Identifying the Impact Ridesharing and Autonomous Vehicles will have on Mobility in a City

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Three year collaboration with WEF

2015

Consumer acceptance
- Customer research

City perspective
- City policy maker interviews

Mobility scenarios
- Scenarios for urban mobility

2016

Go Boston 2030
- AV strategy development

AV testing pilot
- Launch of AV testing in Boston

AV impact study
- Agent-based simulation of downtown traffic

2017

Future modal mix research
- Conjoint study with 7,000 consumers in three cities

Expansion of AV testing
- Expanded testing area, three partners, active passenger trials

AV impact study 2.0
- Holistic city-wide traffic simulation with enriched trip data

presentation today
Last year: Agent-based model for downtown Boston

We took a real world environment ...

And simulated traffic flows in its streets

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<th>Traffic participants</th>
<th>Environment and infrastructure</th>
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Source: World Economic Forum; BCG analysis in cooperation with MIT Media Lab
We used a variety of real-life data sets as model inputs

Roadways

Origin - destination by travel mode

Commuter volume by day part

Bus

Dataset

- **Street centerlines** (lanes, speed, direction, average daily traffic volume), traffic lights, and building footprints
- **Baseline trip counts by mode of transportation** for work commutes; we added non-work commutes based on assumptions
- **15-min traffic volume counts** from representative roadway data from a typical midweek as proxy for trip patterns and applied to all modes
- **Bus routes and schedules** assigned by daypart based on average by route type

Source

- **City of Boston**
- **MassDOT**
- **MassGIS**
- **US Census**
- **MassDOT**
- **MBTA**
- **MassGIS**
This year's model focus

Quantifying the impact of Autonomous Vehicles on city traffic
This year: Expanded scope across four key dimensions

1. Expanded study to cover entire City of Boston

   - 316x Larger area (142 km²)

2. Added enriched trip data and commercial vehicles

   - 11x More trips (2M/day)

3. Determined future modal mix through conjoint study with 2,400 consumers

   - 72 Modal mixes, by area & use case

4. Quantified traffic efficiency gains from AV technology

   - 6.3% Gain in throughput with 37.5% AV mix

Source: World Economic Forum, BCG Analysis
Included eight transport modes—plus commercial

Mass transit
- Bus/subway
- Commuter rail

Personal car
- Personal car
- Autonomous Personal car

Mobility on demand
- Taxi/ride sharing
- Autonomous Shared taxi
- Autonomous Mini-bus

Source: World Economic Forum, BCG Analysis
Travel time impact varies across neighborhoods

City average

- Average travel time
  - Modest improvement: -4.3%
  - Today: 35%, 58% (Mass transit, Personal car)
  - Future: 32%, 30%

- Modal mix
  - Today: 7%, 30%
  - Future: 20%, 45%

Urban

- +5.5%
  - Worsening
  - Today: 35%, 34%
  - Future: 30%, 46%

Suburban

- -12.1%
  - Large improvement
  - Today: 41%, 18%
  - Future: 42%, 42%
Cities can influence outcome through policy levers

- Travel time improvements:
  - Occupancy-based pricing scheme: -15.5%
  - Converting street parking: -10%
  - Dedicated AV lanes: -8.3%

Source: World Economic Forum, BCG Analysis