Mobility after the car

TUe Smart Mobility Research Meet
November 5, 2014
Arie Bleijenberg

End of the car era?
Future of mobility?

Approach: driving forces, long term, facts & figures

› Speed 8
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Grübler 1990

TF CEPS 2013
Car mileage per person 1970 – 2013 (USA)

Constant travel time

Schäfer and Victor 2000
Explaining growth in passenger travel

Mobility [pkm/day]
- Population [P]
- Average travel speed [km/h]
- Travel time ~ 1.1 [h/day]

Speed 1900 – 2000 (Netherlands)

Gemiddelde snelheid (km/uur)

Verkeer en Waterstaat 2002
Constant travel time 1970 – 2010 (UK)

Department for Transport

Mobility 2000 – 2050 (Western Europe)

Bleijenberg 2012
Accessibility counts: economic and social

Accessibility vs Speed vs Distance

Urban population 1950 - 2050

World
Western Europe
Netherlands

UN 2011
Urbanisation and economy

Sharing  Matching  Learning

Duranton and Puga 2004

Rise of the knowledge and creative economy

Florida 2014
New urbanization

Welcoming the knowledge economy!

U.S. Annual Vehicles Mileage Trends

Suburbanization

Central Zone Model

Globalization

Daily trips in Paris

Trips by Car: 20,717,000 (68%)
Trips by Public Transport: 6,618,000 (28%)

WBCSD 2004
Urbanization determines mobility (Netherlands)

<table>
<thead>
<tr>
<th></th>
<th>Most urban</th>
<th>Least urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average trip distance</td>
<td>10 km</td>
<td>12 km</td>
</tr>
<tr>
<td>Average commuting distance</td>
<td>17 km</td>
<td>20 km</td>
</tr>
<tr>
<td>Distance to hospital, station, theatre</td>
<td>2 – 3 km</td>
<td>9 km</td>
</tr>
<tr>
<td>Average speed</td>
<td>24 km/h</td>
<td>33 km/h</td>
</tr>
<tr>
<td>Average speed car</td>
<td>39 km/h</td>
<td>45 km/h</td>
</tr>
<tr>
<td>Average travel time ppd</td>
<td>1.1 h</td>
<td>1.0 h</td>
</tr>
<tr>
<td>Car trips</td>
<td>36%</td>
<td>55%</td>
</tr>
<tr>
<td>Public transport trips</td>
<td>10%</td>
<td>2%</td>
</tr>
<tr>
<td>Walking and cycling</td>
<td>53%</td>
<td>40%</td>
</tr>
<tr>
<td>Total kilometres ppd</td>
<td>26 km</td>
<td>32 km</td>
</tr>
<tr>
<td>Car kilometres ppd</td>
<td>16 km - 40%</td>
<td>26 km</td>
</tr>
</tbody>
</table>

CBS 2014

Mobility in 2010 – 2050 (Western Europe)
**CO₂ emissions transport: trend and target (EU)**

![Graph showing CO₂ emissions trend and targets for transport in EU](image)

**Air pollution from road traffic 1990 – 2007 (EU)**

![Graph showing air pollution trend from 1990 to 2007](image)

*EEA TERM 2013*

*EC 2011*
Standards for air pollution from cars (EU)

TF CEPS 2013

Standards for CO₂ from cars (international)

Ricardo AEA 2013
Sustainable mobility

Only two proven effective policies

Urbanization + Low carbon vehicles

Reduction CO₂ from transport 2010 – 2050 (EU)

75 - 90% TF CEPS 2013
Timeline transport technologies

1850 1900 1950 2000

Steam train  Electric train  Car  Airplane  Combustion engine  Jet engine  Sea container  Manned space ship

New transport technologies?

Long distance travel: Beat the airplane!

Urban travel: Beat the underground!

Or beat the car in door-to-door speed!
Mobility after the car era

Developments and challenges

- Aviation becomes dominant transport mode for passenger travel
- Clean technology for cars and airplanes
- New urbanization: knowledge economy and end car growth
- Urbanization requires improved mass transit, elevators, cycling and walking; car plays its part.

Uncertainties and challenges

- Faster urban transport than the underground?
- Faster long distance travel than aviation?
- Faster or cheaper than car on medium distances?
- Impact ICT on travel behaviour?
- Space ship as future travel mode?

Thank you for your attention!

Questions?
Discourse?

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Freight transport in tkm 1800 – 1990 (France)

Price road freight in €ct/tkm 1850 – 2000 (Europe and Netherlands)
Explaining growth in freight transport

<table>
<thead>
<tr>
<th>Economic value (GDP)</th>
<th>Impact</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical economy (weight, volume)</td>
<td>++</td>
<td>--</td>
</tr>
<tr>
<td>Liberalisation, globalisation</td>
<td>+++</td>
<td>--</td>
</tr>
<tr>
<td>Reduction transport costs</td>
<td>+++</td>
<td>--</td>
</tr>
<tr>
<td>Range of consumer goods</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td>Comparative advantages</td>
<td>++</td>
<td>-</td>
</tr>
</tbody>
</table>

Freight transport growth | -- |

TF CEPS 2013
Logistics sprawl and city logistics

Towards:

Spatial concentration of production sites, distribution centres and multi modal hubs

Public service city logistics

Tavasszy 2013