

Making it Happen: **Trenton MOVES**

*Framework for the **Deployment** of Safe, Equitable, Affordable,
Sustainable, High-quality Mobility*

Alain L. Kornhauser

Professor, Princeton University

Faculty Chair, Princeton Autonomous Vehicle Engineering

Presented at

TRB Challenges and Opportunities of Road Vehicle Automation

January 11, 2022

We have many baseline social benefit programs that provide basic societal needs:

Food

Retirement

Health

Housing

Education

Mobility



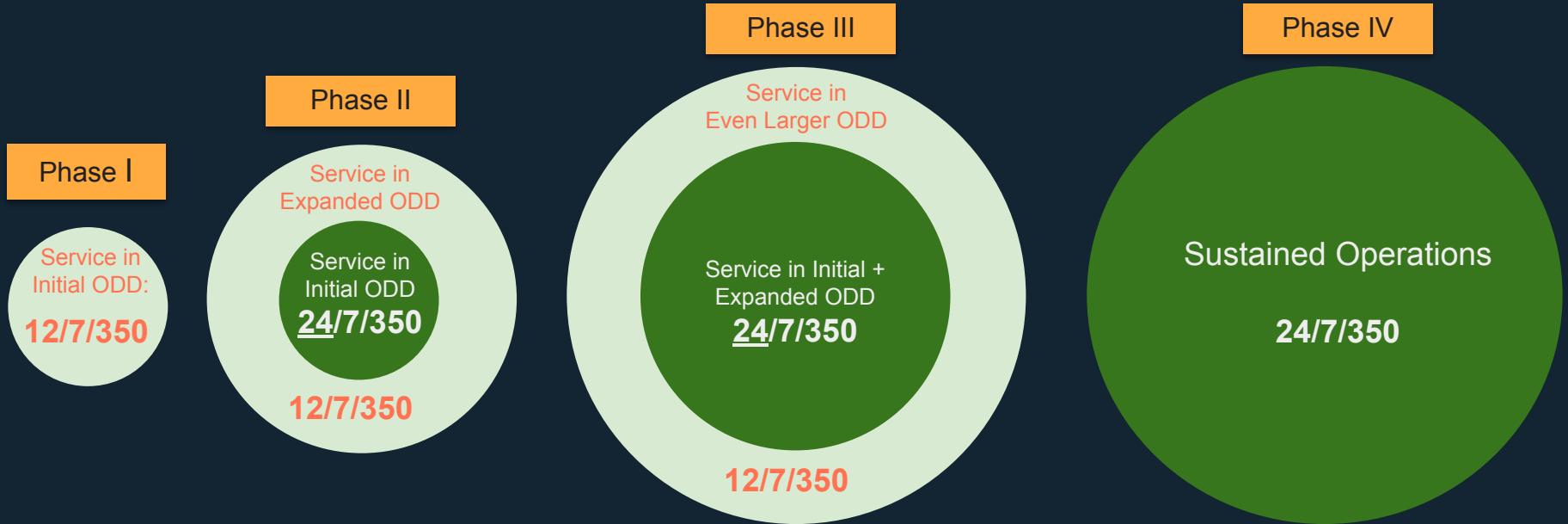
Hmmm...



Can Tech help us do Better?

Our Goal: Deployment of *Safe, Equitable, Affordable, Sustainable, High-quality* Mobility for All

Key are: Evolving ODD & Service Goals



Phased Deployment of Safe, Equitable, Affordable, Sustainable, High-quality Mobility ...

... Can be replicated in many communities across New Jersey (>10) & North America (>100)

The Process

1. Create a Welcoming Environment

- A “Field of Dreams”
- Done in Trenton NJ (Trenton MOVES)

2. Entice a feasible technology company to “Come Play”

- Form a PPP
- **Private:** Contributes IP, expertise, technology + vehicles
- **Public:** Ensures objectives are achieved.
 - Equity
 - Safety
 - High-quality
 - Affordability

3. Up-front / “Infrastructure” Funding

- Start-up \$\$\$
 - Operations Centers
 - Kiosks
 - Curb/Road Improvement
 - **Acclimation of Vehicles & Customers**

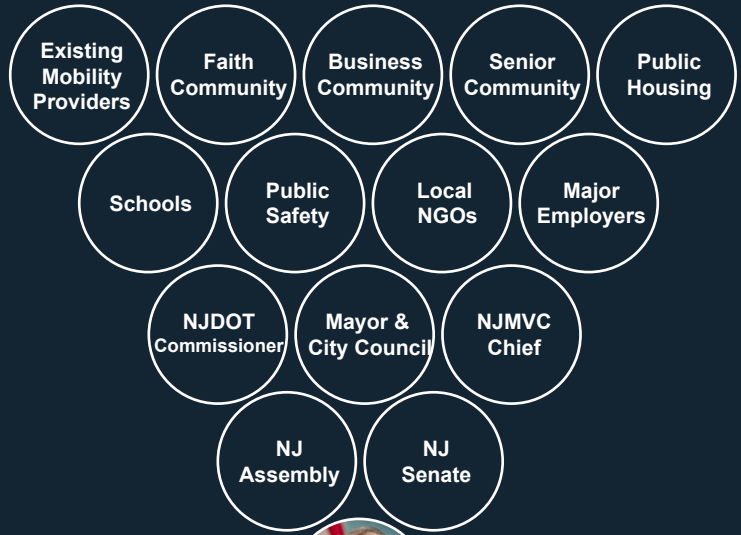
1. Create a Welcoming Environment

2. Entice/select a feasible technology company

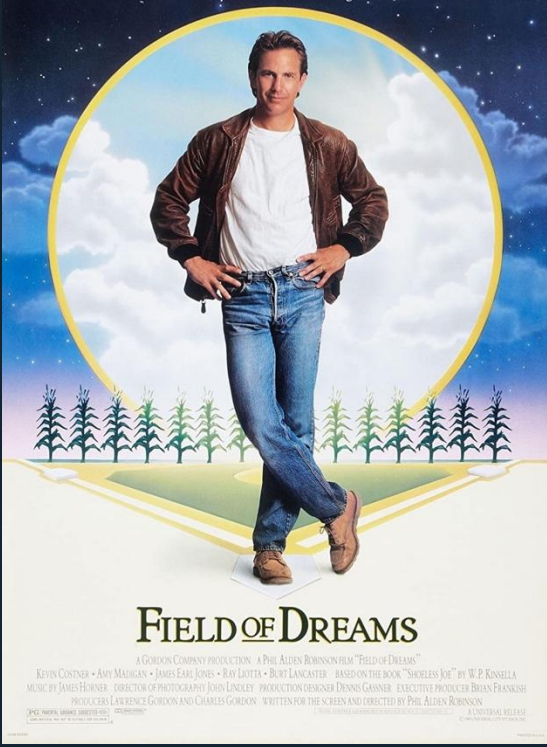
3. Up-front / "Infrastructure" Funding

90,000 RESIDENTS OF TRENTON, NJ

50 KIOSK NEIGHBORHOODS



Governor



1. Create a Welcoming Environment

2. Entice/select a feasible technology company

3. Up-front / "Infrastructure" Funding

The secret sauce: Direct Community Engagement



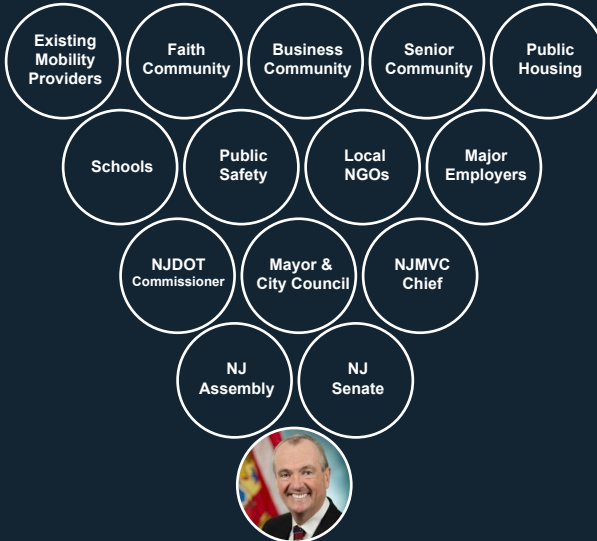
Public Housing



Senior Community

90,000 RESIDENTS OF TRENTON, NJ

50 KIOSK NEIGHBORHOODS



Existing Mobility Providers



Community Canvassing

1. Create a Welcoming Environment

2. Entice/select a feasible technology company

3. Up-front / "Infrastructure" Funding

The Capstone: Enthusiastic Gubernatorial Support

Governor Phil Murphy

☰

Murphy Administration Announces RFEI for Project to Create the First Autonomous Vehicle-Based Urban Transit System in America

12/6/2021

TRENTON – Governor Phil Murphy and New Jersey Department of Transportation (NJDOT) Commissioner Diane Gutierrez-Scaccetti today announced an Request for Expressions of Interest (RFEI) for the Trenton Mobility & Opportunity: Vehicles Equity System (MOVES) Project. Trenton MOVES will act to provide safe, equitable, affordable, and sustainable high-quality mobility through the deployment of 100 Autonomous Vehicles (AVs) throughout the state capital. This on-demand automated transit system will serve 90,000 residents of Trenton.

"Since taking office, we have worked relentlessly towards making New Jersey the innovation center of America," said **Governor Murphy**. "There is perhaps no initiative that embodies this goal more than the Trenton MOVES project, which will attract tech talent from around the country and the world with the mission of creating an autonomous vehicle-based transit system in our Capitol that will provide a new, affordable transportation solution for underserved areas of Trenton. This is an exciting project with immense potential and I look forward to the day that the first vehicle hits the road."

"Mobility is about equity and access to opportunity," said **New Jersey Department of Transportation Commissioner Diane Gutierrez-Scaccetti**. "Trenton MOVES represents an opportunity to utilize innovation to sustainably improve the quality of life of the mobility-constrained in many of our cities. By starting in Trenton, we will have the opportunity to work with a close and effective partner; ultimately our vision is that this effort will ideally scale throughout the state and the region."

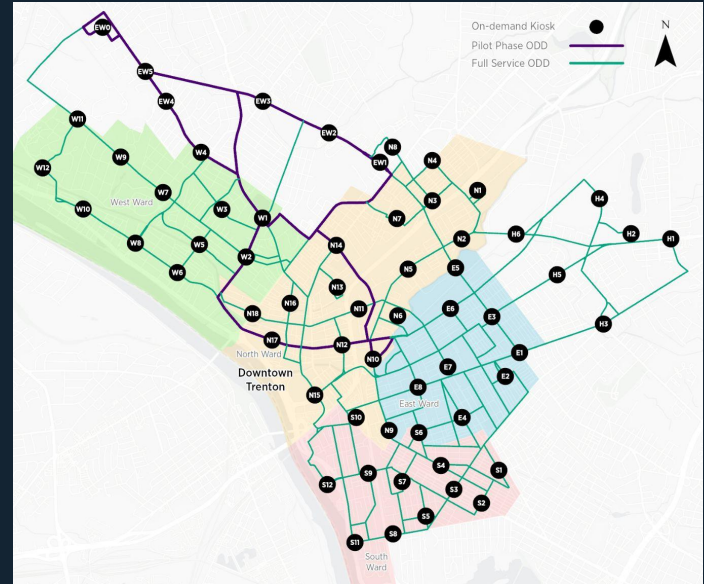
◀ Trenton MOVES, *Governor Murphy Press Release*, Dec 2021



Governor

▶ Trenton MOVES, *Planned Operational Design Domain*.

© CARTS



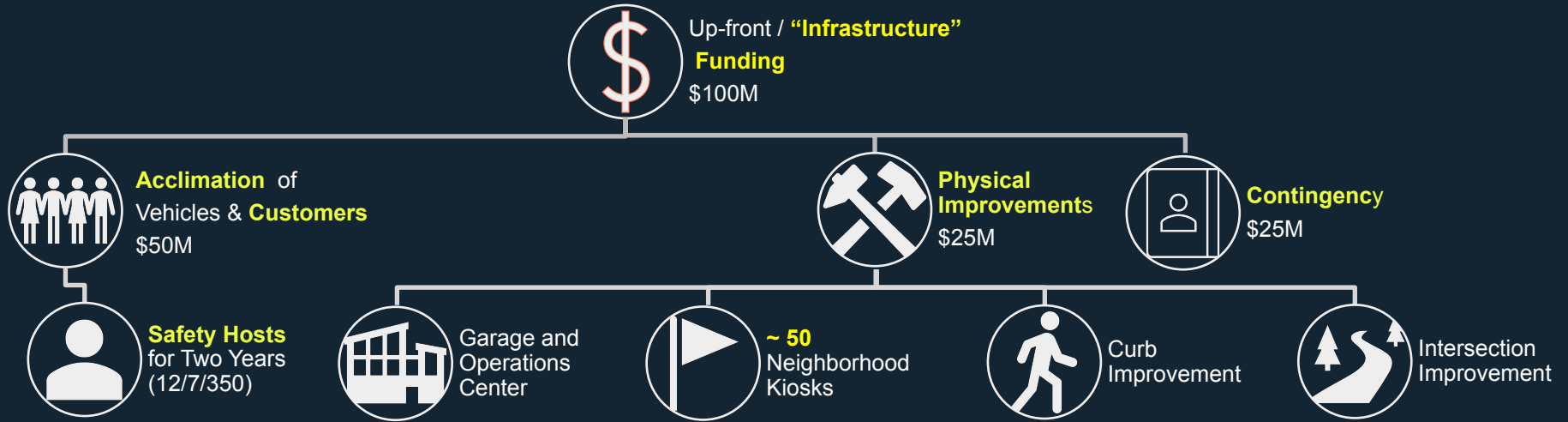
Entice, then select, through a RfP process, a capable tech. entity to form a PPP, where

- Private: Contributes their IP, expertise and technology that is:
 - Safe
 - High-quality (on-demand, 12/7/350 that can **evolve** to 24/7/350)
 - Affordable (Low Cost of **production**)
 - Sustainable (EV, **rideshare**, ...)
- Public: Partners with Private to formulate an ODD, Service & Pricing Plan that achieves:
 - Equity (Mobility for All)
 - Affordability (Low Pricing where need be, **Market Pricing** elsewhere)
 - Sustainability (**Shared-riding** wherever/whenever feasible)

✓ Create a Welcoming Environment

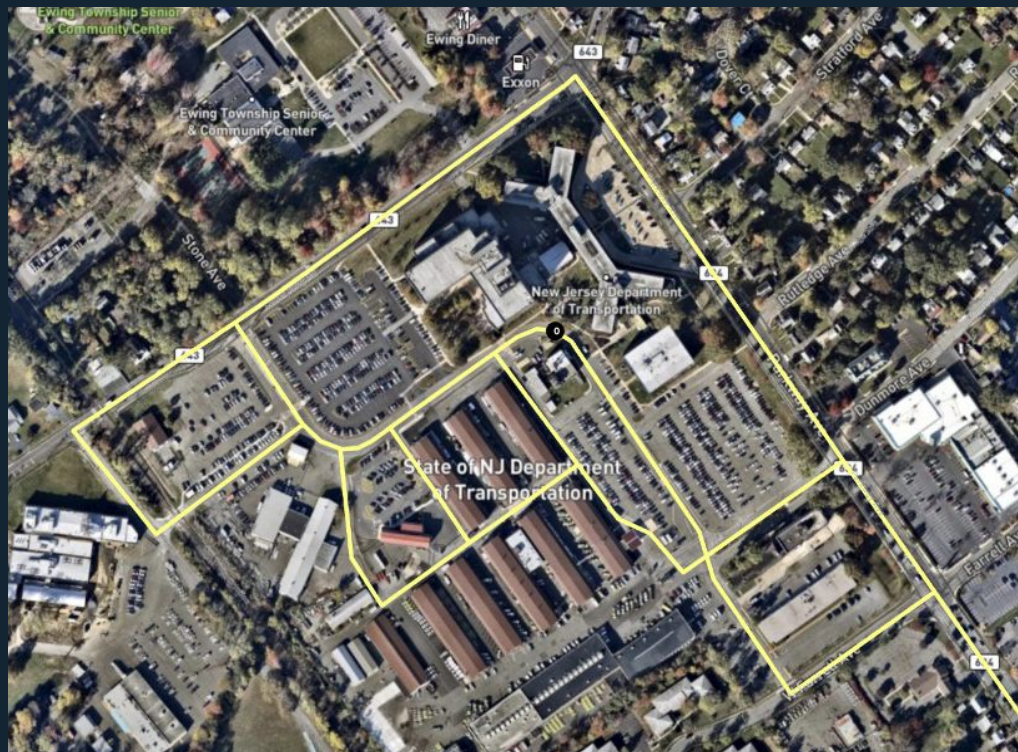
✓ Entice/select a feasible technology company

3. Up-front / "Infrastructure" Funding



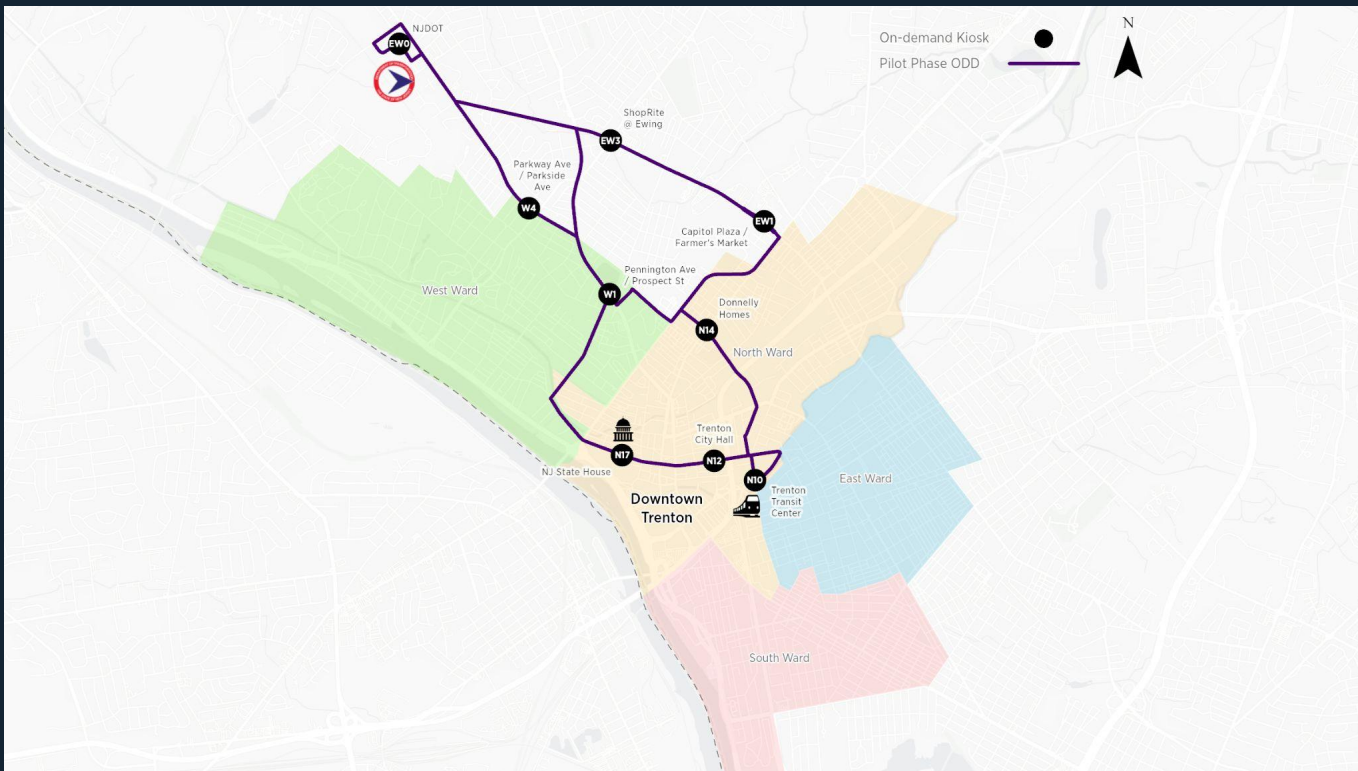
The Evolving ODDs

Phase I.0 NJDOT HQ Campus
Verification of Concept



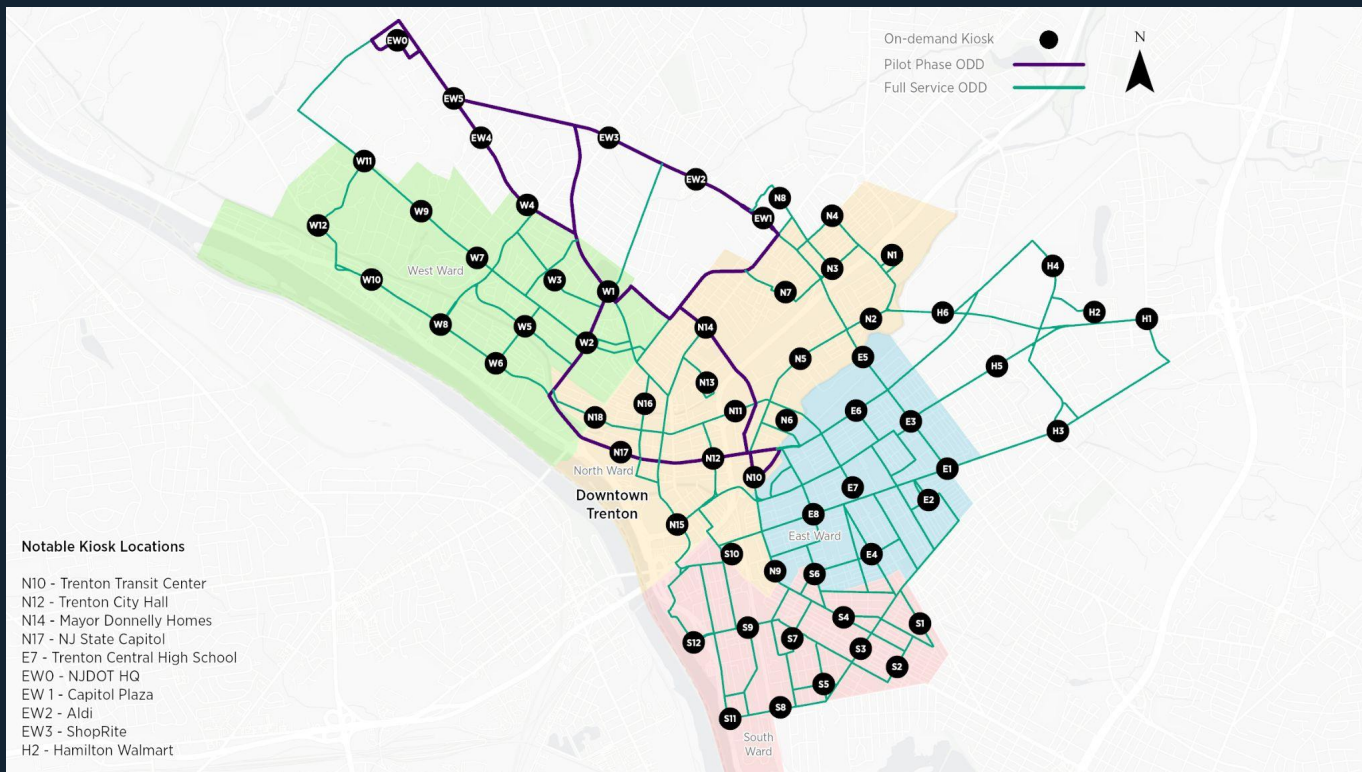
The Evolving ODDs

Phase I.1 Initial Pilot ODD
Proof of **Concept**



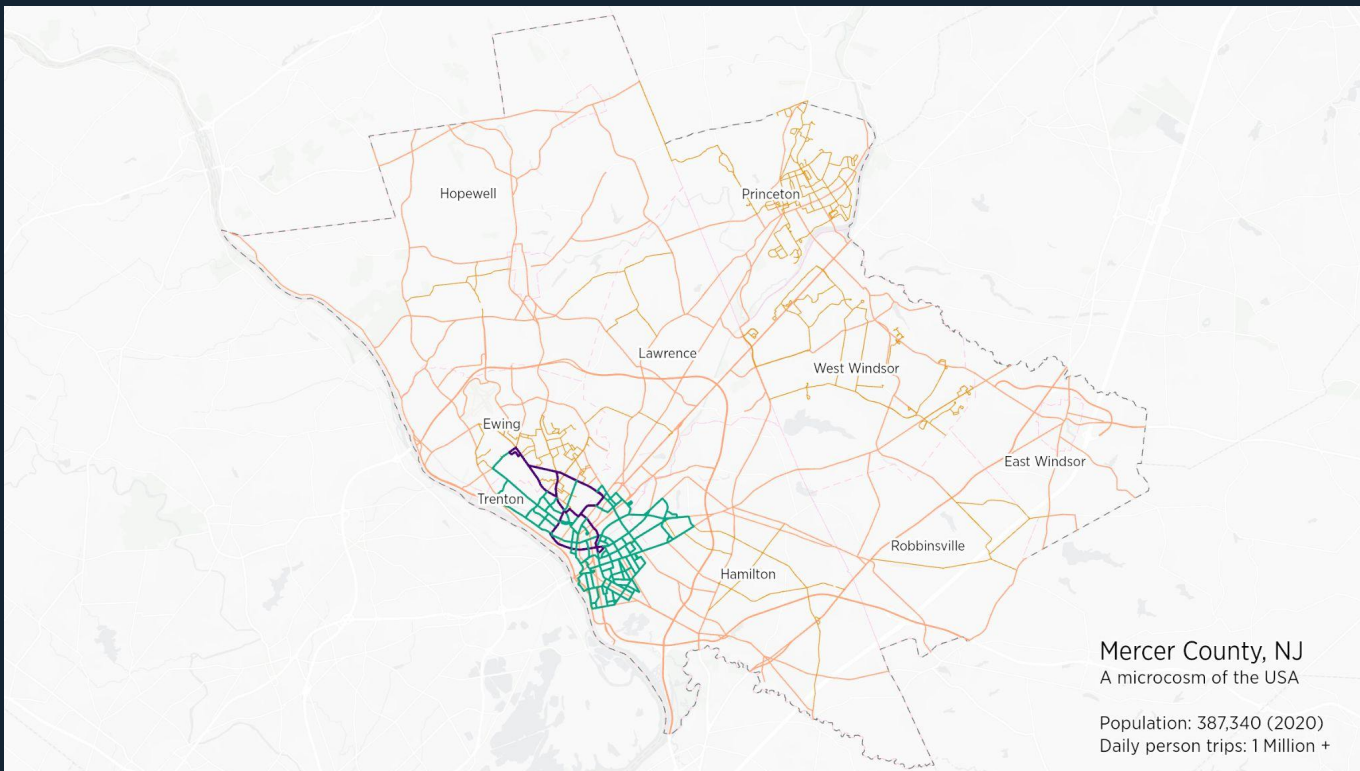
The Evolving ODDs

Phase II. Trenton Area ODD Proof of Societal Value



The Evolving ODDs

Phase III. Mercer County Area ODD
Proof of Market



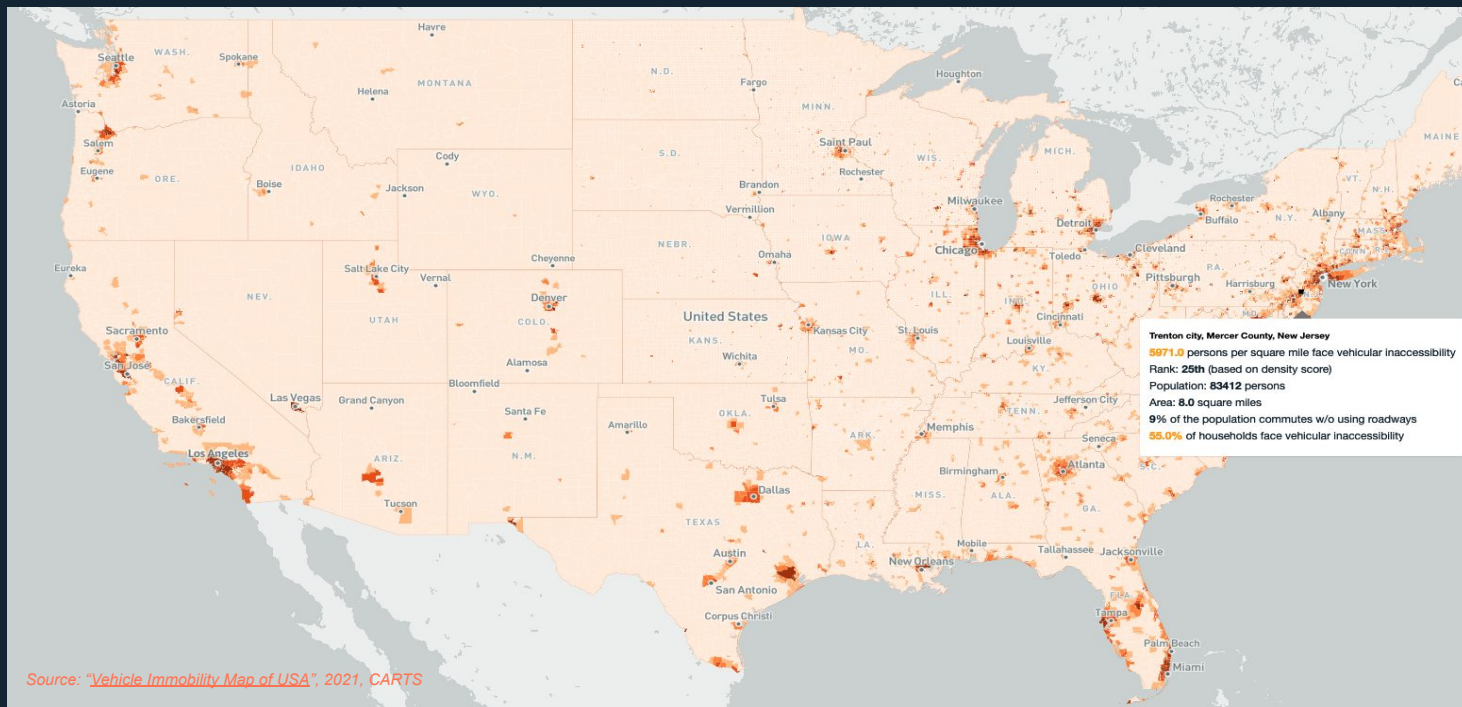
The Evolving ODDs

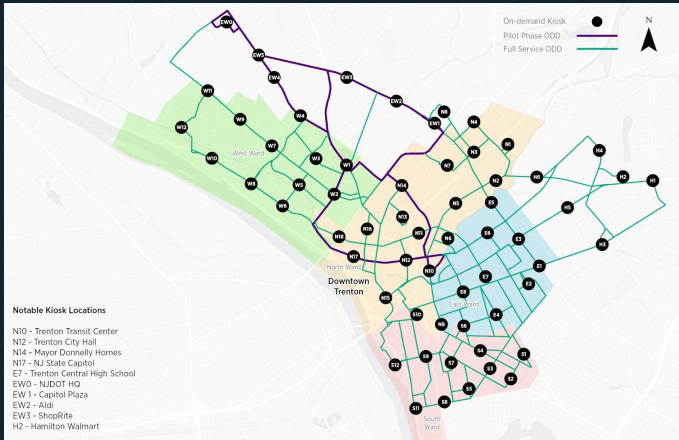
Phase IV. Replication throughout NJ:
Proof of **Network-Scale Economics**



The Evolving ODDs

Phase V. Replication across US:
Delivery of Societal Values at **Massive Scale**





Thank you!

Alain L. Kornhauser
alaink@princeton.edu

Professor, Princeton University
Faculty Chair, Princeton Autonomous Vehicle Engineering