Breakout Session #12, July 19, 2016
"AV-Ready" Cities or "City-Ready AVs?"

How can cities plan for the transition period?
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What is important about the urban "transition period"?

- Coexistence of **conventional and automated** vehicles
- Generally, **varying levels of "AV readiness"** in the entire transport system (users, infrastructure, service providers, etc)
- Transition challenges are particularly **high in urban contexts**
- Critical phase of a **large transformative process** with a major impact on our cities (beyond mobility)
- Managing urban transition well, will be a **key success factor** for effective AV deployment overall
- Not managing urban transition **actively**, can create **safety** issues, reduce public **policy impact**, will add further **uncertainties** to AV impact
## Urban Transition Scenario (technology)  
[source: CityMobil2 Project, 2015]

<table>
<thead>
<tr>
<th>Level 5</th>
<th>Full automation</th>
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<tr>
<td></td>
<td>Cybertcars/ delivery vehicles (last mile, low speed)</td>
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<td>Automated bus/ PRT (segmented lane)</td>
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<td>Cybercars/ delivery vehicles (last mile use)</td>
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<td>Automated bus/ PRT (dedicated lane)</td>
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<td>Automated bus/ PRT (in mixed traffic)</td>
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<td>Parking Garage Pilot</td>
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<td>Truck Terminal Parking</td>
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<td>Self-driving trucks and cars</td>
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<td>Cybertcars (&quot;taxi&quot; &amp; delivery vans in mixed traffic)</td>
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<td>Level 4</td>
<td>High automation</td>
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<td>Traffic Jam Chauffeur</td>
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<td>Truck platooning</td>
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<td>Level 3</td>
<td>Conditional automation</td>
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<td>Partial Automated Parking</td>
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<td>Traffic Jam Assistance</td>
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<td>Level 2</td>
<td>Partial automation</td>
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<td>Adaptive Cruise Control</td>
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<td>ACC + Stop &amp; Go</td>
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<td>Lane Keeping Assist</td>
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<td>Basic Park Assist</td>
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<td>Lane Departure Warning</td>
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<td>Level 1</td>
<td>Active assistance</td>
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<td>2015</td>
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<td>2025</td>
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<td>2035</td>
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- **50% of fleet is level 3 or higher?**
- **50% of fleet is level 2 or higher?**
- **100% of fleet is level 1 or higher?**

Assuming continuous 20 year fleet renewal.
Technology growth rates


Growth rates can be very different!
What determines the speed of transition?

- **General** socio-economic factors
- Definition of successful use and **business cases** – and public **image** of automation
- **Legal** framework (national, multi-/international)
- **Integration** impact (IT, electrification, service models e.g. intermodality)
- **Transition dynamics** [Beiker, 2015]
  - **evolutionary** (~automobile industry) → "something everywhere"
  - **revolutionary** (~IT industry) → "everything somewhere"
  - **transformative** (~start-ups, local automated mobility on-demand services) → "disruptive innovation process"? (Christensen)
- **Visions and mobility policies of local stakeholders**
Policy context of road automation (local government perspective)

Opportunities
- better safety
- fuel efficiency
- less space
- more effective transport system
- higher reliability
- greater comfort

Threads
- new perception of travel time → more VMT
- increased urban sprawl
- lower traffic efficiency (in some contexts)

relevant at which automation level?

priority on individual transport
demand supply policy

quality collective transport
active demand management

synergies between policies
efficient mobility system

oversupply
public acceptance uncertain

ineffective mobility system
social exclusion

higher mobility demand
strong rebound effects

personal car ownership
low

personal car ownership
high

effective strategies to avoid?
What will you do tomorrow about automation in your city?

- Transport planning
- Infrastructure development
- Governance structures/service models
- Policy development

... while dealing with many uncertainties
  (user response, prevailing technologies and business models, timescales)
How can cities prepare (better) for the transition period?

Transport planning – *plan with automation in mind!*

- What are we planning for? (how to overcome uncertainties?)
  - what is the *vehicle share* of "autonomous", "automated and connected" personal cars, and shared vehicles (single occupancy or ride sharing)?
  - what will be the success of "disruptive" **fully automated** services in (specific areas)
  - what is the time horizon for **mainstream AV market take-up**? how does it match our planning horizons?
  - how much is "freight planning" an issue?
How can cities prepare (better) for the transition period?

Transport planning (2) – plan with automation in mind!

- **Transport mode perspective**
  - planning impact of automation corridors
  - drawback of AV's high efficiency road space use for non-automated modes
  - interaction with human road users (e.g. with non-motorised users/ in complex traffic situations)
    - traffic efficiency impact?
  - automation rate of public transport, AV impact on transit demand, intermodal connectivity

- **Modelling** is not yet "AV ready"
  - vehicle behaviour (micro simulation)
  - demand models need to reconsider value of time, car ownership
  - AV network impact: at which automation rate/ in which traffic context?
How can cities prepare (better) for the transition period?

Infrastructure development – "AV-enabling" infrastructure that we build now!

- High automation **pilot areas**: test grounds to understand
  - what are infrastructure needs of **connected vehicles** (IT, financing, standards)?
  - what is **user** response? when and in which context is there a relevant **traffic impact**

- Automation **corridors**
  - how can "**segregated**"/ "**dedicated**" lanes for AVs work in practice?
  - how can **walking/ cycling** travellers survive in AV-built corridors?
  - what are **low-cost** AV-infrastructure options?
How can cities prepare (better) for the transition period?

**Infrastructure development (2)** – "AV-enabling" infrastructure that we build now!

- Infrastructure for **public transport** (transit) and new **AV-based services**
  - the end of the "**bus stop**"?
  - design of (local) interchange **hubs** (AV ↔ transit) – scope for new business models?
  - converting **parking** to "vehicle storage"

- **Freight distribution** infrastructure (e.g. converting parking houses to logistics centres?)

- How to redistribute **space** and to reassign urban **functions**?
How can cities prepare (better) for the transition period?

New service models and governance structures – agree an automation agenda!

- "Mobility on Demand" – or "vehicle on demand"?
  - vehicle and ride sharing services that support policy goals
  - use cases and cooperation models for last mile/low density services, special needs services (e.g., for ageing communities), municipal services, e.g., waste collection
  - new and traditional providers in a "services platform"

- Changing role of large transit operators: innovative mobility providers
  - integrator, system backbone, AMoD provider, hub operator

- Freight distribution: a growing threat (and an opportunity)

- "Automation platform" (or initially a "task force") to facilitate multi-stakeholder cooperation
How can cities prepare (better) for the transition period?

- **Policy development** – *actively develop an "automation vision"!*
  - mobility **innovation culture** – getting ready for "disruptive innovation"
  - land use policy and building standards
  - major new **trends** (e.g. impact of 3D printing)
  - **demand management** policies
  - services based on **shared use**
Discussion:
The next five years of urban "automation policy" development

My City's **Automation Roadmap**, including

- Transport **planning**
- **Infrastructure** development
- **Governance** structures/ **service** models