Reasonable Travel Time

*The Traveller’s Perspective*

Lecture Series ”Current Trends and Future Perspectives on Sustainable and Smart Mobility”

University of Žilina

Yannick Cornet, PhD – Wednesday 14 March 2018
Who I am

• Yannick Cornet, PhD, PMP, Eng.
• Thesis on Transport Systems: Sustainability Appraisal and Transition
  Technical University of Denmark 2013 – 2016

Concepts

Tools

Governance

Presentation plan

• Background: Sustainable Mobility and Travel Time
• The main elements of Reasonable Travel Time
  • Door-to-door travel time
  • Activities at destinations
  • The travel experience
• How to measure them
  … and their equity implications
• Key messages for planning transport
# The Sustainable Mobility Paradigm

<table>
<thead>
<tr>
<th>Conventional paradigm, transport engineering</th>
<th>Sustainable mobility paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical dimension (vehicles, infrastructure)</td>
<td>Physical and Social dimension</td>
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<tr>
<td>Mobility (speed)</td>
<td>Accessibility (proximity)</td>
</tr>
<tr>
<td>Traffic and congestion focus</td>
<td>People focus</td>
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<tr>
<td>Street as a road</td>
<td>Street as a space</td>
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<tr>
<td>Motorised transport, particularly the car</td>
<td>Non-motorised transport, walking and cycling at top of hierarchy</td>
</tr>
<tr>
<td>Economic evaluation of benefits</td>
<td>Multicriteria analysis incl. social &amp; environmental</td>
</tr>
<tr>
<td>Travel as derived demand</td>
<td>Travel as derived demand and valued activity</td>
</tr>
<tr>
<td>Travel time minimisation</td>
<td>Reasonable travel time and travel time reliability</td>
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</table>

Equity?

Reasonable Travel Time

Reasonable Travel Time is the door-to-door journey time that is acceptable to the individual traveller for reaching a particular destination, and its associated activities, given the conditions provided to turn ‘lost time’ into ‘useful time’ while travelling.

Travel Time

• Central to transport planning
  • Journey durations influence travel decisions

• Travel as derived demand
  • Assumption that travel time is ‘wasted’
  • Time is money therefore faster is better

• Implications: goal of dominant paradigm
  • Promoting speed as clear primary objective to ‘save time’
  • Vicious cycle with land use development

Potential problems:
• Only 24 hours in a day
• Use of resources
• Carbon emissions
• Longer travel distances
• Greater inequality
Reasonable Travel Time

Reasonable Travel Time is the **door-to-door journey time** that is acceptable to the individual traveller for reaching a particular destination, and its associated activities, given the conditions provided to turn ‘lost time’ into ‘useful time’ while travelling.

Door-to-door travel time

HS2 Example

• New high-speed rail in the UK

• London to Birmingham
  • Current train travel time 83min
  • New HSR travel time 49min

• London to Coventry
  • Current train travel time 62min
  • New HSR travel time 49min + 25min (by car)
    + parking time + connection time .= 74min++

• Lack of integrated planning

• Accessibility impacts not visible
Equity implications – winners and losers (UK)

- Large transport investments can turn space-time geography upside down
- Number of cities benefiting from HS2 is small and restricted to a few larger cities

Equity implications – winners and losers (FR)

- Paris and cities with >100,000 inhabitants are main users of TGV
- Highest incomes groups vs lower income 

How to measure door-to-door travel time?

• Interconnectivity ratio =

\[
\frac{\text{Access} + \text{Egress} + \text{Transfer} + \text{Wait}}{\text{Main trunk travel time}}
\]

Reasonable Travel Time

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Destination and multi-activity

• What is ‘reasonable’ depends on
  • Why we travel (travel purpose)
  • How long we plan to spend at destination
  • Criticality of arriving on time

• But not all trips A \(\rightarrow\) B
  • Not all trips for a single purpose
  • We may compensate for long travel time by adding activities

\[\text{Travel time and activity time at destination are interdependent}\]
Equity implications – housing + transport affordability

- Planning for speed can lead to sprawl, and displacement of lower income families further away from city centres
- Transportation is the second largest expense for families, but few consider these costs when choosing a place to live

How to measure activities at destination?

- Travel time ratio = \[
\frac{\text{Travel time}}{\text{Travel time} + \text{Activity time}}
\]

- Mandatory activities have higher TTR
- Most essential to plan for optimal distances between the bases (home, work, school)

Reasonable Travel Time

Reasonable Travel Time is the door-to-door journey time that is acceptable to the individual traveller for reaching a particular destination, and its associated activities, given the conditions provided to turn ‘lost time’ into ‘useful time’ while travelling.
The Travel Experience

• Not all travel time is necessarily wasted, on the contrary, travel time can be worthwhile

• Key question: how to ‘reclaim’ lost time?

Reasonable Travel Time and Worthwhile experience

Travel Efforts (typology)

• Lost time: “Time that individuals cannot choose to allocate to an activity they need or wish to participate in (apart from travel itself) due to physical, cognitive or affective efforts imposed by the transport system”

• How to increase ‘free’, ‘usable’ time?
  • By reducing externally imposed efforts..
## Transport interventions

<table>
<thead>
<tr>
<th>Effort</th>
<th>Definition</th>
<th>Example</th>
<th>Intervention</th>
</tr>
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</table>
| **Physical** | Effort asked of and imposed on the body in undertaking travel               | Standing in a crowded bus                   | • Reducing transport connections and ‘smoothing’ them by integrating the transport networks  
|            |                                                                             |                                               | • Improving comfort e.g. seating, personal space, crowding, travel-sickness, travel services (e.g. wifi) |
| **Cognitive** | Mental focus that is needed to execute the journey successfully             | Noisy or attention-demanding environment     | • Improving the familiarity with the transport system  
|            |                                                                             |                                               | • Improving the ability to plan the journey effectively  
|            |                                                                             |                                               | • Reducing unwanted distractions |
| **Affective** | Emotional influence of undertaking the journey                             | Stressful, unsafe or unreliable              | • Improving the perceived security or pleasantness of travel  
|            |                                                                             |                                               | • Improving reliability |

Multitasking is varied and prevalent

Structured observations of multitasking onboard Eurostar (10 min. intervals)

How to measure the travel experience?

**Hensher formula**

- $p$ = average amount of time spent working while travelling
- $q$ = relative productivity of work done while travelling compared with in the office

$\begin{align*}
  p & = 0.11 - 0.46 \\
  \text{(new: 0.30 – 0.57)} & \\
  p & = 0.07 - 0.36 \\
  p & = 0.03 - 0.17 \\
  p & = 0.02 - 0.22 \\
  q & = 0.89 - 1.15 \\
  q & = 0.99 - 1.02 \\
  q & = 0.83 - 1.26 \\
  q & = 0.90 - 1.20
\end{align*}$

Expressing the above ideas mathematically let;

$MP$ = marginal product of labour

$VL$ = the value to the employee of leisure relative to travel time

$W$ = the value to the employee of work time in the office relative to travel time

$r$ = proportion of travel time saved used for leisure purposes

$p$ = proportion of travel time saved at the expense of work done while travelling

$q$ = relative productivity of work done while travelling compared with in the office

$MPP$ = value of extra output generated due to reduced fatigue.

Then the value of savings in (long distance) business travel time (VBTT) is given by:

$VBTT = (1-r)pqMP + (1-r)W + rVL + MPP$  \hspace{1cm} (1)$

It is this expression which we would ideally like to measure, and which we call a synthetic value of time. Next we discuss, in turn, issues concerned with the measurement of $MP$, $VL$, $W$, $MPP$, $p$, $q$ and $r$. 

Conclusion: Implications of RTT for planners

- Minimizing travel time can be costly and counterproductive e.g. environmental impacts.

- Transport planning should **aim to improve Reasonable Travel Time** when looking at investing in transport.
Key take-away messages

• ‘Time is money’ and ‘high speed’ dominates transport planning
• From travellers perspective, reality is more complex
• Travellers want to reclaim their time
  Faster *door-to-door* travel (waste less time)
  AND better travel (make time useful)
• From planners perspective
  • Focus on slowest segment *and* where most ‘effort’ is required
    ➔ Improve interconnections and onboard experience
Thank you

yannick.cornet@uniza.sk

Thank you

yannick.cornet@uniza.sk
Philadelphia

Household Profile

Median-Income Family
$61,927 annual income
4 people
2 commuters

Switch to this profile and location in My Transportation Cost Calculator

Average costs as a percent of income in this location for Median-Income Family Households:
- Renter
- Owner
- Combined

Location Affordability

<table>
<thead>
<tr>
<th>Housing</th>
<th>Transportation</th>
<th>Location Affordability</th>
</tr>
</thead>
<tbody>
<tr>
<td>27%</td>
<td>16%</td>
<td>43%</td>
</tr>
</tbody>
</table>

On average, Median-Income Family Households in this location would:

- Own 1.7 vehicles
- Drive 17,368 miles annually
- Take 357 transit trips annually
Philadelphia (45% threshold)
From data to policy

"What gets measured gets done"

- Data selection is invariably subject to arbitrary decisions at one stage of the process or another
  → Who/what decides what gets measured?

HS2 Project

Key to journey times (Hours:Minutes)

<table>
<thead>
<tr>
<th>Route</th>
<th>HS2</th>
<th>Now</th>
</tr>
</thead>
<tbody>
<tr>
<td>London - Birmingham</td>
<td>0:49</td>
<td>1:24</td>
</tr>
<tr>
<td>Birmingham - Manchester</td>
<td>0:41</td>
<td>1:28</td>
</tr>
<tr>
<td>London - Nottingham</td>
<td>1:08</td>
<td>1:44</td>
</tr>
<tr>
<td>London - Manchester</td>
<td>1:08</td>
<td>2:08</td>
</tr>
<tr>
<td>London - Leeds</td>
<td>1:22</td>
<td>2:12</td>
</tr>
<tr>
<td>Reading - Manchester</td>
<td>1:46</td>
<td>3:10</td>
</tr>
<tr>
<td>Southampton - Leeds</td>
<td>3:35</td>
<td>4:17</td>
</tr>
<tr>
<td>London - Edinburgh</td>
<td>3:38</td>
<td>4:23</td>
</tr>
</tbody>
</table>

- Existing network
- HS2 Route
- Manchester
- Liverpool
- Crewe
- Newcastle
- Edinburgh
- Glasgow
- Leeds
- Sheffield
- Nottingham
- Birmingham
- London

Phase I