# 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

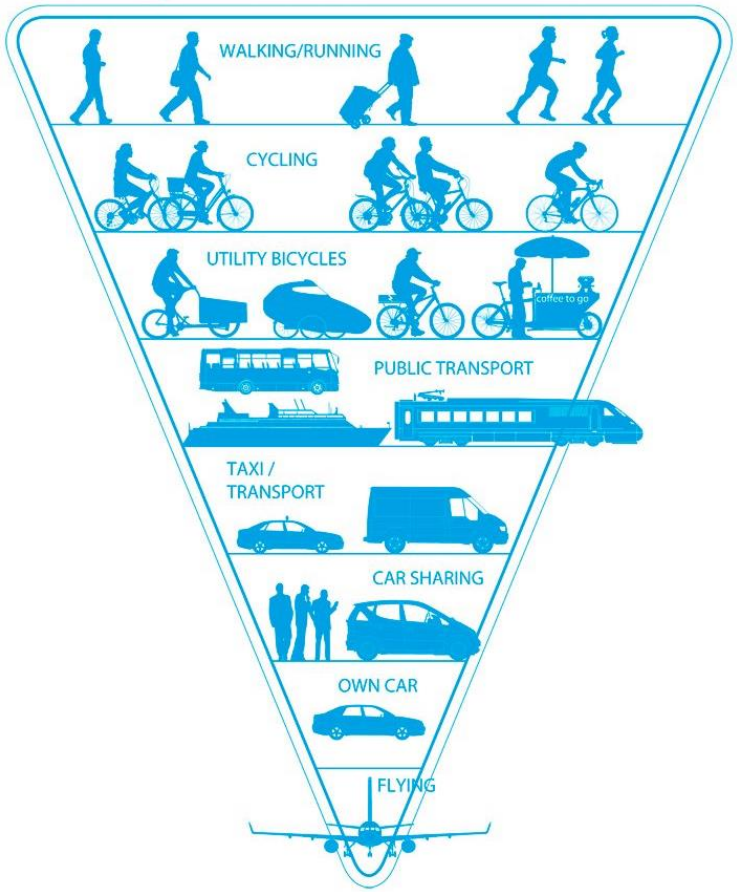
**Cornet, Y**. and Gudmundsson, H. (2015) 'Building a Metaframework for Sustainable Transport Indicators - Review of Selected Contributions', *Transportation Research Record: Journal of the Transportation Research Board*, 2531, pp. 103–112. doi: 10.3141/2531-12

# 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

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




**Equity?**

Banister, D. (2008) 'The sustainable mobility paradigm', *Transport Policy*. Elsevier, 15(2), pp. 73–80. doi: 10.1016/j.tranpol.2007.10.005

# 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.

Banister, D., **Cornet, Y**., Givoni, M., & Lyons, G. (2016). From Minimum to Reasonable Travel Time. In *Transportation Research Procedia, World Conference on Transport Research (WCTR)*. Shanghai. http://www.wctrs-society.com/conferences/archive-of-world-conferences/shanghai-conference-general-2016/

# 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

Potential problems:
- Only 24 hours in a day
- Use of resources
- Carbon emissions
- Longer travel distances
- Greater inequality

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

# 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.

Banister, D., **Cornet, Y**., Givoni, M., & Lyons, G. (2016). From Minimum to Reasonable Travel Time. In *Transportation Research Procedia, World Conference on Transport Research (WCTR)*. Shanghai. http://www.wctrs-society.com/conferences/archive-of-world-conferences/shanghai-conference-general-2016/

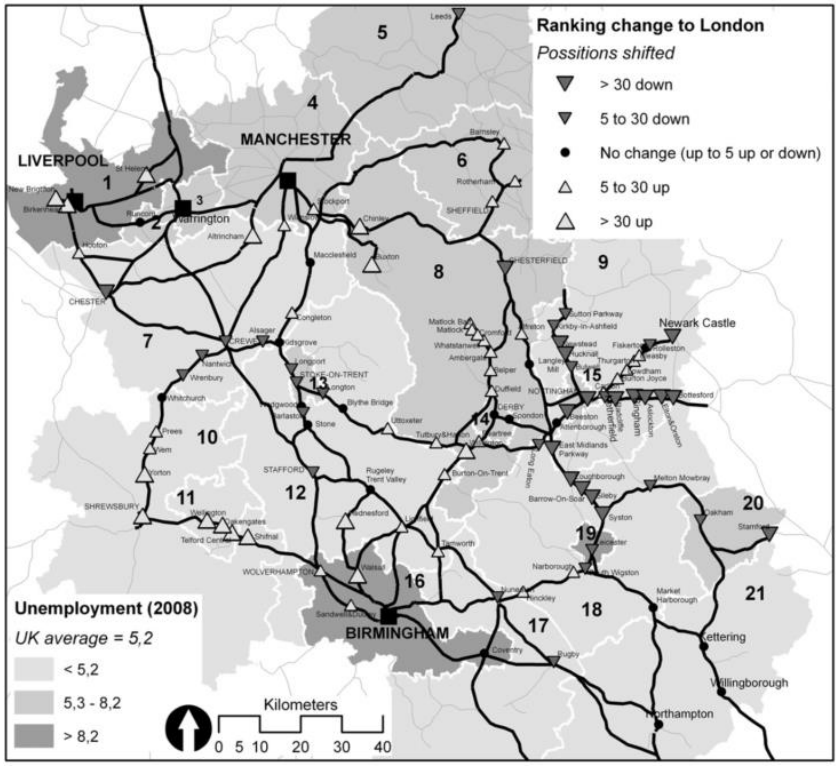
# Door-to-door travel time

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)

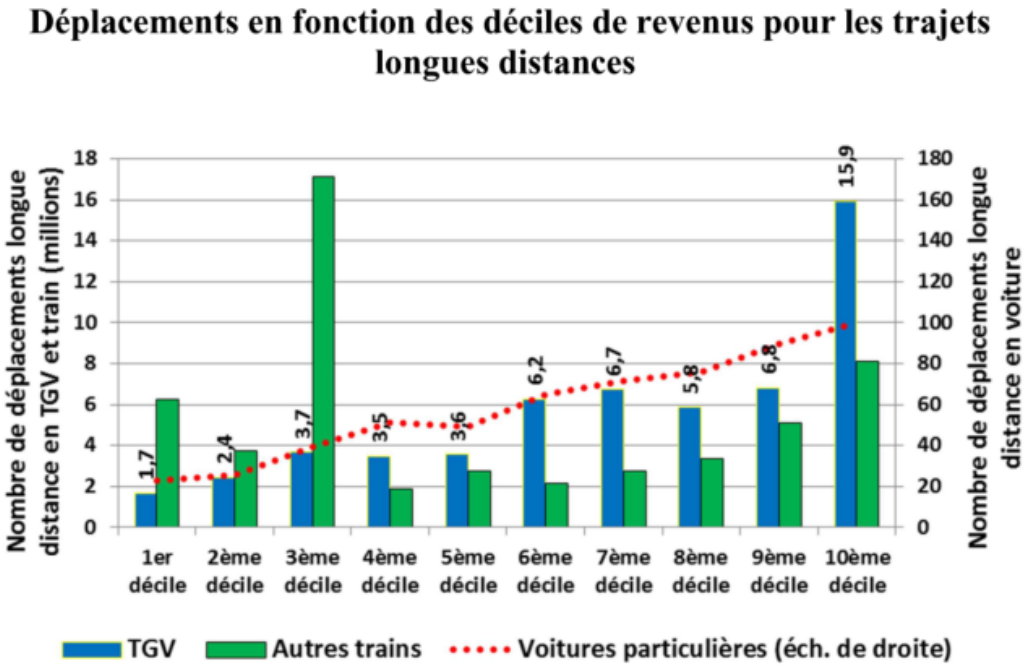
- Large transport investments can turn space-time geography upside down
- Number of cities benefiting from HS2 is small and restricted to a few larger cities




Martínez Sánchez-Mateos, H. S., & Givoni, M. (2012). The accessibility impact of a new High-Speed Rail line in the UK – a preliminary analysis of winners and losers. *Journal of Transport Geography,* 25(December), 105–114. doi: 10.1016/j.jtrangeo.2011.09.004

# Equity implications – winners and losers (FR)

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




Cour des comptes. (2014). La grande vitesse ferroviaire: un modèle porté au-delà de sa pertinence. Retrieved from https://www.ccomptes.fr/fr/publications/la-grande-vitesse-ferroviaire-un-modele-porte-au-dela-de-sa-pertinence

# How to measure door-to-door travel time?

- Interconnectivity ratio =

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

Krygsman, S., Dijst, M., & Arentze, T. (2004). Multimodal public transport: an analysis of travel time elements and the interconnectivity ratio. *Transport Policy*, 11(3), 265–275. doi: 10.1016/j.tranpol.2003.12.001

# 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.

# Destination and multi-activity

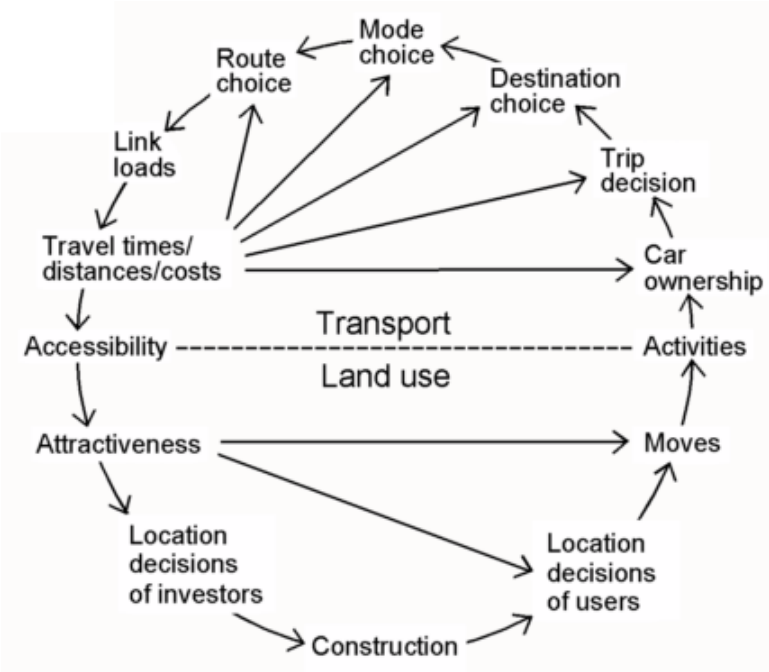
- What is ‘reasonable’ depends on
  - Why we travel (travel purpose)
  - How long we plan to spend at destination
  - Criticality of arriving on time

- But not all trips A → B
  - Not all trips for a single purpose
  - We may compensate for long travel time by adding activities

➔ 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




Wegener, M., & Fürst, F. (1999). Land-use transport interaction: state of the art. http://papers.ssrn.com/sol3/Delivery.cfm?abstractid=1434678

# How to measure activities at destination?

- Travel time ratio = $\dfrac{\text{Travel time}}{\text{Travel time + Activity time}}$

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

| Type of activity place | Single trips | | | Trip chains | | |
|---|---|---|---|---|---|---|
| | N | Mean | S.D. | N | Mean | S.D. |
| Bakery | 30 | 0.53 | 0.22 | 128 | 0.42 | 0.15 |
| Grocer | 18 | 0.45 | 0.19 | 78 | 0.42 | 0.16 |
| Market | 26 | 0.46 | 0.16 | 75 | 0.41 | 0.15 |
| Supermarket | 166 | 0.36 | 0.18 | 263 | 0.38 | 0.14 |
| Bookseller | 10 | 0.57 | 0.19 | 70 | 0.42 | 0.14 |
| Warehouse | 15 | 0.51 | 0.23 | 112 | 0.42 | 0.15 |
| Restaurant | 42 | 0.29 | 0.25 | 41 | 0.29 | 0.18 |
| Snackbar | 21 | 0.43 | 0.16 | 17 | 0.47 | 0.17 |
| Garage | 11 | 0.73 | 0.24 | 10 | 0.53 | 0.19 |
| Sports hall | 27 | 0.18 | 0.10 | 10 | 0.25 | 0.14 |
| Sports ground | 40 | 0.24 | 0.11 | 23 | 0.27 | 0.11 |
| Relatives | 47 | 0.22 | 0.16 | 43 | 0.32 | 0.14 |
| Friends | 94 | 0.18 | 0.12 | 45 | 0.23 | 0.12 |
| Business call | 50 | 0.30 | 0.19 | 34 | 0.28 | 0.14 |
| Voluntary job | 42 | 0.28 | 0.23 | 39 | 0.27 | 0.15 |
| Primary school | 172 | 0.64 | 0.18 | 108 | 0.46 | 0.19 |
| Nursery | 36 | 0.62 | 0.17 | 26 | 0.39 | 0.17 |

Dijst, M., & Vidakovic, V. (2000). Travel time ratio : the key factor of spatial reach. *Transportation* (27), 179–199

# 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**.

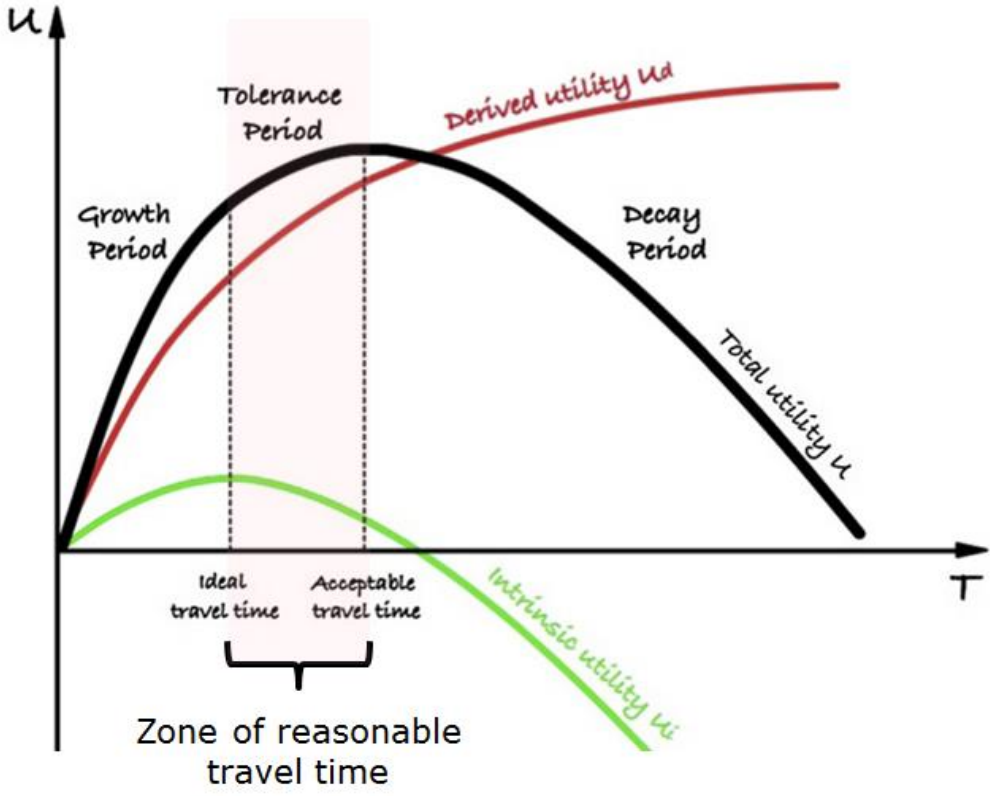
# The Travel Experience

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

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

Wardman, M., & Lyons, G. (2015). The digital revolution and worthwhile use of travel time: implications for appraisal and forecasting. *Transportation*, 43(3), 507–530. doi:10.1007/s11116-015-9587-0

# Reasonable Travel Time and Worthwhile experience




Milakis, D., Cervero, R., van Wee, B., & Maat, K. (2015). Do people consider an acceptable travel time? Evidence from Berkeley, CA. *Journal of Transport Geography*, 44, 76–86. doi:10.1016/j.jtrangeo.2015.03.008

# 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

| Effort | Definition | Example | Intervention |
|---|---|---|---|
| **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<br>• 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<br>• Improving the ability to plan the journey effectively<br>• Reducing unwanted distractions |
| **Affective** | Emotional influence of undertaking the journey | Stressful, unsafe or unreliable | • Improving the perceived security or pleasantness of travel<br>• Improving reliability |

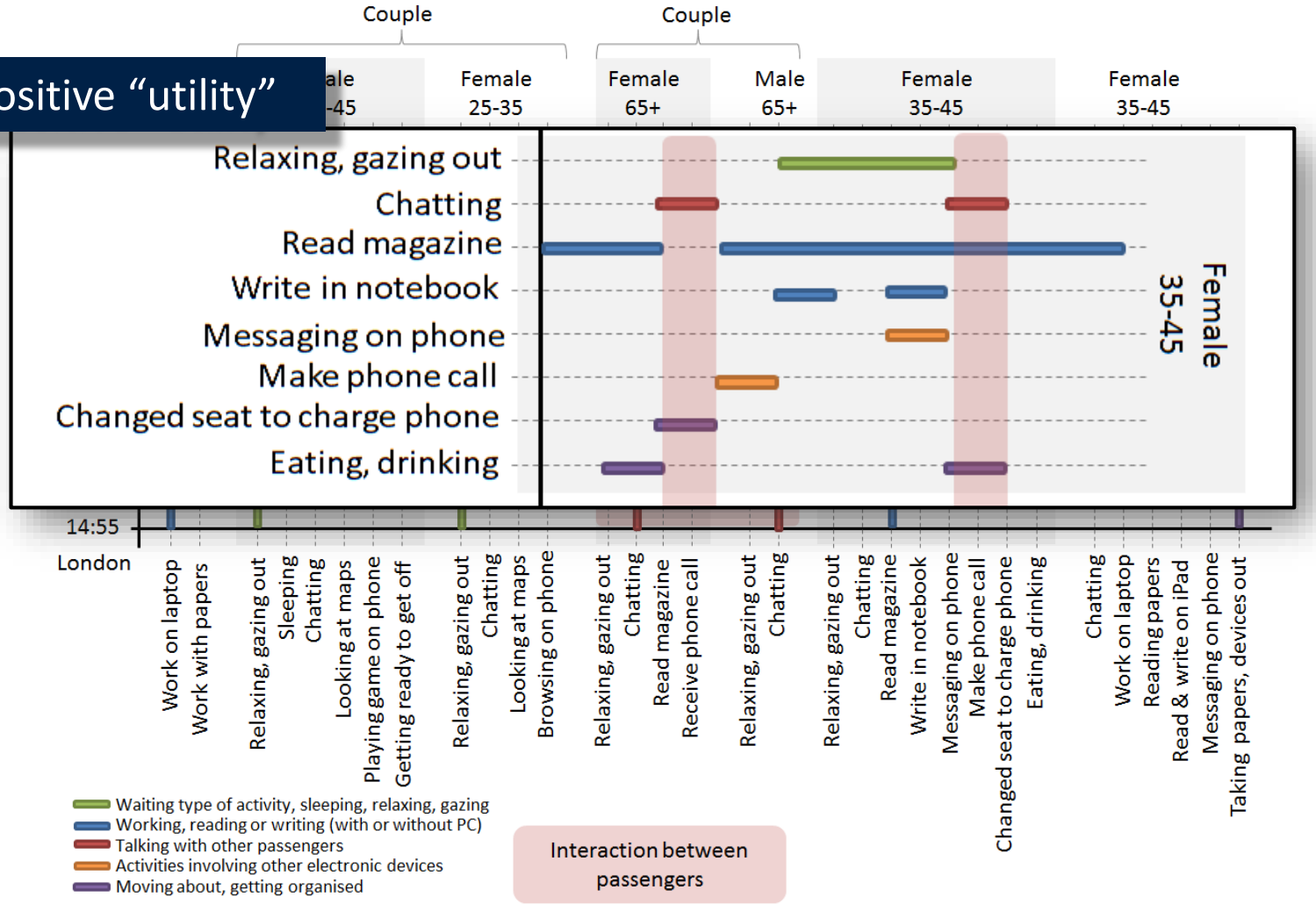
Stradling, S. G. (2006). The Psychology of Travel. Review commissioned for the Foresight "Intelligent Infrastructure Systems" project. *Office of Science and Technology, Department for Trade and Industry*. London. http://researchrepository.napier.ac.uk/2590/

# Multitasking is varied and prevalent

Positive "utility"

Structured observations of multi-tasking onboard Eurostar

(10 min. intervals)




Keseru, I., & Macharis, C. (2017). Travel-based multitasking: review of the empirical evidence. Transport Reviews, 38(2), 1–25. doi:10.1080/01441647.2017.1317048

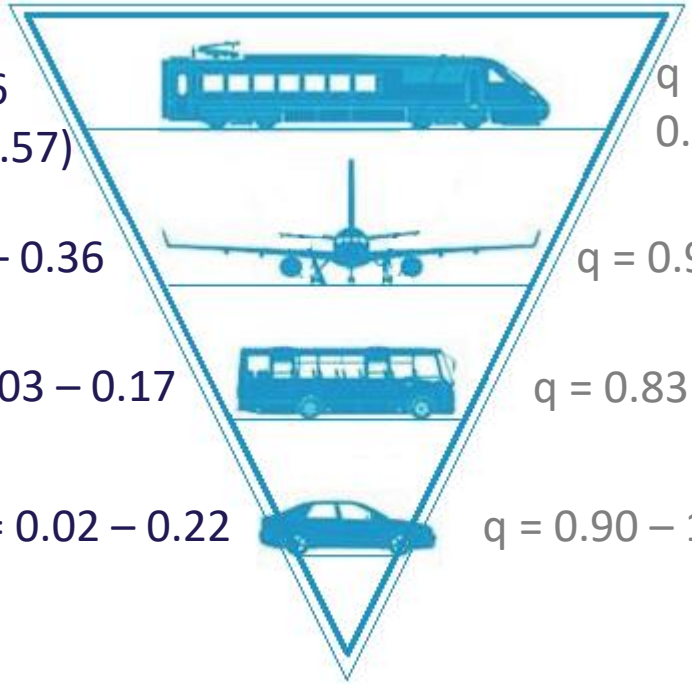
# How to measure the travel experience?

## Hensher formula

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

p = 0.11 – 0.46
(new: 0.30 – 0.57)

q = 0.89 – 1.15



p = 0.07 – 0.36

q = 0.99 – 1.02

p = 0.03 – 0.17

q = 0.83 – 1.26

p = 0.02 – 0.22

q = 0.90 – 1.20

Expressing the above ideas mathematically let;

MP = marginal product of labour

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

VW = 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

MPF = value of extra output generated due to reduced fatigue.

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

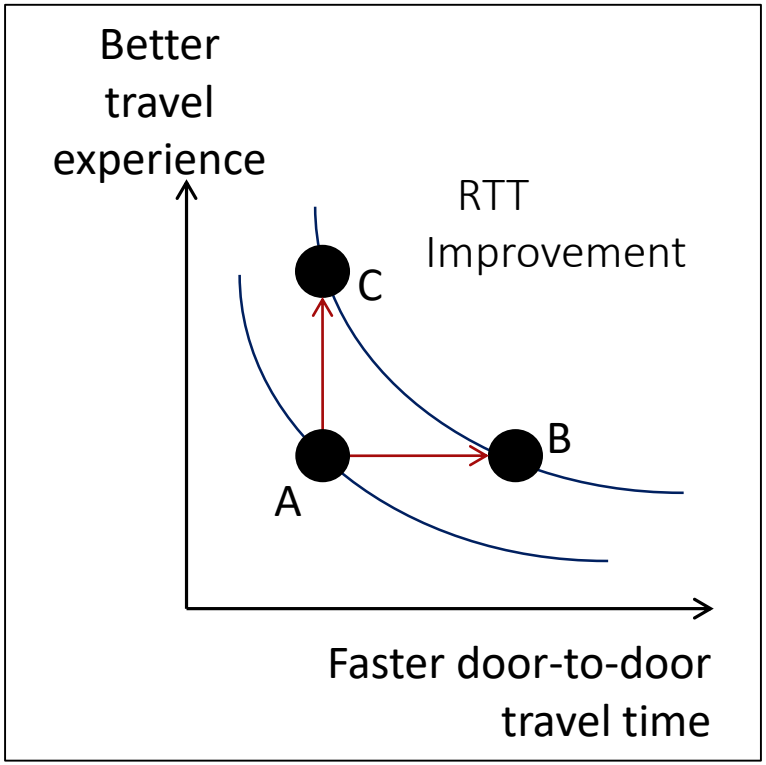
$$VBTT = (1-r-pq)MP + (1-r)VW + rVL + MPF \qquad (1)$$

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, VW, MPF, p, q and r.

Wardman, M., & Lyons, G. (2015). The digital revolution and worthwhile use of travel time: implications for appraisal and forecasting. *Transportation*, 43(3), 507–530. doi:10.1007/s11116-015-9587-0

# 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

Prof. David Banister

Dr. Moshe Givoni

Prof. Glenn Lyons

Banister, D., Cornet, Y., Givoni, M., & Lyons, G. (2016). From Minimum to Reasonable Travel Time. In *Transportation Research Procedia, World Conference on Transport Research (WCTR)*. Shanghai. http://www.wctrs-society.com/conferences/archive-of-world-conferences/shanghai-conference-general-2016/

# 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

| Housing | Transportation | Location Affordability |
|---|---|---|
| 27% | 16% | 43% |
| $16,720 | $9,908 | $26,628 |

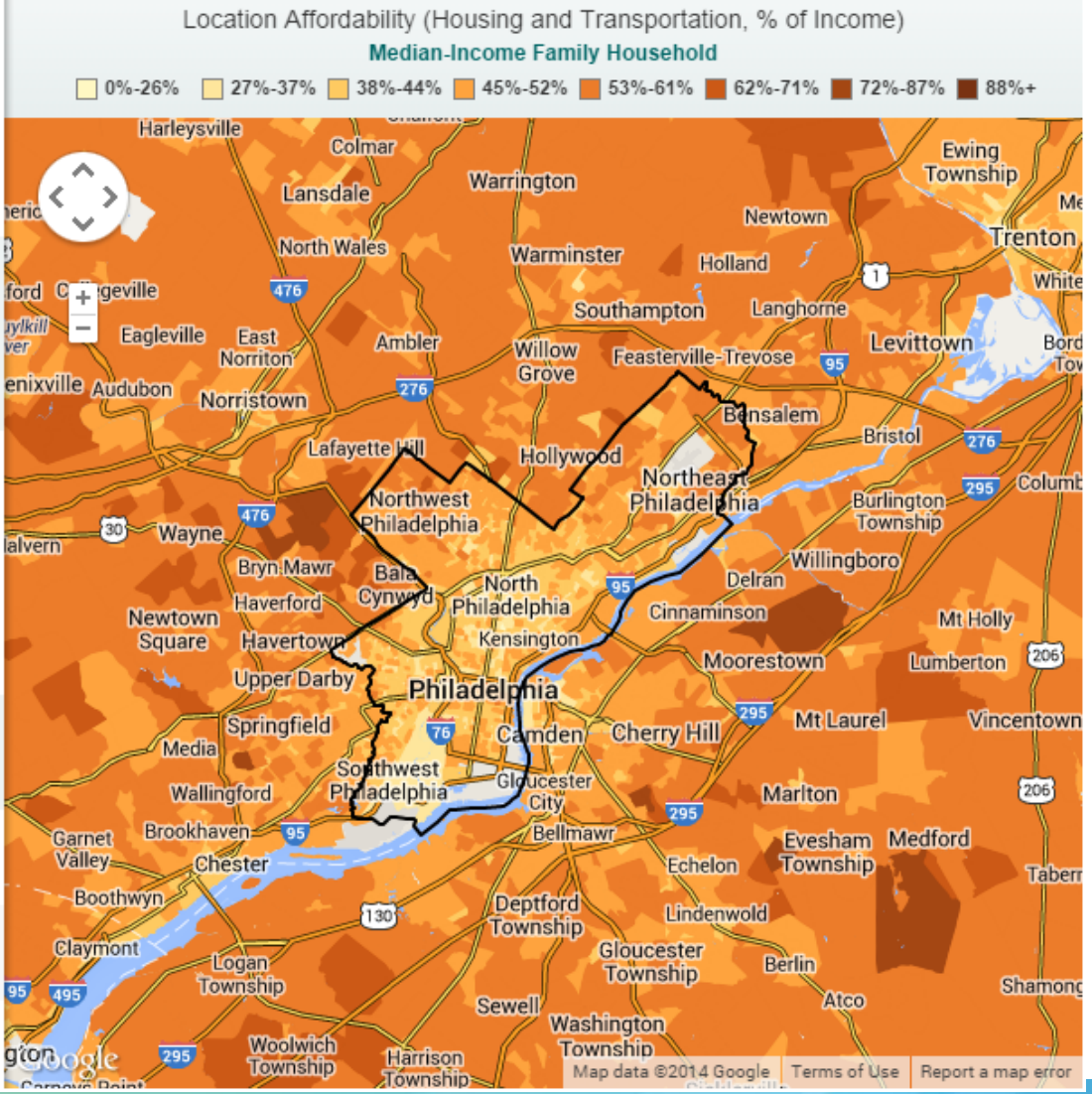
On average, Median-Income Family Households in this location would:

Own **1.7** vehicles

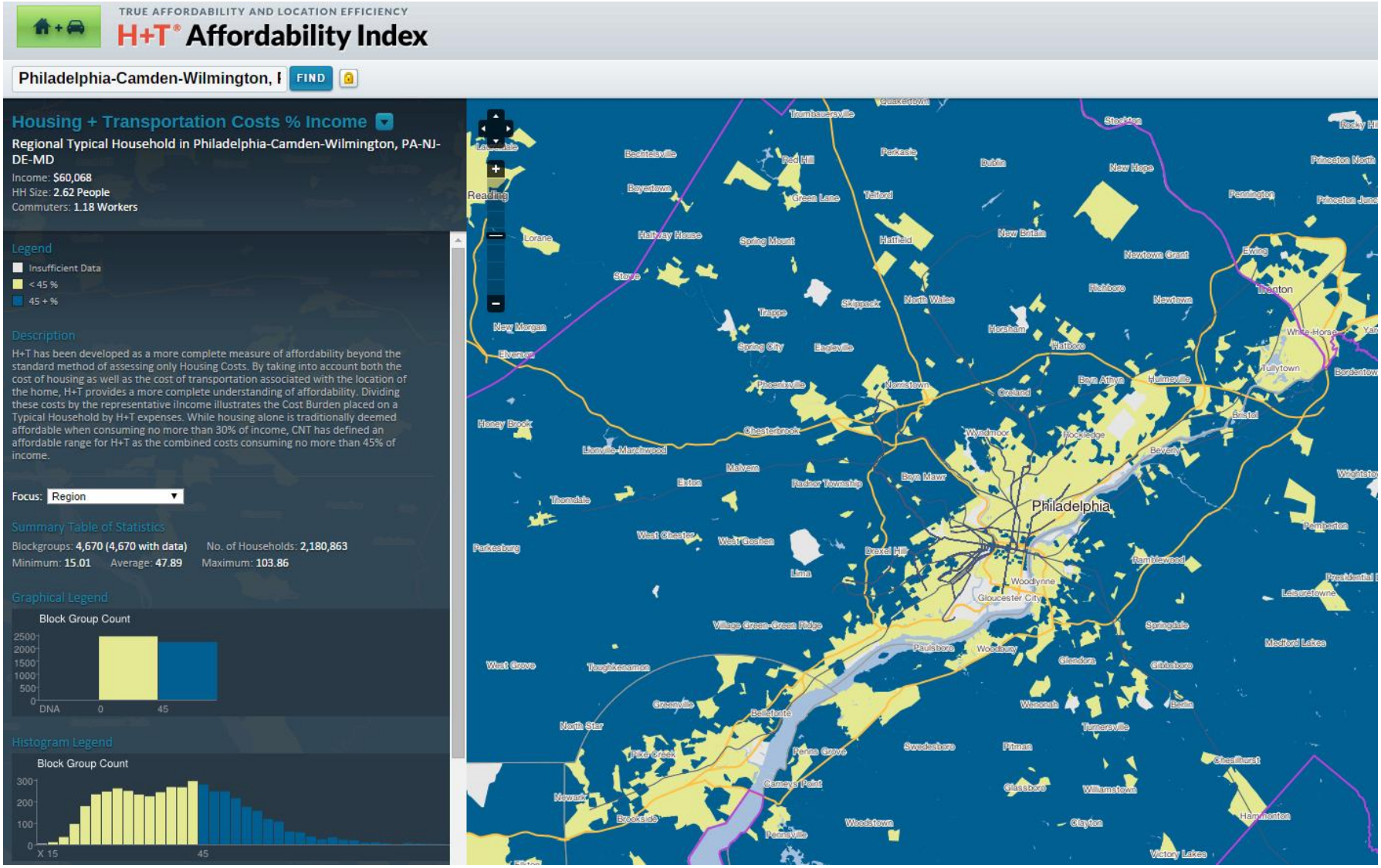
Drive **17,368** miles annually

Take **357** transit trips annually

## Information on Map



# Philadelphia (45% threshold)

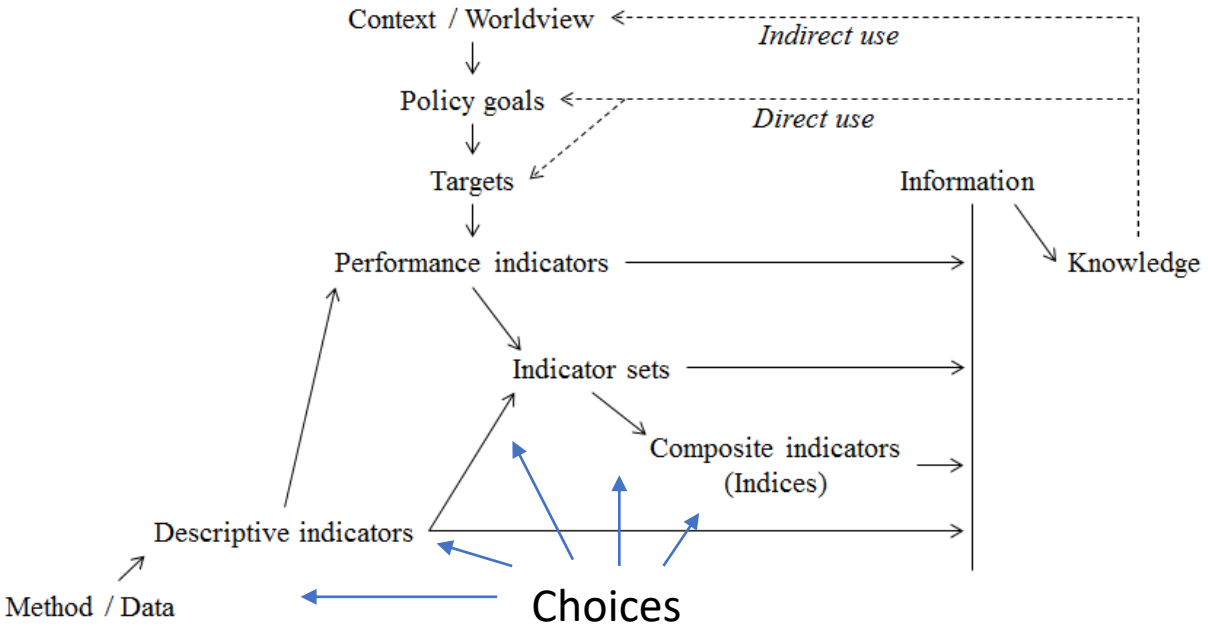


# From data to policy

”What gets measured gets done”

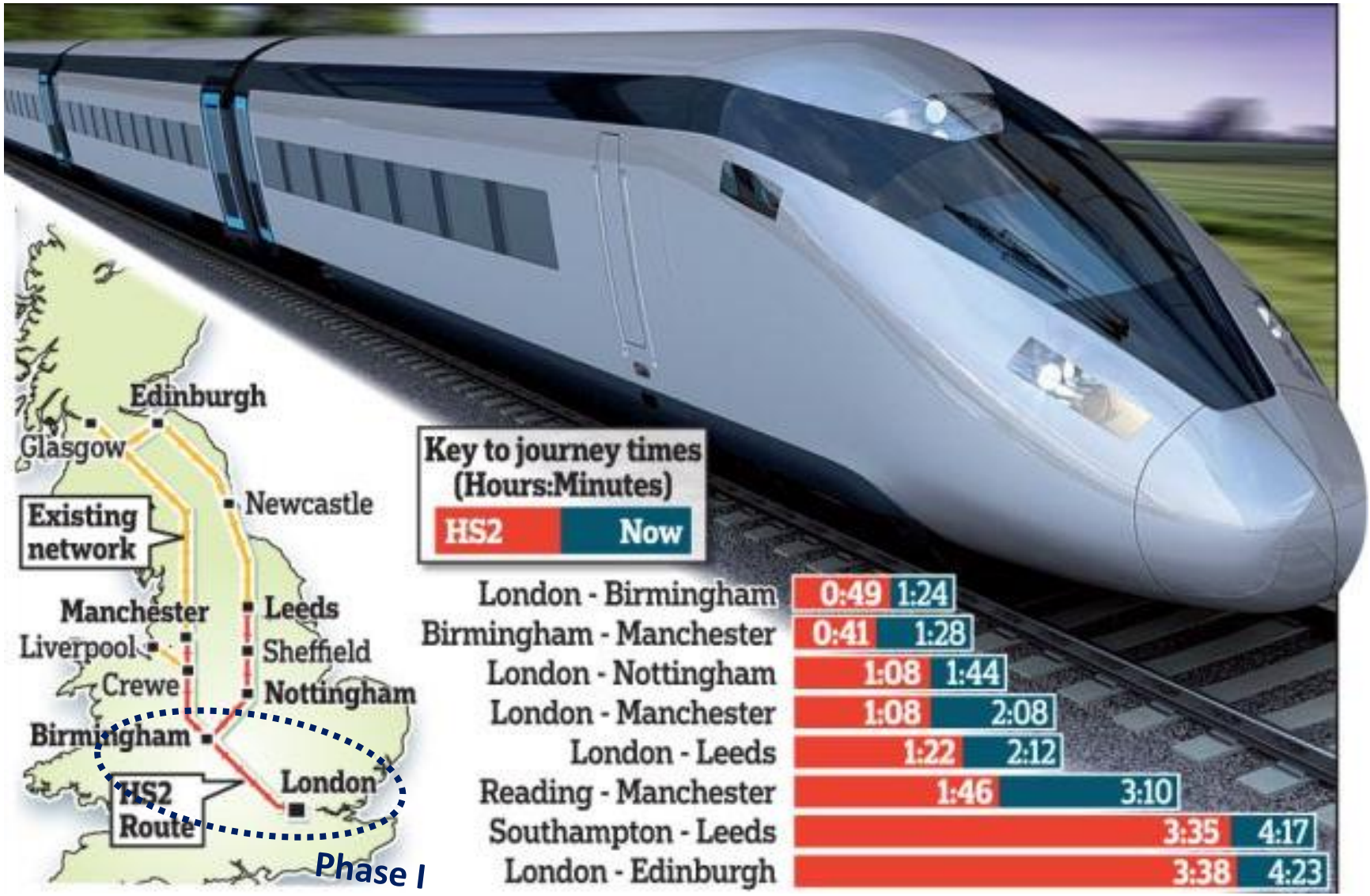
- Data selection is invariably subject to arbitrary decisions at one stage of the process or another

→Who/what decides what gets measured?




**Cornet, Yannick**. 2016. “Indicators and beyond: Assessing the sustainability of transport projects”. Technical University of Denmark (PhD Thesis)

# HS2 Project


Edinburgh
Glasgow
Existing network
Newcastle
Manchester
Leeds
Liverpool
Sheffield
Crewe
Nottingham
Birmingham
HS2 Route
London
Phase I
Key to journey times (Hours:Minutes)
HS2
Now
London - Birmingham 0:49 1:24
Birmingham - Manchester 0:41 1:28
London - Nottingham 1:08 1:44
London - Manchester 1:08 2:08
London - Leeds 1:22 2:12
Reading - Manchester 1:46 3:10
Southampton - Leeds 3:35 4:17
London - Edinburgh 3:38 4:23