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optimizing mobility

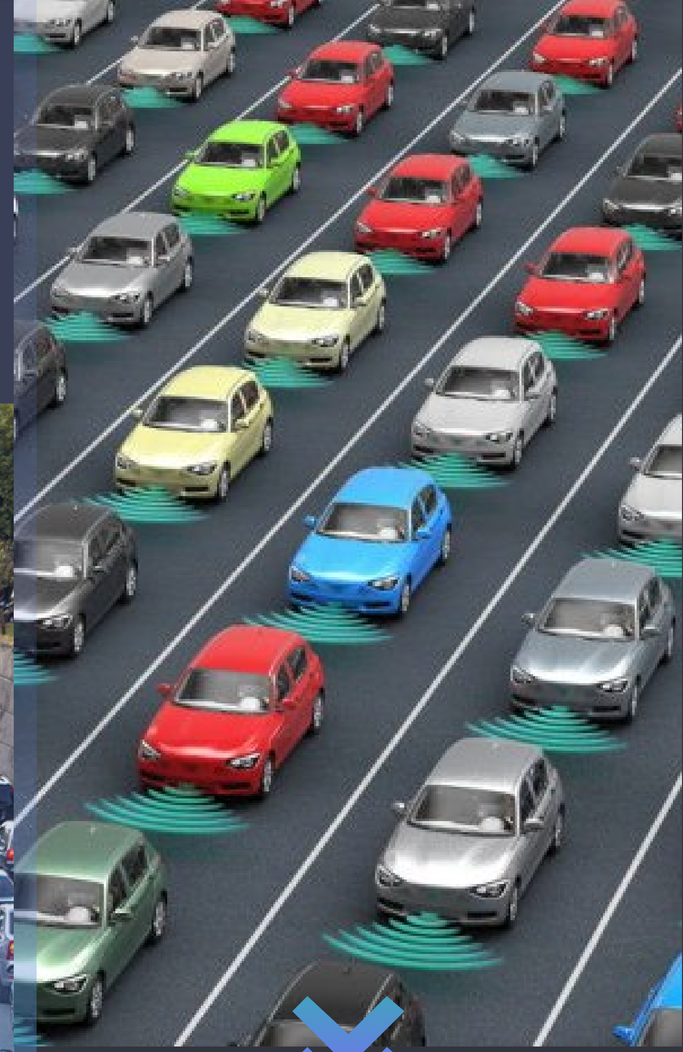
SERVICE DESIGN FOR MOBILITY PROVIDERS: GETTING SHARED SERVICES RIGHT BEFORE LAUNCH

Warren Perry I DRTS, BALTIMORE

NYC
1900

NYC
1913

EVERY
WHERE
TODAY

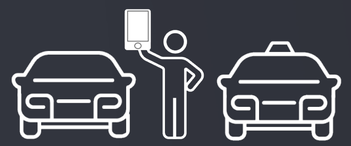


EVERY
WHERE
TOMORROW?

A MASSIVE PARADIGM SHIFT

4TH INDUSTRIAL REVOLUTION - SHARING RATHER THAN OWNING

Digitalization and **automation** of transportation of people and goods



From ownership economy to **shared economy**

On average, a personal car is used only **5%** of the time

"The auto industry will change more in the next 5 to 10 years than it has in the last 50"

Mary Barra
CEO and Chairman of General Motors

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THE CHALLENGES OF ON-DEMAND FLEETS

P2P MARKETPLACES

They don’t own the vehicle and don’t support the costs of assets

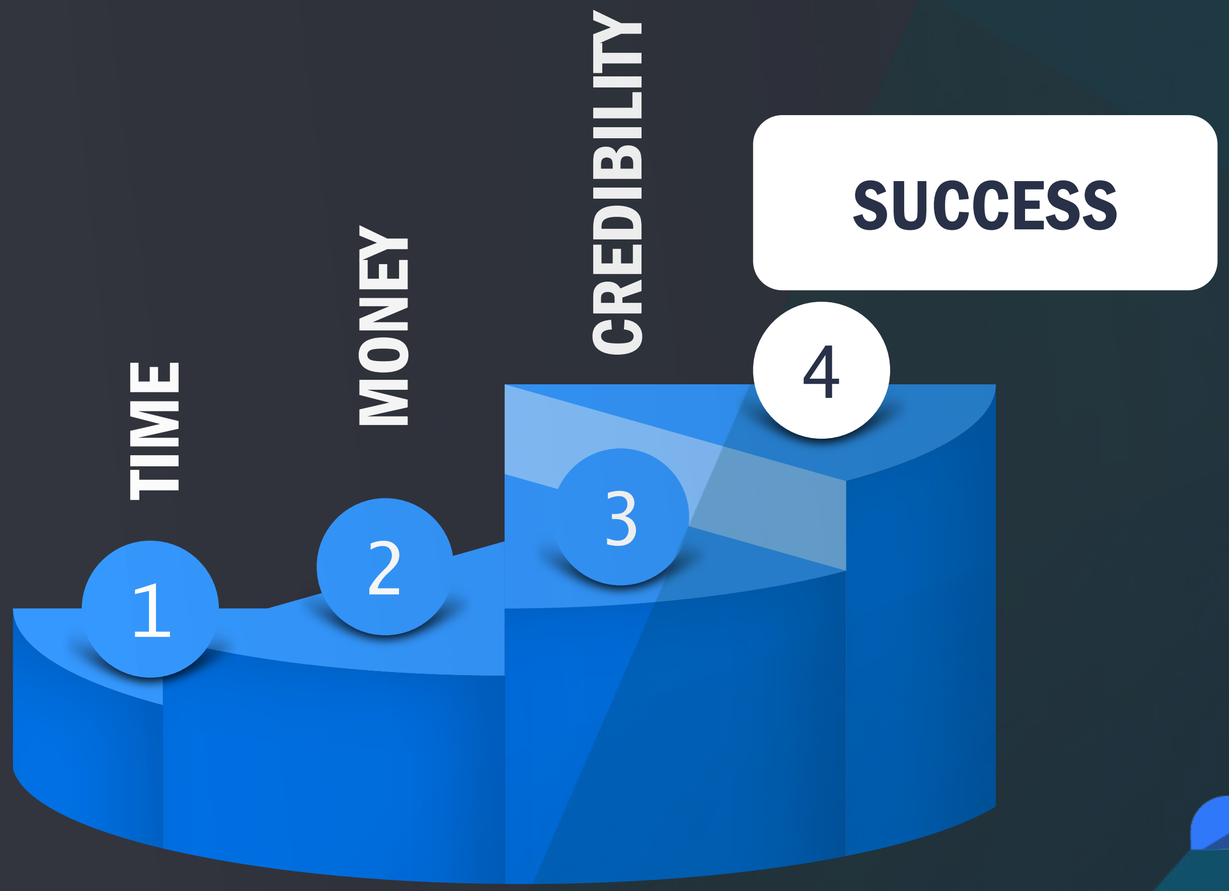
PRO ON-DEMAND MOBILITY

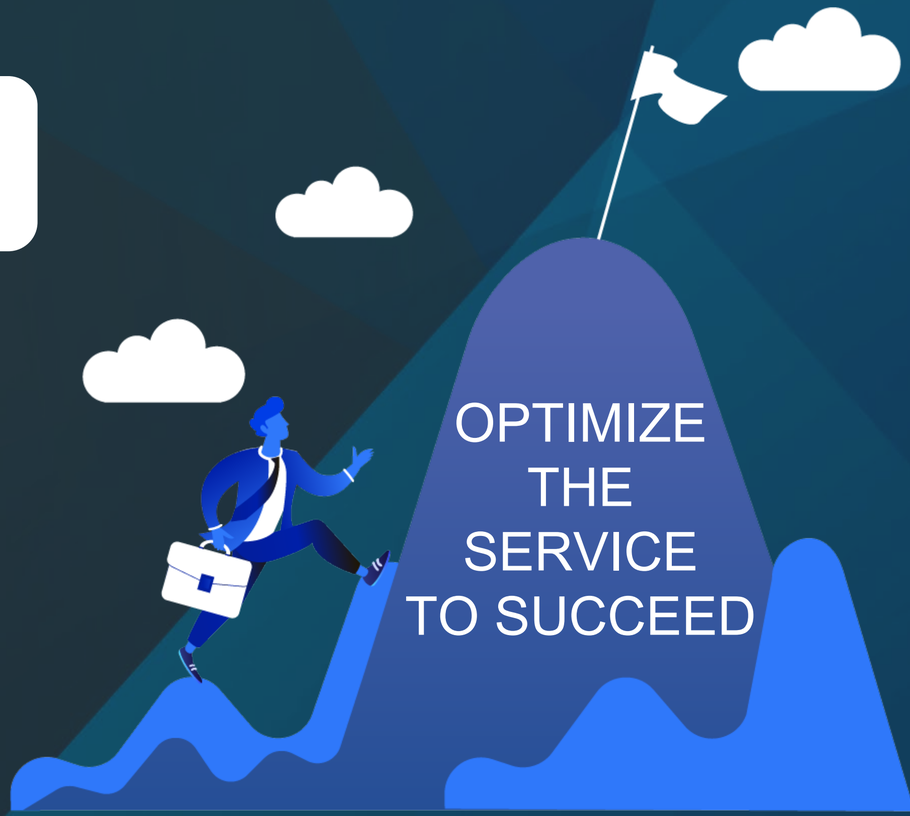
They own the fleets and must support heavy investments & costs of assets

MORE CONSTRAINTS & RISKS

PLANNING ON-DEMAND SERVICES IS HARD

PROFESSIONAL ON-DEMAND MOBILITY SERVICE PROVIDERS OWN THE FLEETS AND SUPPORT INVESTMENTS AND RISKS





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…AND RISKY

SEVERAL ON-DEMAND SERVICES HAVE ALREADY FAILED

What Killed Kutsuplus? 3 Takeaways for Cities Pursuing Mobility-On-Demand

By Editor | May 3, 2016 | News, Shared-Use Mobility

Helsinki's Kutsuplus transportation service – an on-demand, city-r
via smartphone – is often held up as an ideal of public sector inno
ultimately forced to close its doors at the end of 2015.

Slide Bristol shared-ride minibus scheme to close

27 November 2018

The app-based service which allows commuters to book a ride in

**A shared-ride bus firm has blamed Bristol's "challer
competition from the new Metrobus scheme for its**

Slide Bristol was the first "microtransit" service to be lau
2016, and has made more than 40,000 trips in the city.

App-Based "Microtransit" Provider Bridj Closes Shop

By Stephen Miller | May 1, 2017 | 7

Photo: Jason Lawrence/Flickr

TRANSPORTATION \ CARS \ FORD

Ford's on-demand bus service Chariot is going out of business

'We apologize for the inconvenience this may cause Chariot's riders'

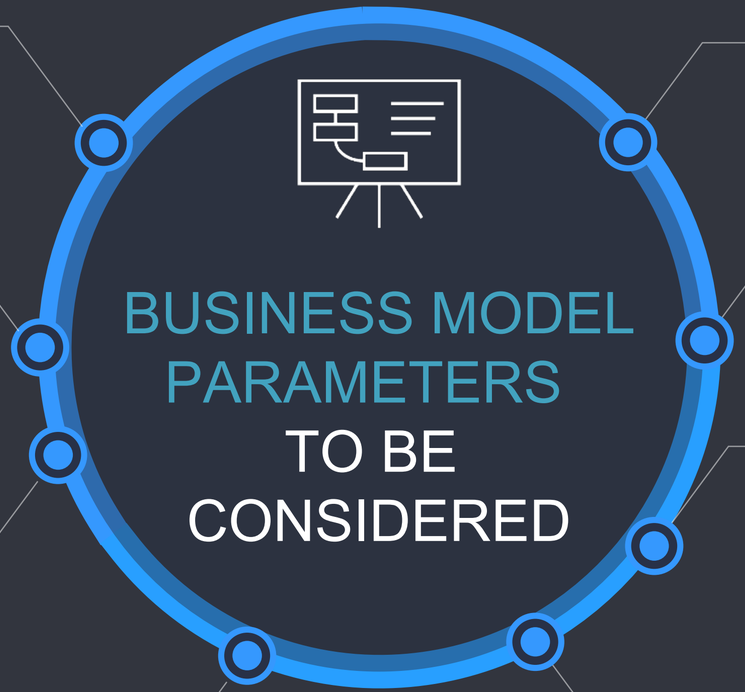
By Andrew J. Hawkins | @andyjayhawk | Jan 10, 2019, 3:49pm EST

SHARE

Photo by Amelia Holowaty Krales / The Verge

GET MOBILITY SERVICES RIGHT THE 1st TIME

WHAT DO MOBILITY SERVICE PROVIDERS CARE ABOUT?



1. How many vehicles?
2. Where should they go and when?
3. Pre-book or on-demand?
4. Station-based or door-to-door?
5. What's the influence of traffic?
6. What are acceptable waiting times?
7. What are acceptable ride times?
8. How many vehicle-kilometers are needed?

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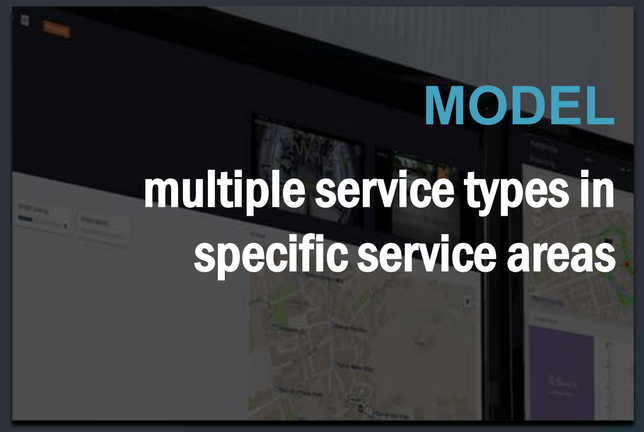
OUR SOLUTION: SERVICE DESIGN

DESIGN THE SERVICE THAT BEST FITS BUSINESS GOALS BUT ALSO MEETS CUSTOMER NEEDS



MODEL

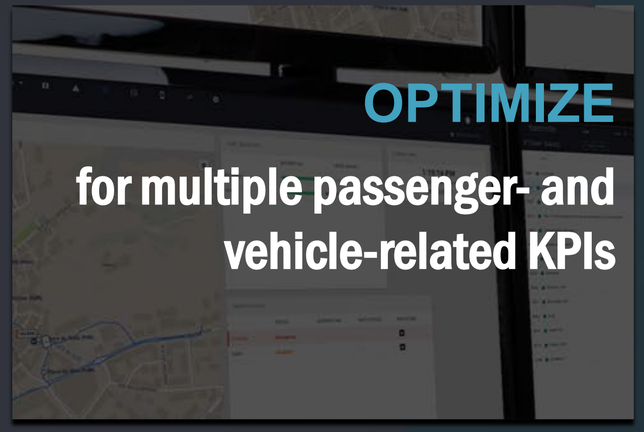
multiple service types in specific service areas

USE

realistic demand data to feed the simulation

ADJUST

service and fleet design parameters

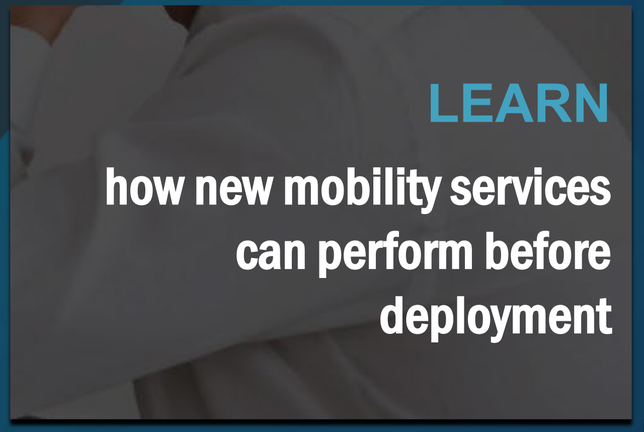


OPTIMIZE

for multiple passenger- and vehicle-related KPIs

ANALYZE

the trade-offs between service level, cost, and fleet efficiency



LEARN

how new mobility services can perform before deployment

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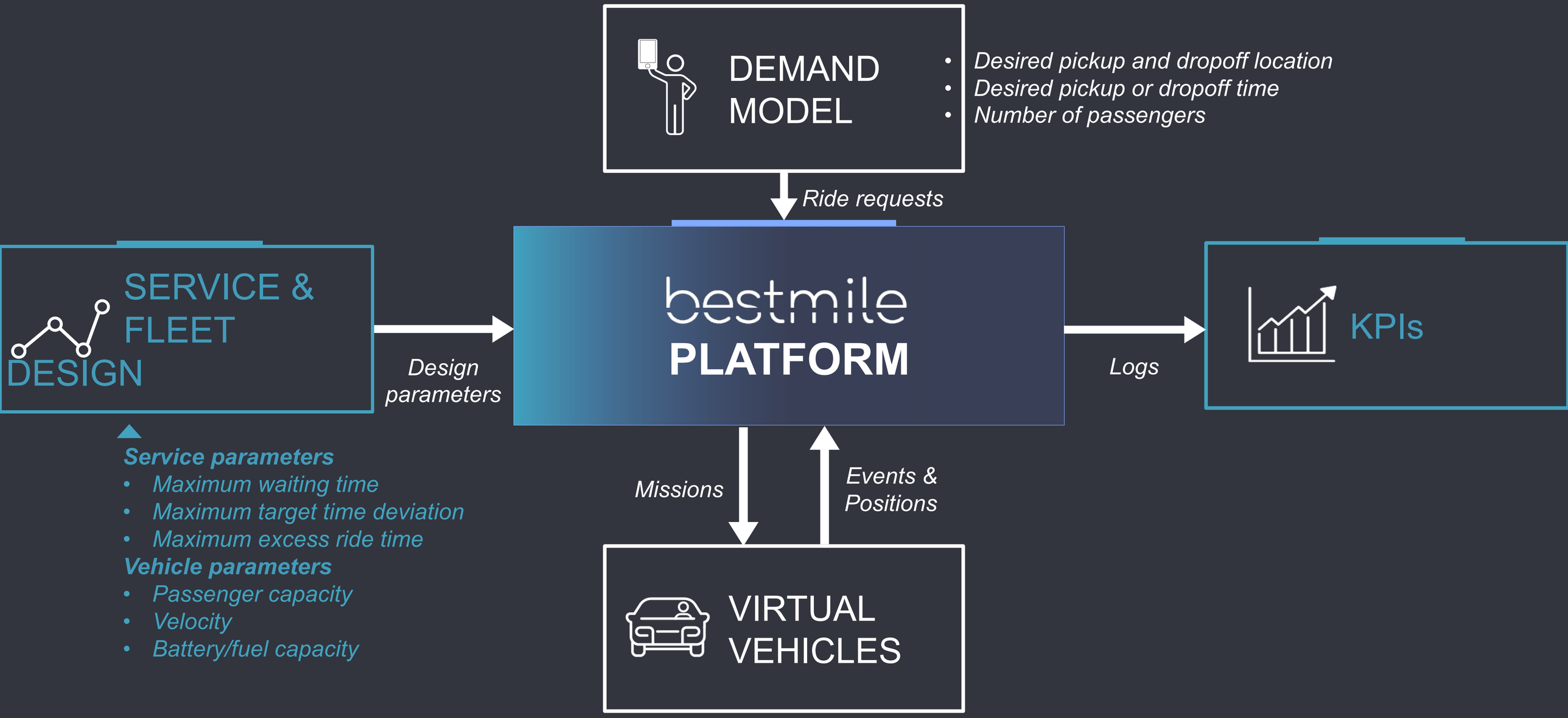
SERVICE DESIGN FRAMEWORK



ACHIEVED KPIs

PASSENGER-RELATED KPIs

Acceptance rate (AR)

Excess ride times (ERT)

Pickup time deviation (PTD)

VEHICLE-RELATED KPIs

Vehicle movement distance (VMD)

Vehicle occupancy (VO)

FLEET EFFICENCY KPIs

Vehicle transportation distance ratio (VTDR)

Effective transportation distance ratio (ETDR)

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EXPLORING SERVICE DESIGN IN CHICAGO

3RD LARGEST U.S. CITY
WITH 2M+ RESIDENTS

UNDER-STUDIED
(IN THE PUBLICLY AVAILABLE STUDIES)

THE CITY SHARES
TAXI DATA

PUBLIC TAXI DATA INFORMATION:

~31,000 records after cleaning for March 1, 2017 with:

- ride start and end time (15 minutes granularity)
- ride start and end census tract / community area

ONE CITY, 3 USE CASES

3 DIFFERENT SERVICE SCENARIOS AND AREAS TO SHOWCASE THE FLEXIBILITY AND ROBUSTNESS OF THE SERVICE DESIGN APPROACH

LINCOLN PARK

~4,500 rides per day
(~5 min average direct ride time)

1

O'HARE AIRPORT

~2,600 rides per day
(~40 min average direct ride time)

2

CITYWIDE

~15,600 rides per day
(~8 min average direct ride time)

3

FIRST USE CASE: LINCOLN PARK

1

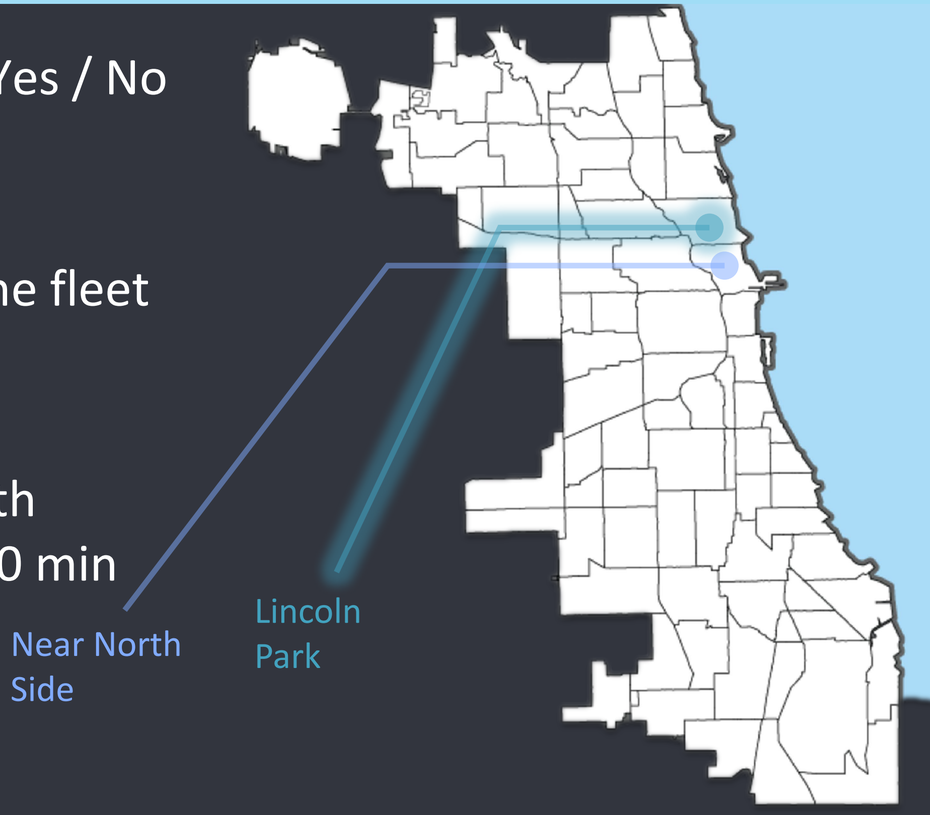
Micro-transit for Downtown - Lincoln Park/Near North Side

VARIABLE — Sharing: Yes / No

VARIABLE — 10-60 vehicles in the fleet

VARIABLE — 0, 50%, 100% prebooking with mean prebooking time of 120 min

VARIABLE — Door-to-door, station-based with 40 and 80 stations



Service Level Specification

MAX ERT = 50% of the direct ride time plus 2min

MAX PTD = 10min

SECOND USE CASE: O’HARE AIRPORT

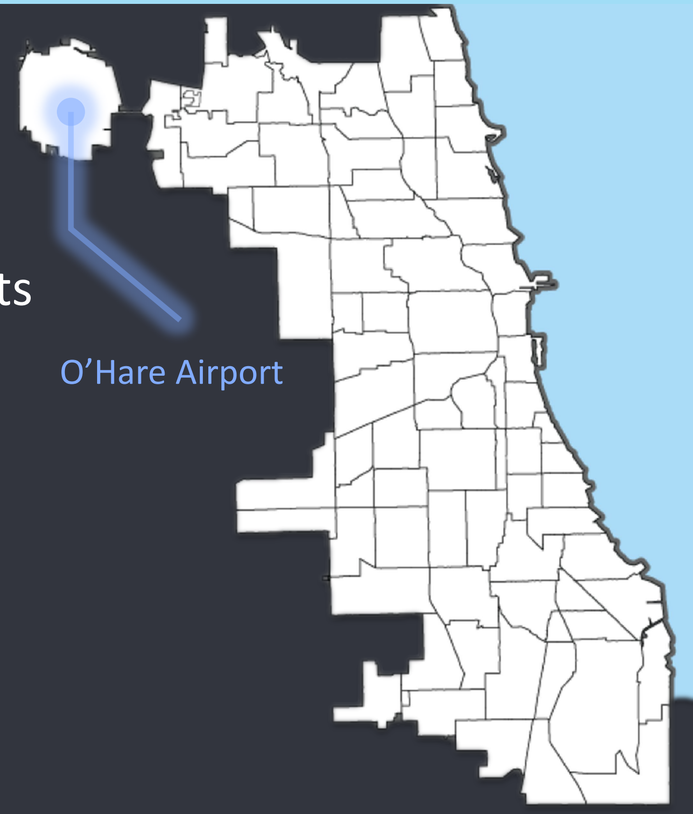
2

Shuttle Service to and from O’Hare Airport

VARIABLE — Sharing: Yes / No

VARIABLE — 45, 60, 75 and 90 vehicle fleets

VARIABLE — 0, 50%, 100% prebooking with mean prebooking time of 120 min



Service Level Specification

MAX ERT = 50% of the direct ride time plus 10min

MAX PTD = 10min

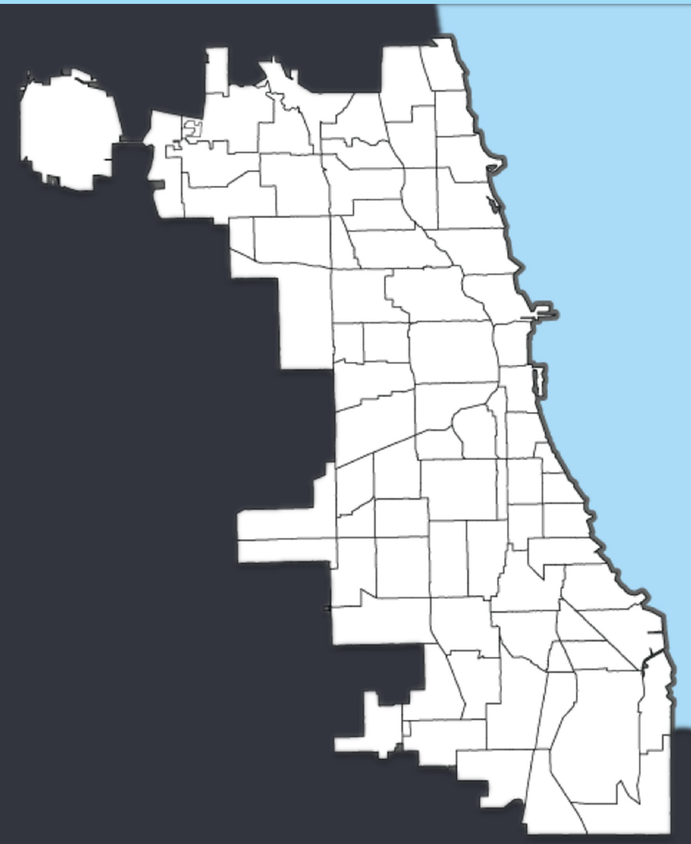
THIRD USE CASE: CITYWIDE RIDESHARIN(3

Ridesharing service that aims to cover 50% of the daily taxi trips

VARIABLE Sharing: Yes, No

VARIABLE 60, 80, 100, 120, 140 and 160 vehicle fleets

FIXED 50% prebooking with mean prebooking time of 60 min



2 Service Level Specifications

1 **MAX ERT = 50% of the direct ride time plus 2min**

MAX PTD = 10min

2 **MAX ERT = 50% of the direct ride time plus 10min**

MAX PTD = 10min

LEARNINGS FROM A SELECTED USE CASE

USE CASE IN THE CITY OF CHICAGO TO SHOWCASE THE SERVICE DESIGN

The design highlights that ridesharing results in significantly higher acceptance rates, effective vehicle transportation distance ratios, and vehicle occupancies

With a decrease of only 10% of the acceptance rate, the full set of 31,000 rides needed to satisfy the demand can be handled with a fleet of 200 vehicles instead of 2,711

The ability to cut the number of vehicles **by a factor of 10** shows the advantage of an optimized and coordinated design

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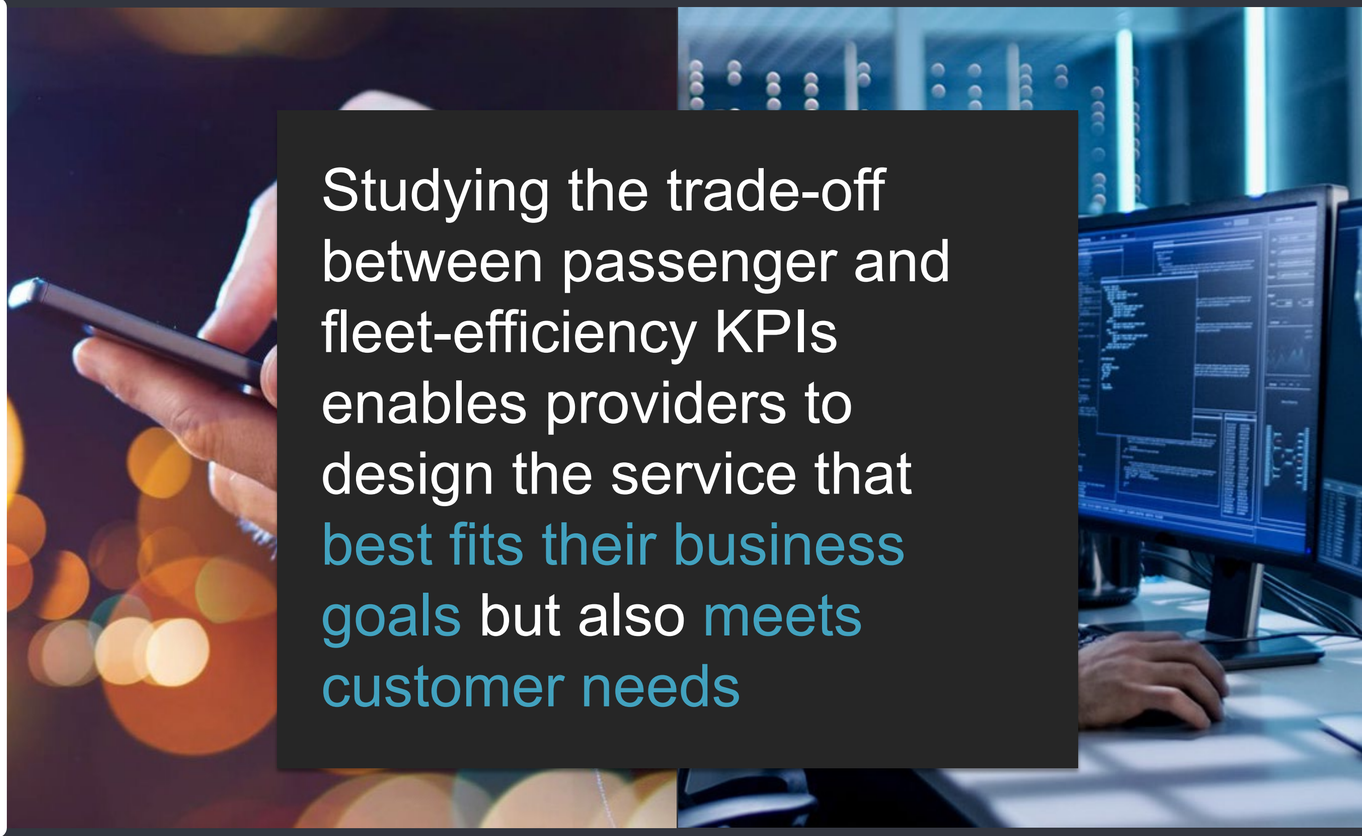
GET SHARED MOBILITY SERVICE RIGHT

EACH DEPLOYMENT IS UNIQUE AND HAS IT'S OWN SPECIFICITIES

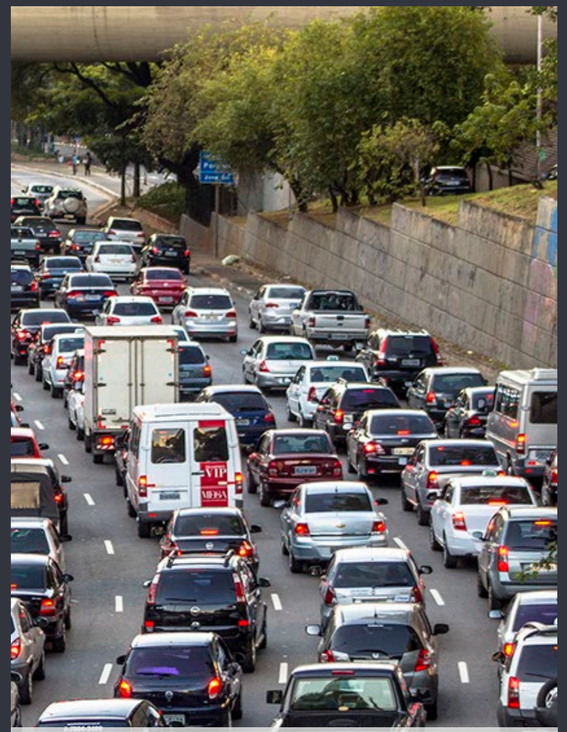
1. Bridge the gap between theory and practice
2. Enable accurate, demand-based planning
3. Test multiple scenarios
4. Optimize fleet and passenger KPIs
5. Remove risk and increase confidence
6. Use proven dispatching logic and matching algorithms



Studying the trade-off between passenger and fleet-efficiency KPIs enables providers to design the service that best fits their business goals but also meets customer needs

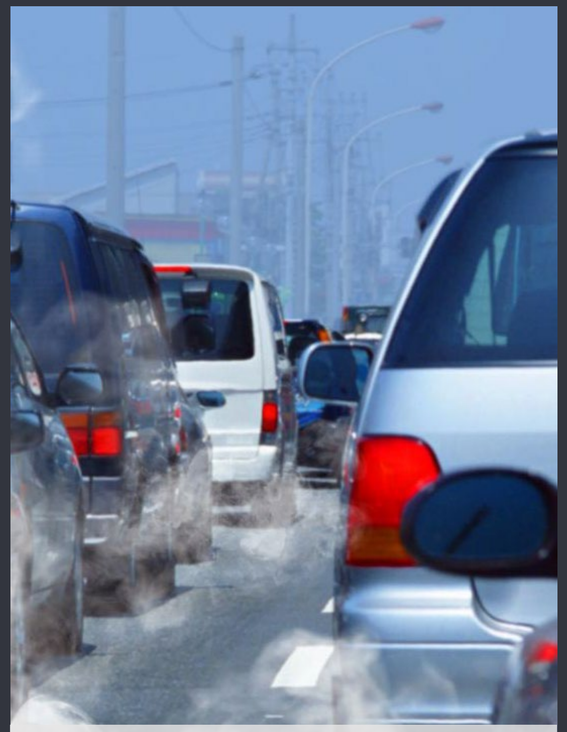
WHAT ELSE IS AT STAKE?

BENEFITS BEYOND MOBILITY SERVICE PROVIDERS



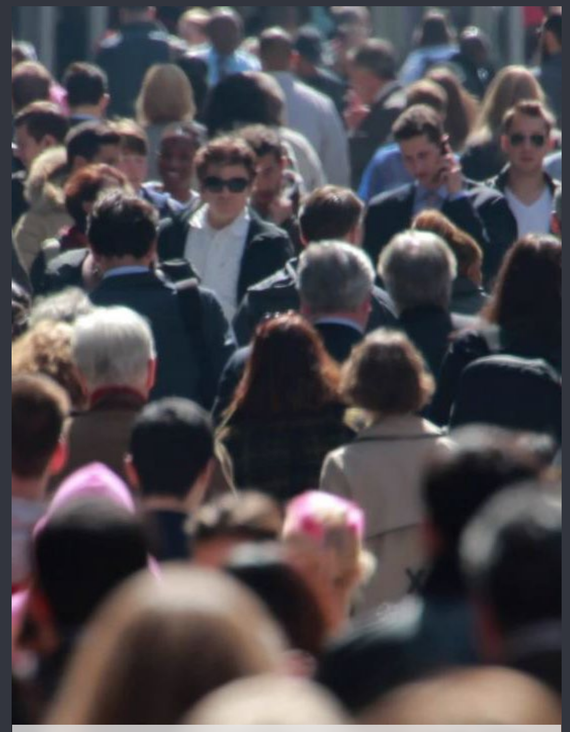
DECREASE CONGESTION

EFFECTS ON TRAFFIC



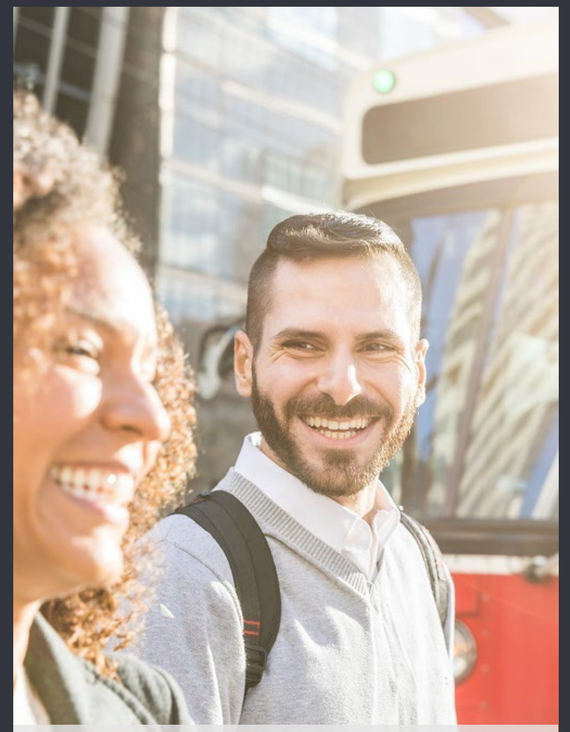
REDUCE POLLUTION

GREENHOUSE GAS



IMPROVE PUBLIC OPINION

CUSTOMERS & PUBLIC



ENHANCE QUALITY OF LIFE

LESS NUISANCE

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