Conceptualising Mobility as a Service

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I. Introduction
Mobility as a Service (MaaS) State-of-the-Art

Common view
- addresses growing mobility needs
- can be sustainable
- related to megatrends collaborative consumption and sharing economy

However: ‘hyped’ socio-technical phenomenon
- optimistic political dogma, activists’ enthusiasm
- some successful services
- investors believe in Uber

Positive: paradigm shift
- has electrified public decision makers
- wave of innovation in SMEs
- multi-disciplinary collaborations
I. Research Questions

1. What are the **key features** of MaaS?

2. How can these features be interlinked into a **scientific concept** of MaaS?
II. The Nature of Travel

1. The Type of Payload
2. Travel Goal – Experience or Distance
3. Trip Purpose – Why go the Mile?
4. Trip Length
5. Accessibility and Directness
6. Travel Mode and Means
7. Borders and Boundaries
8. Trip Phases – From Planning to Journey
III. Intelligent Transportation Systems (ITS) Overview

1. ITS Definition by IEEE
2. Finland’s Second Generation Intelligent Strategy for Transport
3. European Mobility-as-a-Service Alliance
4. Interoperability as Prerequisite
5. The Role of Social Media
III. ITS – IEEE Definition

Transportation systems can involve

- humans, vehicles, shipments,
- information technology,
- and the physical infrastructure,

all interacting in complex ways.¹

Intelligent Transportation Systems are defined as those systems

- utilizing synergistic technologies and
- systems engineering concepts

to develop and improve transportation systems of all kinds.²
III. ITS – Finland’s 2nd Generation Intelligent Strategy for Transport

1. An ITS reference architecture
2. Real-time data of transport system status and operation
3. Integrated public transport system(s)
4. Intelligent traffic control
5. Reactive and proactive safety systems
6. A multi-service model for transport
7. Intelligent logistics
8. Smarter and more eco-friendly mobility
III. ITS
European Mobility-as-a-Service Alliance

Offering them

- *tailor made mobility solutions*
- *based on their individual needs*

[with]

- *easy access to the*
- *most appropriate transport mode or service […]*

*included in a bundle of flexible travel service options.*
III. ITS – Interoperability as a Prerequisite

Interfaces & interoperability between
- data (real-time, processed and archived)
- modes (air, land, water)
- vehicle types (=> transfer types)
- payload types (as in aircraft transport)

ICT interoperability
- planning, booking, paying and ticketing services
- timetables, real-time traffic- and transport data
- real-time location of specific passengers & goods (as in logistics)
- traffic control

Picture: smile project - http://smile-urbanlogistics.eu
III. ITS – The Role of Social Media

- enables end-users and providers to get rid of intermediators
- user and operators rate each other

=> builds trust between mobility user and operator

=> most important interaction between MaaS users and operators

Uber’s business model: users needing a cab are brokered to individual ‘cab entrepreneurs’ who perform actual transport
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IV. The End User Perspective

1. User Acceptance Criteria
2. (User Group Segments)
3. What Can We Change, Regarding User Behaviour?
4. (How Can We Change User Behaviour?)
5. A View of the Future?

Picture: http://digitransit.fi
IV. Factors Influencing End User Mobility Behaviour

Personal, internal factors

Socio-demographic aspects

Social behaviour

Lifestyle and travel goal

Attitudes

Health (physical constitution)

Perceived accessibility & directness

Individual Mobility Behaviour

Work trip purpose

Trip distance (km & time)

Natural environment

Borders and boundaries

Transport policy (incentives & restrictions)

Mobility offers

ITC offers

External factors

IV. The End User Perspective

Short Range vs. Long Range

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<tr>
<th>Mode</th>
<th>Costs</th>
<th>Convenience</th>
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<tbody>
<tr>
<td>Taxi</td>
<td>High</td>
<td>Low</td>
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<tr>
<td>Uber &amp; Lyft</td>
<td>High</td>
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<tr>
<td>Car sharing</td>
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IV. The End User Perspective

Drones: When, Not If?

Ehang 184 (www.ehang.com/ehang184)

Snowstorm (Poster EVER16-154)

Pictures: Ehang, University of Singapore
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V. Three Dimensions of Sustainability
V. 1. Environmental Sustainability

Population
- much more motorised & connected
- more spatially dispersed

Quality of travel time
- ICT offers on mobile devices
- commuters use trip time for work or leisure
  ⇒ prefer direct connections, even if longer
  ⇒ commuting better accepted

Trip avoidance through ICT use
  ⇒ virtual work place
  ⇒ digital access to public services
V. 2. Social, Inclusive Sustainability
Seven Features [29]

<table>
<thead>
<tr>
<th>Exclusion Type</th>
<th>Problem Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>barriers inhibit accessibility</td>
</tr>
<tr>
<td>Geographical</td>
<td>rural areas, peripheral urban estates</td>
</tr>
<tr>
<td>Facilities</td>
<td>shops, schools, healthcare or leisure</td>
</tr>
<tr>
<td>Economic</td>
<td>costs of travel</td>
</tr>
<tr>
<td>Time-based</td>
<td>combined work, household and child-care duties</td>
</tr>
<tr>
<td>Fear-based</td>
<td>personal safety</td>
</tr>
<tr>
<td>Space</td>
<td>security or space management</td>
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</tbody>
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V. 3. Economic, Societal Sustainability
End User and Society

End Users’ View

- duration of travel = f(cost of living, quality of living, income)

- 1st priority = finding work

Society Level

- Fair salaries

- Salary pays for a living
V. 3. Economic, Societal Sustainability
Economic Feasibility of a MaaS Offer

1. market size (share of private cars to be replaced)
2. overall population density
3. competition from competing or substituted offerings
4. availability of open data about different means of travel
5. legal and regulatory framework – incl. data security and safety
6. collaboration between relevant stakeholders in the area
V. 3. Economic, Societal Sustainability Business Ecosystem

- complementary local resources and know-how
- reference customers
- researchers (consultants) evaluating the service
- collaboration with local authorities
- visibility in main traffic networks and interchanges
- complementary companies offering goods delivery

Figure: Frost & Sullivan
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VI. Exemplary Mobility Services

1. Cab Services
2. Car Sharing
3. MaaS for Corporate Clients
4. MaaS for End-Users

Figure: Frost & Sullivan
VI. Mobility Services
1. Cab Services – Uber and Lyft vs. Taxi

- Difference to taxi (end user view)
  - hailing process
  - no tipping
  - lower price per mile
- Intermediator taken out
  - matchmaking by algorithms and ratings
  - customers rate their experience
  - risks and costs taken by driver
- Sustainable?
  - driver-entrepreneurs share their existing asset
  - cars often older than taxis => local pollution
  - contribute to congestion as much as taxis
  - economic risks fully on driver’s side
  - neither health- nor retirement coverage
VI. Exemplary Mobility Services

2. Car Sharing

**Car2Go**
- In 8 countries, many cities
- Parent: Daimler

[www.car2go.com](http://www.car2go.com)

**DriveNow**
- In 5 countries (EU), 9 cities
- Parents: BMW & Sixt

[de.drive-now.com](http://de.drive-now.com)

- ‘free-floating’ concept: “pick up car and leave where you want”…
- …limited to large urban areas
- New, rather small cars, often electric
- Hybrid between taxi and rental car
- Sustainability issues
  - use of parking space
  - (some) traffic congestion

*Pictures: Car2Go, DriveNow*
VI. Exemplary Mobility Services
3. MaaS for Corporate Clients

Tuup
- In Helsinki & Turku (Finland)
- Motto: ‘broker of everyday travel’
- Covers
  - public transport,
  - taxi,
  - car- and bike-sharing
  - parking
- Users
  - primary user: corporate customers
- Business model
  - procures mobility services from various transport service providers
  - connects to corporate travel management system
  - improves employee satisfaction

http://tuup.fi/
VI. Exemplary Mobility Services
4. MaaS for End-Users

UbiGo
• In Gothenburg, Sweden
• Motto: ‘broker of everyday travel’
• Covers
  – public transport,
  – taxi,
  – car- and bike-sharing
  – rental cars
• Users
  – inner-city households
  – single subscription service
• Business model
  – procures mobility services from various transport service providers

Moovel
• In same cities as Car2Go
• Motto: ‘the mobility app for your city’
• Covers
  – public transport,
  – train transport
  – taxi
  – car- and bike-sharing
• Users
  – (inner) city households
  – single subscription service
• Business model
  – procures mobility services from various transport service providers

www.ubigo.se

www.moovel.com

Pictures: UbiGo, Moovel
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VII. MaaS on Conceptual Level

Key Features

Clearly specified transport offer
- valid for short and long distances
- uses wide variety of means smartly
- includes existing offers, (public transport, car- and bike-sharing, taxi on demand)

Appealing to end users
- saves costs with equal convenience (incl. accessibility, directness, comfort), or
- increases convenience with equal costs

Leads to sustainable behaviour
- mechanisms might be complex and unpredictable
- change may take long
- social media approaches can assist and drive user demand.

Sustainable on all levels
- environmental
- social, inclusive
- economic, societal

Supported by ITS
- real-time data and traffic control
- real-time modal prioritization (for overall transport convenience and environment)

Based on stakeholder collaboration
- within local MaaS ecosystem
- on regional, national, and international levels
- with standardisation bodies, authorities and policy makers.
VII. MaaS on Conceptual Level
Conceptual Architecture

Full Sustainability

Sustainable Behaviour

Transport Offer

End Users

Intelligent Traffic Systems

Stakeholder Collaboration

ends

supports

guides

appeals to

demands

change to

enable
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