Human- and Society-Centered Mobility Systems for Attractive Cities

Prof. Dr. Meike Jipp
meike.jipp@dlr.de
Traffic in Germany

Volume of Traffic (2017)

- About 3.1 ways per person and day

Traffic Performance (2017)

- About 39 km (24 miles) per person and day
Traffic in Germany

Volume of Traffic (2017)

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Traffic Performance (2017)

About 39 km (24 miles) per person and day

The purpose of mobility is need satisfaction!
### Human Needs

<table>
<thead>
<tr>
<th>Needs</th>
<th>Hull (1952)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provision of the power necessary to act</td>
<td></td>
</tr>
<tr>
<td>Expression of what humans need for their survival and development</td>
<td>Lebeder (1980)</td>
</tr>
</tbody>
</table>

#### Deficiency Needs
- Need to be satisfied in order to survive
- The motivation *decreases* when the needs are met.

*Precondition for life & satisfaction*

#### Growth Needs
- Desire to grow as an individual
- The motivation *increases* when the needs are met.

*Precondition for happiness*
Human Needs

- **Fundamental Physiological Needs**: Food, Water, Oxygen, Silence
- **Safety Needs**: Safety, Personal Safety, Financial Security, Health
- **Social Needs**: Friendship, Intimacy, Family
- **Cognitive Needs**: Knowledge, Understanding
- **Self-Esteem**: Self-Confidence, Freedom, Self-Respect
- **Self-Actualization**: Developing Activities, Pursuing Goals

Maslow (1971)
Human Needs

Maslow (1971)

Needs lower down in the hierarchy must be satisfied before individuals can attend to needs higher up in the hierarchy.
Human Needs

Traffic participants are no transport objects. Instead, they are individuals making their own decisions!

Means used by individuals to satisfy their needs

Primary

Secondary

Humans select their means of transportation,
• which allows the satisfaction of primary needs or
• which makes the satisfaction of secondary needs more likely.
Modal Split of the Traffic Volume

- Walking: 22%
- Cycling: 14%
- Driving by car: 43%
- Using public transportation: 11%
- Being a passenger: 10%

MiD (2017)
Under which circumstances would you ask your 6-year old child to use an autonomous shuttle?
Technological Progress

Digitalisation

Automation

Artificial Intelligence

Self-Driving Cars
Technological Progress

Digitalisation

Automation

Artificial Intelligence

Self-Driving Cars

Mobility-on-Demand Systems

Autonomous Shuttles

Kutsuplus – Helsinki

Leap Transit – San Francisco

IAV – Project HEAT

Local Motors – „Olli“
"Under which circumstances would you ask your 6-year old child to use an autonomous on-demand-shuttle?"

"I would like to drive alone, because I don’t know who else would get into the shuttle (e.g., a group of drunken people)"
(male, 41 years old)

"Under absolutely no circumstances!"

"I would never use an autonomous on-demand-shuttle. It’s not a matter of price. Even if I had the money, I wouldn’t use it because of safety issues. Alone, I would probably use it"
(female, 55 years old)
Human Needs

Maslow (1971)

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  - Food, Water, Oxygen, Silence

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- **Self-Actualization**
  - Developing Activities, Pursuing Goals

DLR.de • Chart 16  meike.jipp@dlr.de
Safety Issues

Experiencing an autonomous shuttle → Introduction of the envisioned system → Identification of difficulties

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<tr>
<th>Category</th>
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<td>Harassment</td>
<td>Crowded bus</td>
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<td>Theft</td>
<td>No help from others</td>
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<td>Unclear whether obstacle will be recognized</td>
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<td>Unknown neighbourhood</td>
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<td>Route through a bad neighbourhood</td>
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Grippenkoven et al. (2018)
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$p < .001$, $d > 0.8$

Grippenkoven et al. (2018)
Improvement of Feeling of Safety

Grippenkoven et al. (2018)
## Do These Measures Improve the Feeling of Safety?

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Means</th>
<th>Indiv. cabin</th>
<th>Emerg. brake</th>
<th>Mobile security service</th>
<th>Video assistance system</th>
<th>Mobile application</th>
<th>Panic button</th>
<th>Info System</th>
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<tr>
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<td>😞</td>
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- 😞 = significant, p < .001
- 😞 = not significant

Gripenkov et al. (2018)
Measures to Improve the Feeling of Safety

Grippenkoven et al. (2018)
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Creativity-Shuttle

Social Shuttle

Gaming-Shuttle

Wellness-Shuttle

Shopping-Shuttle

Peer Group
Travel System

Study-Shuttle

Office-Shuttle

Orchestra-Shuttle

Relax-Shuttle
Service-Oriented Mobility

Services tailored to meet the needs of target groups which are large enough to make the business case work
Yes, technology can help create attractive cities if human needs are considered when designing mobility!
Thank you for your attention!

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Institute of Transportation Systems
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