Supply chains, Logistics and the Economics of Mobility

2nd City Lab
Stephanie Haag
Associate Partner, McKinsey Center for Future Mobility
Munich

Diego Fernando Zapata
Mobility Undersecretary
Medellin

Cornelia Dinca
International Liaison
Amsterdam Smart City

Achim Schade
Associate Partner
McKinsey & Co.
Dusseldorf
Our thematic group

Supply chains, Logistics and the Economics of Mobility

Mentor cities
Amsterdam, Medellin, Antwerp, Hamburg, Singapore, Phoenix

Core Cities
Alcobendas, Chalkida, Corfu, Gdańsk, Haskovo, Kavala, L'Aquila, Logroño, Métropole Rouen Normandie, Metropolitan City of Rome Capital, Padua, Pamplona, Skellefteå, Tripoli (Consortium), Vari-Voula-Vouliagmeni,
## Agenda:
Supply chains, Logistics and the Economics of Mobility

17 February 2021

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.10 – 13.30</td>
<td><strong>Welcome</strong></td>
</tr>
<tr>
<td></td>
<td>Introduction to objectives</td>
</tr>
<tr>
<td></td>
<td>Reflections on cities’ progress and recap learning</td>
</tr>
<tr>
<td>13.30 – 14.00</td>
<td><strong>Mentor presentations and Q&amp;As</strong></td>
</tr>
<tr>
<td></td>
<td>Urban mobility – Medellin &amp; Amsterdam</td>
</tr>
<tr>
<td>14.00 – 14.10</td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td>14.10 – 14.40</td>
<td><strong>Core city sharing and group problem solving</strong></td>
</tr>
<tr>
<td></td>
<td>Core cities volunteer their asks of the expert and mentors on needs, solutions to scale and challenges faced by each city</td>
</tr>
<tr>
<td>14.40 – 15.05</td>
<td><strong>Full group reflections</strong></td>
</tr>
<tr>
<td>15.05 – 15.10</td>
<td><strong>Closing remarks</strong></td>
</tr>
</tbody>
</table>
Success factors for supply chains, logistics, and economics of mobility:

A brief recap
Small and medium cities in Europe face significant mobility challenges

Setting the stage: mobility systems in EU cities have become increasingly stressed by growing populations

70% The percent of EU population that lives in cities, including small and medium-sized cities

85% The percent that cities account for total EU GDP

The present mobility situation in many European cities has created unsustainable conditions for living, including:

- Severe congestion
- Poor transit access
- Noise emissions
- Poor air quality and GHG emissions

Small and medium-sized European cities are particularly hard pressed, given:

- S-M cities often lack the necessary institutional capacity to manage growing populations
- Financial resources are often more limited in S-M cities compared to large city counterparts
- S-M cities in Europe tend to skew older, creating acute accessibility challenges

Looking ahead

Small and medium sized EU cities will need to understand the evolving disruptions and available solutions that will support enhancing their urban mobility, improve accessibility, and create high quality, sustainable transport systems

Urban mobility is vital to our economy

Cities will have more than 60% of the population and supply 65% of the economic growth\(^1\) by 2030 ...

...causing demand for mobility to nearly double in growing cities\(^2\)...  

... making urban mobility vital to our economy: reducing a single minute of congestion saves more than \(\$1.4B\)^3

1. McKinsey Global Institute  
3. For a city of 10 million residents with a per capita GDP of 35,000 USD and 2 commutes on each of the 230 working days

Source: ONS, City of New York, McKinsey
Disruptive supply chain and logistics trends sit amidst other significant societal and industry trends

The mobility revolution is being shaped by changing societal norms...

- Urbanization
- Infrastructure
- Consumer preference
- Autonomous driving
- Shared mobility
- Decentralization of energy system
- Internet of Things and Seamless Mobility
- Regulation
- Public Transit
- Electrification of vehicles
- E-Commerce

... impacting transportation outcomes

- Increasing push for clean, livable cities
- Lower reliance on traditional ownership models
- Rapidly growing logistics demands
- Tightening regulatory restrictions
30+ technology and tech-enabled operating model interventions are changing the future of logistics...

Supplier Portal on live quality and inventory management

No-touch order processing

Real-time inventory tracking

E2E supply chain control tower

Cloud logistics platform

Smart package with blockchain

Dynamic end-to-end network optimization

Shippers

Warehouse

First/mid mile

Airport/ port

Customers

Air/ocean linehaul

Customers

Airport/ port

First/mid mile

Warehouse

Last mile

Customer

Returns

1. Predominately IoT lever

AGV-based goods-to-man solutions

Smart shelves / Pick to Light

Fully automated robotics picking

Information platforms

Drones for delivery

Smart public & personal parcel lockers

Uberization of transport/Last-mile delivery

2. Inventory tracking

3. Cloud logistics platform

4. Smart package with blockchain

5. Dynamic end-to-end network optimization

Source: McKinsey SC survey, Team analysis
These interventions are advancing through five key categories...

<table>
<thead>
<tr>
<th>Category</th>
<th>Offering/services</th>
<th>Examples (Large companies &amp; startups)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IoT</td>
<td>Telematics, Wearables/ Smart glasses, RFID, Motion detection sensors</td>
<td>[Scandit, Verizon Connect, Omnitrac, Cisco, others]</td>
</tr>
<tr>
<td>Automation</td>
<td>Drones for delivery, AGV solutions, Autonomous truck and truck convoys, Warehouse robotics</td>
<td>[Alphabet, Bastian, Daifuku, XPO, others]</td>
</tr>
<tr>
<td>Agile IT systems</td>
<td>Enterprise Resource planning (ERP), Transport Management Systems (TMS), Warehouse Management Systems (TMS), Fleet Management System (FMS)</td>
<td>[Oracle, SAP, BlueYonder, Optoro, others]</td>
</tr>
<tr>
<td>Integrated on-cloud/AI</td>
<td>Advanced analytics and artificial intelligence, End-to-end platform, Modularized product development</td>
<td>[Microsoft, Oracle, Google, Xena, Xinghai, others]</td>
</tr>
<tr>
<td>Customer front-end interfaces</td>
<td>Digitized information platforms</td>
<td>[CMA CGM, IBM, Amazon, others]</td>
</tr>
</tbody>
</table>

Significant outcomes

- **30-40%** reduction in inventory with end-to-end visibility in operations
- **15-30%** reduction in transportation and warehousing costs
- Improved customer experience and service delivery

1. Emerged by integrating various elements of IoT, automation, and AI with strong execution focus
...leading to new business models in the industry

<table>
<thead>
<tr>
<th>Offering / services</th>
<th>Description</th>
<th>VC funding into startups (2014 - 19)</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>In USD Bn</td>
<td></td>
</tr>
<tr>
<td>Last-mile delivery</td>
<td>Offer innovative last-mile delivery services to retailers and individuals by using crowdsourced delivery, drones, AVs, etc.</td>
<td>9.9</td>
<td>dada, LALAMOVE, HIVE, G OGO X, SHU TONG, FREIGHTOS, FORTO</td>
</tr>
<tr>
<td>Road freight marketplaces and solutions</td>
<td>Increase efficiency by connecting shippers and trucking companies via marketplaces or provide fleet management services</td>
<td>6.0</td>
<td>BLACKBuck, CONVOY, ABI U, SHU TONG, FREIGHTOS, FORTO</td>
</tr>
<tr>
<td>Air and ocean transportation</td>
<td>Offer booking and management of international shipments, incl. value-added services (e.g., track and trace, customs)</td>
<td>1.6</td>
<td>FREIGHTOS, FORTO</td>
</tr>
</tbody>
</table>

Source: Crunchbase
What happened since our last workshop
What we heard from you in the last workshop:

1. **Different starting points**
   There is a clear split between cities looking at urban centres vs industrial nodes

2. **Solution oriented**
   Traffic management and data management platforms ranked top solutions, with general interest in broader connected logistics infrastructure

3. **Unlocking resource constraints**
   There is high demand for solutions that are effective for smaller cities that need capital-light approaches to better mobility

---

What types of transport solutions are you most interested in?

<table>
<thead>
<tr>
<th>Solution</th>
<th>Interest Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic management</td>
<td>5</td>
</tr>
<tr>
<td>Data management and platforms</td>
<td>5</td>
</tr>
<tr>
<td>Connected infrastructure</td>
<td>4</td>
</tr>
<tr>
<td>Shared mobility</td>
<td>3</td>
</tr>
<tr>
<td>Delivery</td>
<td>3</td>
</tr>
<tr>
<td>Public transit</td>
<td>3</td>
</tr>
<tr>
<td>Electric</td>
<td>2</td>
</tr>
<tr>
<td>Autonomous</td>
<td>1</td>
</tr>
<tr>
<td>Active transport</td>
<td>0</td>
</tr>
</tbody>
</table>
Lack of sufficient skills and operational challenges are key challenges across both themes

Key challenges faced

- Need to clearly define a data strategy and legislation, including cooperation with trade associations
- Lack of awareness and low utilization rates of digital solutions and broader mobility systems
- Coordination and management of large number of stakeholders
- Developing sustainable long-term business models, and short-term financing options
Mentor city presentation: Urban mobility
We observe three groups of trends shaping urban mobility in the new normal

Demographic trends
Increasing population of city agglomerations, especially in boroughs of the city

Technological trends
Autonomization, Internet of Things, electrification, shared mobility / MaaS
User acceptance for technological innovations

Socio-economic changes, including those induced by Covid-19
Changing the consumption model, in particular on the axis "owner" vs. "user"
Rapid digitization, increasing cleanliness and hygiene requirements
A seamless urban mobility ecosystem would improve major paint points for city residents

<table>
<thead>
<tr>
<th>System indicators</th>
<th>Change from baseline</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Availability</strong></td>
<td>30% more travel</td>
<td>30% more passenger km travelled&lt;br&gt;Mobility system able to support economic growth, urbanization, and induced demand</td>
</tr>
<tr>
<td>Passenger km per year</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Affordability</strong></td>
<td>25-35% less expensive</td>
<td>Users move from expensive commuter and heavy rail to less-expensive point-to-point shared AVs</td>
</tr>
<tr>
<td>Average USD per trip</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Efficiency</strong></td>
<td>10% less time</td>
<td>Increased rush hour capacity for both road and rail (e.g., off-peak delivery, AV dedicated lanes, predictive maintenance)&lt;br&gt;Demand shifted away from peaks and onto shared modes with dynamic pricing</td>
</tr>
<tr>
<td>Average time per trip</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Convenience</strong></td>
<td>50% more point-point</td>
<td>15% of trips previously served by bus to rail switch newly available and more convenient point-to-point mobility options</td>
</tr>
<tr>
<td>share point-point trips</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sustainability</strong></td>
<td>80-95% less CO₂</td>
<td>The shift away from private internal combustion engine vehicles to autonomous modes – assumed to be electric given high usage - reduces CO₂ emissions</td>
</tr>
<tr>
<td>Mn tons of CO₂ per year²</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Assuming no electrification of vehicle parc in B-A-U scenario, zero marginal emission of rail modes, and that all AVs are electric

Source: McKinsey (FoM 3 Urban Mobility Model)
Our solution: McKinsey supports cities in decision-making with urban mobility simulation

Dashboard allows to evaluate effects of selected interventions on mobility performance metrics in future scenario

1. Status quo: View of the selected KPI in 2030 without any interventions
2. Selected interventions: Turn on/off individual interventions
3. Future scenario: Evaluate the impact of the interventions, by origin, for the selected KPI
4. Performance metrics: Evaluate how the selected interventions impact key mobility performance metrics

Key benefits

- Framework and catalogue of interventions to assess interventions against predefined performance metrics
- Fact-based evaluation of interventions based on decision-oriented urban mobility simulation
- Prioritization of most effective solutions for both Cities and mobility players
- Design of integrated urban mobility strategy based on scenario analysis
How it works: Digital twin uses numerous data sources to simulate behavior of mobility users and assess performance of the system

**Inputs** (for typical city)

**10+**
Data sources

**10+ GB**
Of raw data

**100.000+**
Weekly trips

**600.000+**
GPS locations

**1 mn.+**
Individual agents

**Urban mobility simulation…**

The model evaluates how residents choose their transport mode and predicts future travel flows based on adjusted agent choice

- Virtual residents change their transport choices based on these new options
- Travel times are recalculated based on induced congestion levels
- Digital twin models actual flow of real travelers, and derives individual utility function
- Travel times and cost for trips reflect a city’s specific infrastructure
- New policies change attractiveness of transport options

**…results in two key outcomes**

- Urban mobility performance metrics
- Value estimation of use cases

---

1 e.g., for smart parking, new transport models congestion mitigation, AV offloading 2. e.g., public transit data, traffic data, individual movements, demographics
Diego Fernando Zapata
Undersecretary for Mobility
City of Medellín
Q&A
Cornelia Dinca
International Liaison
Amsterdam Smart City
Accelerating The Mobility Transition: An Ecosystem Approach

Cornelia Dinca
International Liaison
18 Feb 2021
Independent innovation platform that brings together innovative companies, knowledge institutions, public authorities and proactive citizens to shape the city of the future.
Smart City approach to boost transitions

Energy from fossils to clean, creating sustainable energy options for all

Digital City from closed to open, using tech for social value

Circular Economy from linear to regenerative use of resources

Mobility from crowded and polluting to smart and sustainable mobility
Human Centered Public Values
Open & transparent Learning by doing
E-Mobility: Getting Smart with Data

Amsterdam University of Applied Sciences, Interreg, NWO, TKI Urban Energy, Regieorgaan SIA

Applied research on the roll-out of public-charging infrastructure, compiling lessons learned from several large projects including: FLEXPOWER, SEEV4-City, U-SMILE and addressing:

- Various use groups: visitors, residents, commuters, shared fleets, taxis
- Charging infrastructure definitions
- Managing charging infrastructure data
- Key Performance Indicators (KPI) of charging infrastructure
- Roll-out strategies: Demand-driven versus Strategic
- Smart charging strategies
- Fiscal incentives and their effect on EV sales in the Netherlands

More info:

- [https://www.mra-e.nl](https://www.mra-e.nl)
Crowdedness Dashboard

City of Amsterdam, AMS Institute, National Road Traffic Data Portal, amsterdam&partners

Web application providing current information about busy and quiet places and in the city, supporting people in deciding which areas to visit.

Combines data sources from different organizations / departments including the Crowd Monitoring System Amsterdam (CMSA) & parking garage data.

More info: www.druktebeeld.amsterdam.nl
Scale-up: Visitor Flows

MRA Smart Mobility Platform, Province of North Holland, Province of Flevoland, Vervoerregio, City of Amsterdam, Floriade, AMS Institute, Johan Cruijff Arena

Innovation partnership: a form of contracting in which clients, knowledge partners and entrepreneurs collaborate intensively. The goal is to predict visitor flows of people and influence their behaviour.

The jointly developed and purchased solution will support:

• Real-time management of traffic and visitor flows in public spaces
• Exchanging data in the chain (data aggregation, forecasting and influencing behaviour), aimed at a (market) standard for data exchange for traffic and visitor flows

More info: https://www.innovatiepartners.nl/project/Scale_Up
Marineterrein Amsterdam Living Lab

Bureau Marineterrein, AMS Institute, NEMO Science Museum, Amsterdam Smart City

Testing ground facilitating the collaboration between companies, knowledge institutions and governmental organizations, leading to experiments that can be transferred and scaled.

Focus on mobility challenges including clean logistics, mobility hubs and last-mile solutions.

More info: https://www.living-lab.nl
Data Dilemmas: Data Sharing for MaaS Systems

Amsterdam Smart City, City of Amsterdam Data Lab, Province of North Holland

Public dialogue and international knowledge exchange on data sharing for MaaS systems between Province of North Holland, EMT Madrid and City of Helsinki

18 Feb 2020, 16:00-17:30 CET


Discover more updates, projects, events & connect with 8,000+ innovators: www.amsterdamsmartcity.com
Core city sharing and group problem solving
Please use your computer or mobile device to visit Menti.com

Use code: 39 97 75 5

Please select/rank the issue(s) you would like to cover today

1. Digital upskilling
Support to manage different tools and get staff to use them effectively; digitally upskilling citizens to use services

2. Under-utilisation
Understanding the levers available to support sustainable usage rates of mobility solutions (e.g., public transit), especially post-Covid

3. Implementation support
Designing systems, what data to collect, in what format, how to store & share data and ensure security; setting up innovation labs/sandboxes to improve interactions

4. Synergies with national government mobility policy and systems
Identifying the overlap with the central government plan and resources to digitize services efficiently and create momentum

5. Stakeholder management
Working with different teams within government and third-party vendors to ensure on-time and within-budget delivery

6. Business models
Developing business models and unlocking creative financing opportunities to support sustainable funding long-term
Which subthemes are you most excited to explore during the ICC?

We can discuss ideas on 3 areas

1. The need I have in my city is....
2. The solution I’m trying to scale in my city is...
3. The challenge I face is...
Reflections and wrap-up