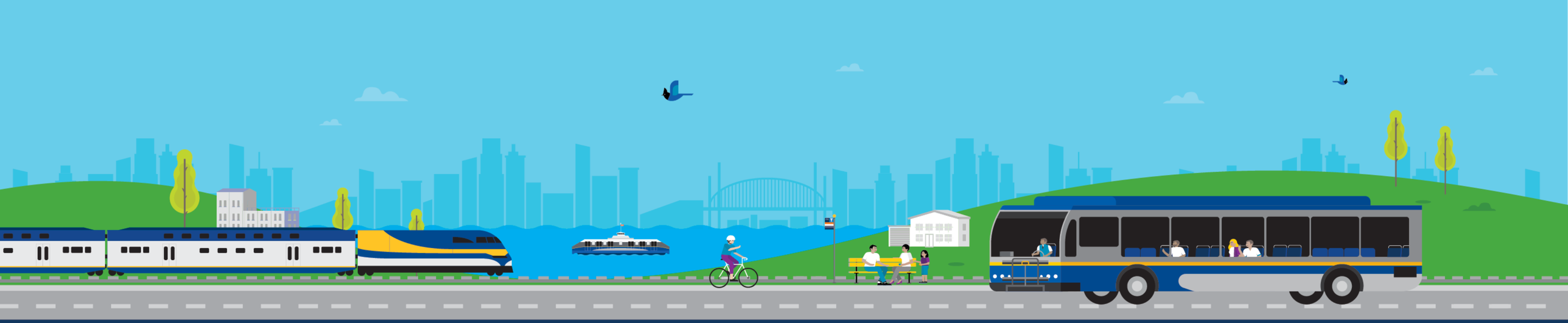


Exploratory Modeling to Inform Planning for COVID-19 Recovery

May 2021

Together all the way

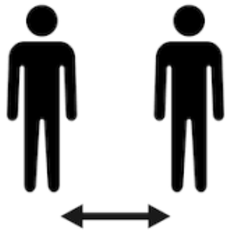
TRANSLINK

WHY IS EXPLORATORY MODELING NEEDED?

- COVID-19 decreased transit ridership by 60% and profoundly disrupted overall regional transportation behaviours
- One year into the pandemic, significant demand uncertainty persists, making it challenging to forecast revenue and plan service levels
- Exploratory modeling helps manage this uncertainty by simulating future scenarios to understand the probability and distribution of outcomes

SIGNIFICANT UNCERTAINTIES

Employment?



Willingness to share rides?

Strength of economy and discretional spending?

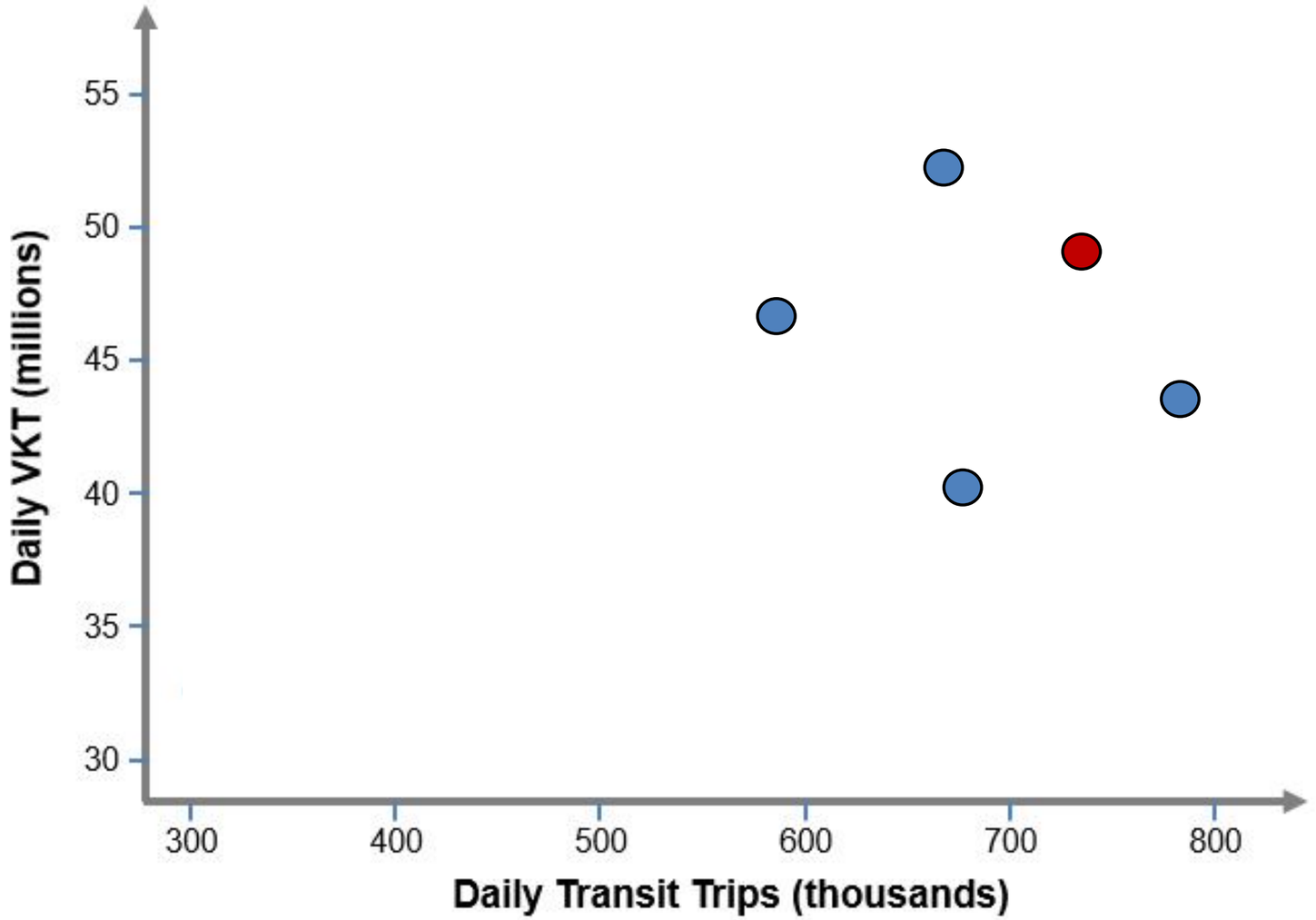
Auto ownership?

Work from home?

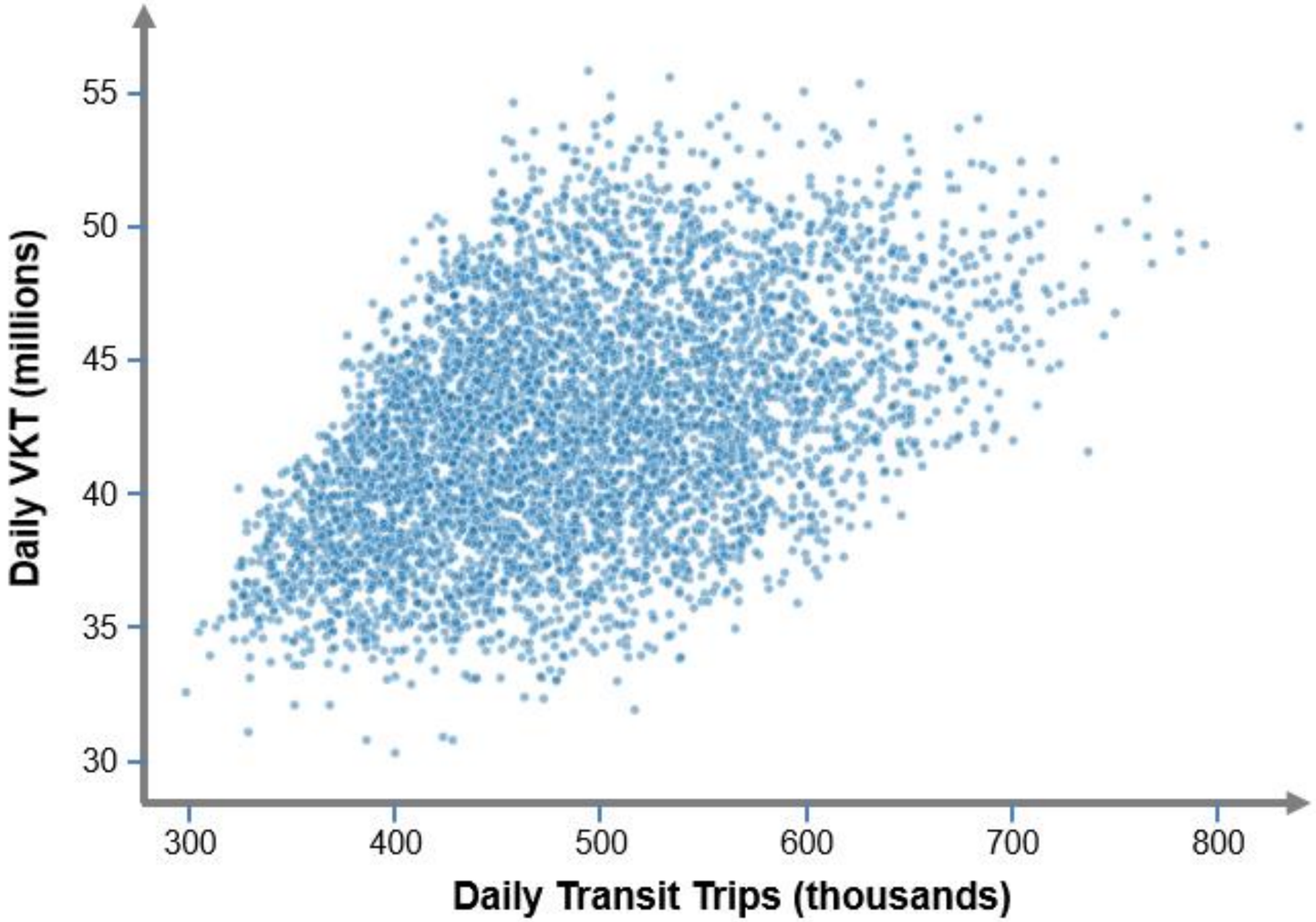
Distance learning?

Fuel prices?

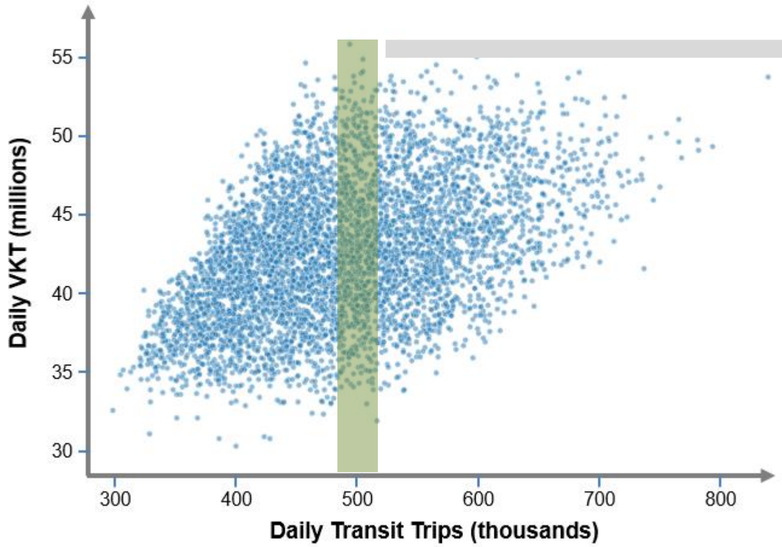
TRADITIONAL FORECASTING PROVIDES A SMALL NUMBER OF FORECASTS

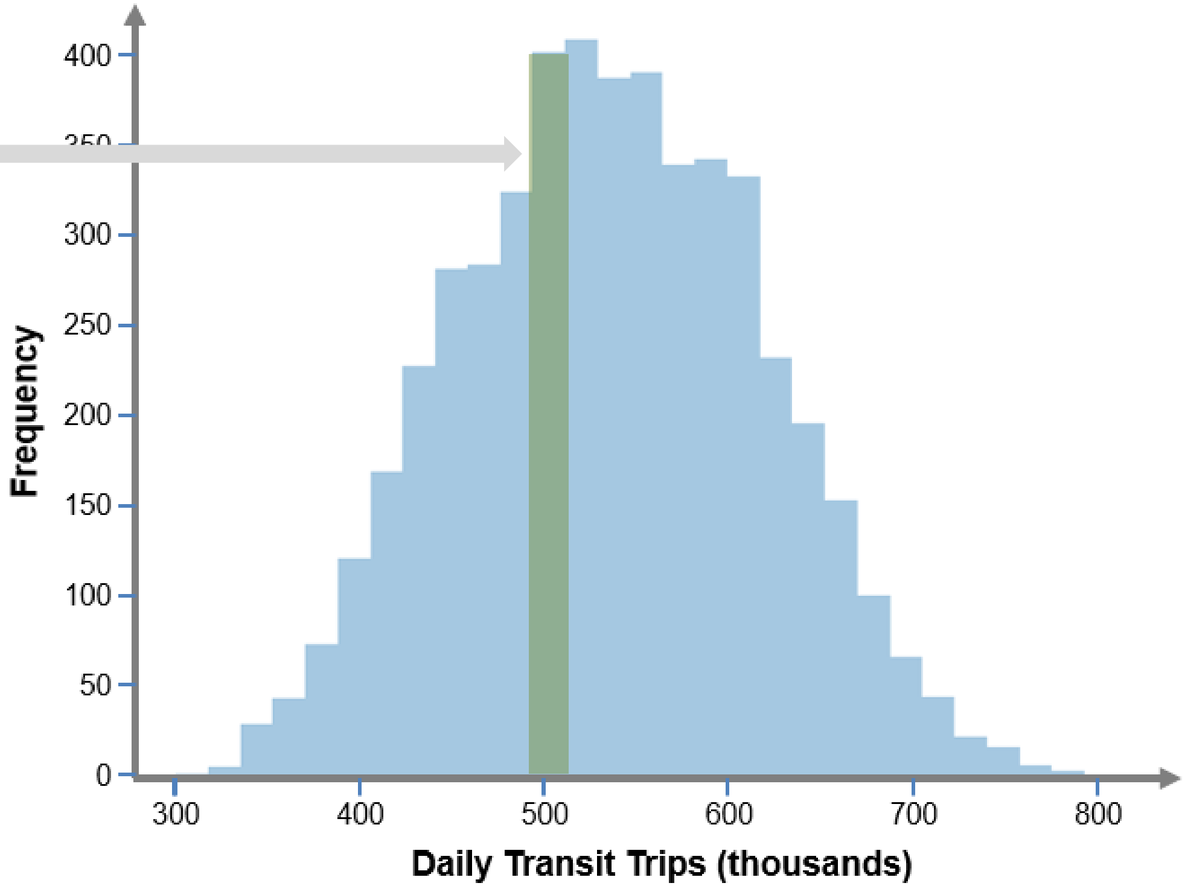


EXPLORATORY MODELING ALLOW MULTIPLE SCENARIOS



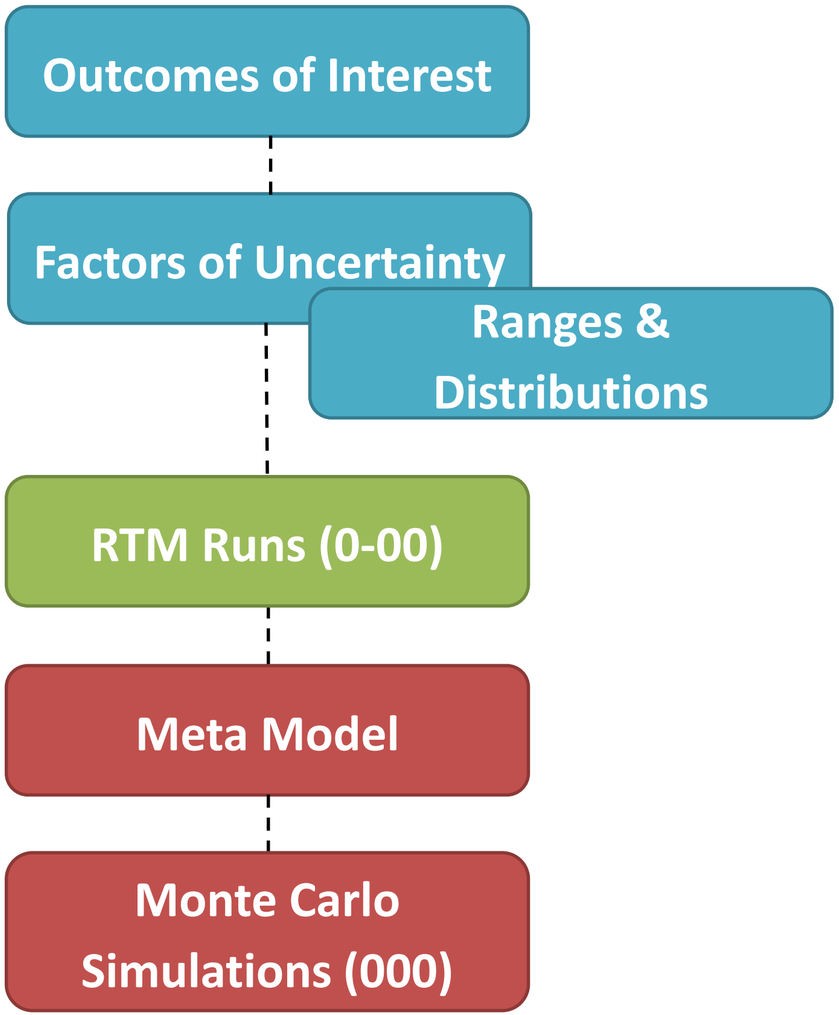
SIMULATIONS HELPED ASSESS THE PROBABILITY AND DISTRIBUTIONS OF POTENTIAL SCENARIO OUCOMES





The highlighted cross-section of scenario outcomes above maps to the green bar in the figure to the right.

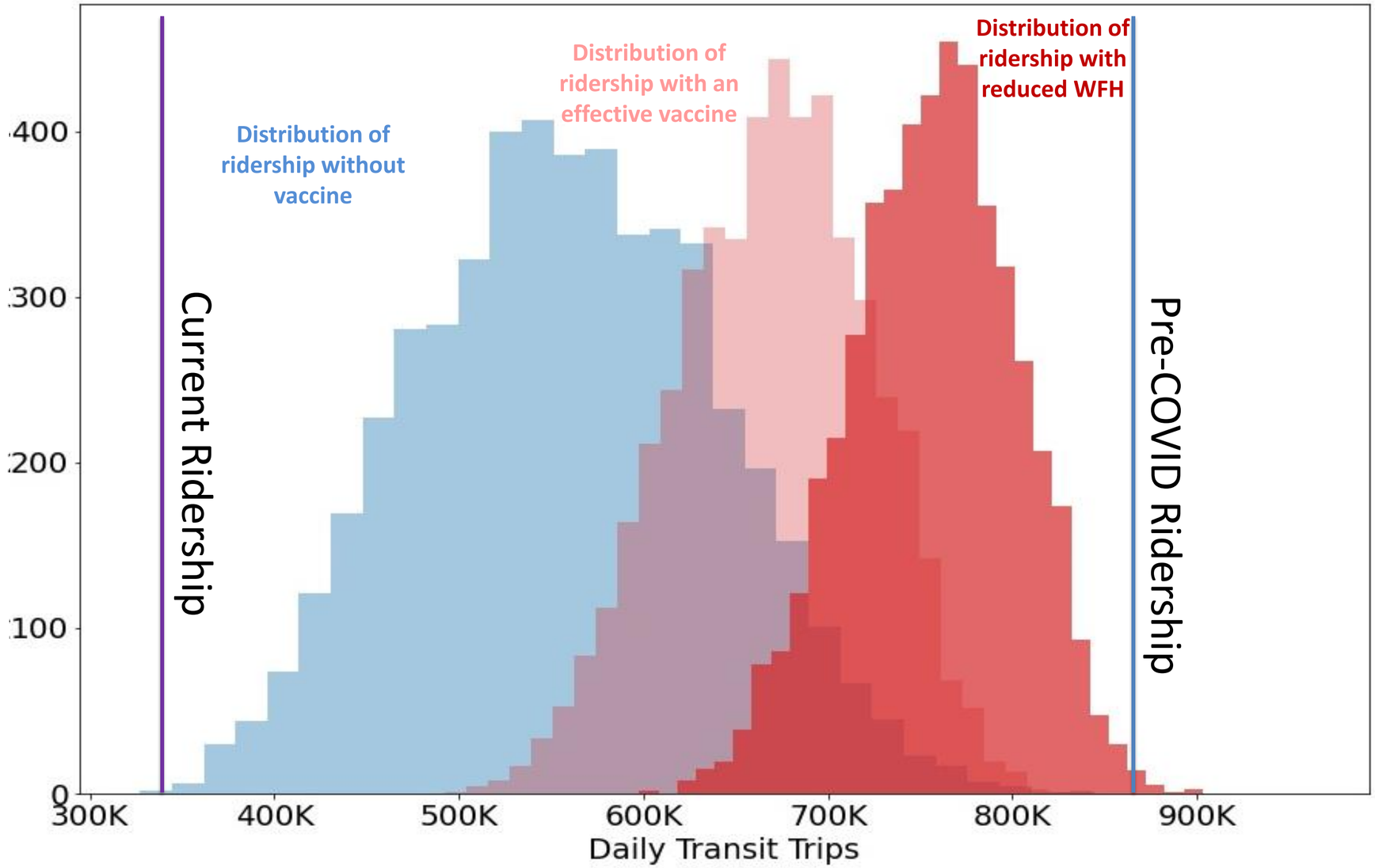
WHAT THE PROCESS LOOKS LIKE



KEY DEMAND FACTORS IMPACTING COVID RECOVERY

Factor:	High Point:	Low Point:
1. Working/Studying from Home	▪ *Full return to offices and classrooms*	▪ *Lasting changes in preferences to working/studying from home*
2. Propensity to Share Rides	▪ *Vaccine fully eliminates the need for social distancing*	▪ *Some level of social distancing maintained indefinitely*
3. Shift to Driving	▪ *Reduction in private auto ownership in post-vaccine world*	▪ *Lasting change in travel preferences towards private vehicles*
4. Employment Levels	▪ *Quick return to full employment and economic recovery*	▪ *Lasting unemployment, prolonged economic impacts*
5. Discretionary Trips	▪ *Lasting increase in discretionary trips beyond pre-COVID levels*	▪ *Decrease in discretionary trips due to proximity anxiety, lower income, on-line shopping, etc.*

Modeled ridership distributions with and without vaccine



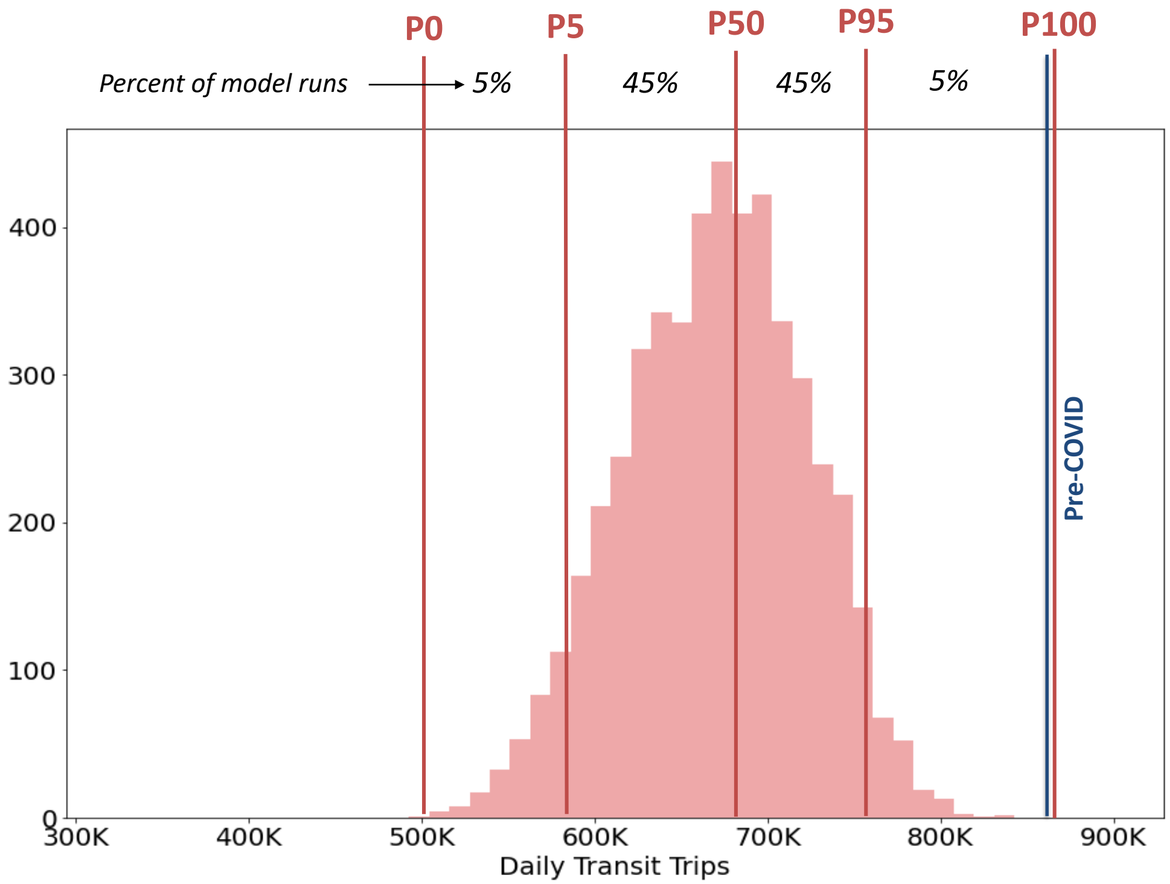
RELATIVE IMPORTANCE OF FACTORS – NO VACCINE

	Discretionary Trips	Employment	Gas Prices	Propensity for Vehicle Ownership	Propensity to Ride Share	Vehicle Capacity	Telecommuting/ Remote Learning
Daily Transit Trips	0.09	0.09	0.09	0.08	0.45	0.04	0.16
PM Speed	0.07	0.13	0.04	0.22	0.07	0.03	0.43
Sustainable Mode Share	0.08	0.08	0.10	0.21	0.41	0.04	0.07
Daily VKT	0.09	0.14	0.06	0.22	0.06	0.03	0.40
Daily Fare Revenue	0.07	0.09	0.09	0.08	0.42	0.05	0.20

RELATIVE IMPORTANCE OF FACTORS – WITH VACCINE

	Discretionary Trips	Employment	Gas Prices	Propensity for Vehicle Ownership	Propensity to Ride Share	Telecommuting/ Remote Learning
Daily Transit Trips	0.12	0.15	0.11	0.10	0.34	0.17
PM Speed	0.07	0.22	0.06	0.23	0.06	0.36
Sustainable Mode Share	0.09	0.09	0.09	0.38	0.21	0.13
Daily VKT	0.07	0.25	0.08	0.22	0.08	0.30
Daily Fare Revenue	0.11	0.17	0.10	0.11	0.31	0.21

What will be “new normal” ridership after the pandemic?



Distribution Percentile	2022 Ridership (% Pre-COVID)	Role in Recovery Scenarios
P0	60%	
P5	70%	Low scenario
P50	82%	Medium scenario
P95	91%	High scenario
P100	103%	

Key DECISIONS INFORMED BY THIS METHODOLOGY

- 2021 budgeting based on ridership and revenue projections
- Recovery expectations and updating of service levels/vehicle procurement
- Funding discussions with senior governments

Future Applications:

- Network decisions and long-term project prioritization
- Capital investment decisions
- Evaluation of major regional policy alternatives

Acknowledgement

The technical work presented here was made possible by using the TMIP-EMAT an opensource tool developed for the USA FHWA