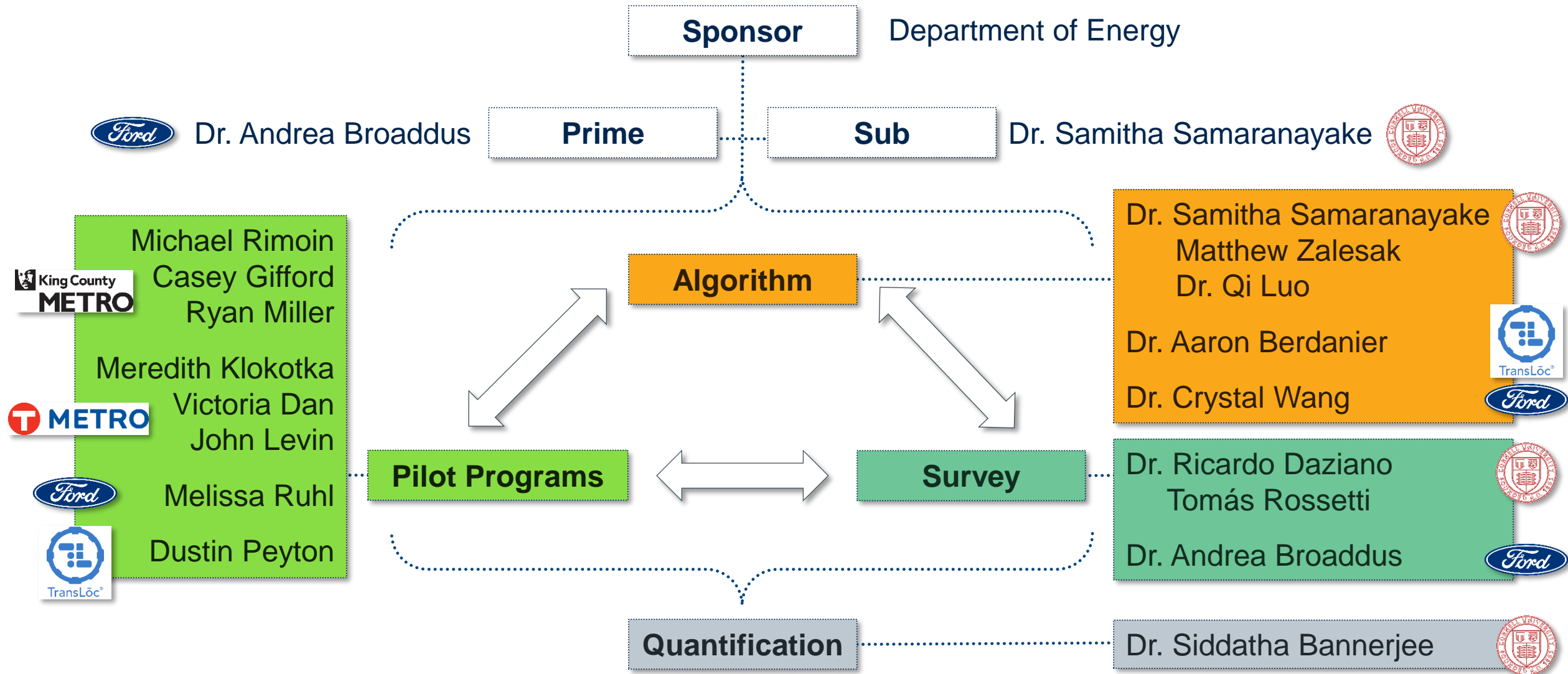
- **Minneapolis-Saint Paul**, representative Midwest urban area
- **Metro Transit Quick Facts**
 - Bus, light rail, commuter rail
 - 260,000 daily ridership (2018)
 - 130 routes
- **Developing microtransit service:**
 - Connecting to a major rail and bus station, helping industrial workers access nearby employment
- **Seattle**, representative Coastal urban area
- **King County Metro Quick Facts**
 - Bus
 - 510,000 daily ridership (2017)
 - 215 routes
- **Developing microtransit service:**
 - Providing access to a new, popular BRT corridor *or*
 - Supplementing access to a key transit transfer station

This pilot program will be Metro Transit's first microtransit experiment.

King County Metro is an established microtransit provider. This pilot will help them further improve their service.



Collaboration and Coordination among Project Team



Market Impact and Sustainability

Contributions

- Algorithm improving first/last mile access to real-time trunkline public transit services
- Data-driven microtransit service planning methodology

Impact beyond project

- Improving microtransit in an era in which low-density fixed route is too expensive for many agencies
- New microtransit services in Seattle & Minneapolis
- Economic feasibility analysis for microtransit
- Data from pilots shared on DOE Livewire platform

Upcoming tasks

- Algorithm development and testing via API
- Contracting for drivers & vehicles in King County and Minneapolis-Saint Paul

Remaining challenges

- Securing budget to extend pilots for one year
- Microtransit uptake post-COVID-19

Summary

Key Goal

- To research, develop, and demonstrate that a first/last mile mobility service, integrated with transit agencies' real-time transit and user data, works seamlessly in a simulation environment and a real-world pilot

Approach

- Simulation environment integrated with real-time transit data and calibrated via user surveys
- Microtransit pilot service in Seattle and Minneapolis-Saint Paul
- Energy efficiency quantification

Accomplishments

- Collaborations with two cities
- Travel behavior surveys to be deployed in two cities
- Efficiencies achieved through simulation, such as building walking algorithm

Upcoming

- Survey results, possibly revealing microtransit demand post-COVID-19
- Pilot program in two cities
- Multi-layered quantification