Improving urban mobility with transit centric on-demand services

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On-demand transportation systems

Are ride-hailing systems as they operate today a scalable and sustainable alternative to private vehicle ownership?
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Ride-hailing systems without pooling may increase total vehicle miles traveled (VMT) compared to private vehicle ownership

⇒ Increase in negative externalities (e.g. congestion, emissions)
⇒ Competition can amplify this via the "Price of Fragmentation"
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Question: how can cities utilize these innovations in a more scalable and sustainable manner?

- Enabling and encouraging (high-capacity) ride-pooling
- Integrating with mass transit
Higher capacity sharing at scale

The color of each vehicle (circle) shows the number of passengers, from light blue (empty) to dark red (full).

The vehicles move to serve incoming requests.

Service rate, c. [total]:
0% [0%]
Waiting time, c.m.:
0 min 0 s
In-car delay, c.m.:
0 min 0 s
Occupancy, c.m.:
0.0 pass/vehicle
Travel distance, c.m.:
0 km/vehicle

n: 1000 vehicles
c: 10 passengers
W: 7 min
D: 14 min
Day: Th 5-18-2013
Time: 00:00:00

[Alonso-Mora, Samaranayake, et al. PNAS'17]
Higher capacity sharing in practice
Park and ride (pooling)

King County Metro will experiment with ride-hailing app

With a responsive, municipal shuttle, Metro hopes to make transit easier to use—starting with the Eastside

By Sarah Anne Lloyd | @sarahanelloyd | Oct 17, 2018, 2:38pm PDT
Questions/challenges- redesigning mass transit

- Redesigning fixed route transit (bus) in the presence of on-demand services
- Addressing “coverage vs ridership problem”

Frequent Network Red Frecuente

Ready to go when you are, routes in the Frequent Network come every 15 minutes or better, 15 hours a day, 7 days a week.

Houston network resign
Effective August 27, 2017

80% of routes are ridership based
Questions/challenges - regulation

- Tools for understand responses to regulatory interventions