

Preferred citation style

Axhausen, K.W. and N. Schüssler (2010) Improving and replacing travel diaries using mobile tracing?, presentation at *Mobile Tartu 2010*, Tartu, August 2010.

Improving and replacing travel diaries using mobile tracing?

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IVT
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Zürich

August 2010

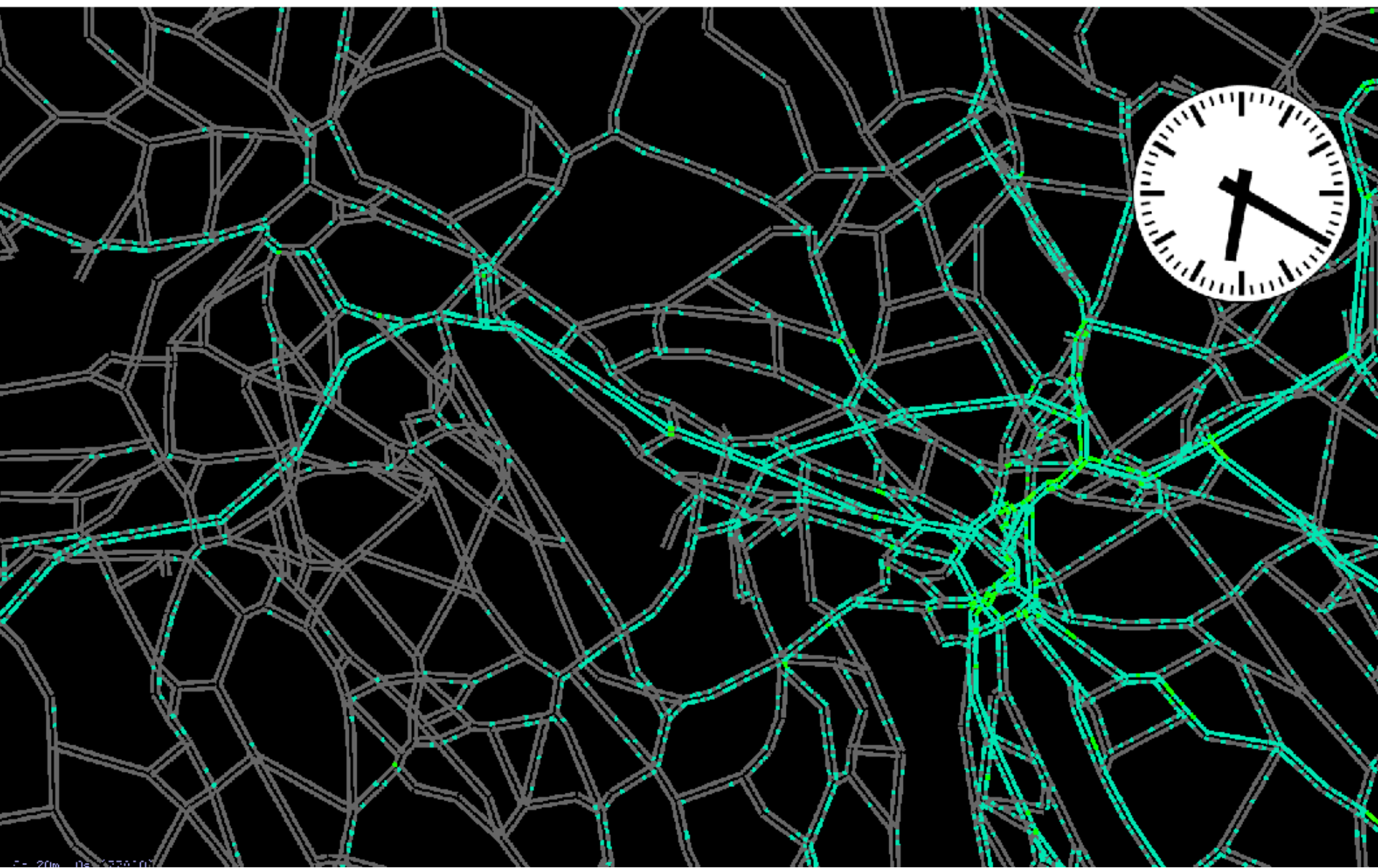
 Institut für Verkehrsplanung und Transportsysteme
Institute for Transport Planning and Systems

ETH

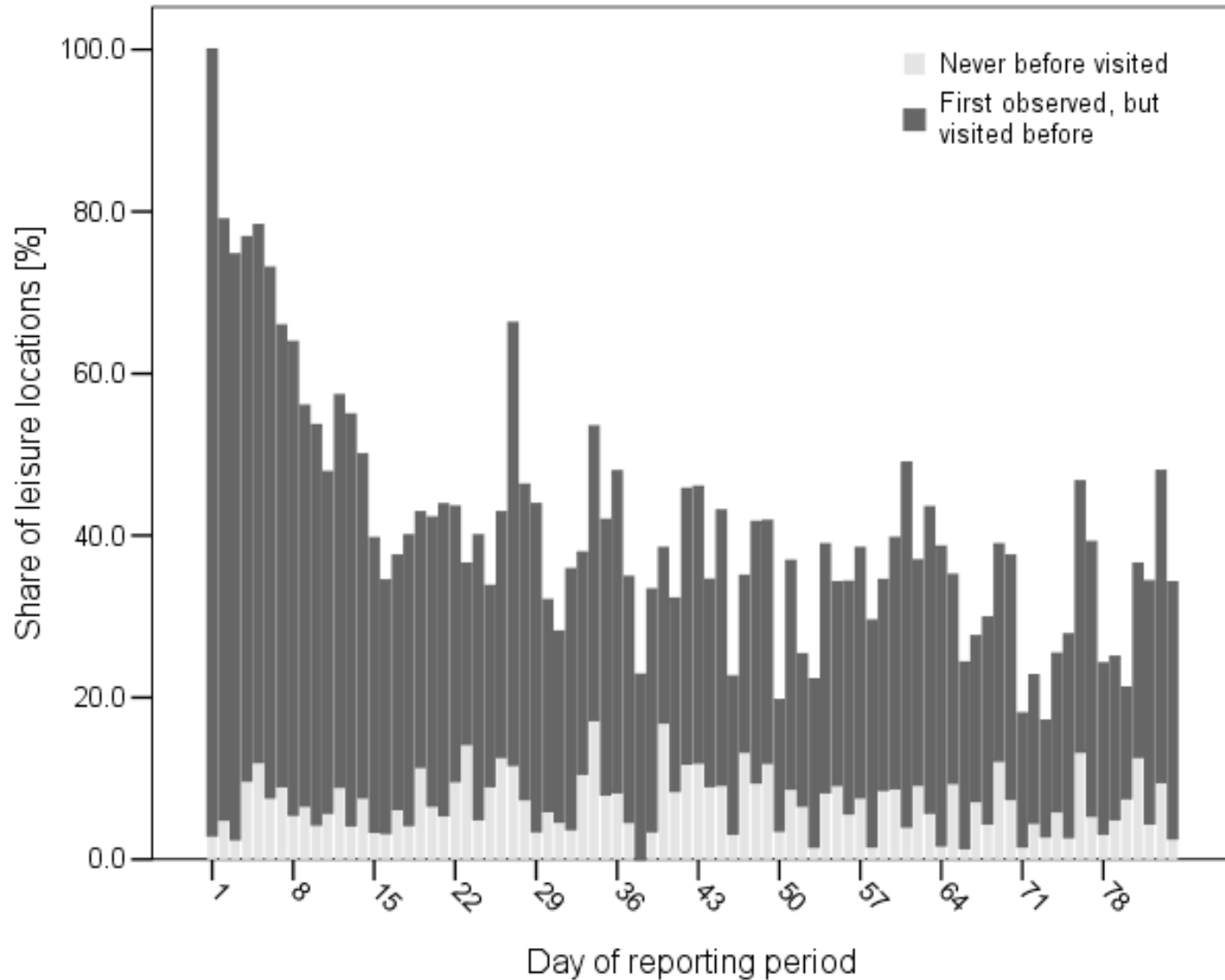
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Why do we need the information?

Simulating a day (with www.MATSim.org)



Understanding dynamics: Variety seeking in location choice



Source: Zürich 12-week leisure diary

What do we want to know ?

Defining movement

- **Stage**: a continuous movement with one means of transport
- **Trip**: sequence of stages between two activities
- (**Subtour**): sequence of trips starting and ending at the same location
- **Tour**, journey, sojourn: sequence of trips starting and ending at the relevant reference locations

- **Activity**: meaningful interaction with people or objects in the same social environment
- **Reference location** for day, i.e. the home

What do we want to know for activity scheduling ?

- Number and type of activities
- Sequence of activities
 - Start and duration of activity
 - Composition of the group undertaking the activity
 - Expenditure division
 - Location of the activity
- Movement between sequential locations
 - Location of access and egress from the mean of transport
 - Parking type
 - Vehicle/means of transport
 - Route/service
 - Group travelling together
 - Expenditure division

What possibilities do we have ?

Pro & contra

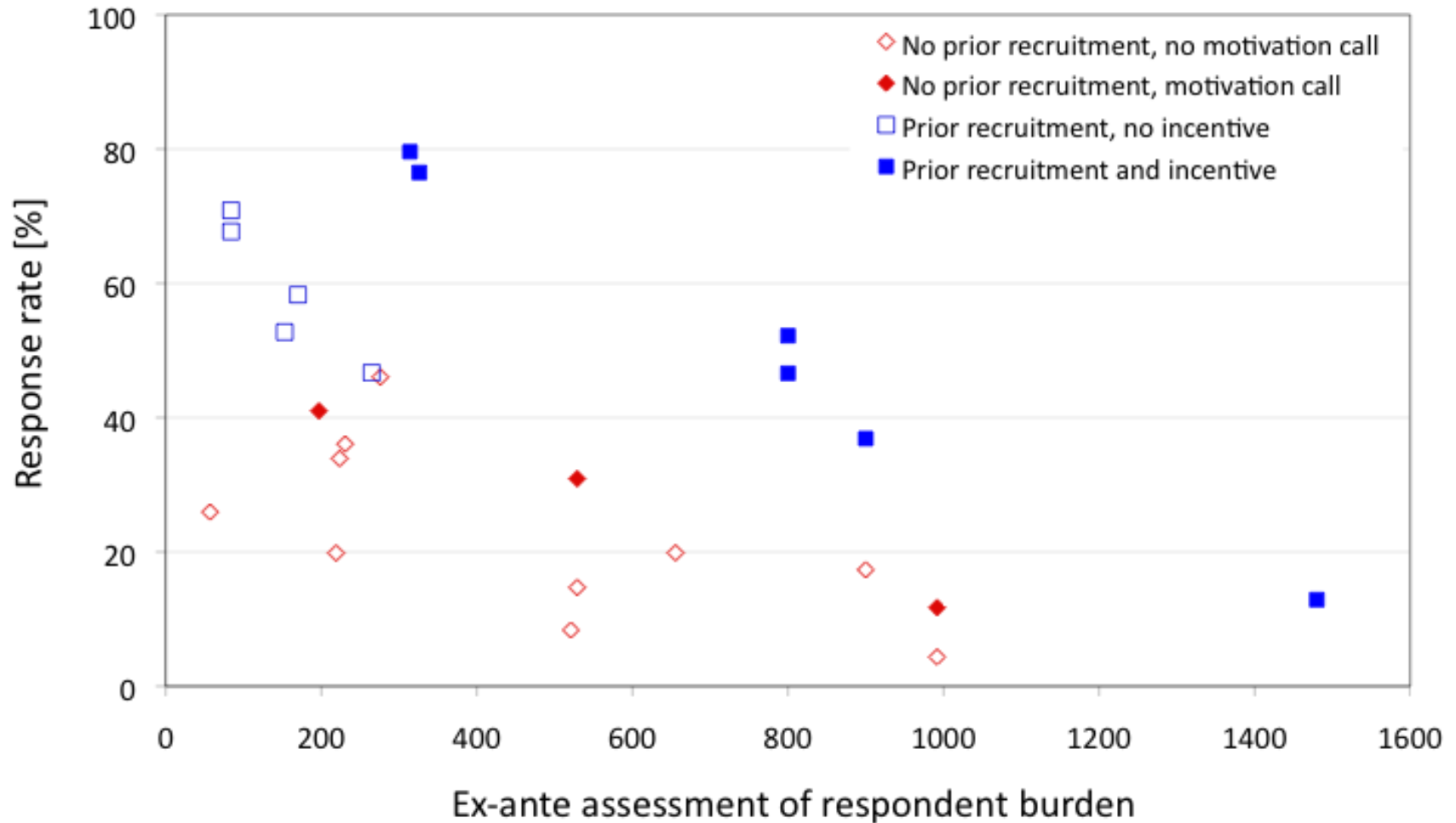
Item	P&P	CATI	GSM	Person-based GPS
Delimitation	Easy	Easy	Very difficult	Difficult
Coverage	With bias	(With bias)	Incomplete	(Complete)
Time	Rounding	Rounding	(Exact)	Exact
Route	No	(Yes)	(No)	(Exact)
Location	Precise	Precise	Imputed	(Exact)
Mode	Yes	Yes	(No)	Imputed
Purpose	Yes	Yes	(No)	Imputed
Cost	Rounding	Rounding	No	Imputed
Social content	(Yes)	(Yes)	No	No

Pro & contra

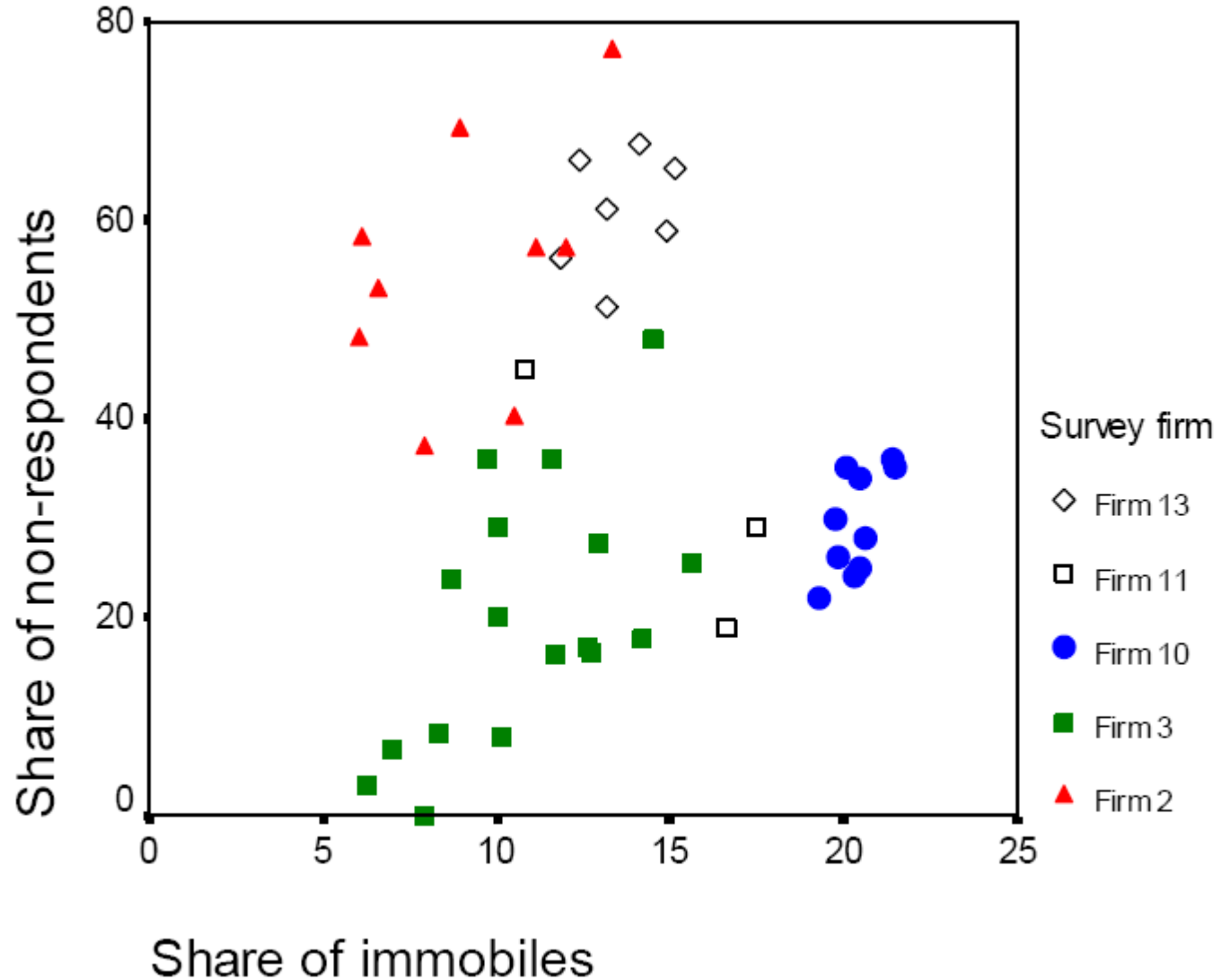
Item	Where is George?	Credit card payments	CCTV observation
Delimitation	No	No	No
Coverage	Selective	Selective	Selective
Time	No	Presence	Presence
Route	No	No	(Yes)
Location	No	(Exact)	Exact
Mode	No	No	Yes
Purpose	No	No	No
Cost	No	No	No
Social content	No	No	(No)

What further problems do diaries have?

Diary: Response rate versus response burden



Diary: Unit-non response versus soft refusals



Diary: Trip underreporting (GPS versus diary)

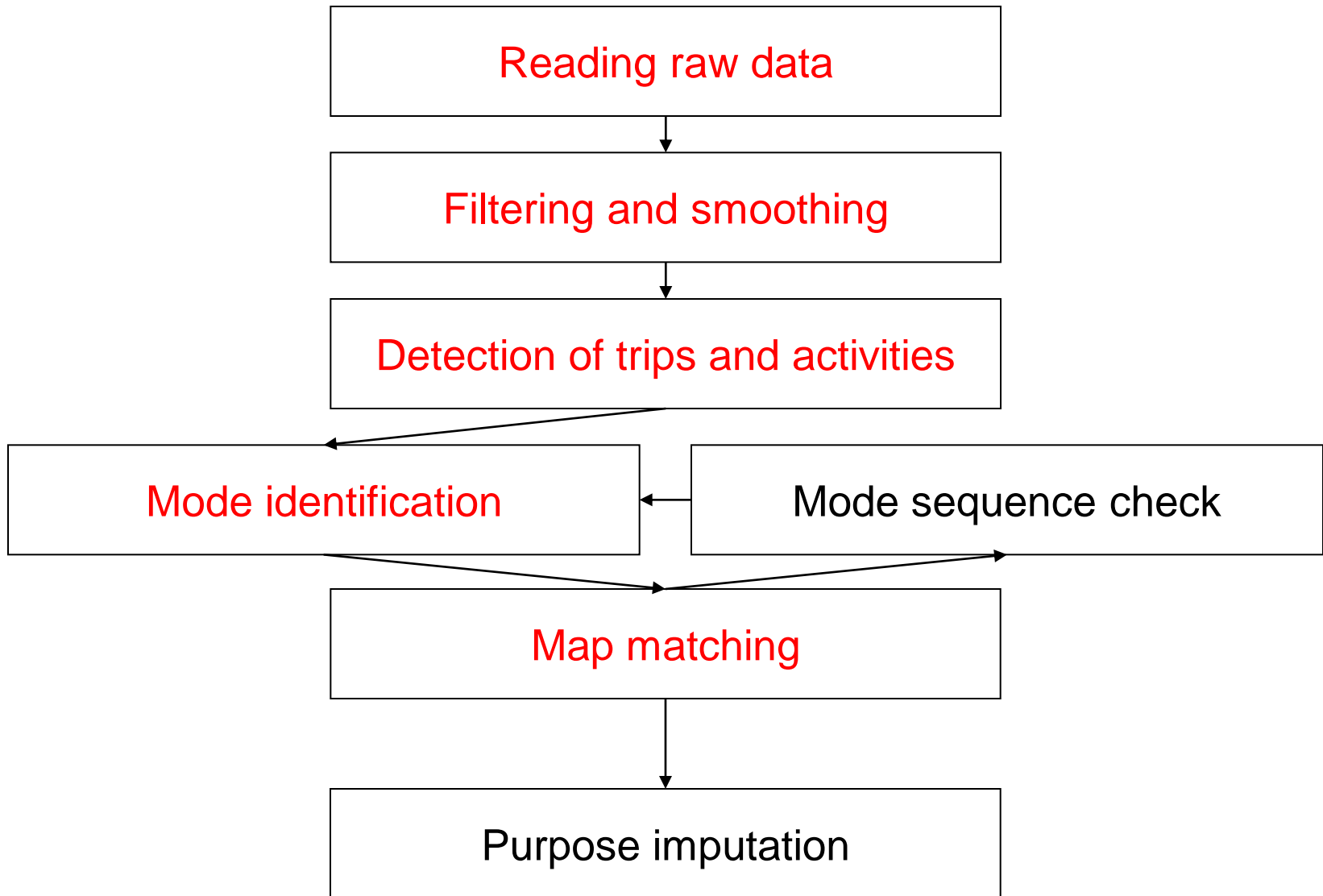
Location	Year	Number of households for comparison	Rate of trip under-reporting
Laredo	2002	87	81%
Los Angeles	2001/2	293	35%
Austin	1997	200	31%
Pittsburgh	2001/2	46	31%
Ohio	2002	230	30%
California	2001	292	23%
St. Louis	2002	150	11%
Kansas City	2004	228	10%
Zürich, Winterthur, Geneve	2004		13%

What are the issues for GPS traces ?

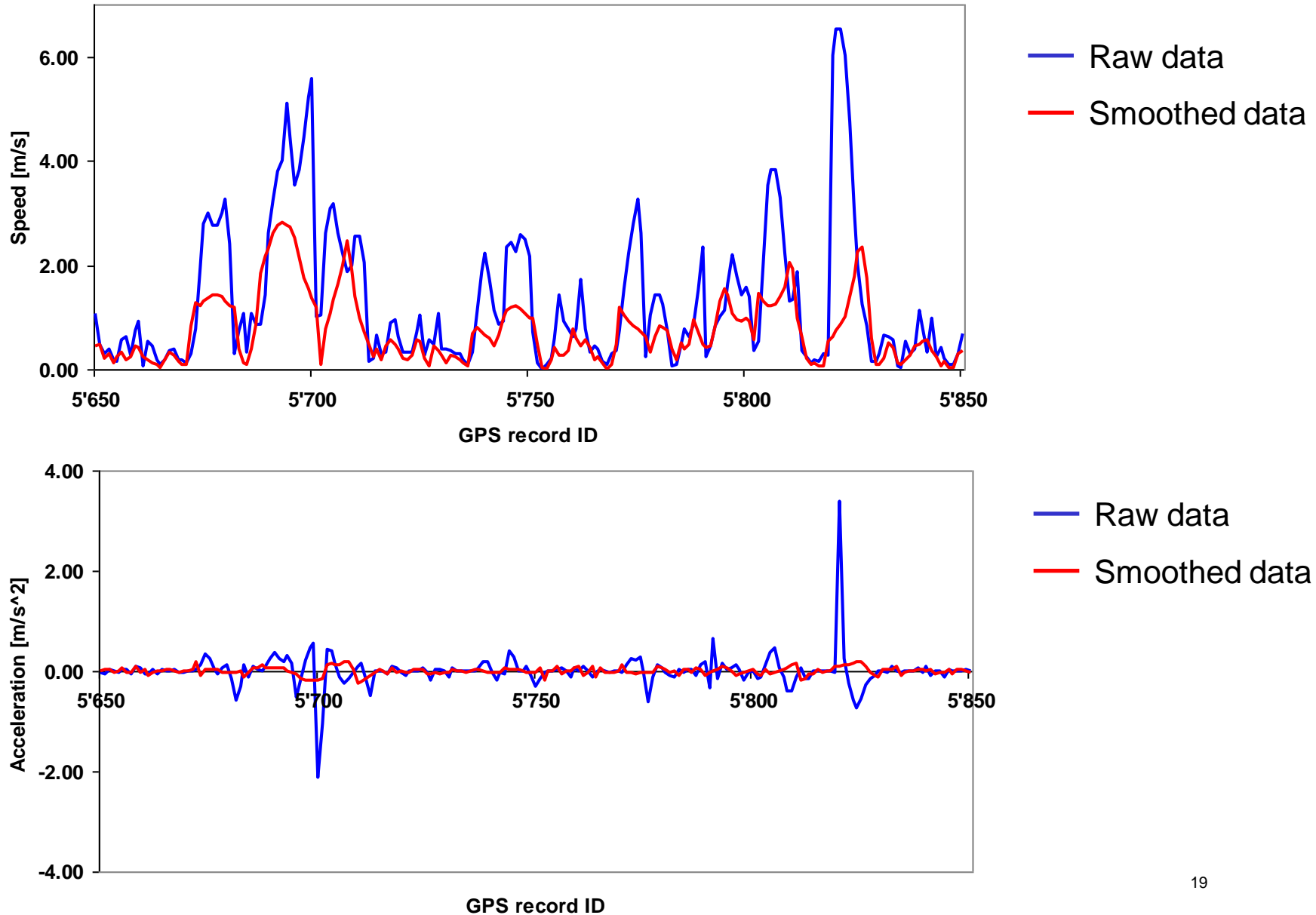
Issues from a transport planning perspective

- Processing of poorly characterised GPS points
- Automatic and fast processing of large volumes of GPS points
- Imputation of mode and purpose
- Generation of large scale validation data sets

Outline of the approach chosen



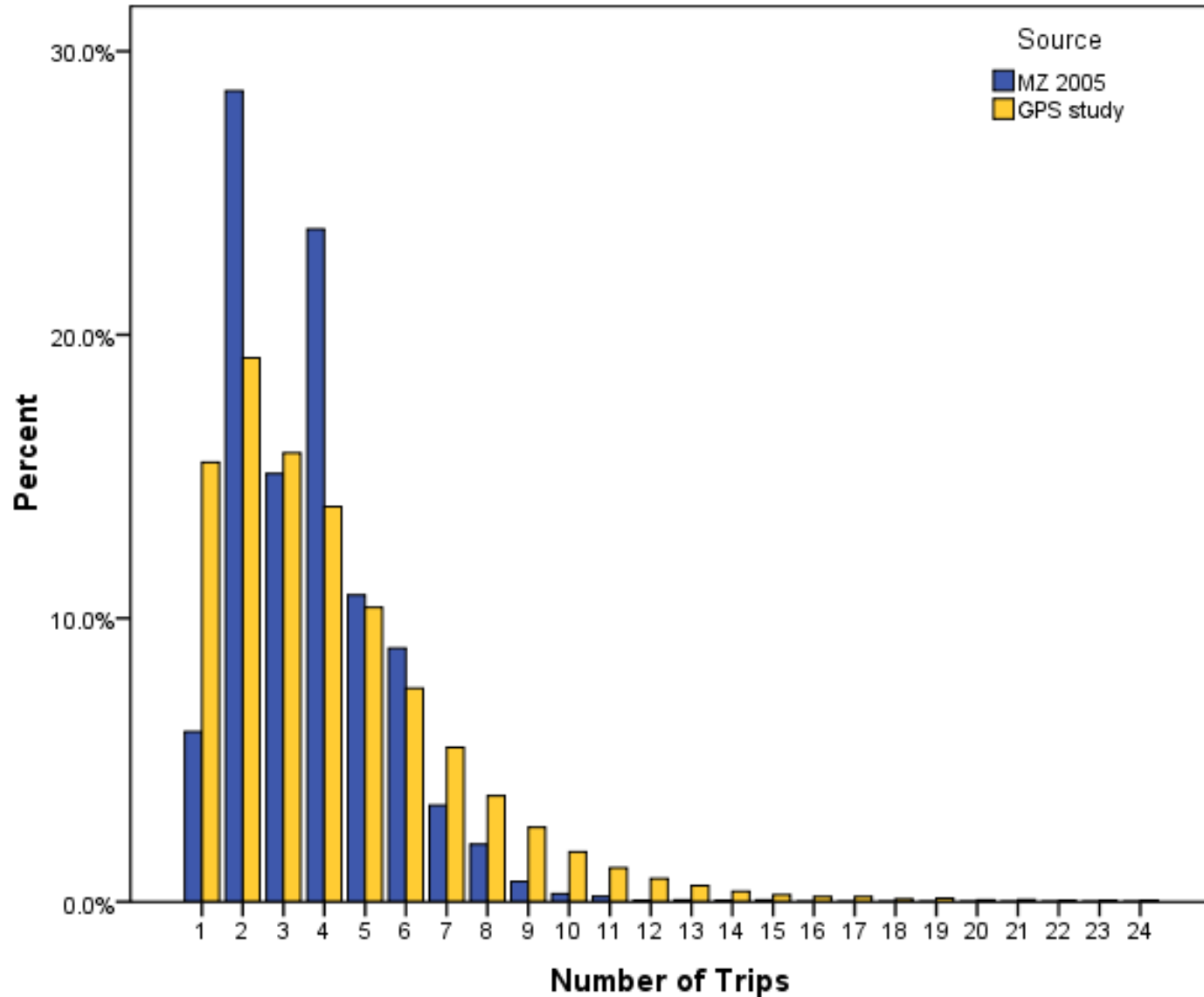
Smoothing: Impact on speed and acceleration



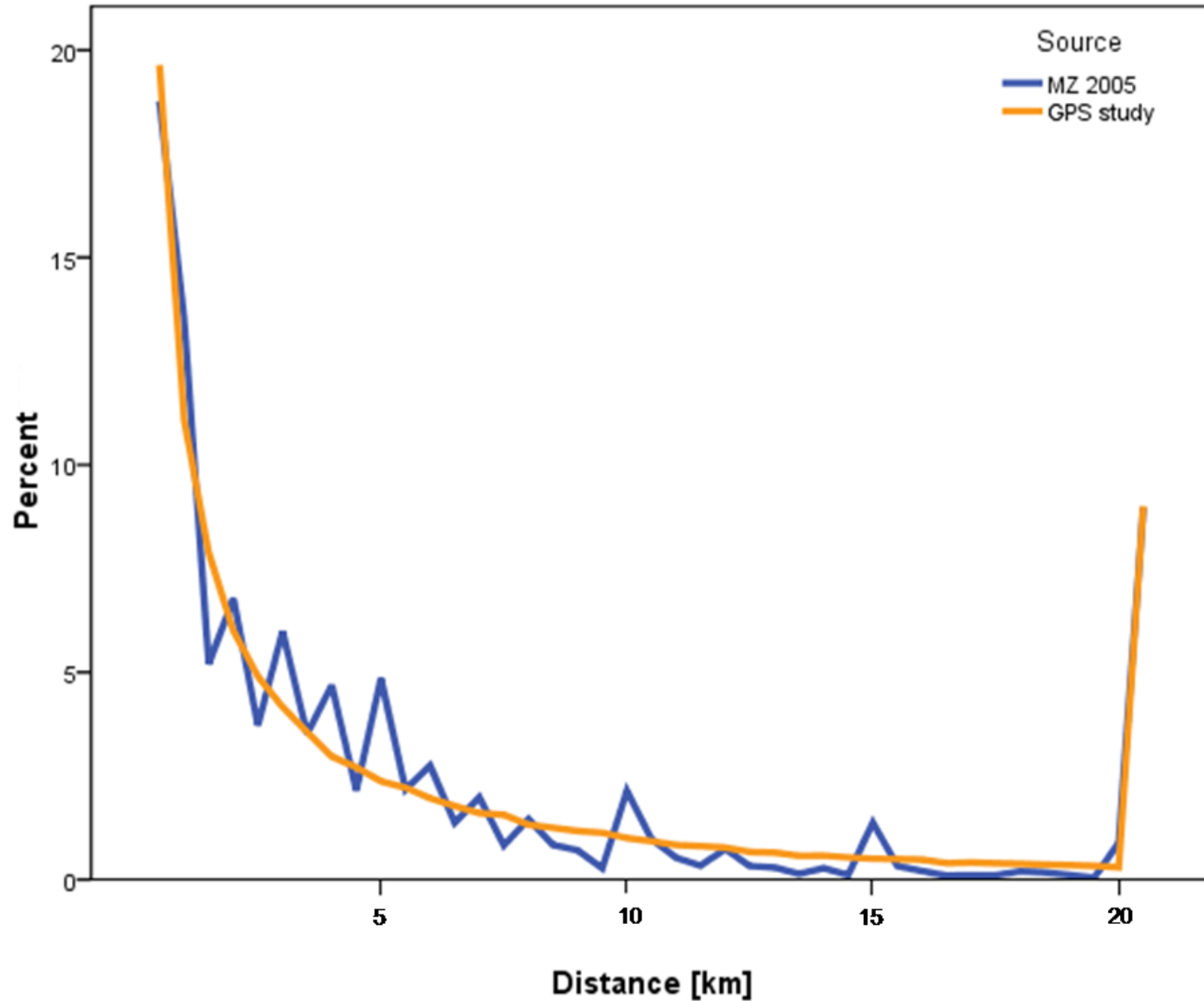
Smoothing: Impact on point locations



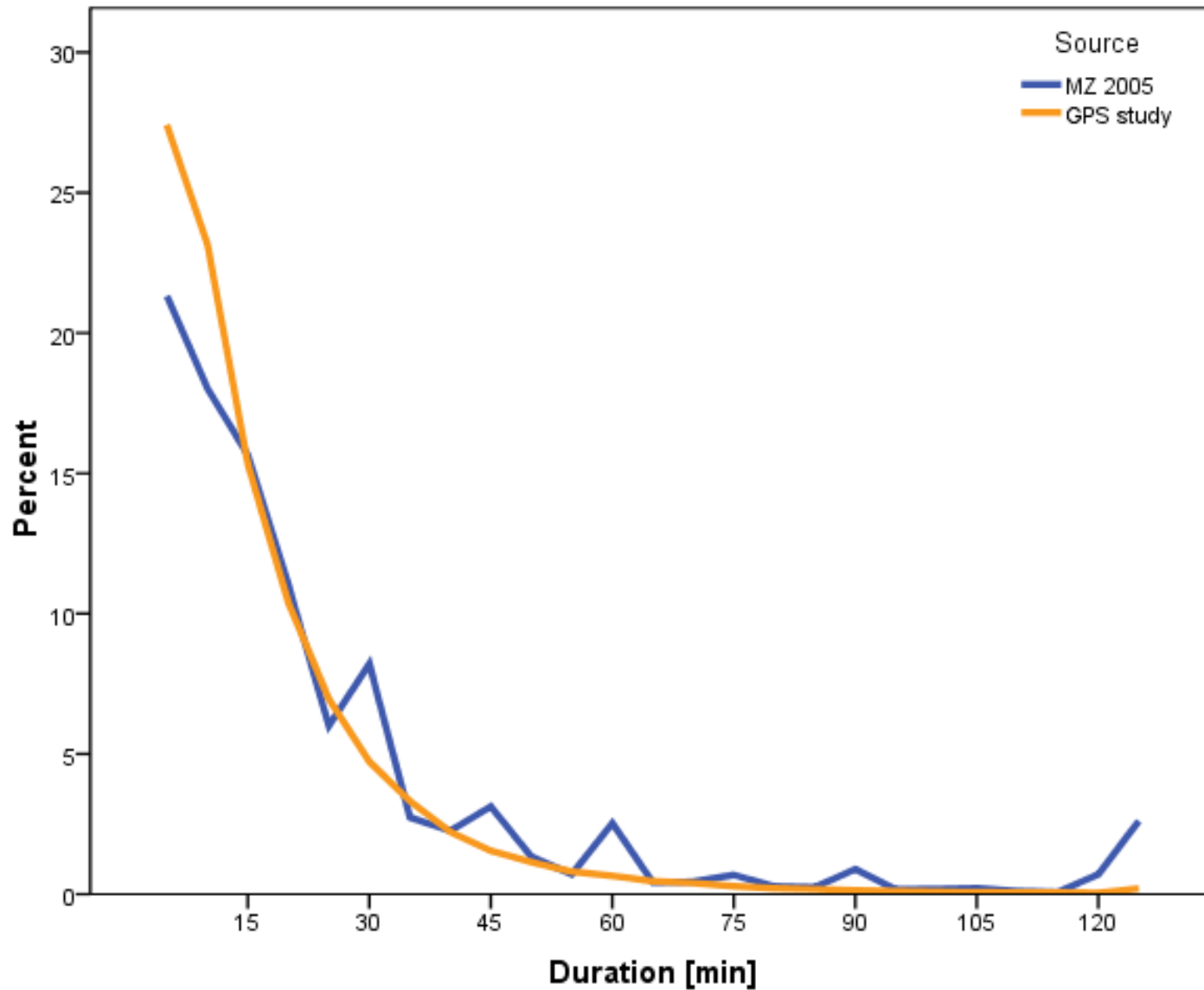
Trip detection: Comparison of trips/day with MZ 2005



Trip detection: Distances compared to the MZ 2005



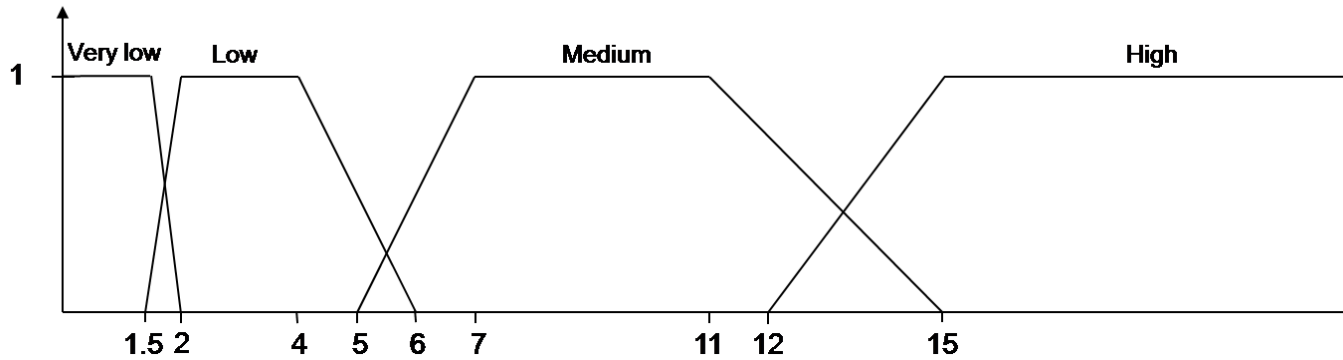
Trip detection: Durations compared to the MZ 2005



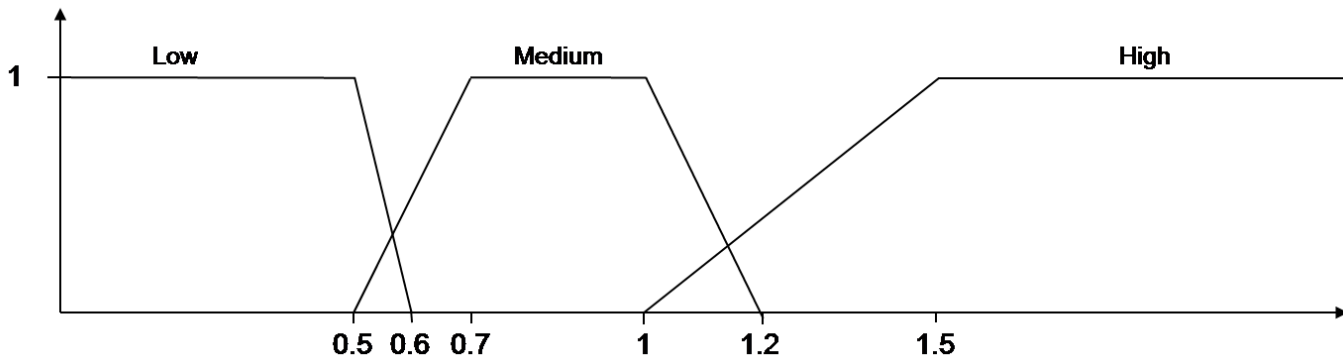
Trip detection: Comparison with the MZ 2005

	ZH	WI	GE	MZ 2005
Number of persons	2 435	1 086	1 361	2 940
Days per person	6.99	5.96	6.51	1
Trips per day	4.50	3.40	4.26	3.65
Mean trip distance [km]	7.72	7.37	7.19	8.79
Mean daily mileage [km]	34.74	23.20	29.25	32.13
Mean trip duration [min]	15.17	13.71	15.05	26.21
Mean number of stages/trip	1.40	1.31	1.47	1.68

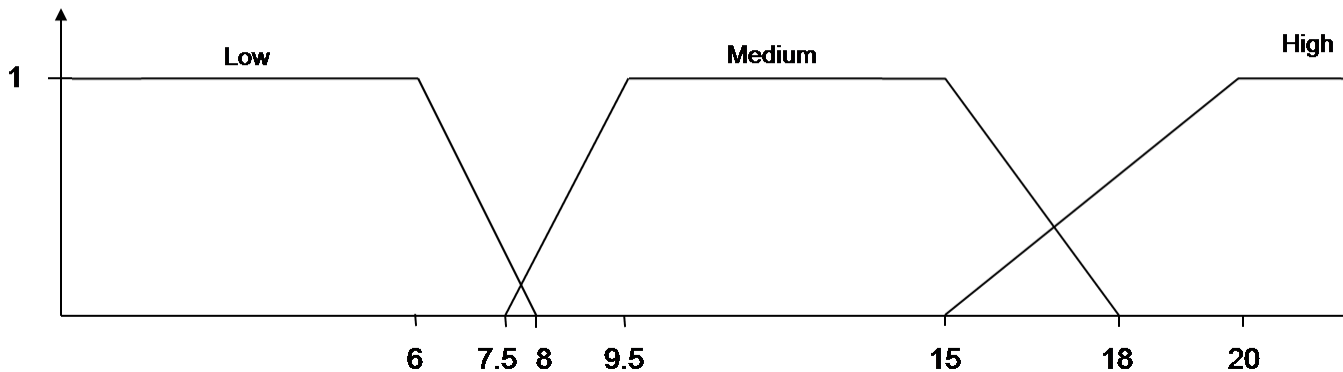
Mode detection: Fuzzy logic approach



Median speed

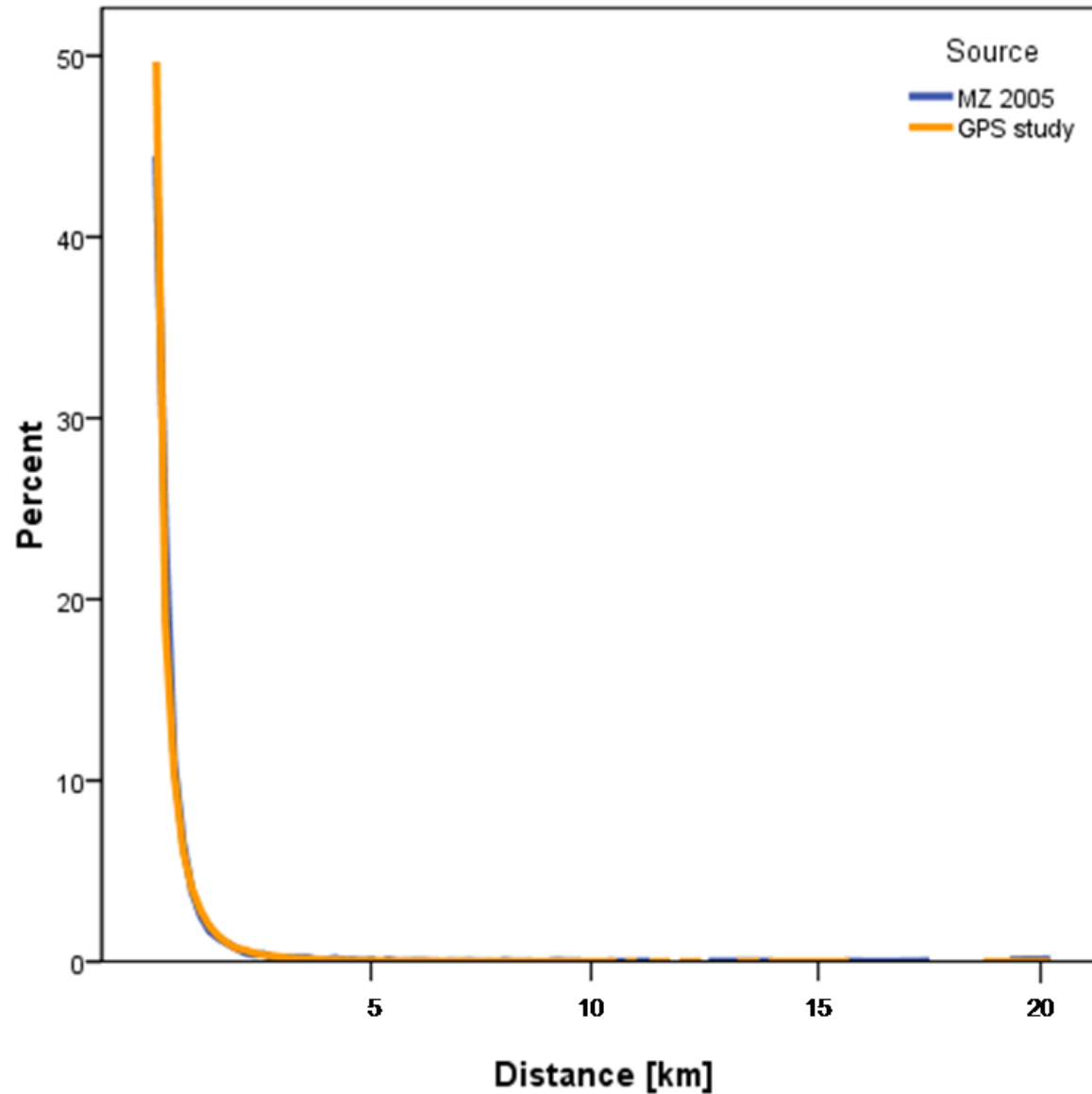


95 percentile acceleration

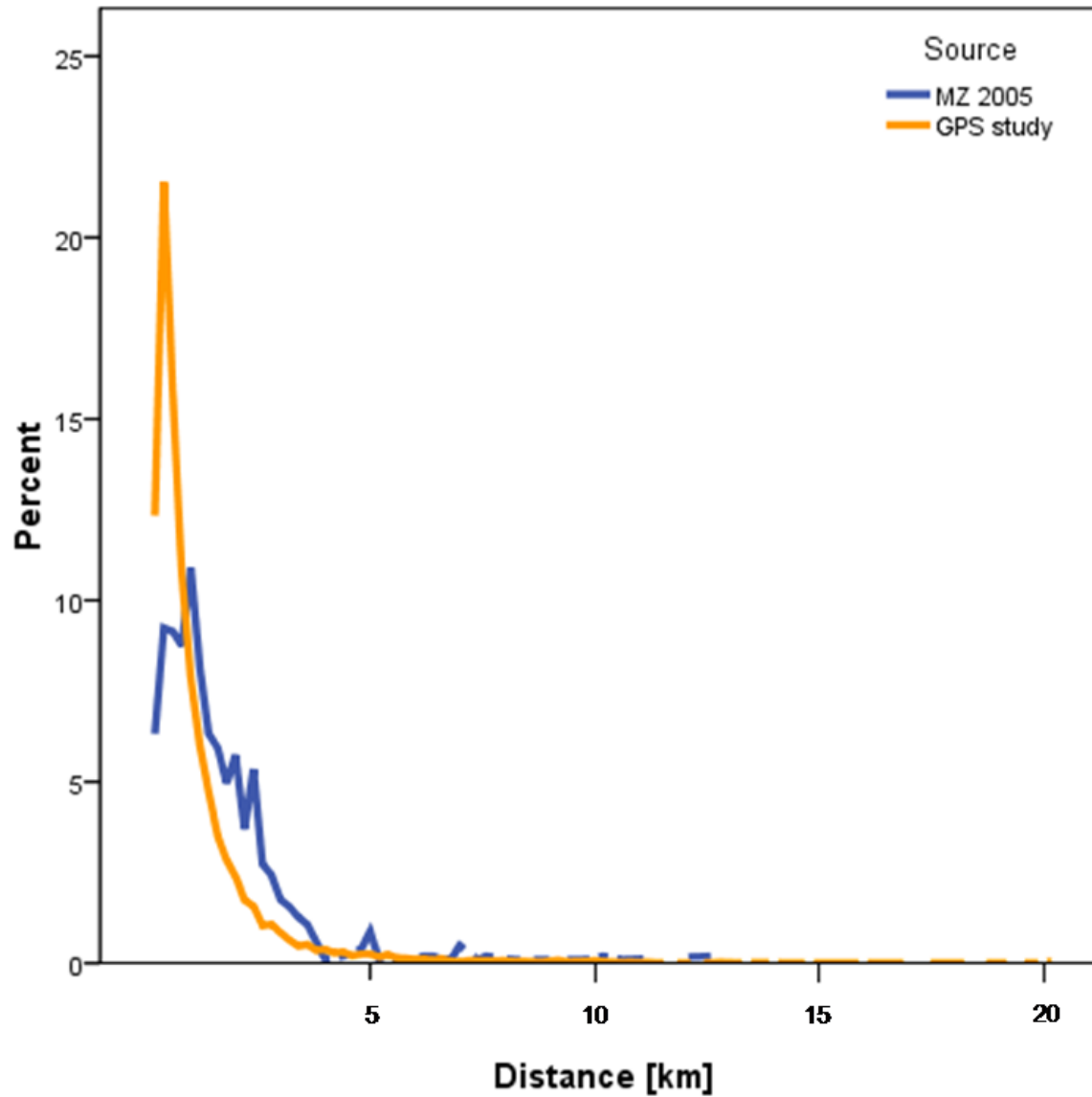


95 percentile speed

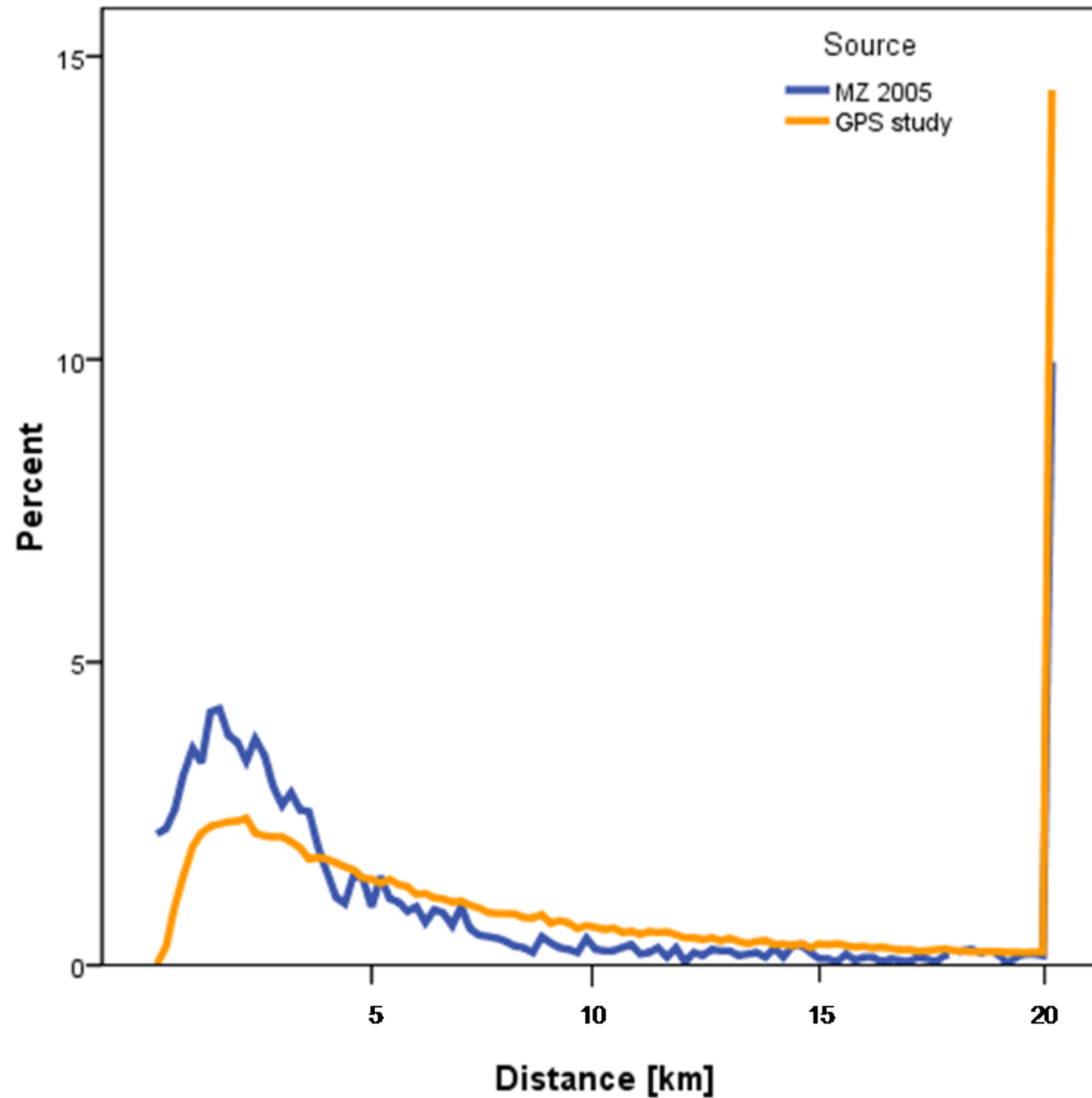
Mode detection: Walk distances with MZ 2005



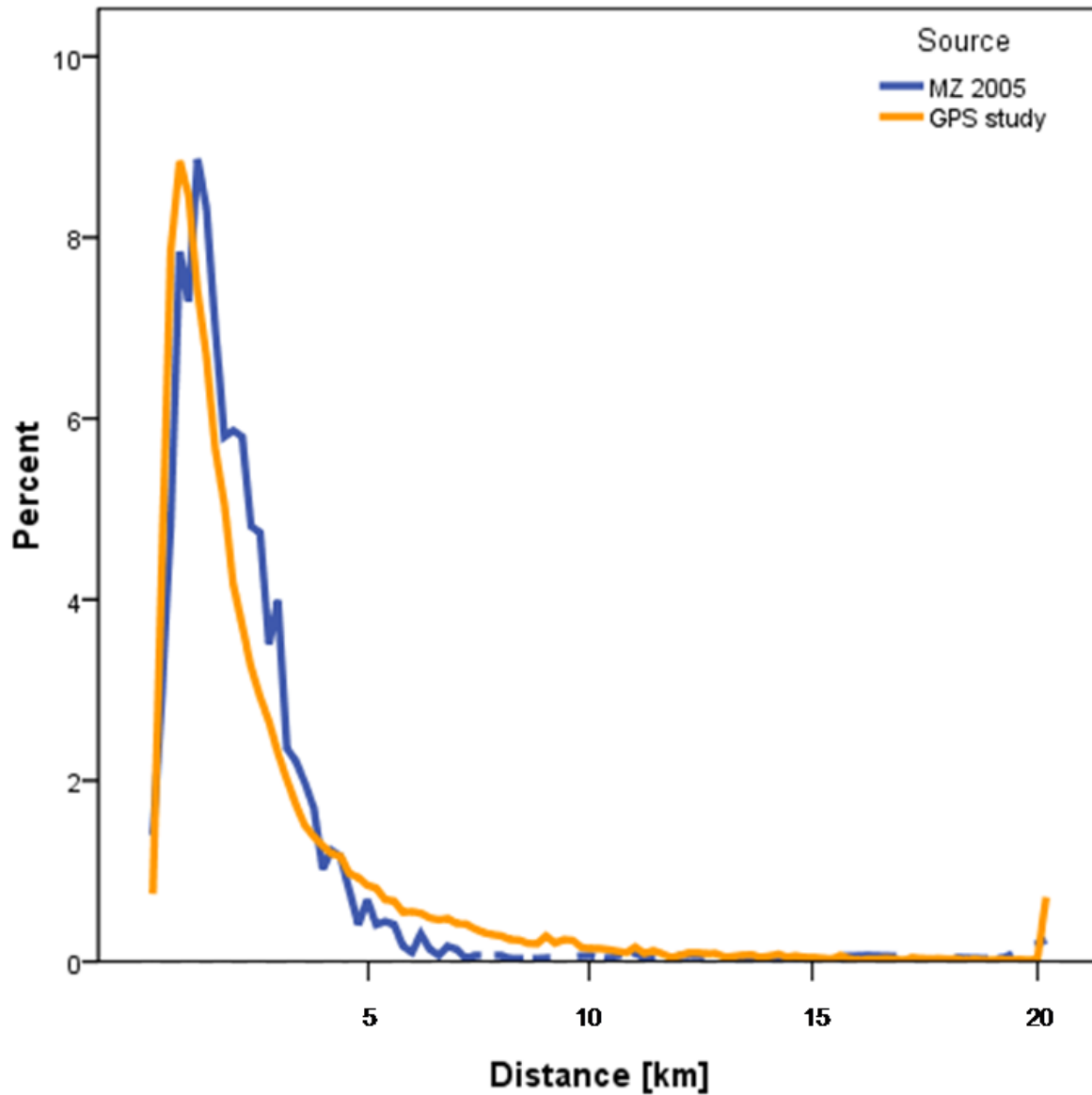
Mode detection: Cycling distances with MZ 2005



Mode detection: Car distances with MZ 2005



Mode detection: Local transit distances with MZ 2005



Remaining issues

- Car, bike and urban public transport mismatch
- Car and heavy rail mismatch
- Logic of stage mode sequence
- Detecting incomplete trips and joining them
- Short (and close by) activity detection
- Trip purpose imputation

Can we replace diaries today?

- Yes, if the emphasis is on times, routes and distances
- In combination with some diaries, if modes and purposes are needed
- No, if social content and activity expenditures are needed
- But, we don't know anything about response rates yet

For more information

www.ivt.ethz.ch

www.matsim.ch