Preferred citation style

Axhausen, K.W. (2006) The social content and the generalised costs of travel: Balancing the explanations, NSSI/HEI research group meetings, January 2006.

The social content and the generalised costs of travel: Balancing the explanations

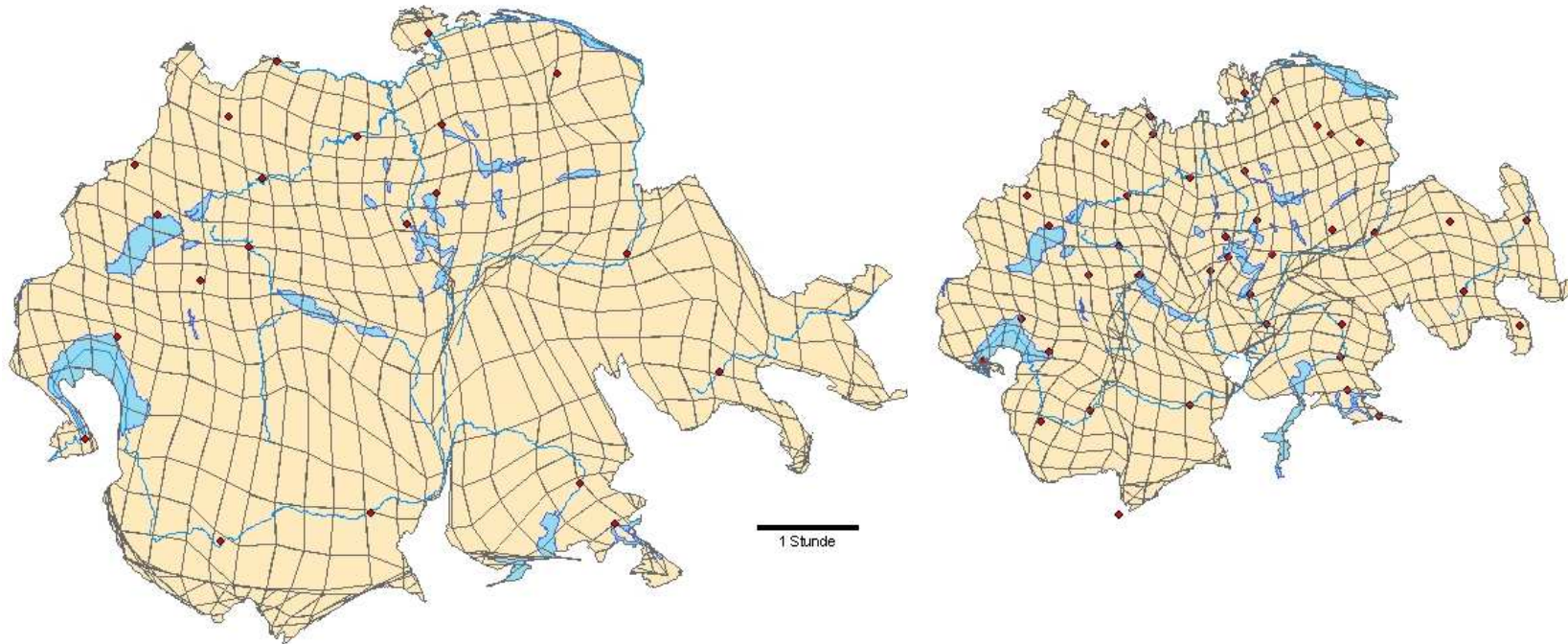KW Axhausen

IVT
ETH
Zürich

January 2006

Trends: Road travel time scaled Switzerland (1950 & 2000)

1 Stunde

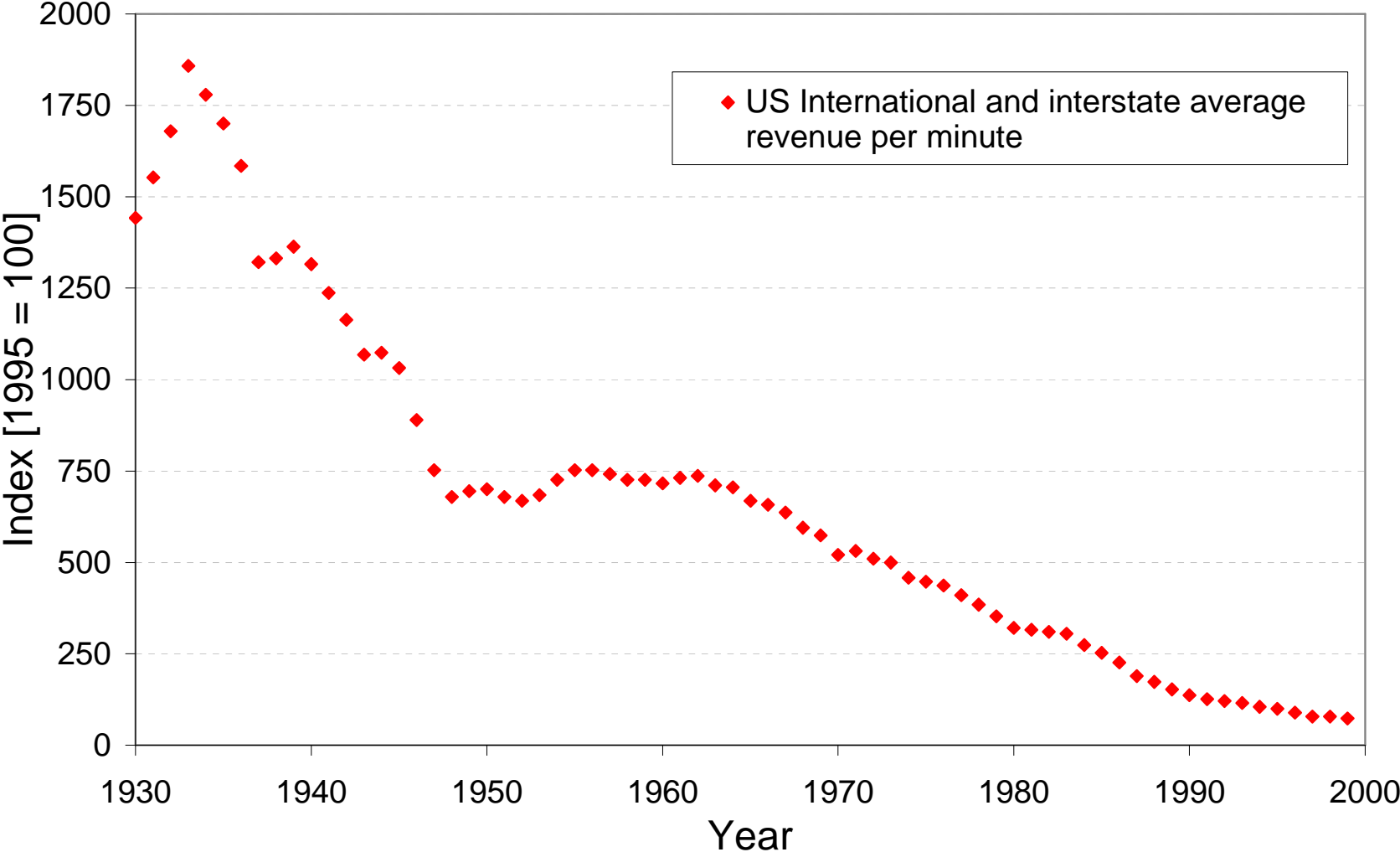# Trends: Quality controlled prices of the mean new Swiss car
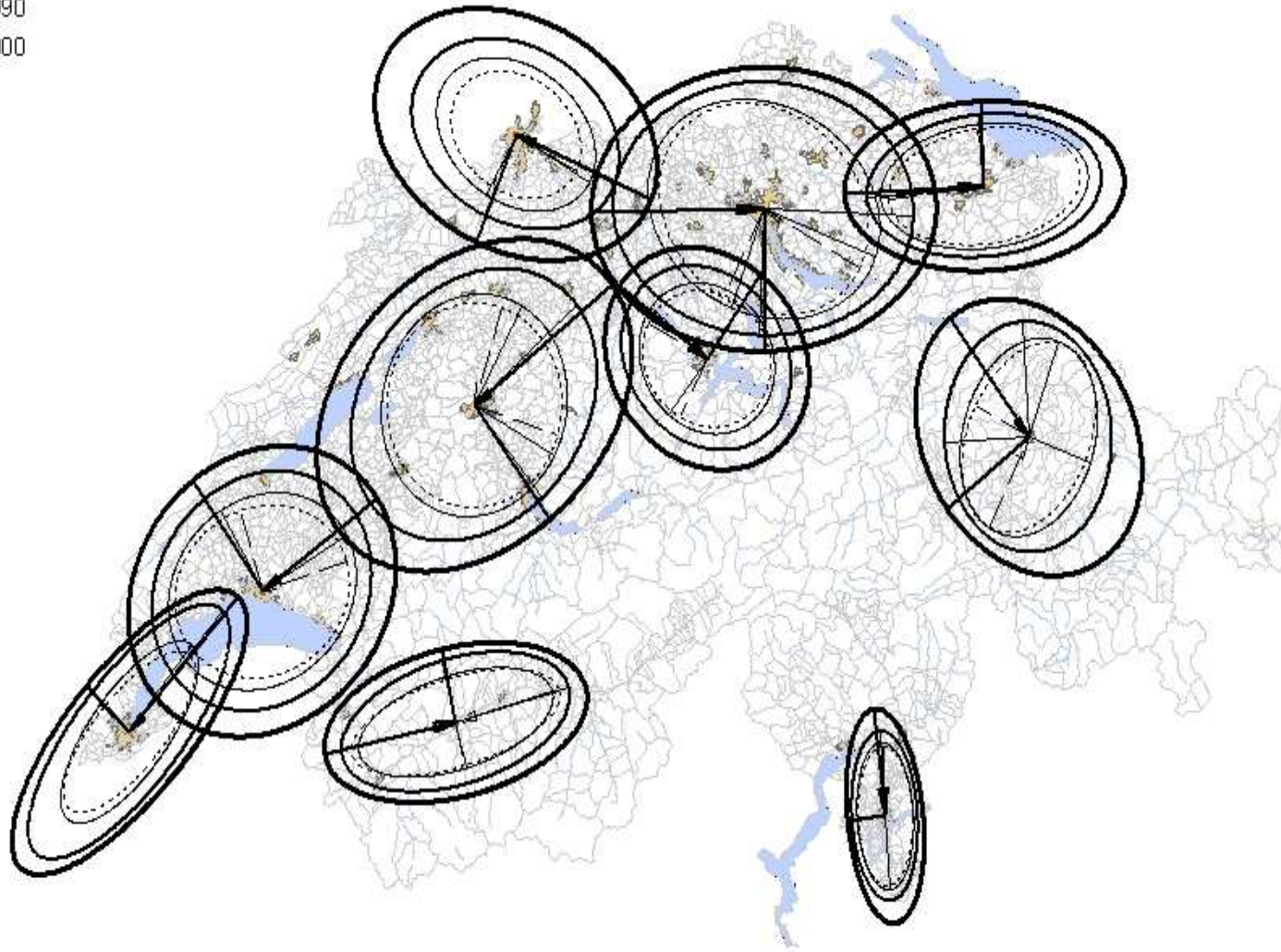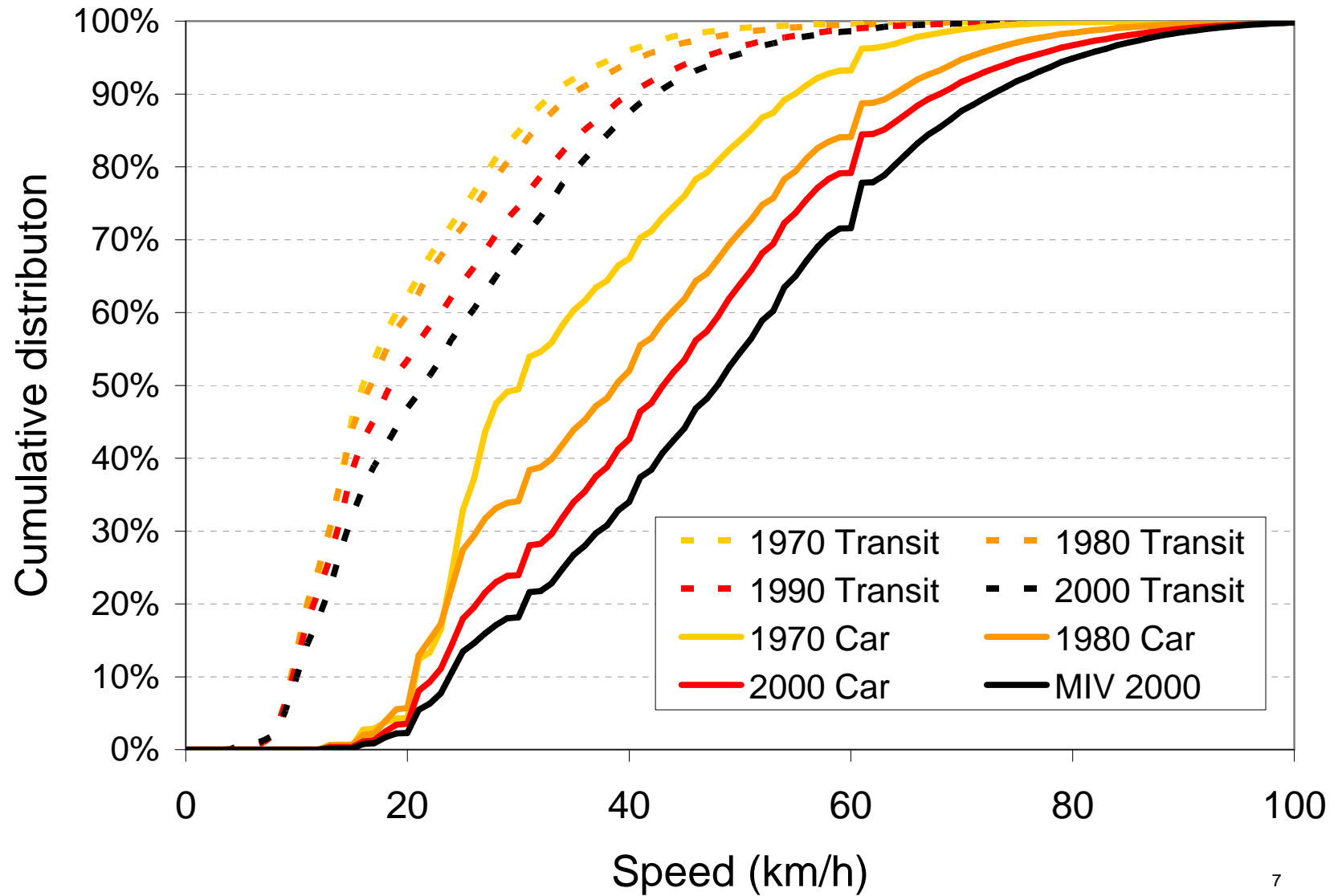
4
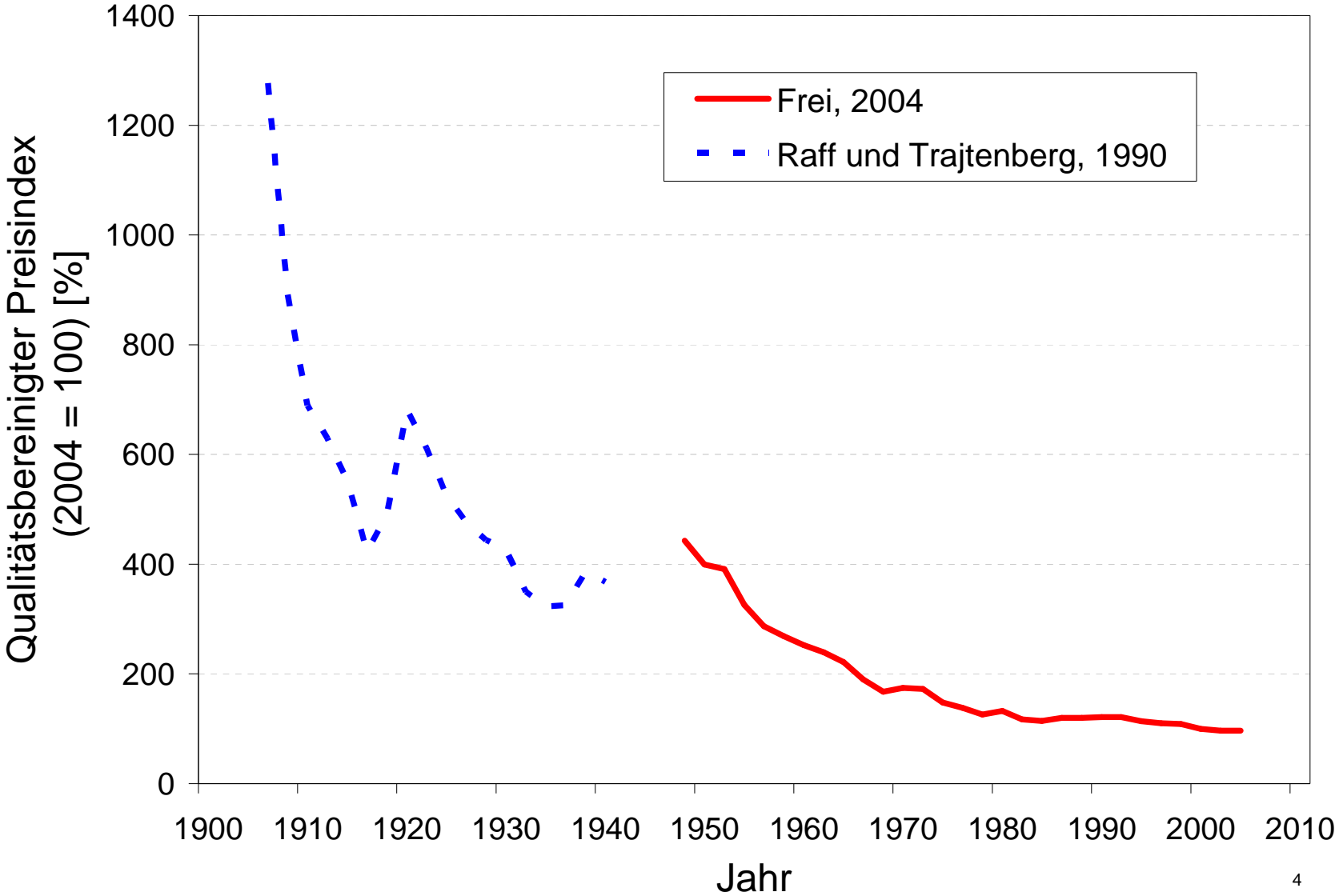
Trends: Real price of telecommunication

Adapted from FCC (2001)

Adapted from Botte, 2003

Response: Swiss commuting speeds since 1970

Response: Annual vmt increase since 1960
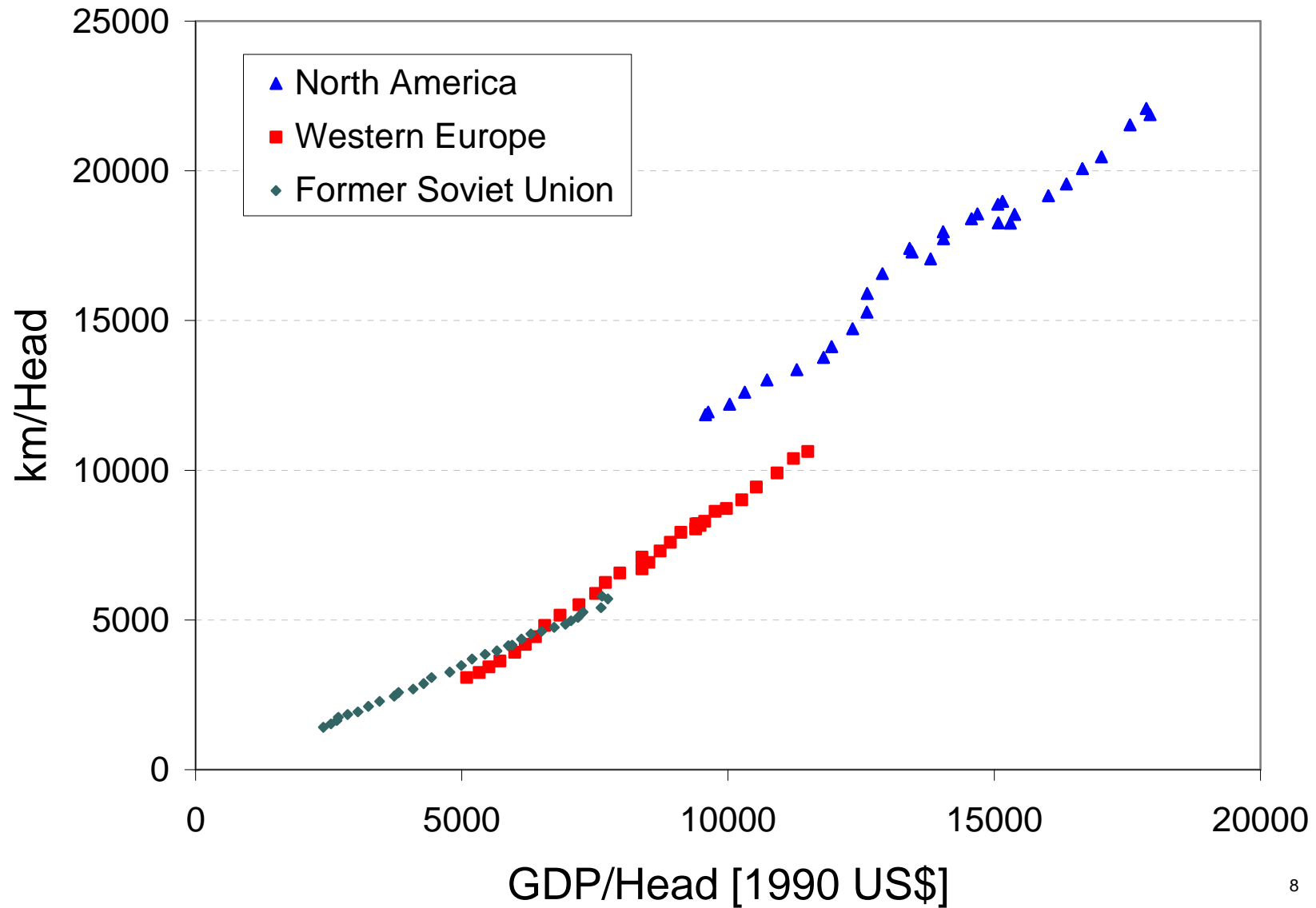
Source: Schäfer

How do we explain this at the macroscopic level ?

Economies of scale
Economies of scope

GDP

Activity

Fleet comfort

slots

vtts et al.

Tours

vkm

t/pkm

k

Market size

Energy costs
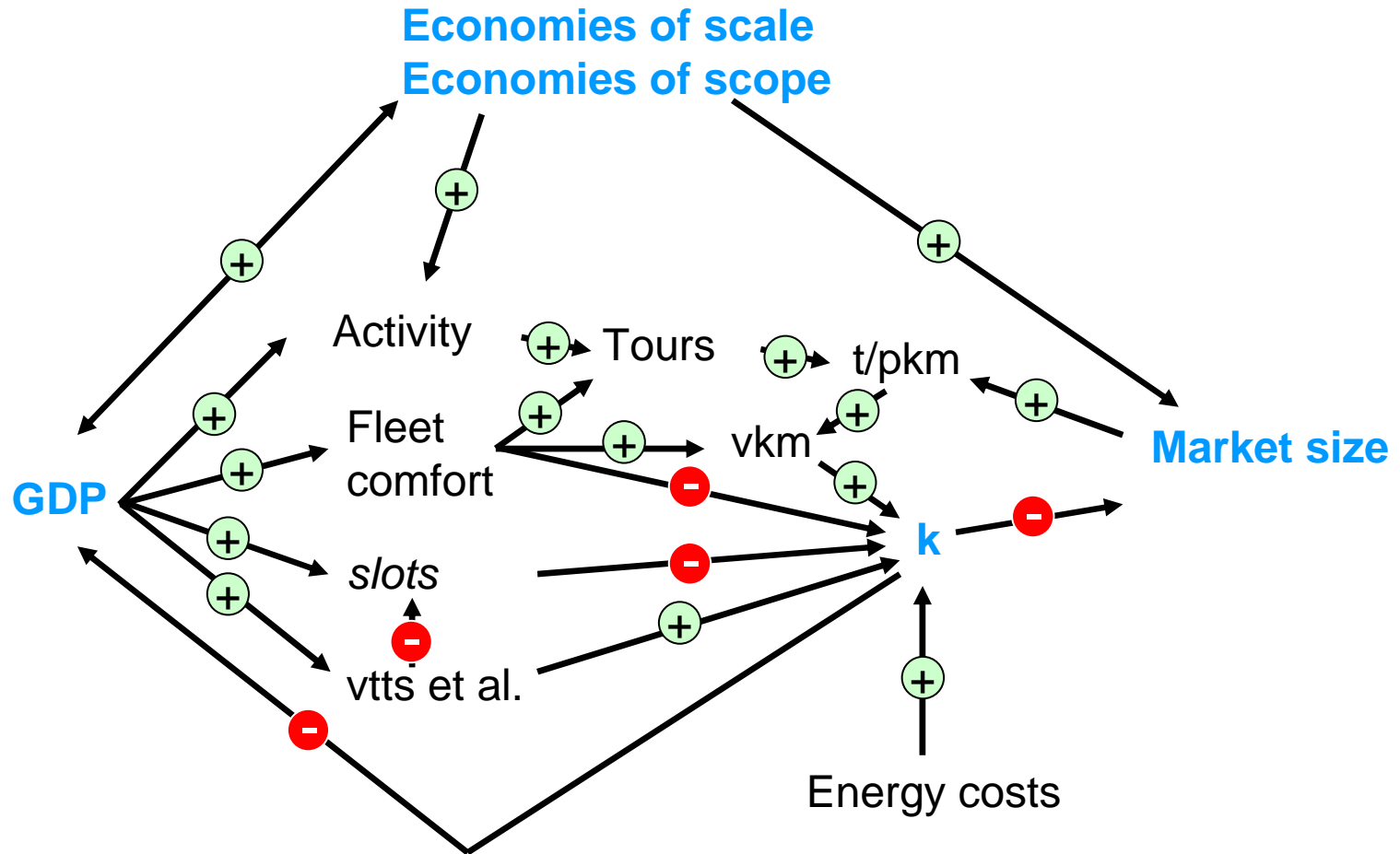
+ Elasticity > 0   Slots: possibilities to move goods or people
− Elasticity < 0   For a given infrastructure and commercial
                    and private fleet

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How do we explain this at the microscopic level ?

Possible elements:

- Generalised costs of the route-mode-location alternative
- Budgets
- Taste (Values, attitudes, life style) by socio demographics

- Personal world (i.e. Mental map)
- Social network membership

Generalised cost of a route-mode-destination alternative

Elements:

- (Comfort adjusted) time spent traveling
- Schedule delay (relative to intended arrival time)
- (Decision time-frame relevant) monetary expenditure

- (Comfort adjusted) time spent at the location by type
- Activity expenditure
- Social content

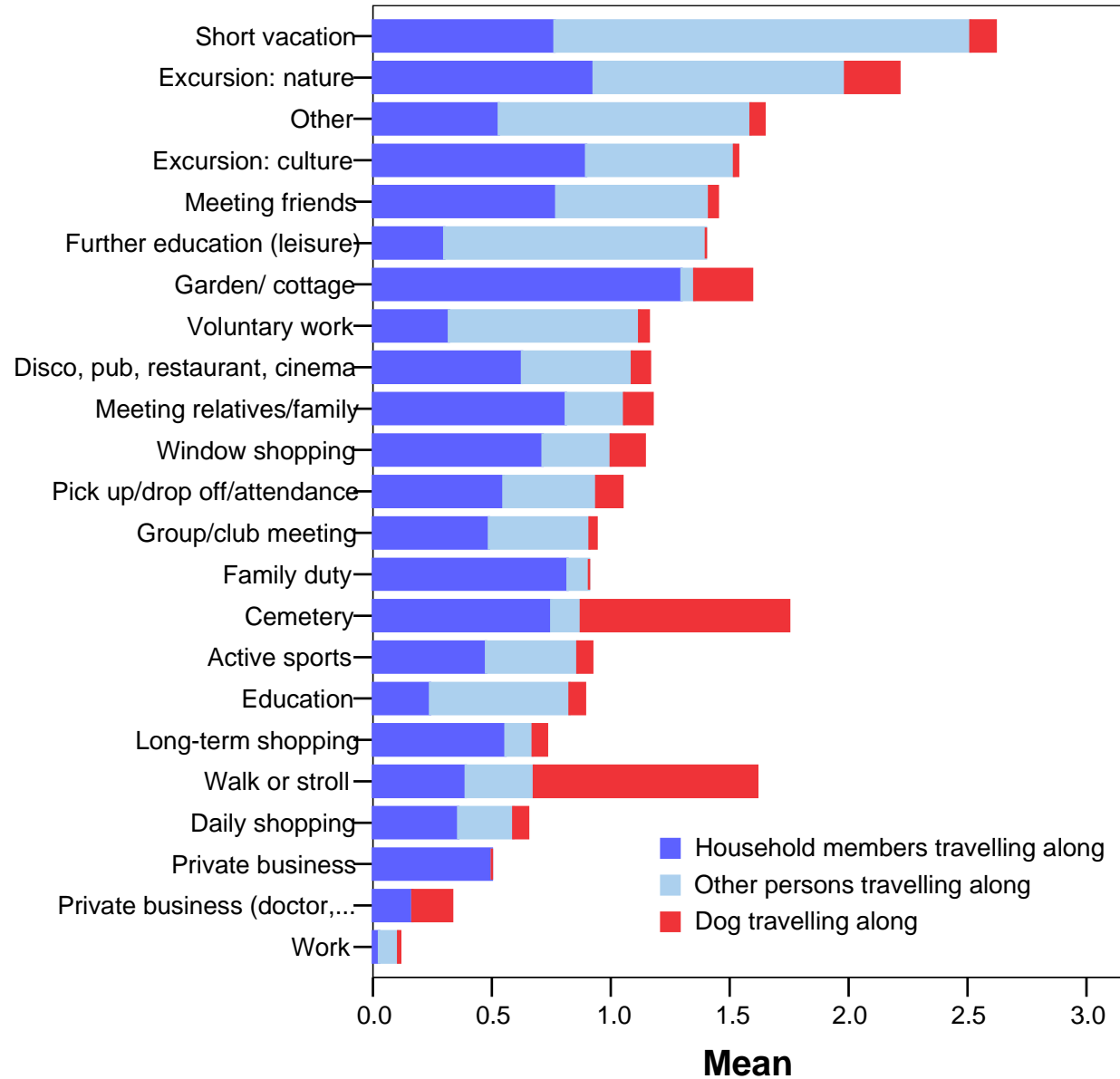# What could we summarize under „social content" ?

Who is participating ?
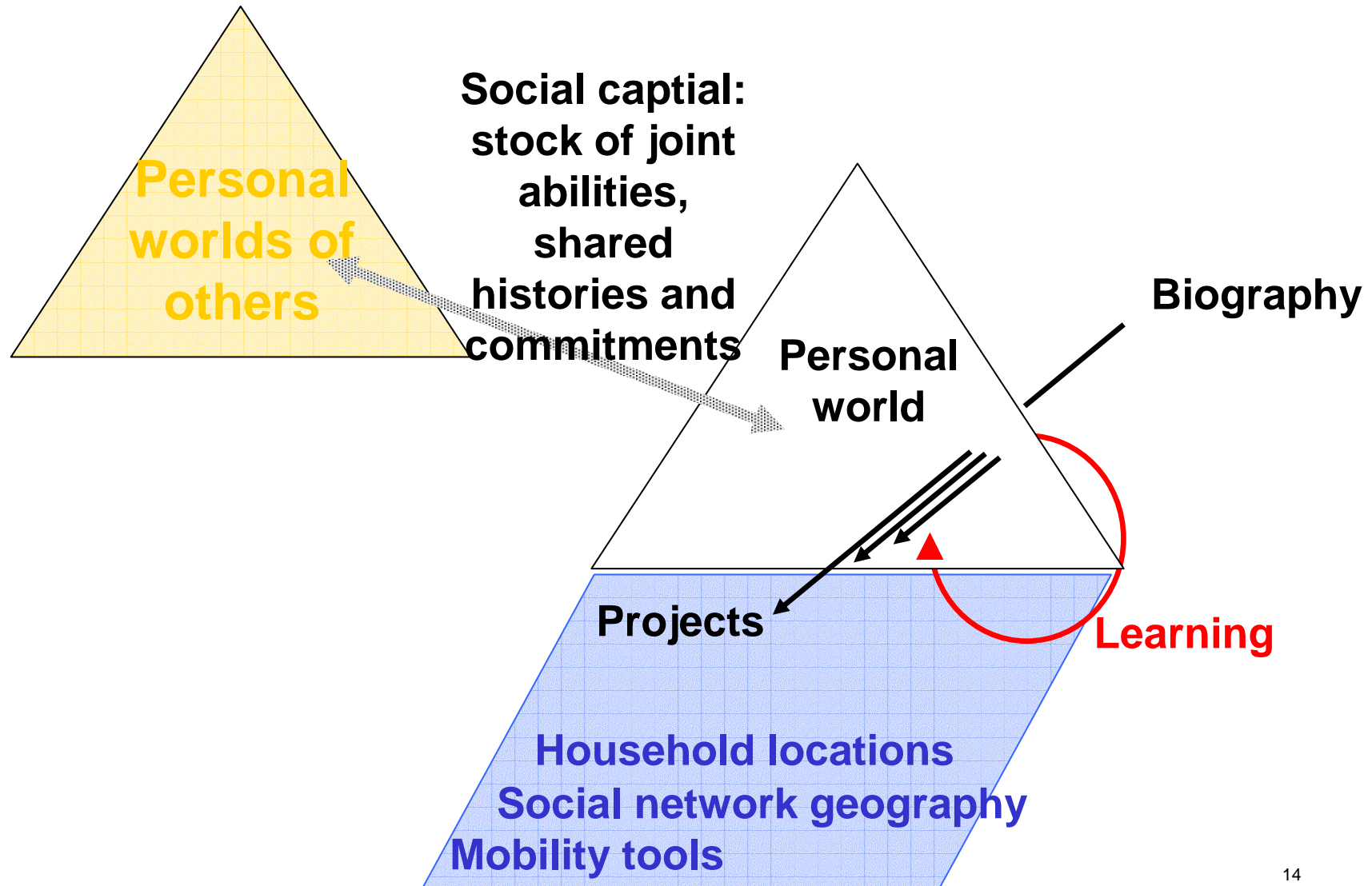
For whom is the activity undertaken ?

Issues:

- Consistency with self image
- Fulfilment of obligations

- Coordination with others

- „Networking"

Social content of travel (2003 Thurgau): Who is travelling ?

The „network actor" in a dynamic social context

Personal worlds of others

Social captial: stock of joint abilities, shared histories and commitments

Personal world

Biography

Projects

Learning

Household locations
Social network geography
Mobility tools

What are the new research questions ?

Travel:
- Can we measure the social content ?
- What is its impact on model quality ?

Person:
- [Can we measure the personal world ?]
- Can we retrieve the (mobility) biographies ?
- Can we measure the social network geography ?
- What is its impact on model quality ?

System:
- How fast has it changed ?
- How large are the social costs ?
- How can we stear it ?

What are the challenges ?
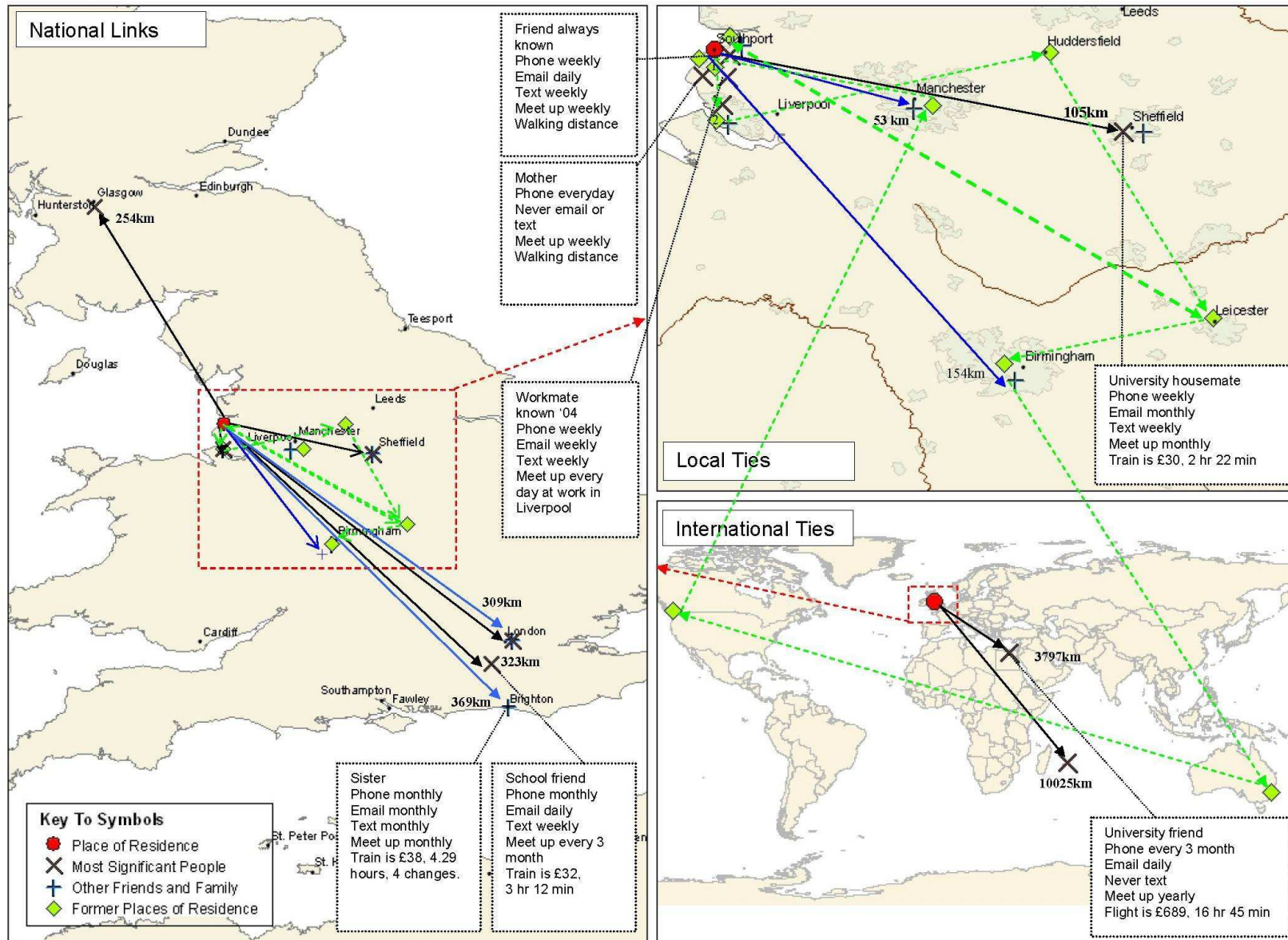
Personal world and social network geography:

- Measurement

- Measures

Mobility biographies:

- Retrieval and reconstruction

- Measures

Biography of a male architect, early-30ies

National Links

Friend always known
Phone weekly
Email daily
Text weekly
Meet up weekly
Walking distance

Mother
Phone everyday
Never email or text
Meet up weekly
Walking distance

Workmate known '04
Phone weekly
Email weekly
Text weekly
Meet up every day at work in Liverpool

254km

309km

323km

369km

Sister
Phone monthly
Email monthly
Text monthly
Meet up monthly
Train is £38, 4.29 hours, 4 changes.

School friend
Phone monthly
Email daily
Text weekly
Meet up every 3 month
Train is £32, 3 hr 12 min

Key To Symbols
● Place of Residence
✕ Most Significant People
✚ Other Friends and Family
◆ Former Places of Residence

Local Ties

53 km
105km
154km

University housemate
Phone weekly
Email monthly
Text weekly
Meet up monthly
Train is £30, 2 hr 22 min

International Ties

3797km
10025km

University friend
Phone every 3 month
Email daily
Never text
Meet up yearly
Flight is £689, 16 hr 45 min

Measurement

Personal world as „mental map" and „expectation space":

- Sketching
- Think aloud protocols
- Spatial tasks

Personal worlds as „activity space" of visited locations:

- Diaries
- GPS/GSM tracing
- Data traces (payments of all kinds, CCTV, phone and pc use)

Measurement

Social network geographies:

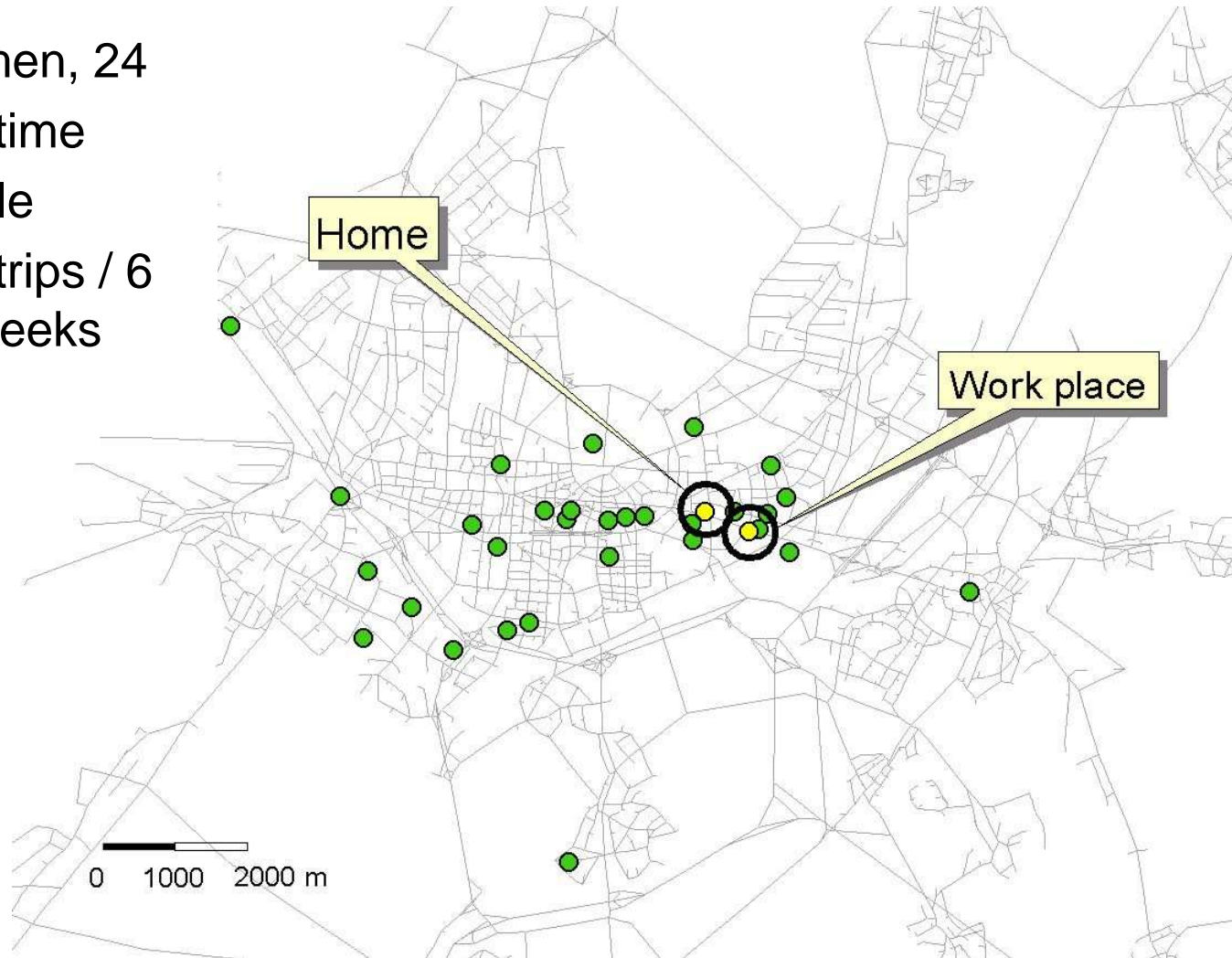- Name generators

- Traces of contacts (email, SMS, IM, internet chat, letters, phone records, etc.)
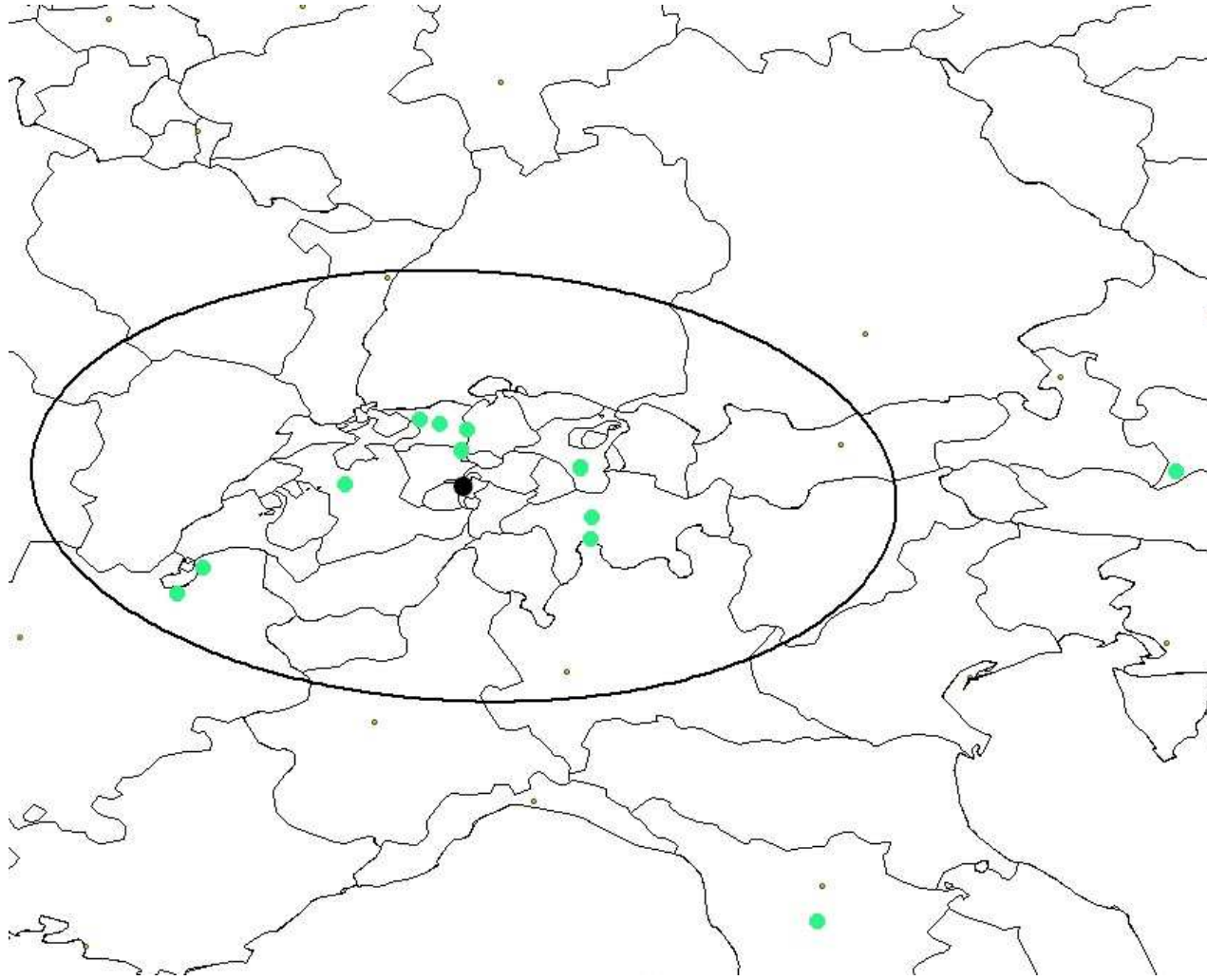
- Diary – based prompting

Contacts and contact frequency – emails to kwa (Outlook)

Example of an activity space

Women, 24

Full-time

Single

216 trips / 6 weeks

Example of a social network geography

Female, 28,
4 moves,

Ohnmacht, 2004

Measures

Requirements:

- Low dimensional (scalar)

- Describe size, orientation and spread

- Consistency with behavioural possibilities (theoretical intent)

- Ease of calculation

How to measure ?

Parametric:
- 95% confidence ellipse (form and type of distribution)

Semiparametric:
- Inclusion geometries (form of geometry)
- (Weighted) shortest path networks (structure of path)
- (Percentage) Minimum convex poligons (convexity)
- Kernel density estimator (form of estimator)
- Mean harmonic home ranges (form of estimator)

Non-parametric
- Observed path geometries

Measures: Confidence ellipse
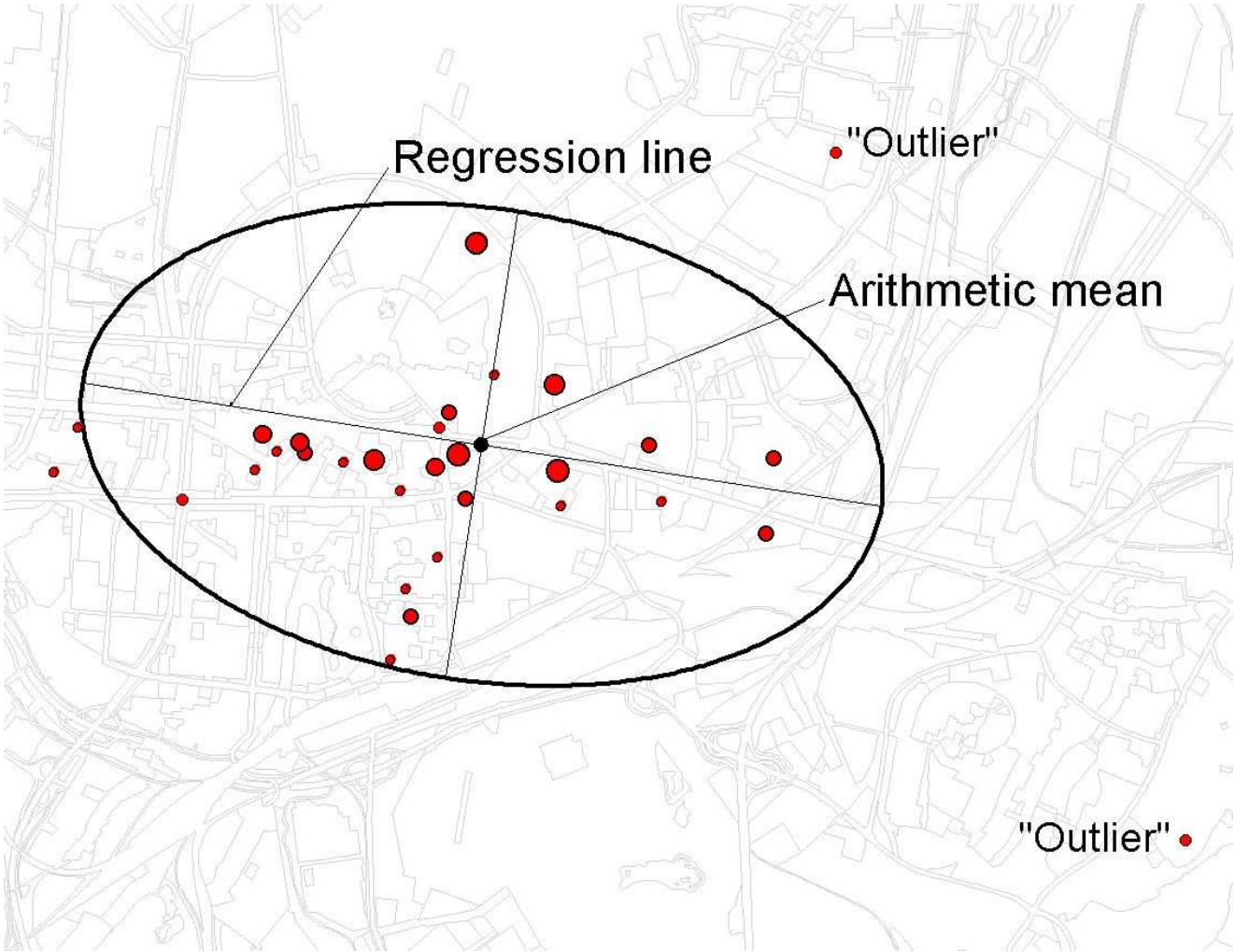
Measures: Kernel densities

Schönfelder, 2006

Measures: Inclusion geometries

Find:

$$\min A_i(\beta_{i1} \;..... \;\beta_{in})$$

s.t.

Area A_i covering p% of all observed points

with:

i   :   Type of geometry (Ellipse, bean, Cassini ...)

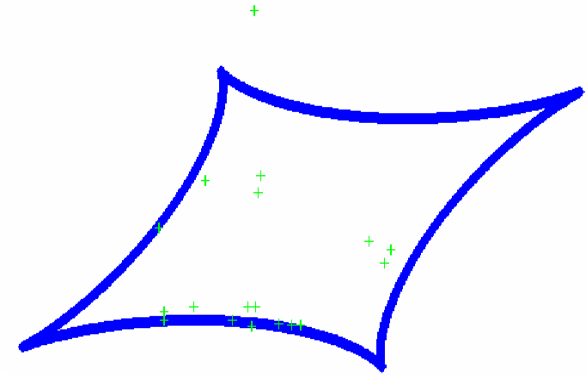p   :   Predetermined share, e.g. 95%
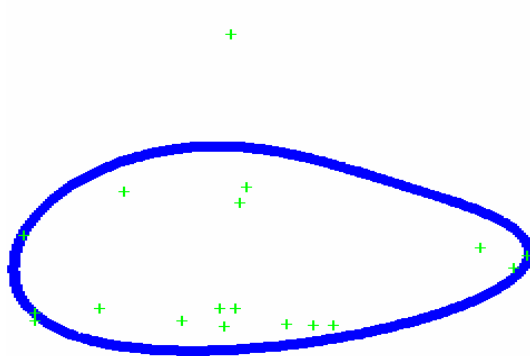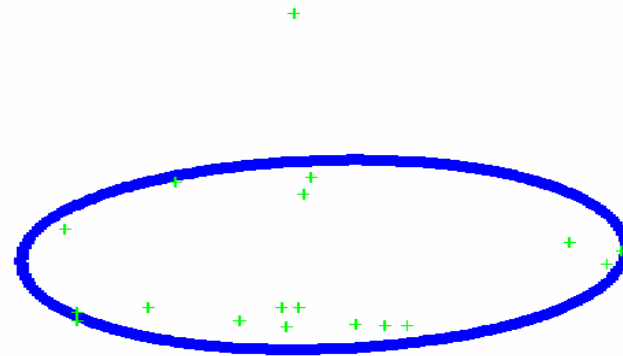
Measures: Inclusion geometries
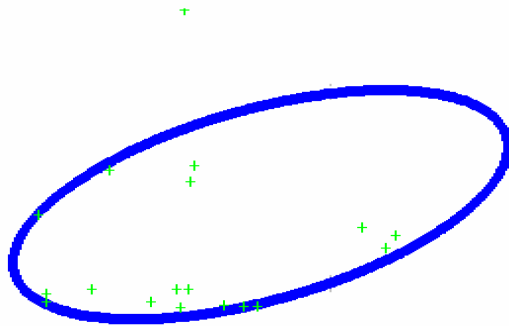
Ellipse
Superellipse 1
Superellipse 2
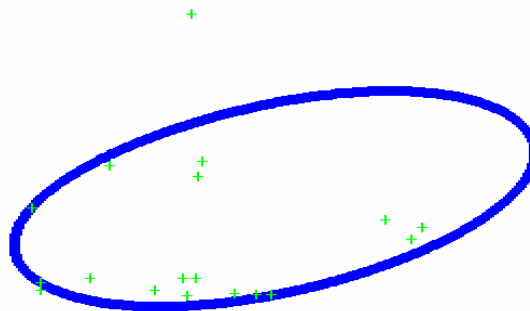
Bean
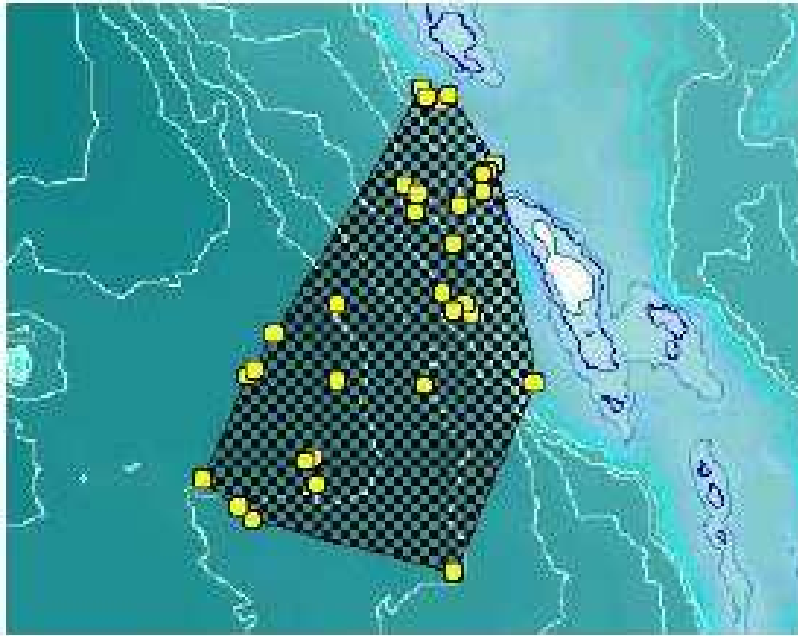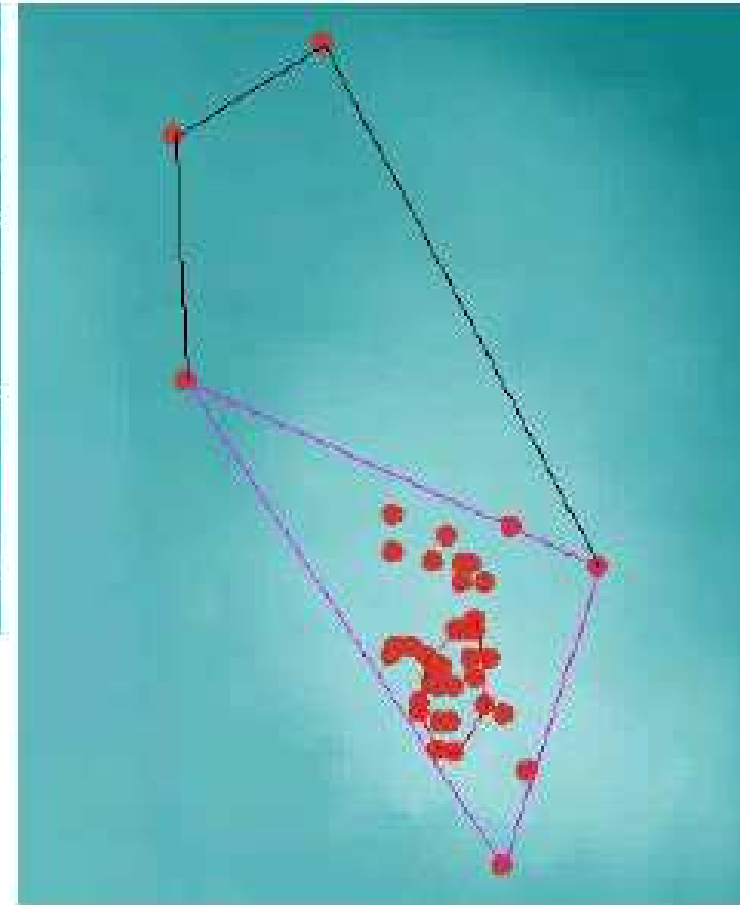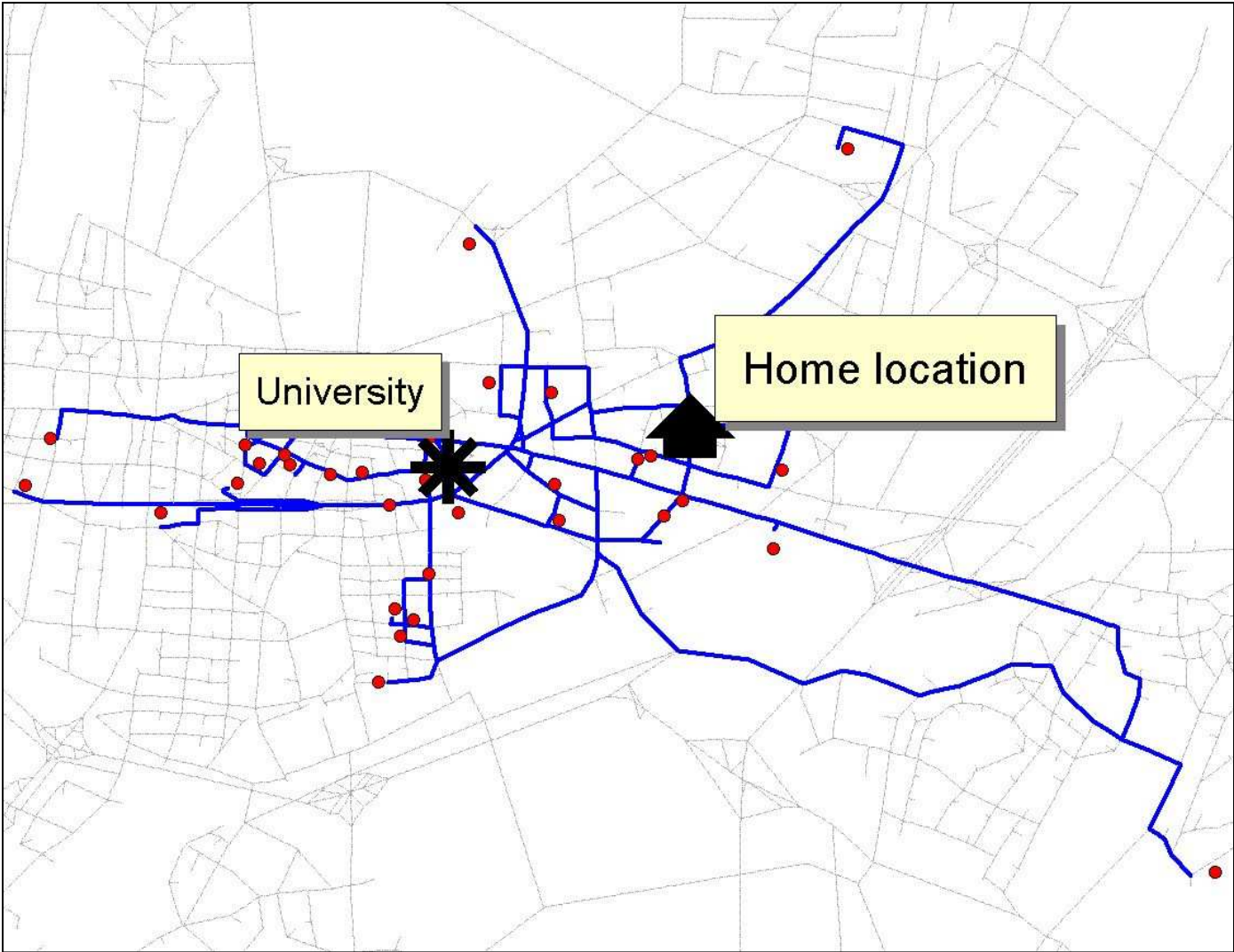Cassini

Measures: Minimum convex poligons (MCP)

MCP

Percentage MCP

Schönfelder, 2006

Measures: Shortest path network

30

Measures: Weighted shortest path network

Home

Workplace

● Activity location

⋀ Minimum paths for OD relations

Schönfelder, 2006
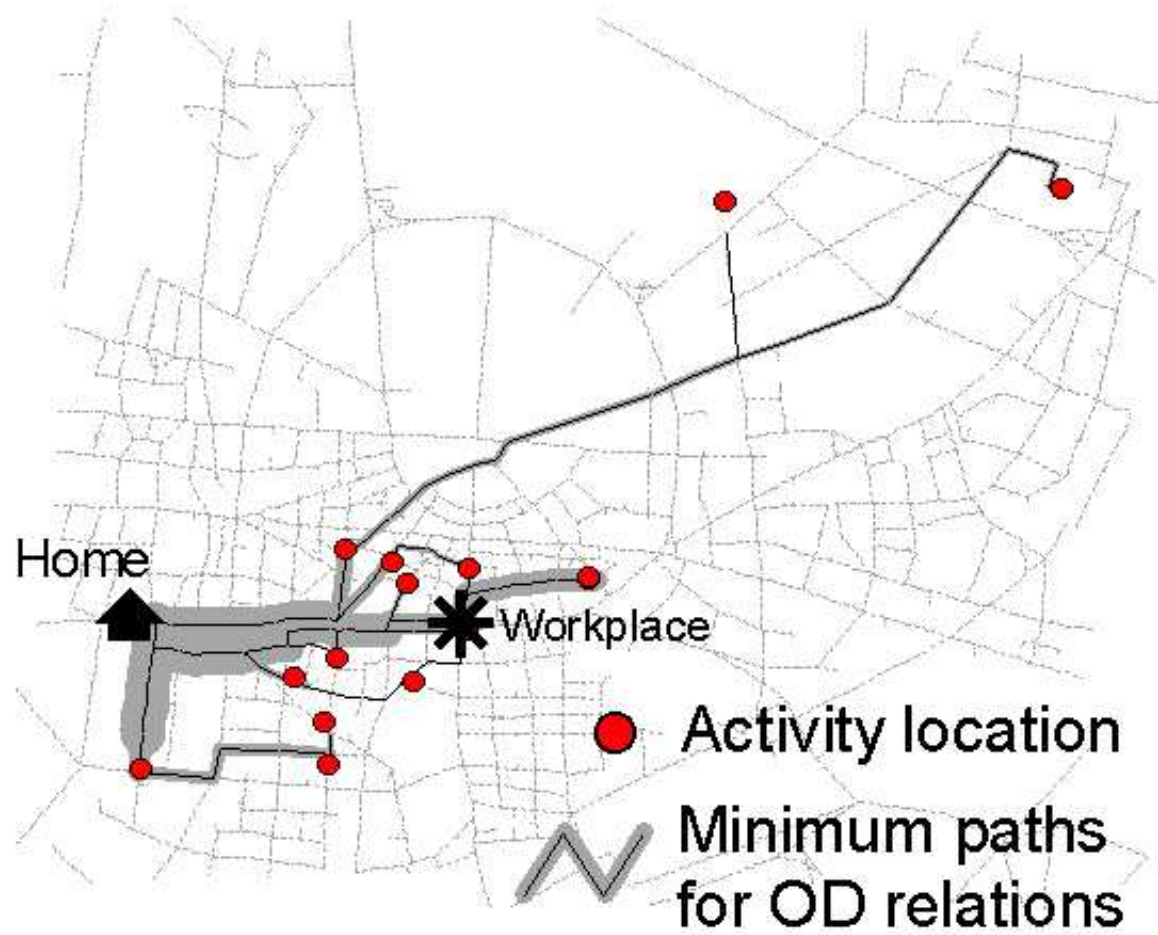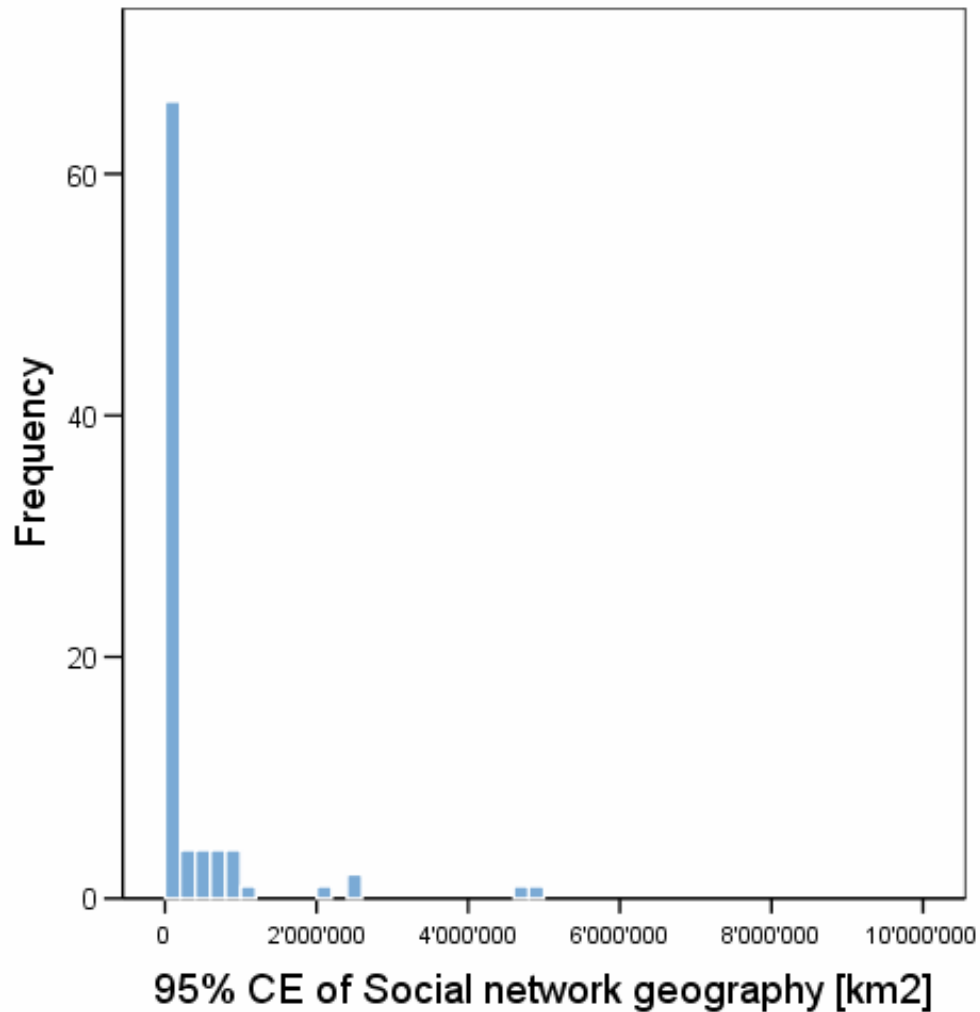
Size of activity spaces: Shortest path network
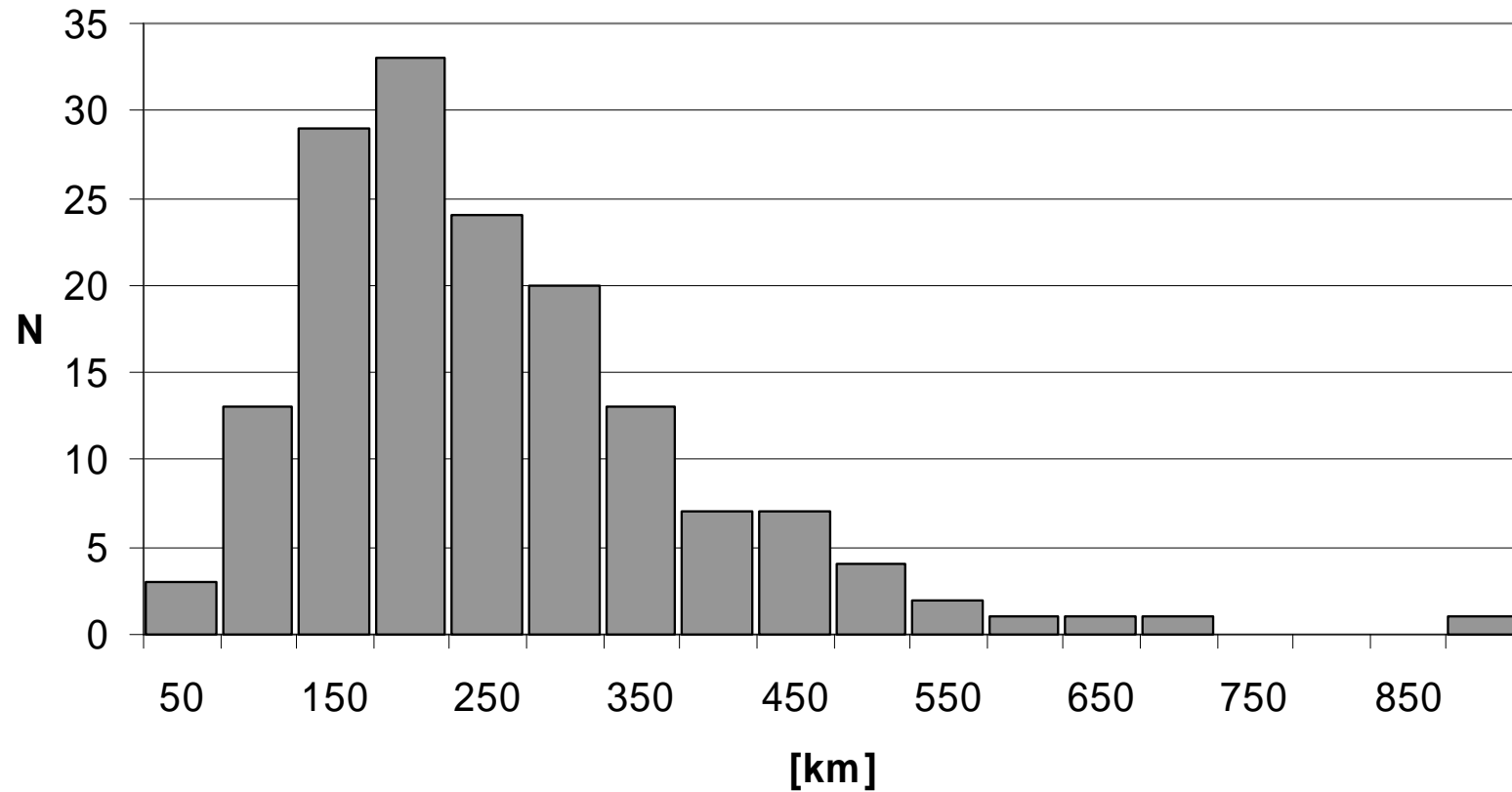
* Observed O-D-relations, Mobidrive, Karlsruhe subsample
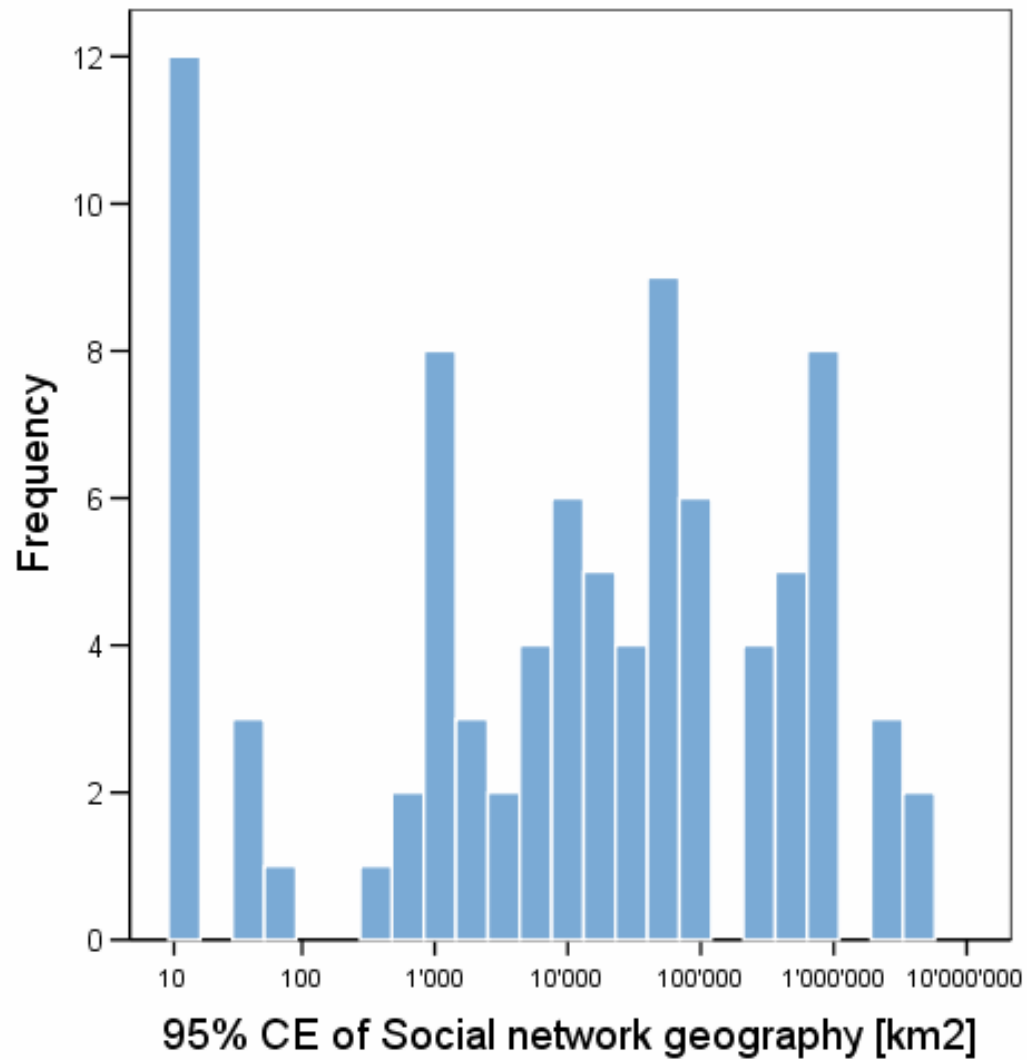
Size of social network geometries: 95% CE

Data stems from
recent interviews
in Zürich, NE England,
Berlin and survey
work in Germany

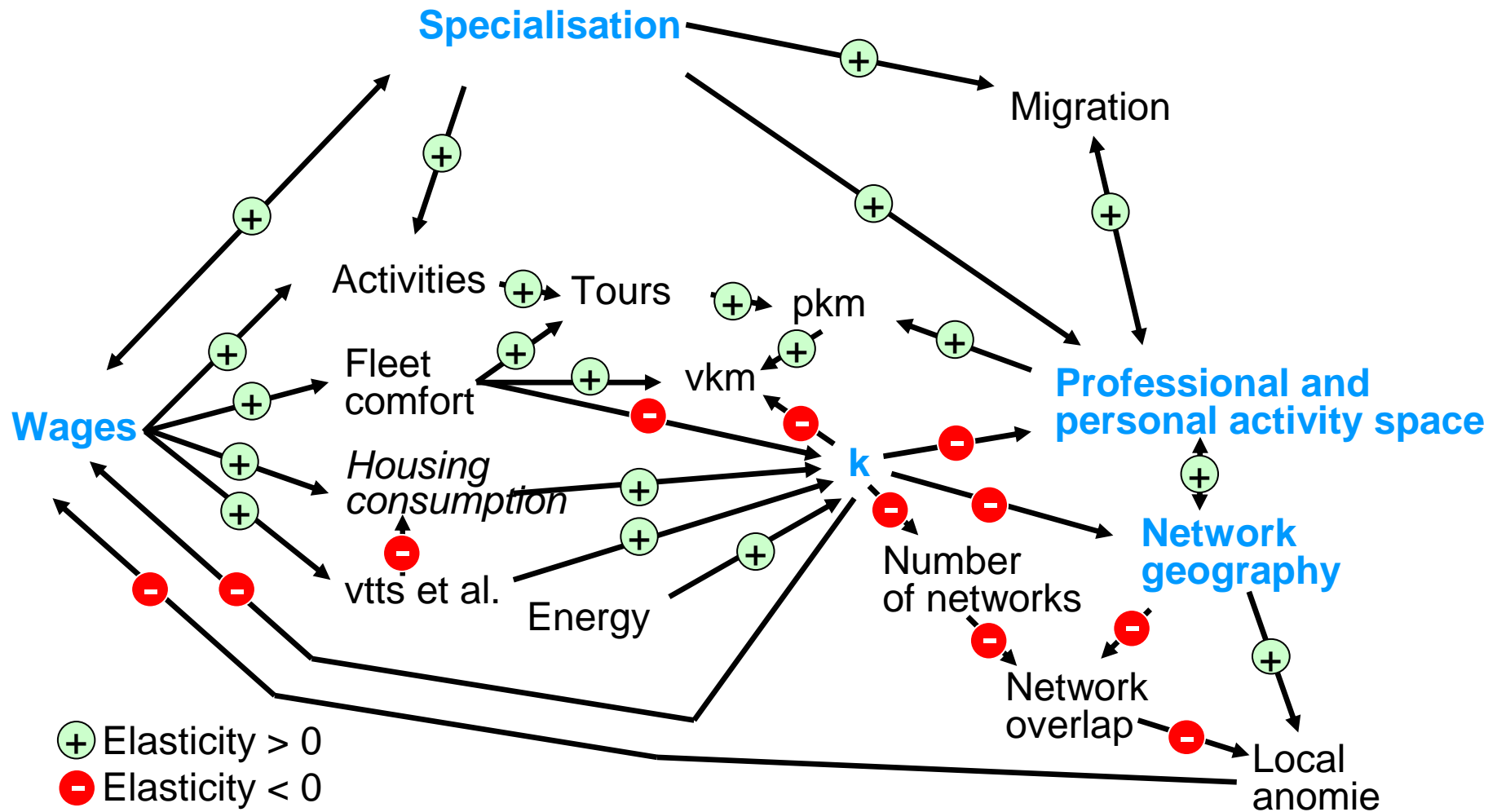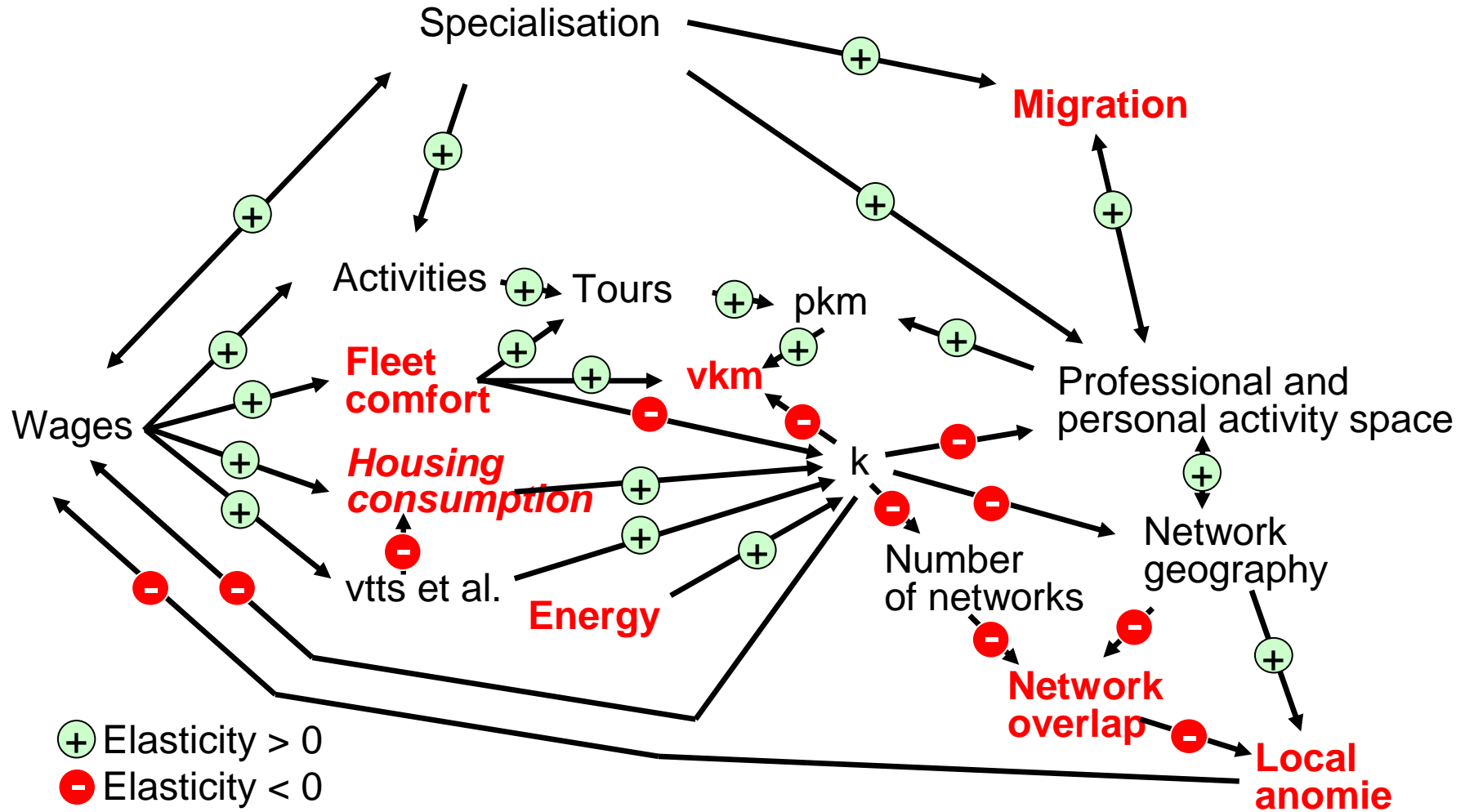88 persons

Size of social network geometries: 95% CE

95% CE of Social network geography [km2]

Activity spaces and network geographies: A hypothesis

35

Factors generating externalities in the hypothesis

What remains, needs to be done ?

- Prove the mechanisms stipulated

- Provide the data on a representative scale

- Develop stable survey methods

- Think through the policy implications

Literatur

Axhausen, K.W. (2000) Geographies of somewhere: A review of urban literature, *Urban Studies*, 37 (10) 1849-1864.

Axhausen, K.W. (2005) Activity spaces, biographies, social networks and their welfare gains and externalities: Some hypothesis and empirical results, PROCESSUS Colloquium, Toronto, June 2005.

Botte, M. (2003) Strukturen des Pendelns in der Schweiz, Diplomarbeit, Fakultät für Bauingenieurwesen, TU Dresden, August 2003.

Carosio, A., C. Dolci and M. Scherer (2005) Erreichbarkeitsveränderungen in der Schweiz: Eine kartographische Darstellung, in K.W. Axhausen and L. Hurni (eds.) Zeitkarten Schweiz 1950-2000, Chapter 3, IVT and IKA, ETH Zürich, Zürich.

FCC (2001) Long distance telecommunication industry, FCC, Washington, D.C.

Frei, A. (2005) Was hätte man 1960 für einen Sharan bezahlt?, MSc thesis, IVT, ETH Zürich, Zürich.

Literatur

Larsen, J., J. Urry and K.W. Axhausen (2005) Social networks and future mobilities, report to the Horizons Programme of the Department for Transport, Department of Sociology, University of Lancaster and IVT, ETH Zürich, Lancaster and Zürich.

Ohnmacht, T. und K. W. Axhausen (2005) Entwicklung des Forschungsdesign und der Erhebungsinstrumente für das Projekt Mobilitätsbiographien, Mobilitätswerkzeuge und soziale Netze, Arbeitsberichte Verkehrs- und Raumplanung, 298, IVT, ETH Zürich, Zürich.

Schönfelder, S. (2006) Urban rhythms: Modelling the rhythms of individual travel behaviour, PhD dissertation, ETH Zürich, Zürich.

Schönfelder S. and Axhausen K. W. (2003) Activity spaces: Measures of social exclusion? *Transportation Policy,* 10 *(4)* 273-286.

Vaze V.S., S. Schönfelder and K.W. Axhausen (2005) Optimization of continuous space representation for human activity spaces, *Arbeitsbericht Vekehrs- und Raumplanung,* 295, Institut für Verkehrsplanung and Transportsysteme (IVT), ETH Zürich, Zürich
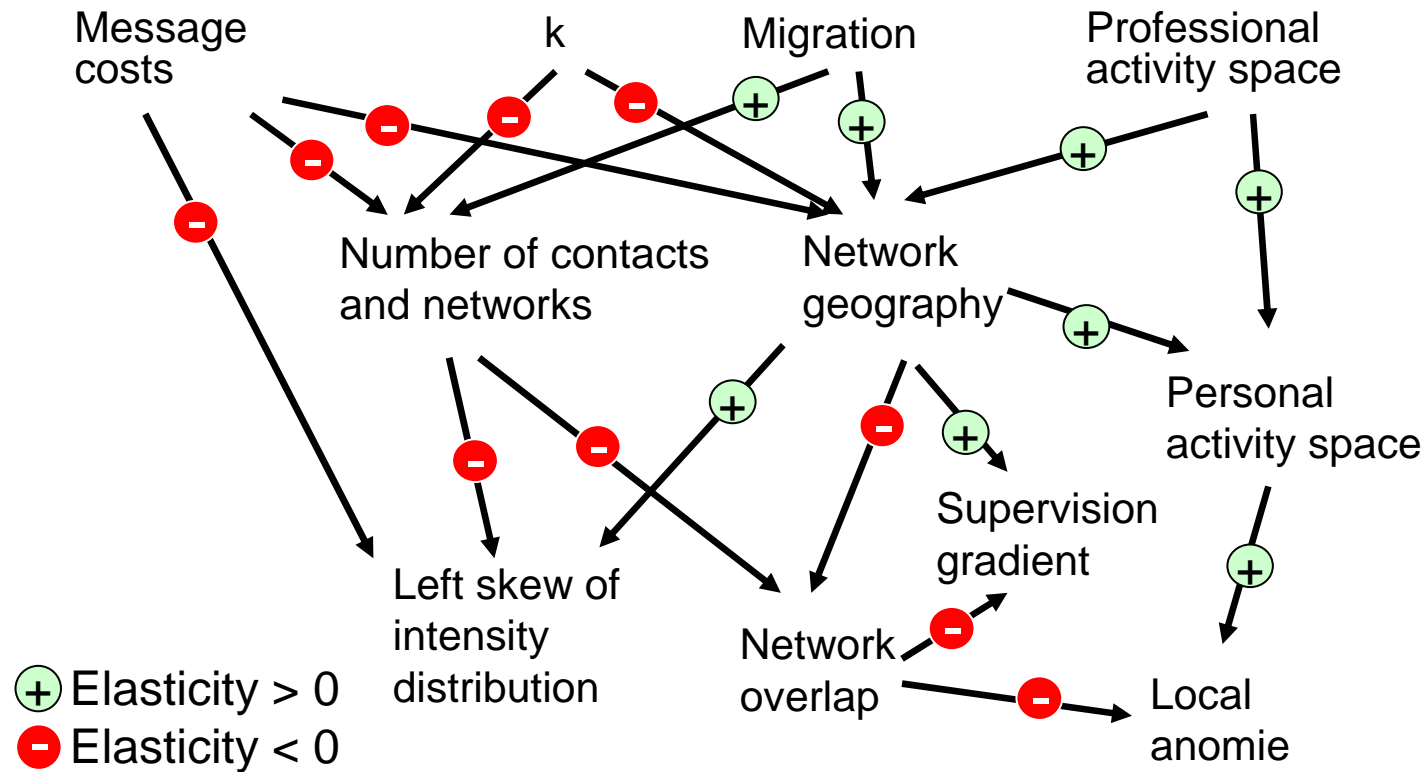
Appendices

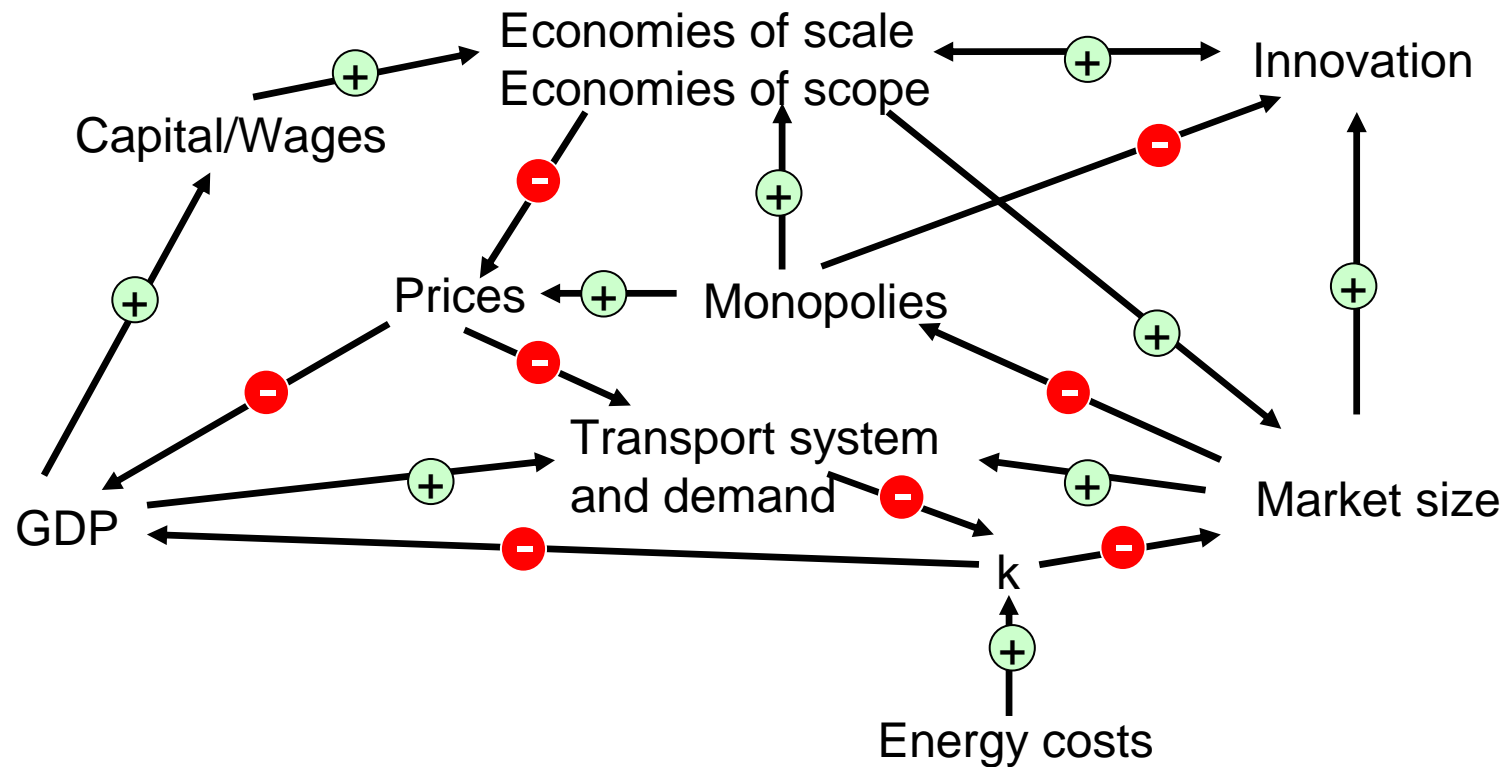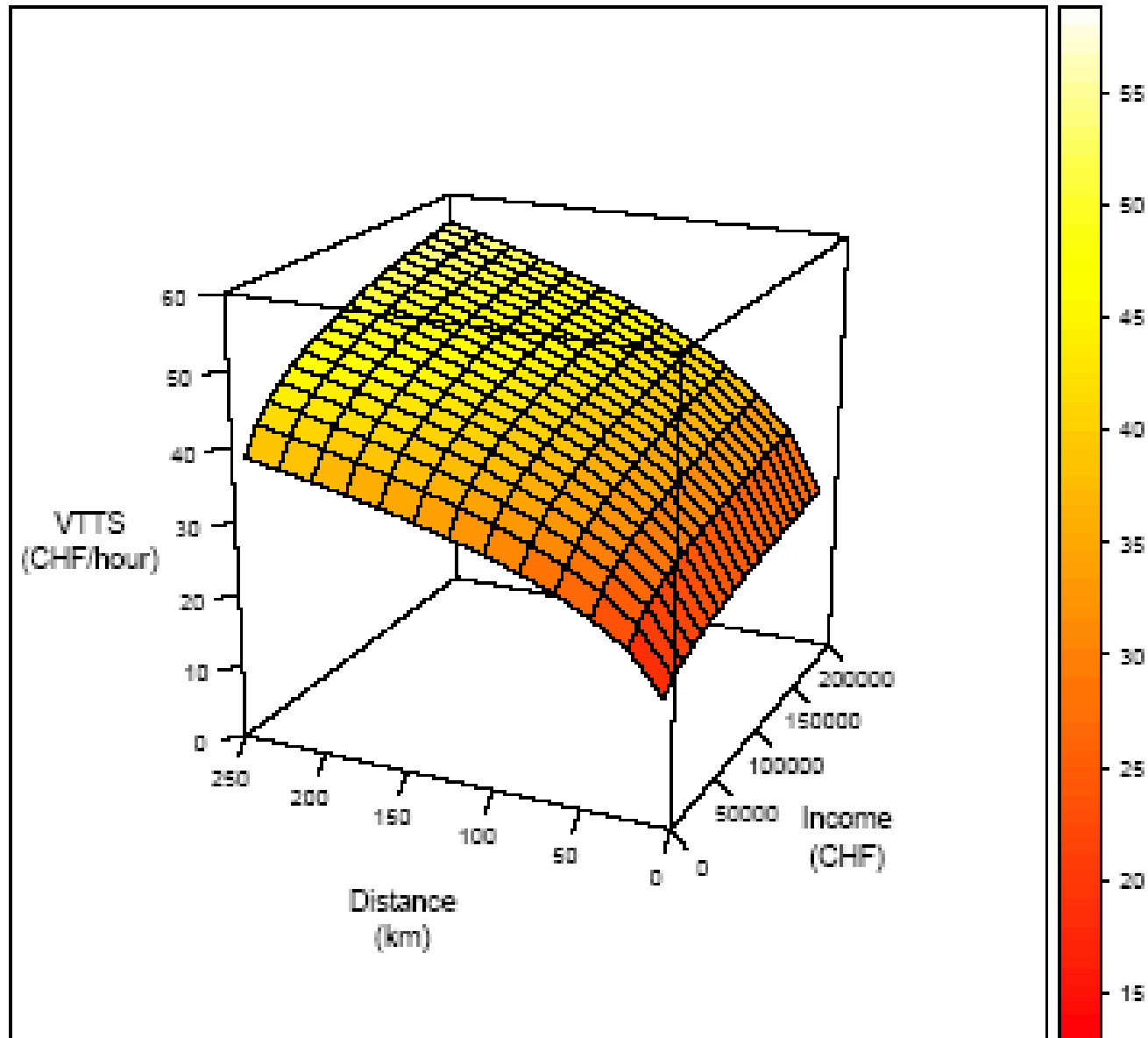# Summary

Size of goods markets and productivity: A hypothesis

+ Elastizität > 0   k: Generalisierte
− Elastizität < 0   Kosten

Willingness to pay for reduction of free-flow travel time

Willingness to pay for reduction of congested travel time