Preferred citation style

Axhausen, K.W. (2011) Activity Space and Social Network Geographies: Growth Ahead?, presentation at the NUS Department of Sociology, Singapore, November 2011.

Activity space and social network geographies: Growth ahead?

KW Axhausen

Institute for Transport Planning and Systems
ETH
Zürich

November 2011

Institut für Verkehrsplanung und Transportsysteme
Institute for Transport Planning and Systems

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Collaborators

- Andreas Frei
- Matthias Kowald
- Timo Ohnmacht
- Stephan Schönfelder

- Teresa Tan
- Vincent Chua

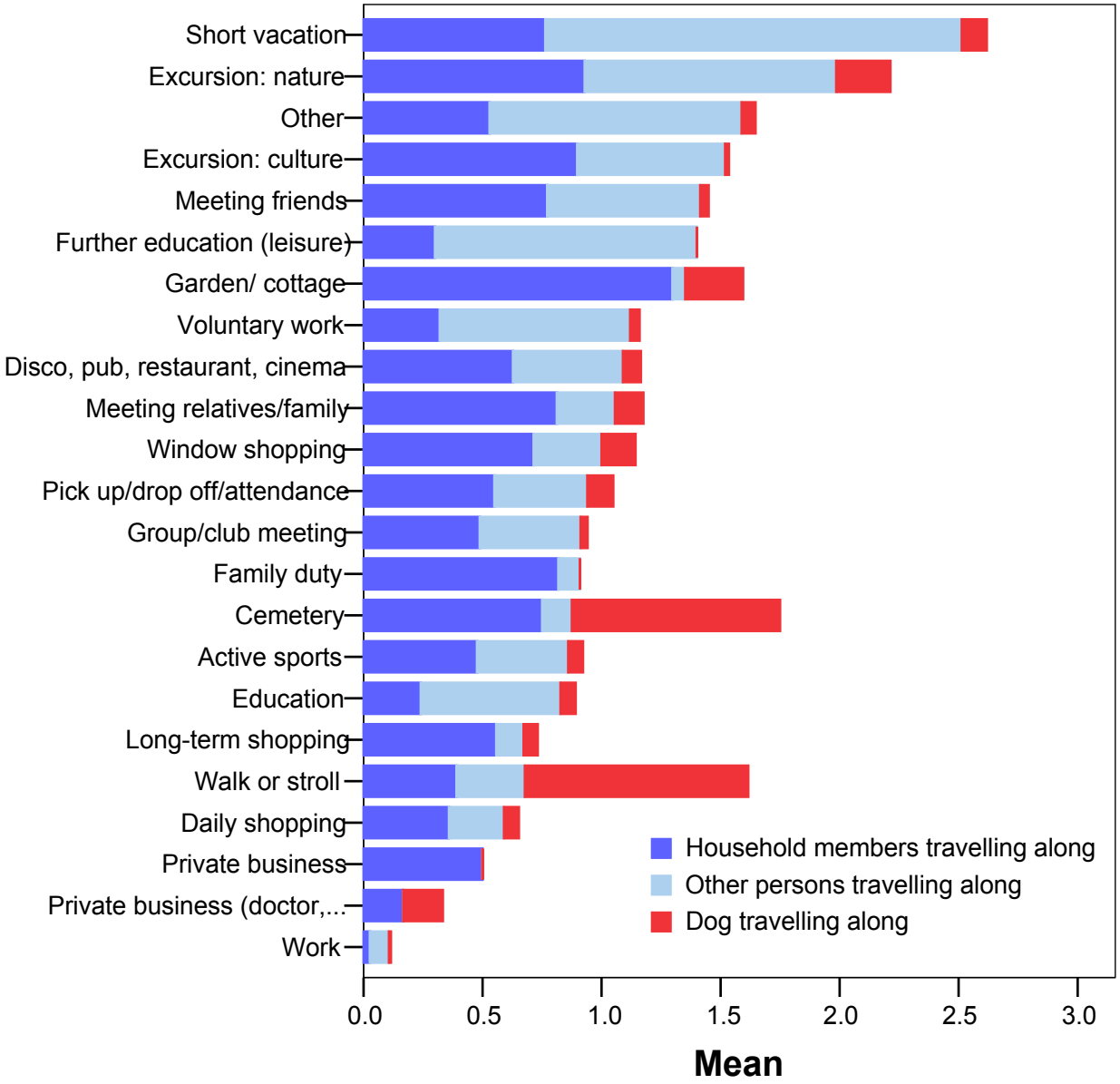
- Jonas Larsen
- John Urry

Research support by

- ETH Zürich
- ifmo, Berlin
- NRF, Singapore
- UK Department of Transport, London
- VW Stiftung, Wolfsburg

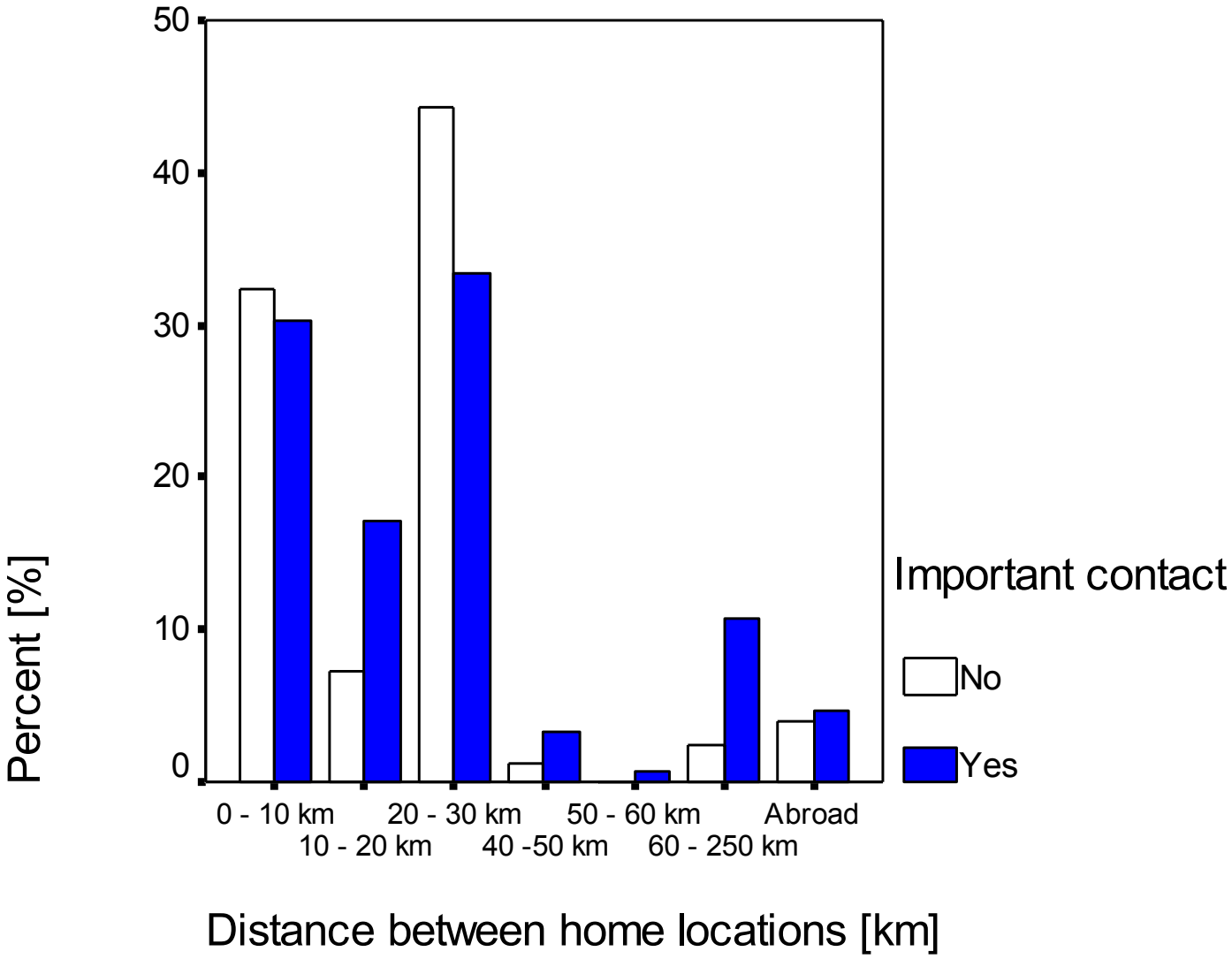
Why social networks in transport/spatial planning ?

Example: Number of accompanying travellers



Axhausen et al., 2007

Example: Required travel for meetings of ego-alter

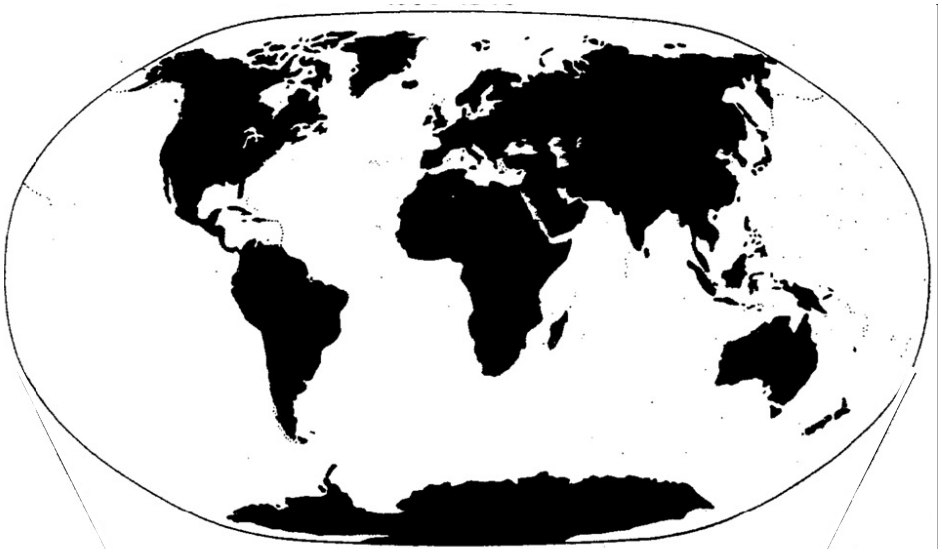


Schlich et al., 2002

Example: Residential location choice in Kt. Zürich

Variable	Beta	t-Test
Rent/Income	-5.51	***
log(m2/head)	0.98	***
Frequency weighted mean distance to friends	-8.16	*
Exponent (friends)	0.22	**
Mean distance to work/school	-1.59	**
Exponent (distance to work)	0.37	**
Travel time to Bürkliplatz	0.02	**
log(transit accessibility) * "No car"	0.41	**
log(car accessibility) * “Car"	-0.30	**
Share of equally sized HH within 1 km	0.02	*
Population density within 1 km	0.01	**
Share of empty flats in municipality	-0.11	
N= 683, rho² = 0.2128; * > 0.1; ** > 0.05; *** > 0.01		

A shrinking world



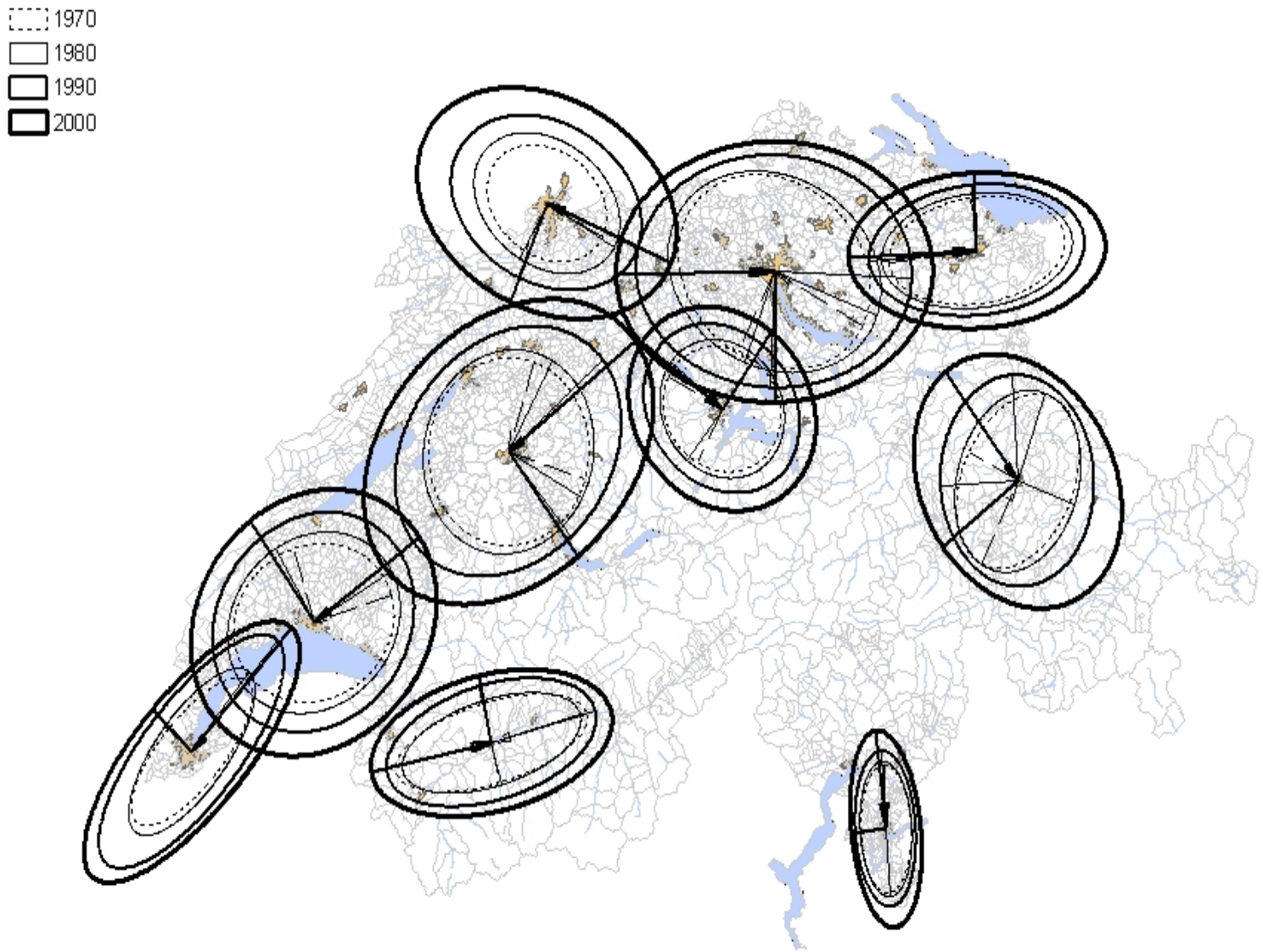
Coach and sailing boat until 1840

Steam ship and locomotive, 1840 - 1930

Propeller aircraft, 1930-1950 

Jets, from 1950 

In-commuter sheds of the ten largest Swiss towns



Nach Botte, 2003

Travel and social networks

Starting point

Maintenance of the social networks requires:

- Face to face interaction
- Balanced by other forms of interaction

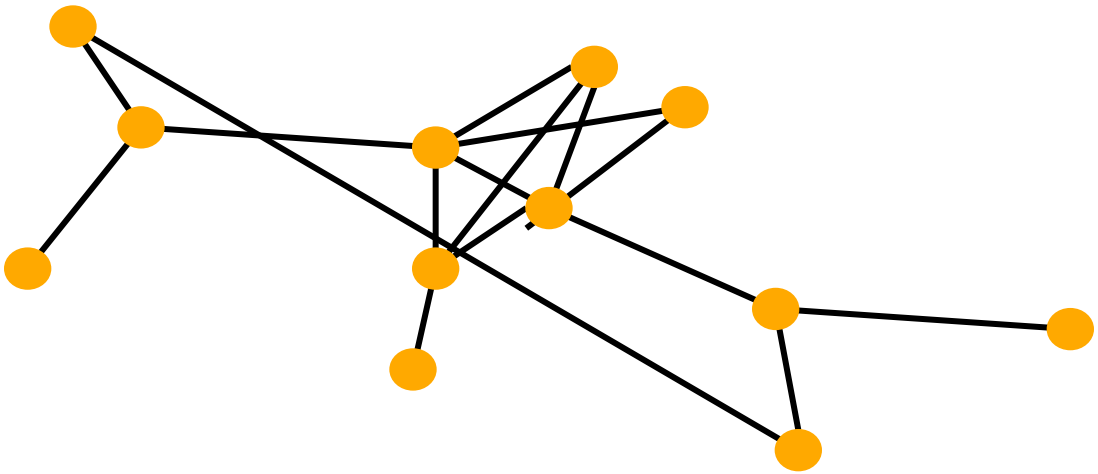
- Travel ~ Physical spread of the contacts

- Trade-off between loosing contacts and “social” capital and investing in new contacts closer to home

Definition of a social network

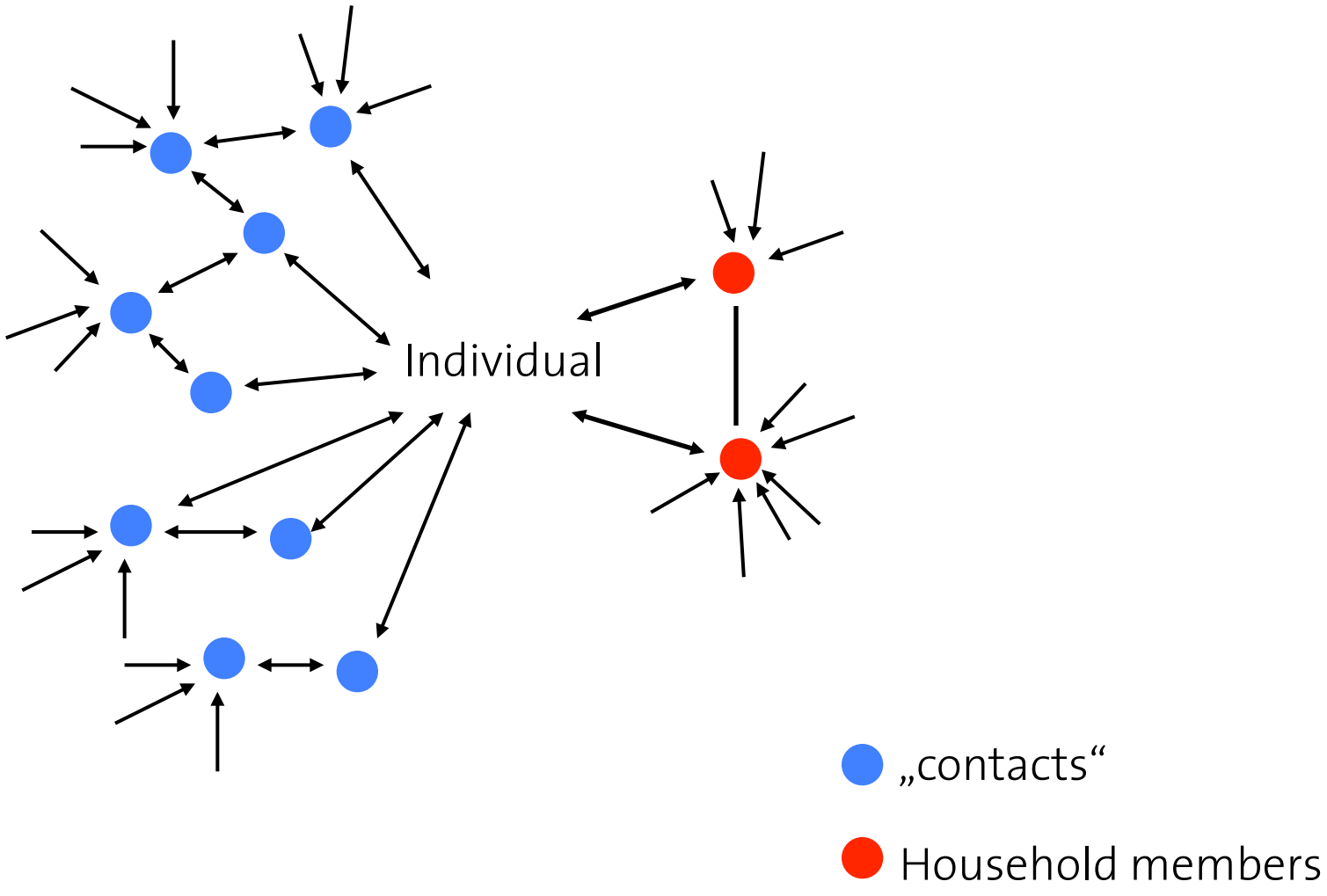
The topology of a social network describes

- Which person/firm (node) is linked to which other persons/ firms
- By contacts (links) of a certain quality (impedance or cost)

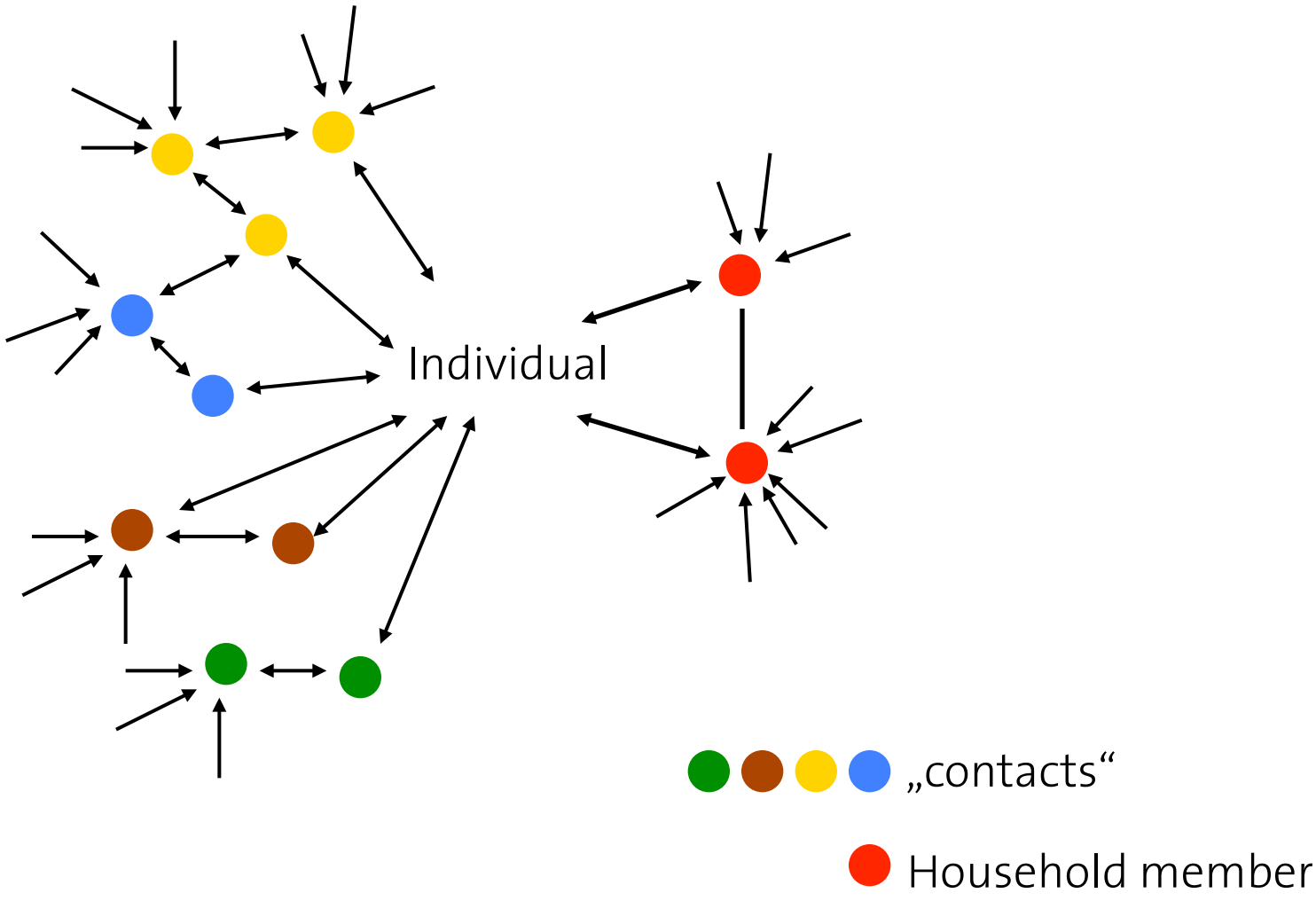


Closeness ~ 1/Impedance

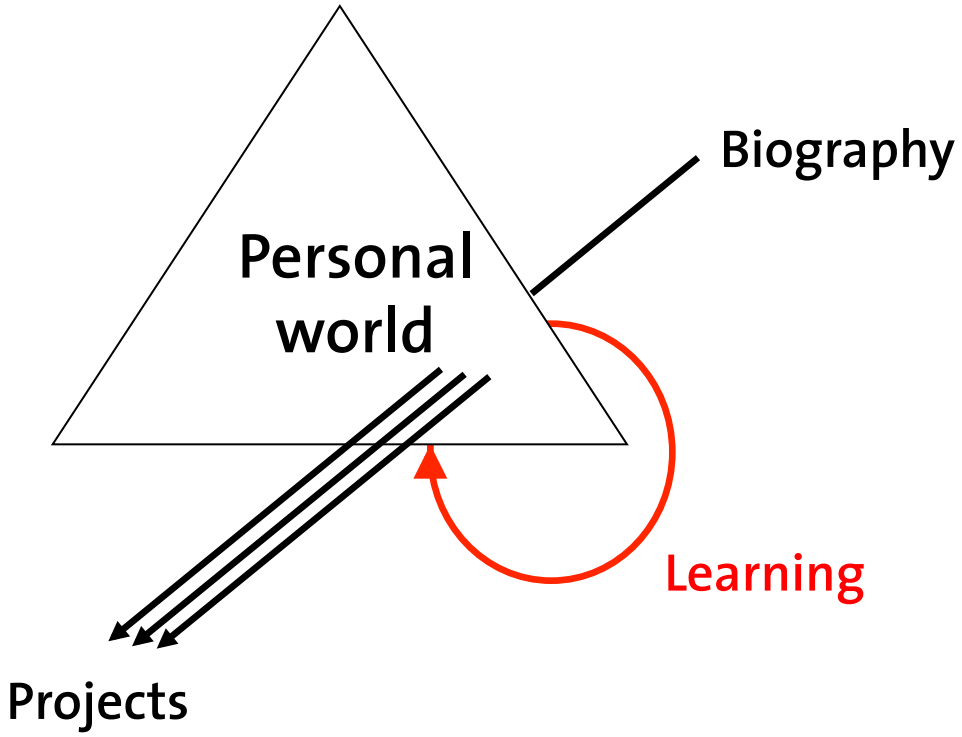
Position: Person as a network member



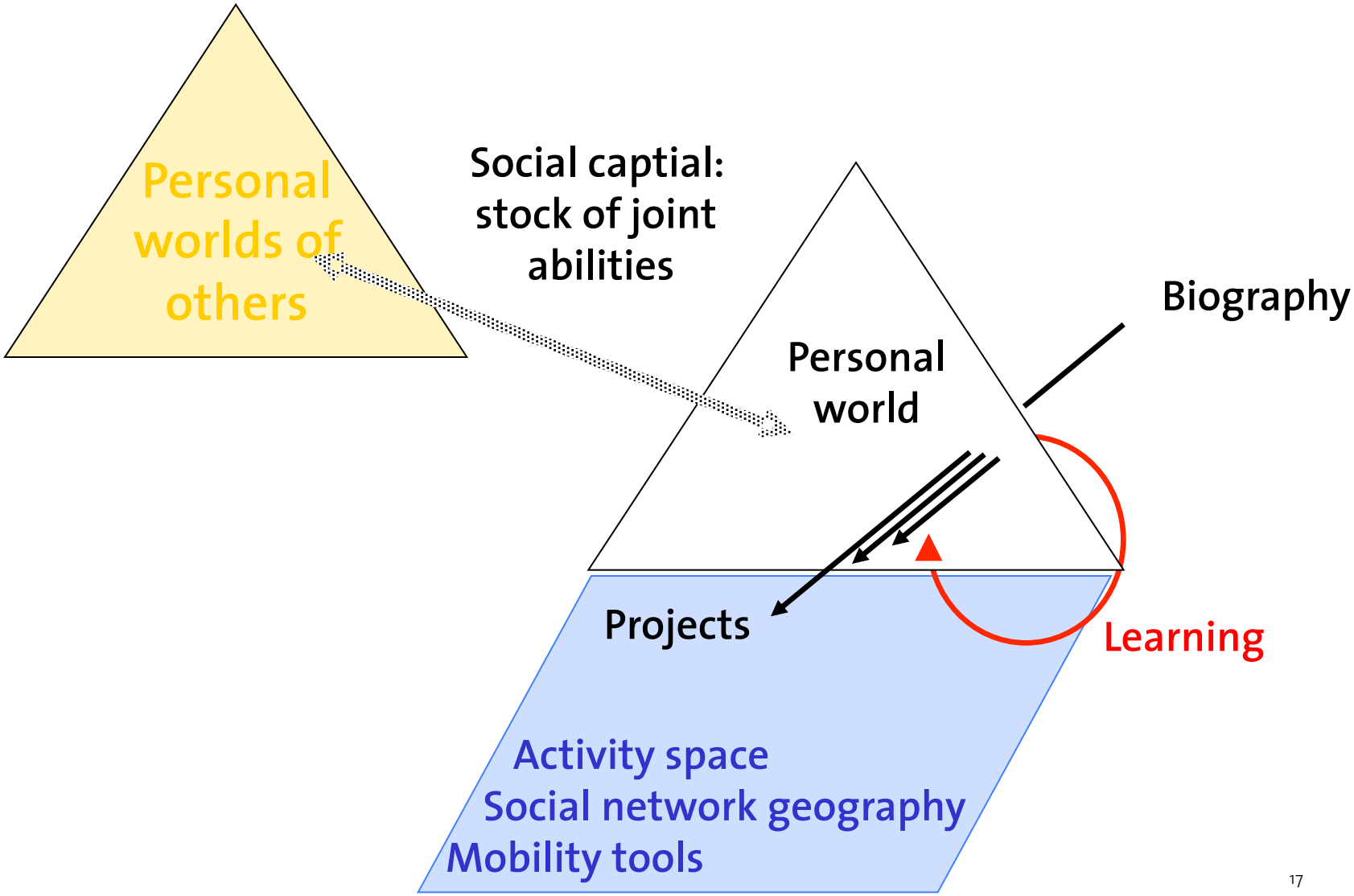
Position: Person as a member of multiple networks



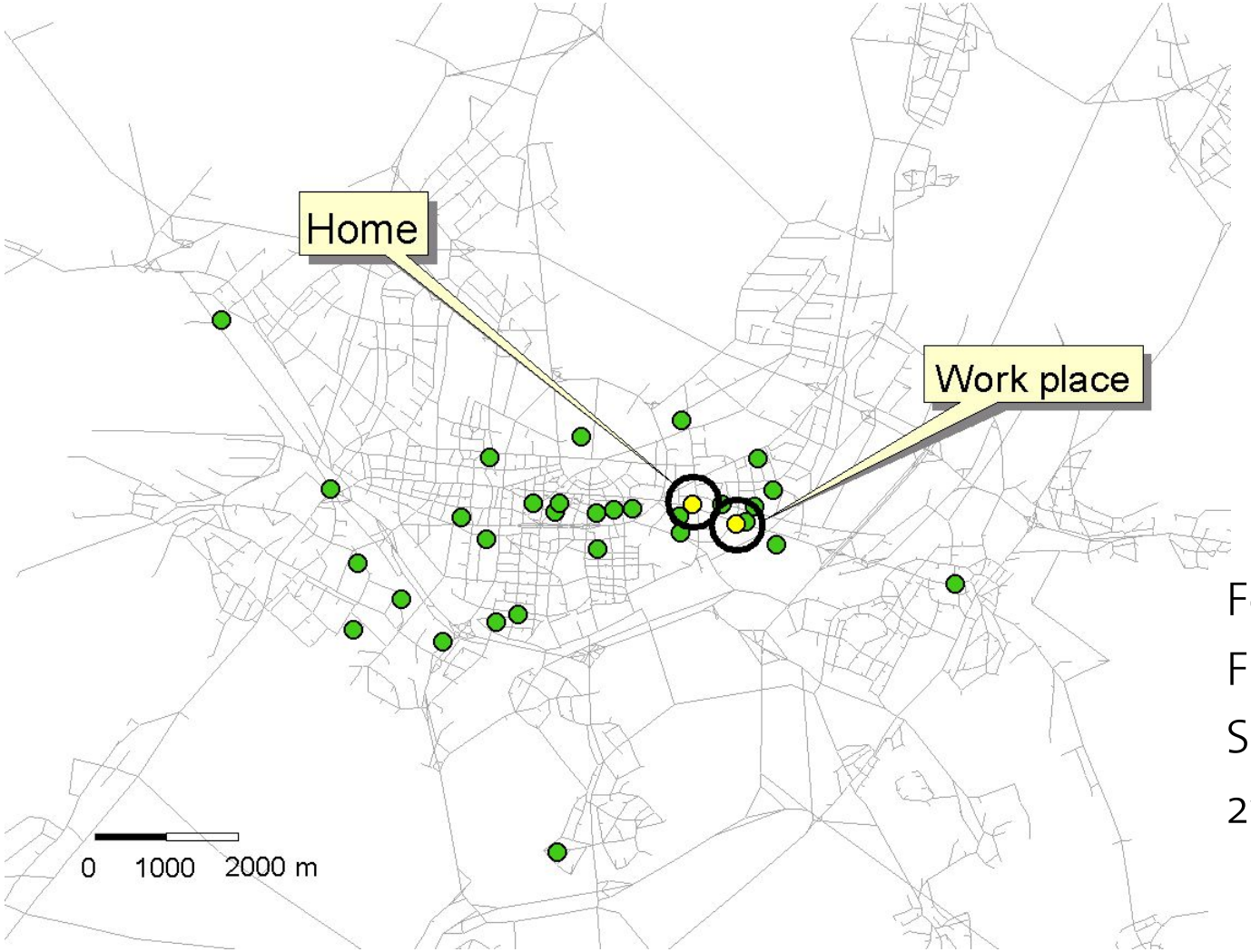
Position: Individual in the biographical context



Position: Individual in the biographical networked context



Example of a local activity space

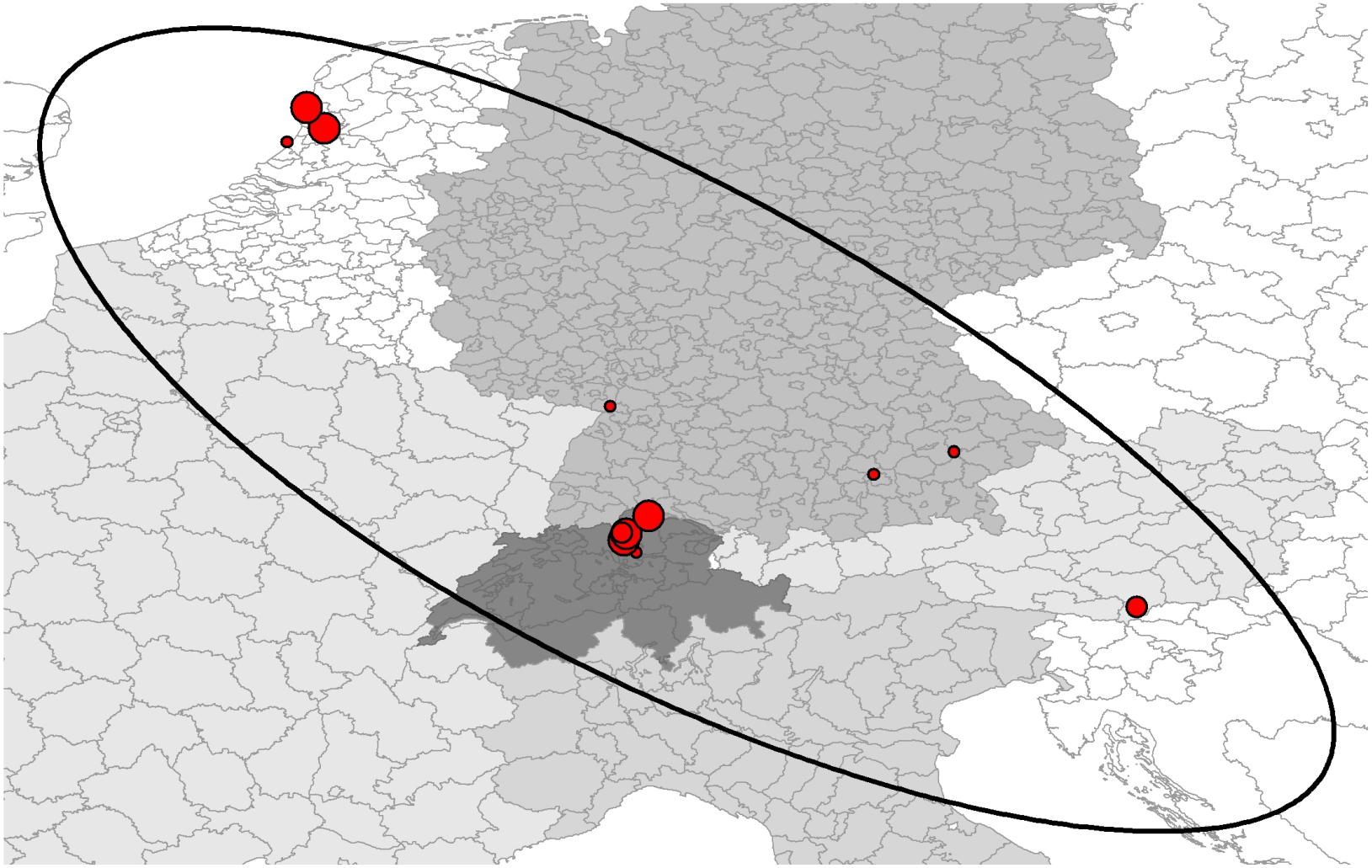


Female, 24
Full time
Single
216 trips / 6 weeks

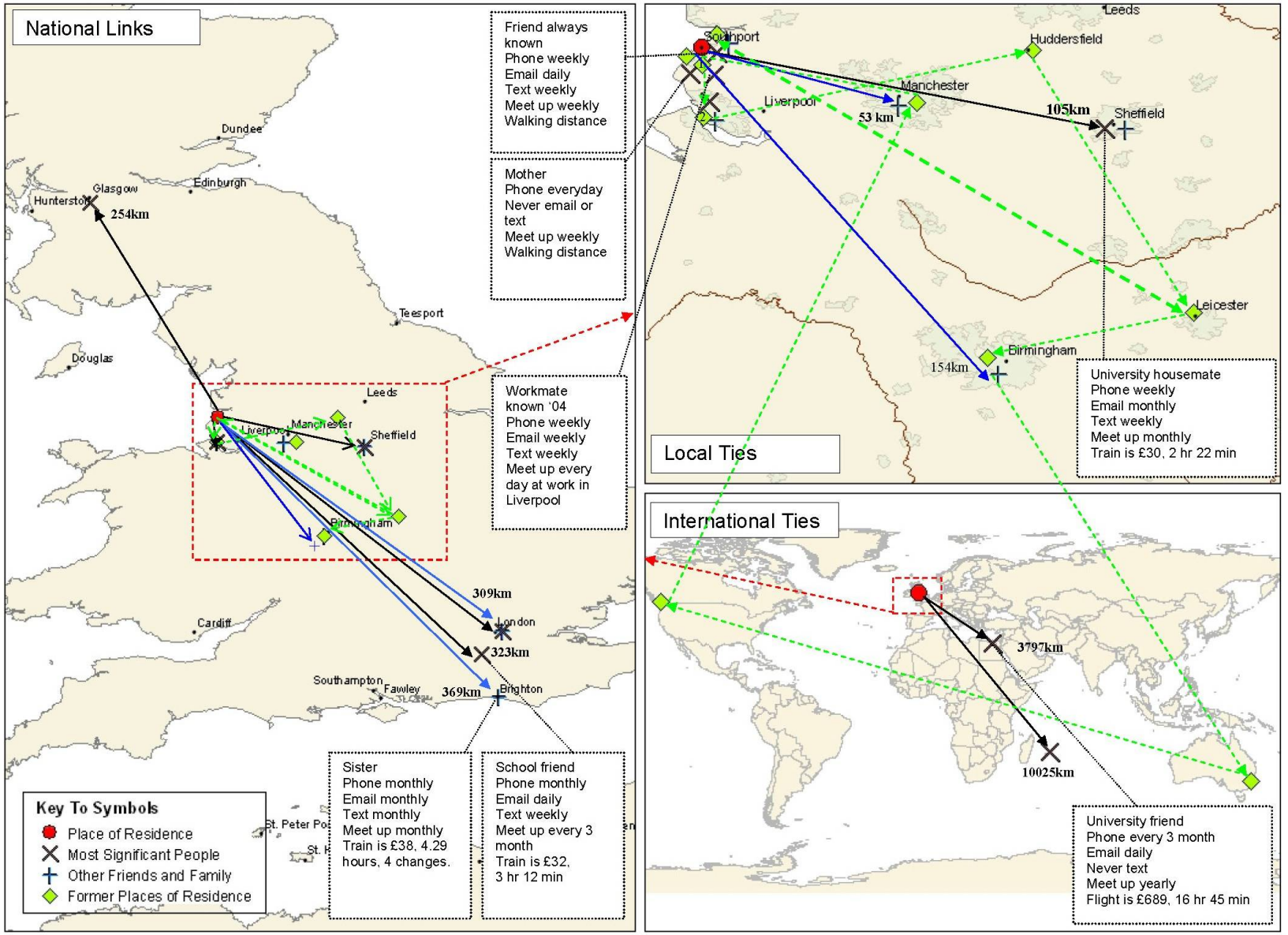
Schönfelder

12000761

Example of a social network geography



Example of a mobility biography (UK architect)



Larsen, Urry and Axhausen, 2006

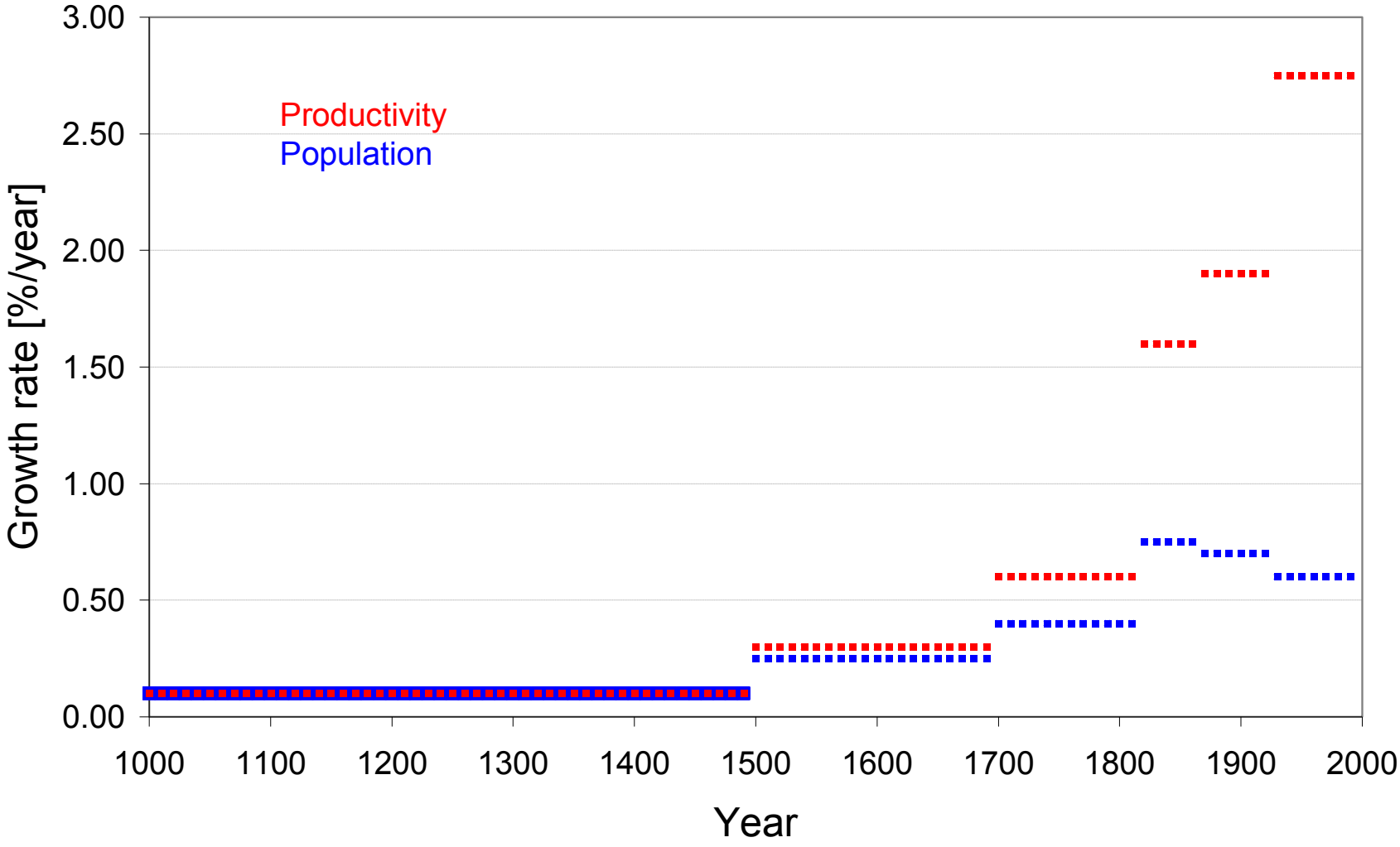
Why further growth ?

Participation of all in the productivity increases (real quality adjusted income growth)

Drastic reductions of the generalised costs of travel and telecommunication

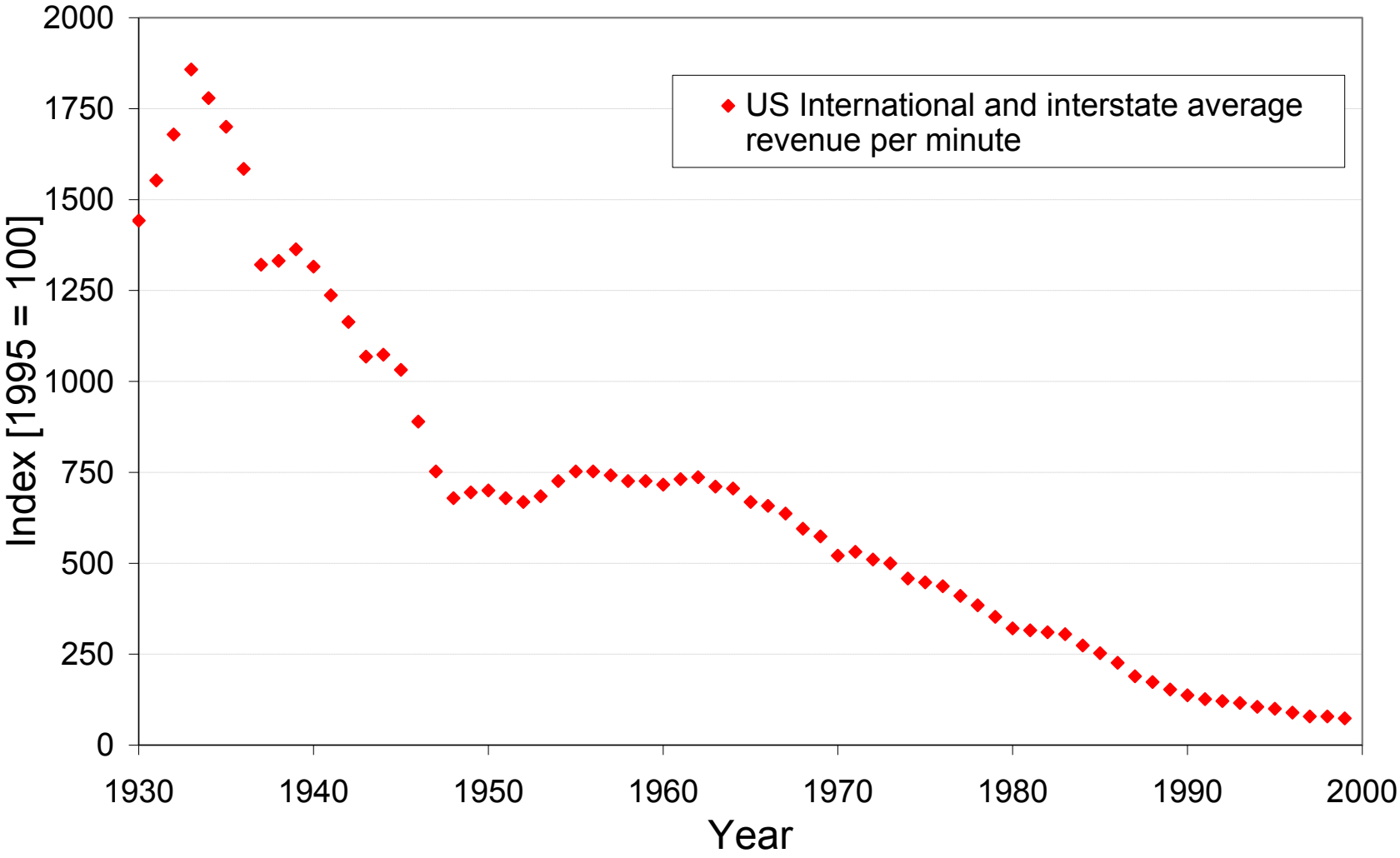
(Substantial) replacement of local personalised links by anonymous instruments of social integration

Productivity growth in Western Europe



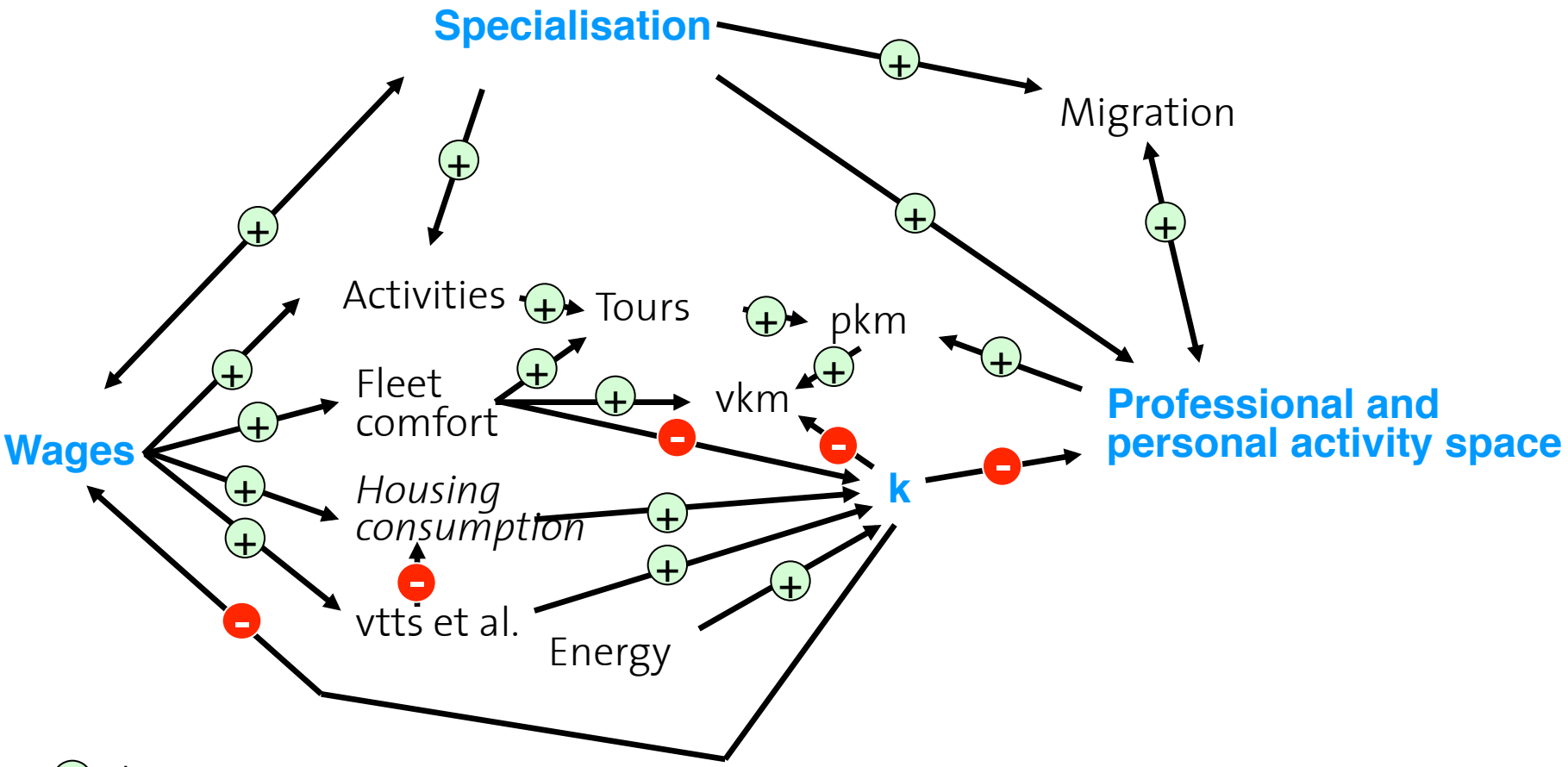
Adapted from Galor and Weil (2000)

Price deflation for telecommunication



Nach FCC (2001)

An abstract model ?



Social networks

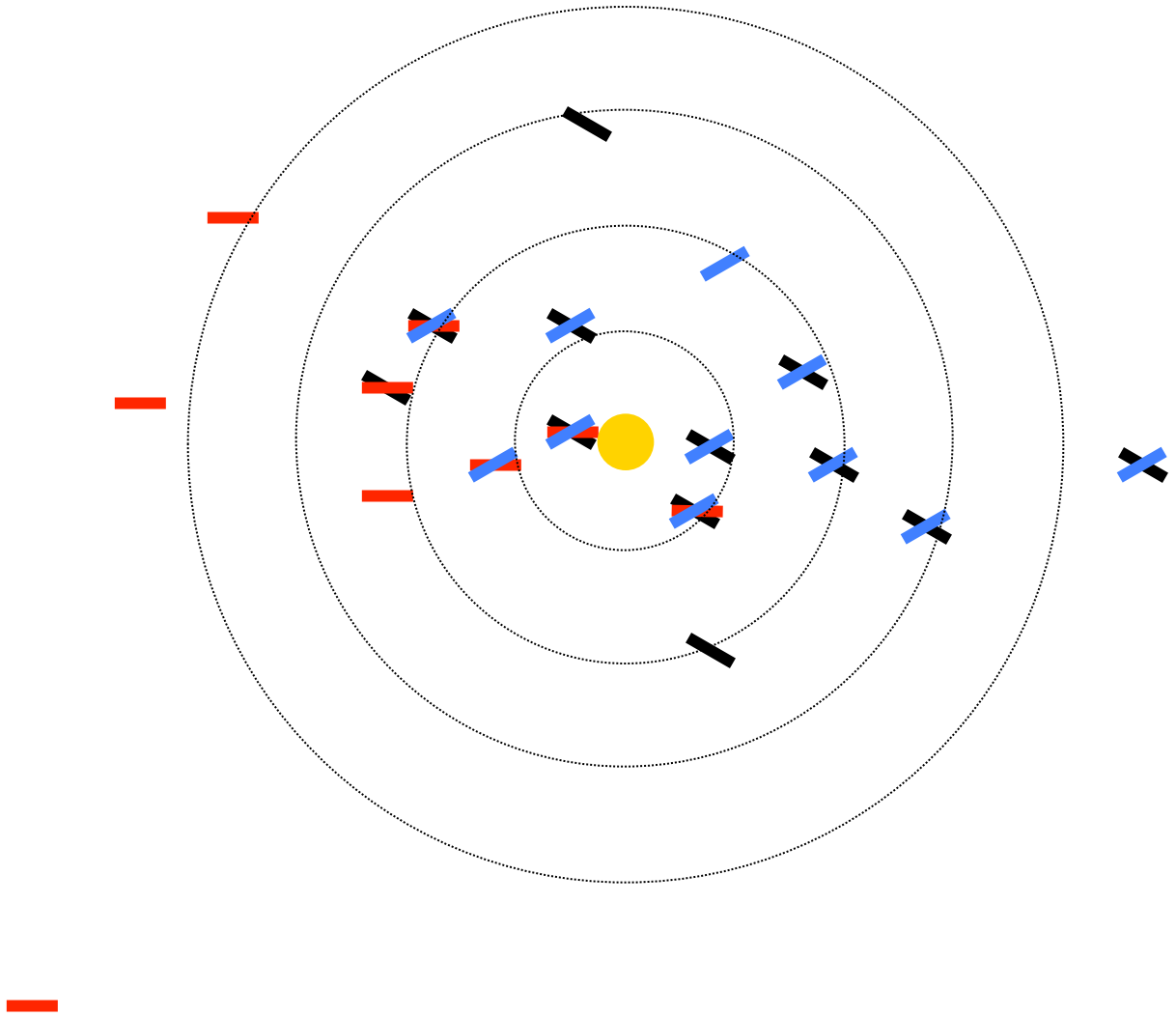
Social networks: Hypothesis 1

The size of spread (geography) of the social networks is inversely proportional to the generalised costs of communication (travel and telecommunication)

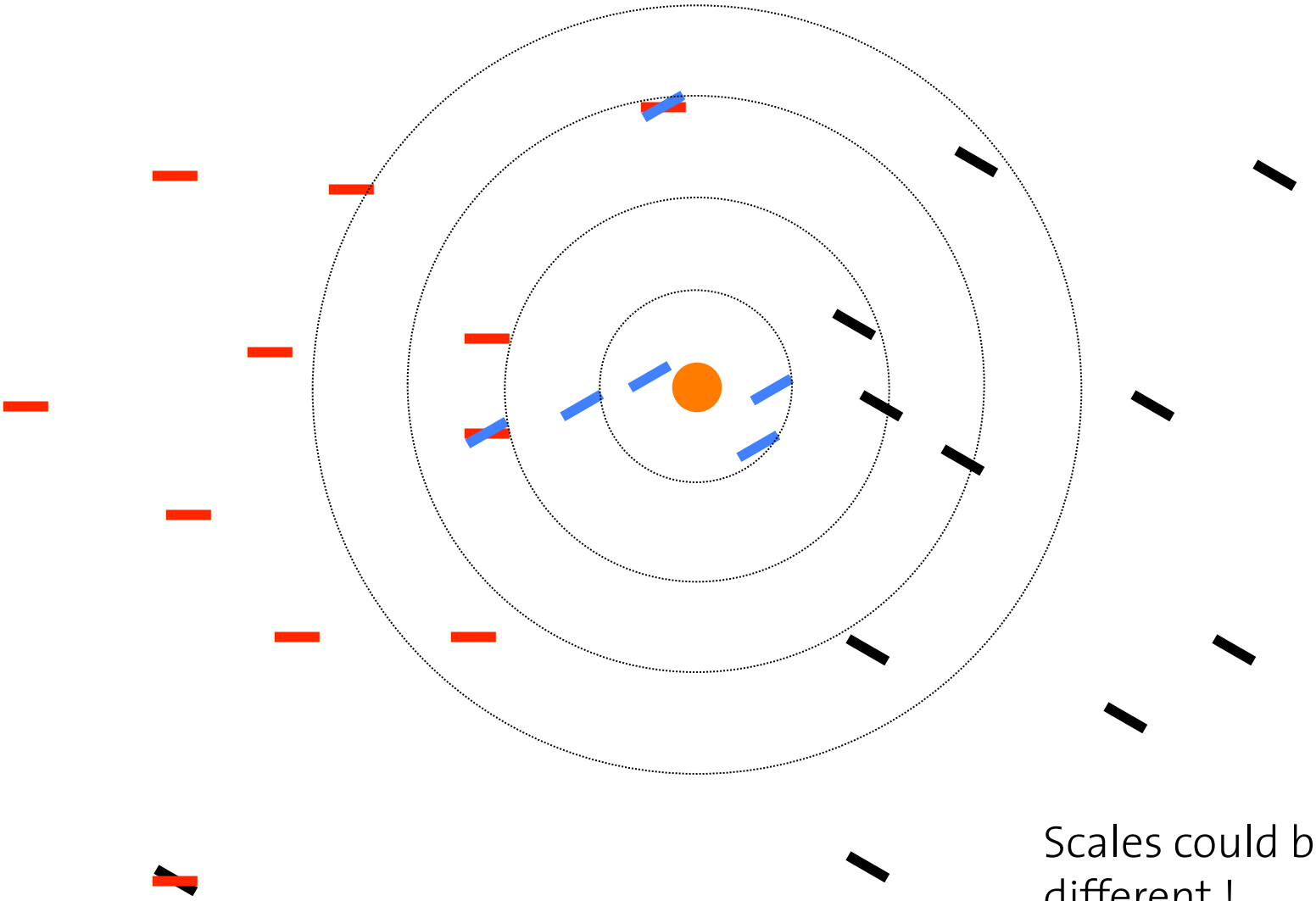
Additional result: Small geographies make it more likely that any two persons are linked through multiple networks

Corollary: The feeling of personal safety (“eyes on the street”) is proportional to the density of local links

Locally coherent networks (of the past ?)



Spatially non-coherent networks (today ?)



Scales could be different !

Social networks: Hypotheses 2a and b

Persons belong to more networks today
Persons keep more contacts alive then earlier

- More leisure time over the life cycle
- Drastically reduced costs of communication
- Copying of messages has become nearly free

Social networks: Hypotheses 3

Contacts have become more selective

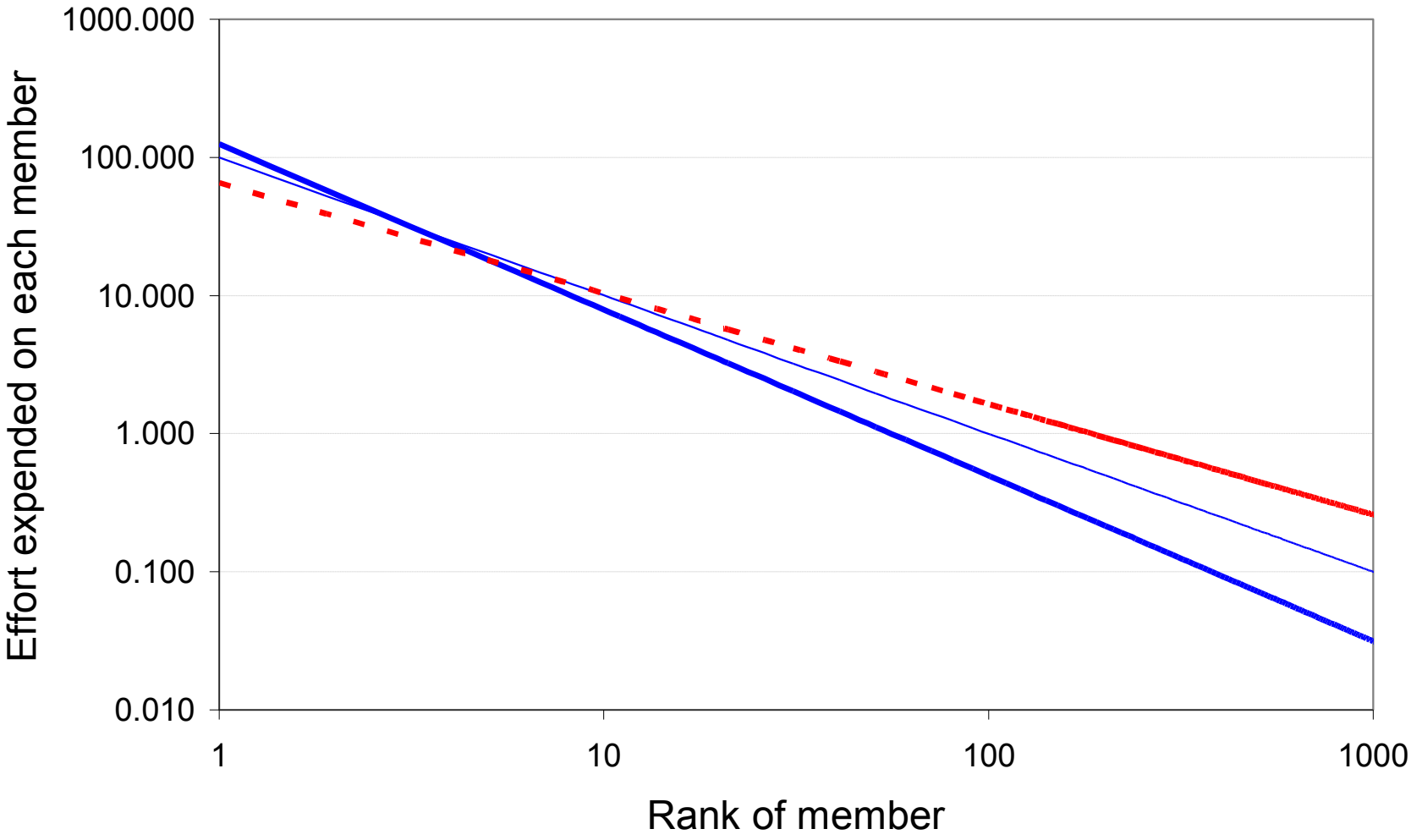
- No need to make do with the „neighbours“

Social networks: Hypothesis 4

The distribution of contacts intensity has become more left skewed

- Selectivity of contacts
- Time requirements for acquiring the background knowledge about the references of the other persons
- Less gossip
- Fewer random meetings

Shift in contact intensity



Detour: The question of “milieu”

How do milieux constitute themselves ? (socially effective, stable “crowds” without strong links)

- Definition of style
- Transmission of fashion
- Membership rules

How do they work in a society without a clear apex ?

How do they spread ?

What role do commercial providers of milieux play ?

What power do they have ?

Social networks: Hypothesis 5

The average knowledge about the contacts of own contacts is reduced by the increasing skew of the contact intensity:

- Less knowledge about everyday life and contact
- Lower visibility of many technologically enabled contacts

Corollary 1: The impact of gossip/news can be less well predicted

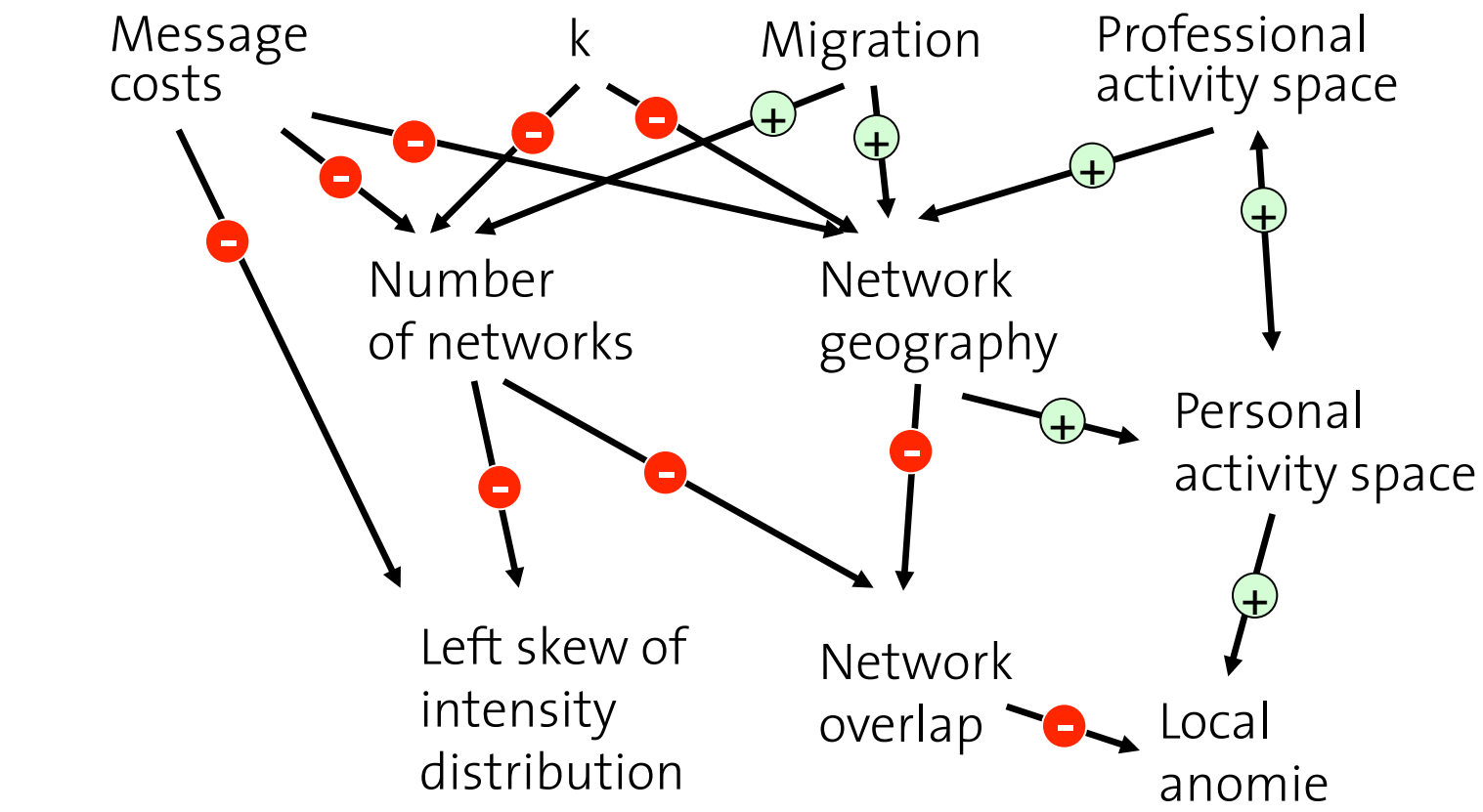
Corollary 2: The distance decay of "network supervision" should be spatially less steep then in the past; the friends of ones friends are likely to be present in the same milieux independent of location.

Social networks: Assumption

The selectivity is being increased by the general availability of mobile phones:

- More spontaneous patterns of time use
- Fewer predictable availabilities at certain (time-space) locations

Hypotheses summarized



Setting the benchmark

First set of research issues

Benchmarking the current state:

- Numbers of contacts
- Distance distributions
- Geographies
- Frequency and mode of contact

- Productivity
- Levels of local anomie
- Levels of local trust
- Level of place attachment

Empirical strategy

- Surveys of social geographies & mobility biographies
  - Egocentric
  - Snowball

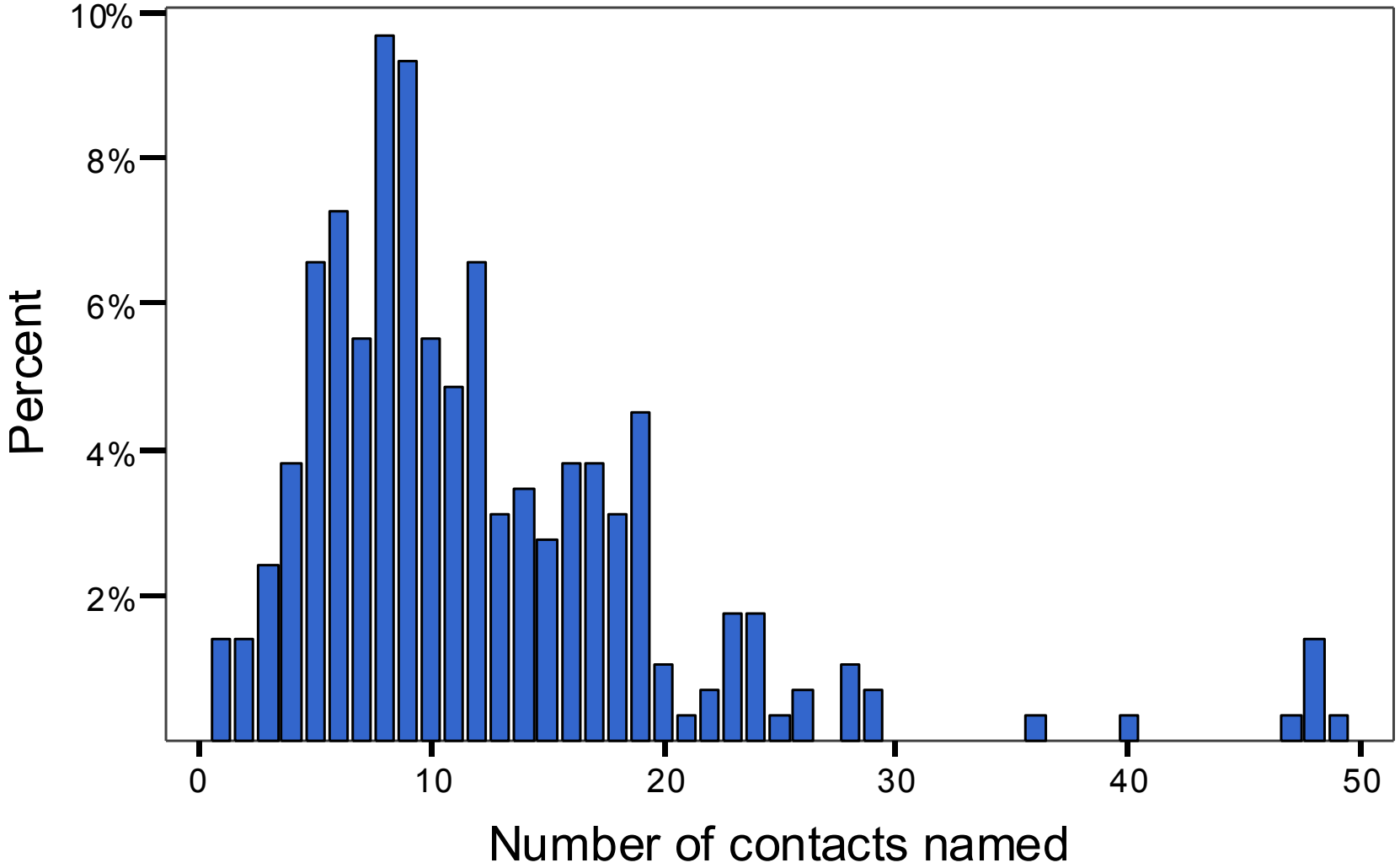
- Travel diaries
  - One-Day
  - Multple days

  - With/without information about the presence of others
  - With/without named co-travellers, co-present persons

Social network surveys @ IVT

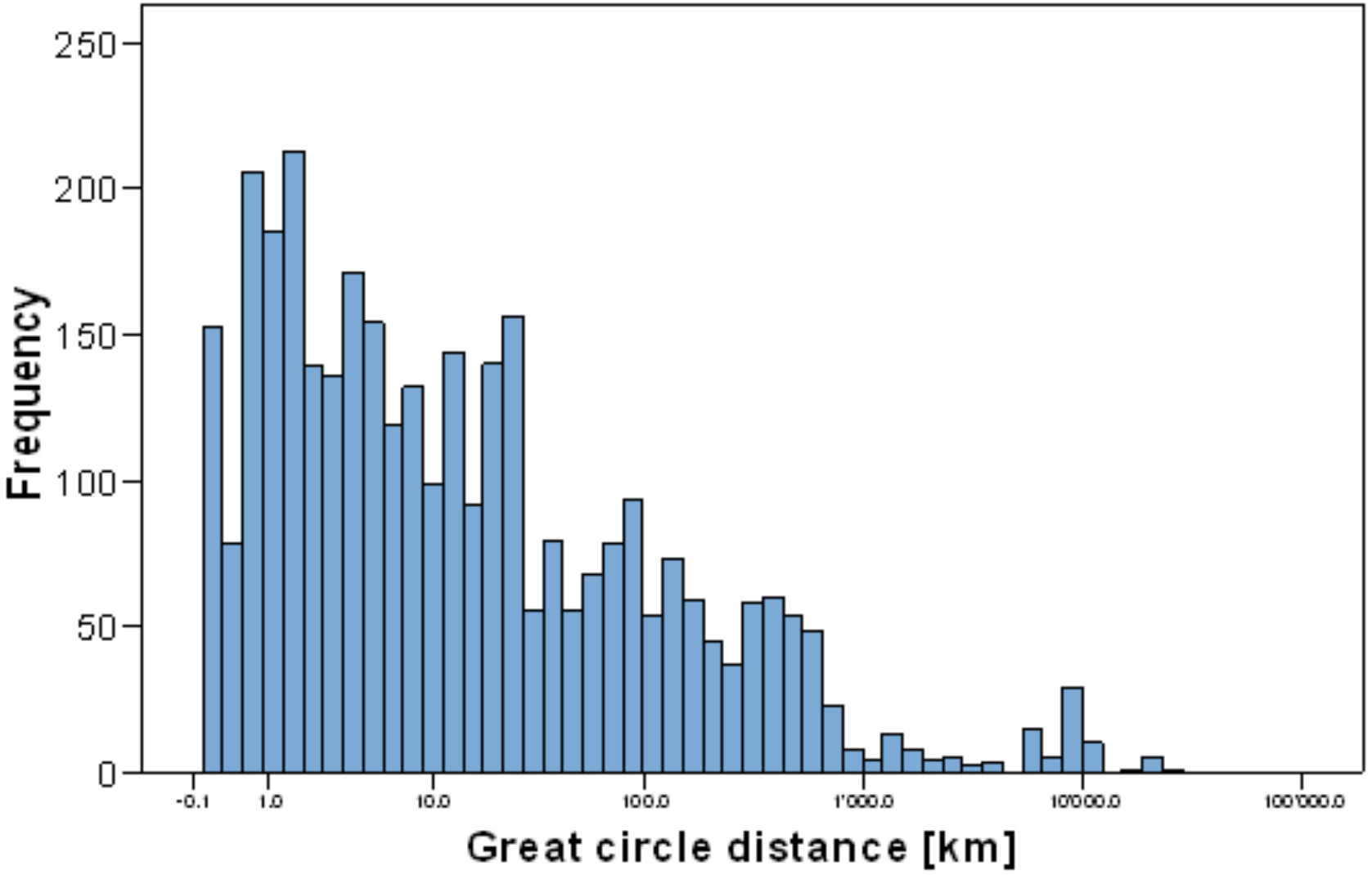
- Ohnmacht: 50 egos qualitative/quantitative in Zürich
- Larsen/Urry: 24 egos qualitative/quantitative in NE England
- Frei: 300 egos quantitative in Zürich
- Kowald: snowball; 750 egos quantitative worldwide (with core in Kanton Zürich) (8 day diary included)

Number of contacts reported



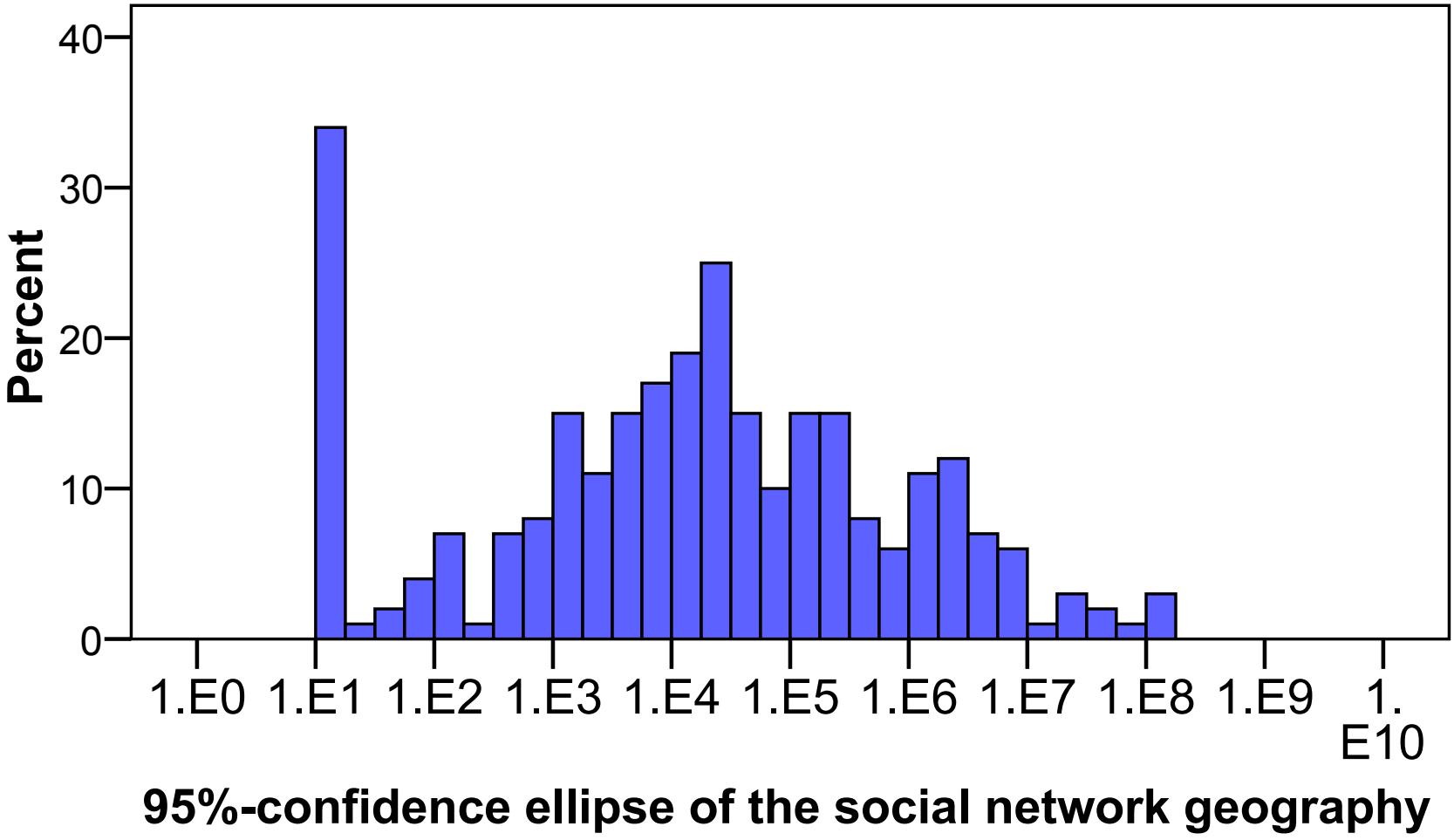
Frei and Axhausen, 2007

Distances between home locations



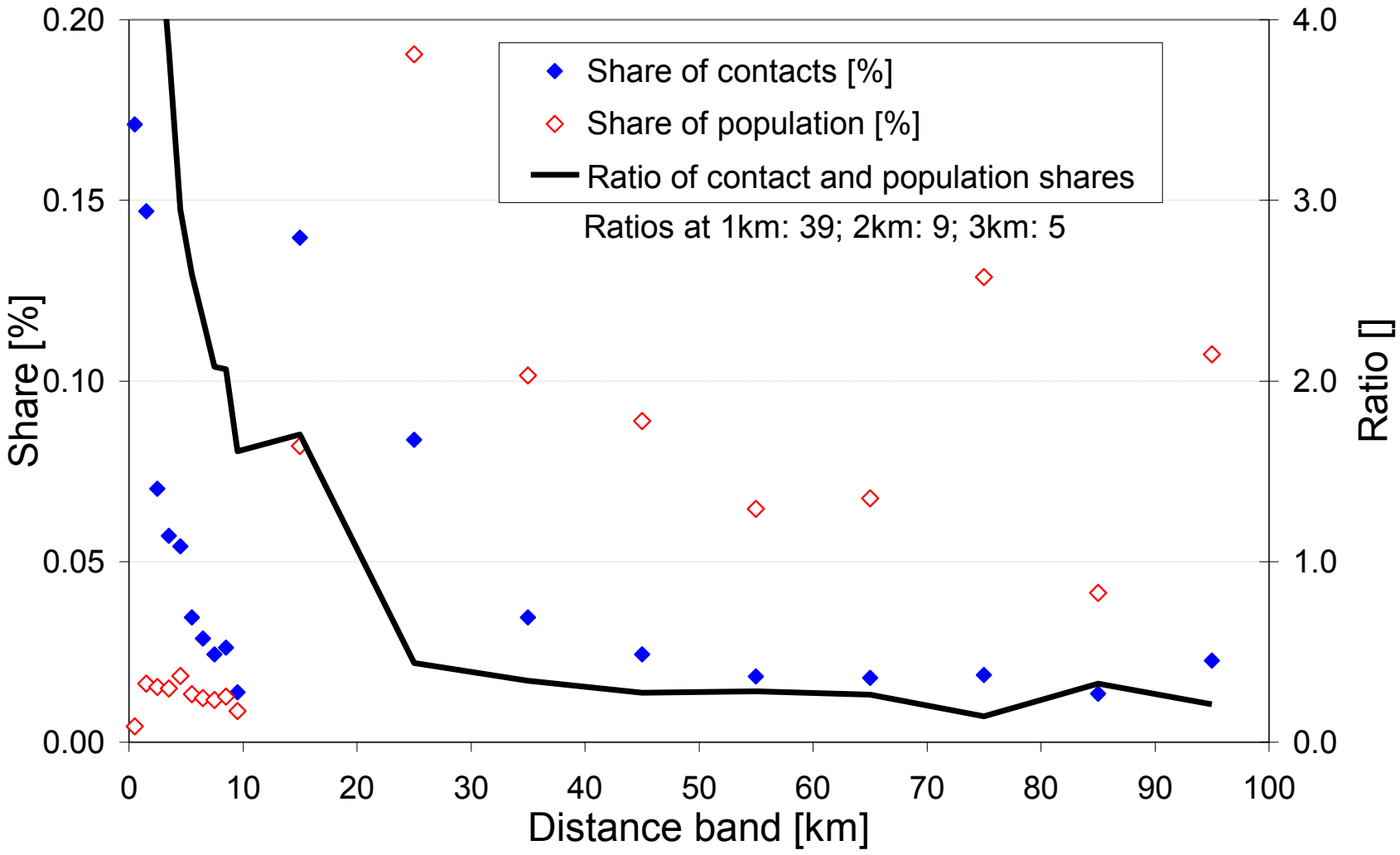
Frei and Axhausen, 2007

Size of network geometries



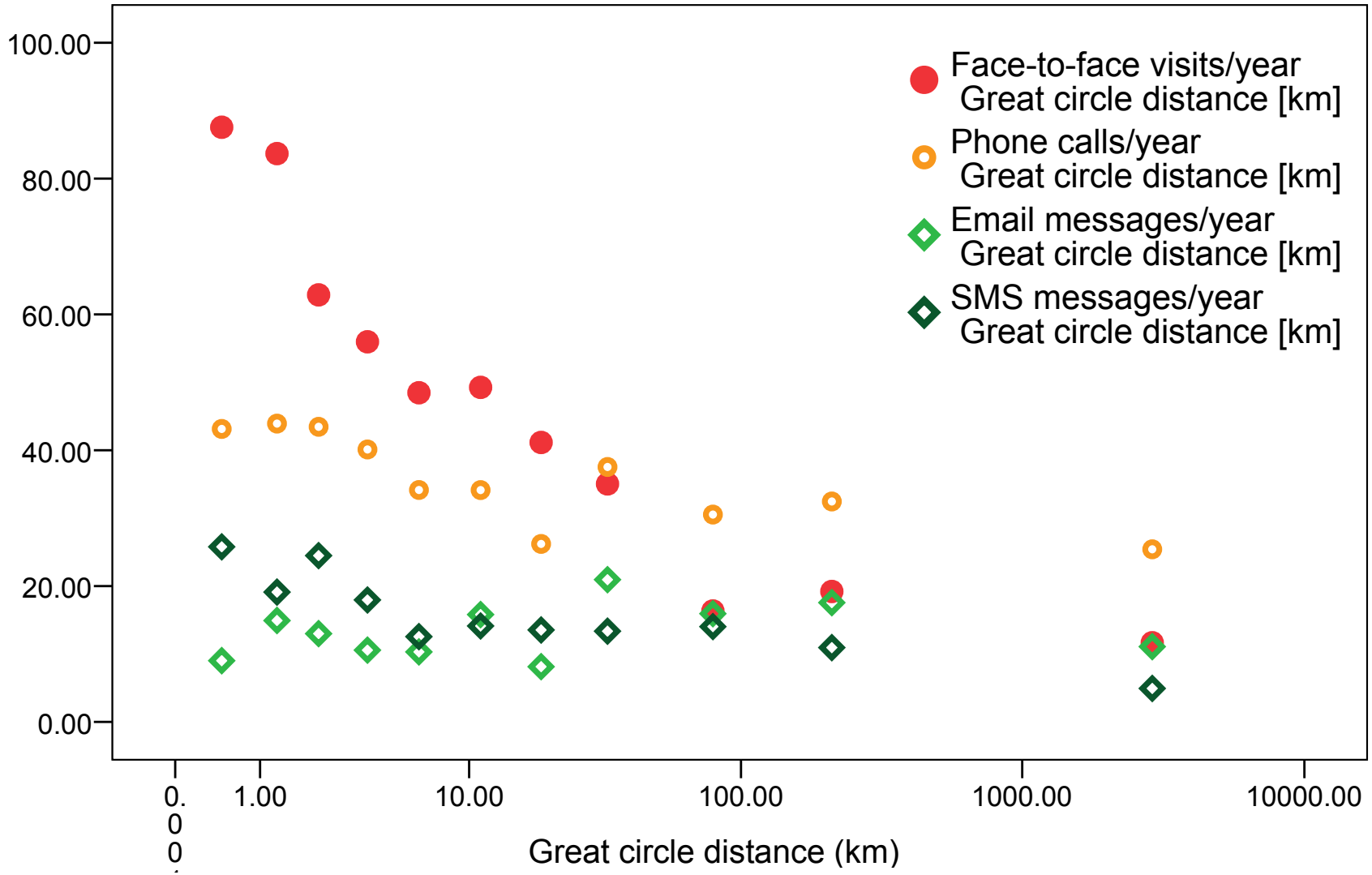
Frei and Axhausen, 2007

Ratio of contacts to population



Frei and Axhausen, 2007

Interactions by mode and distance between homes



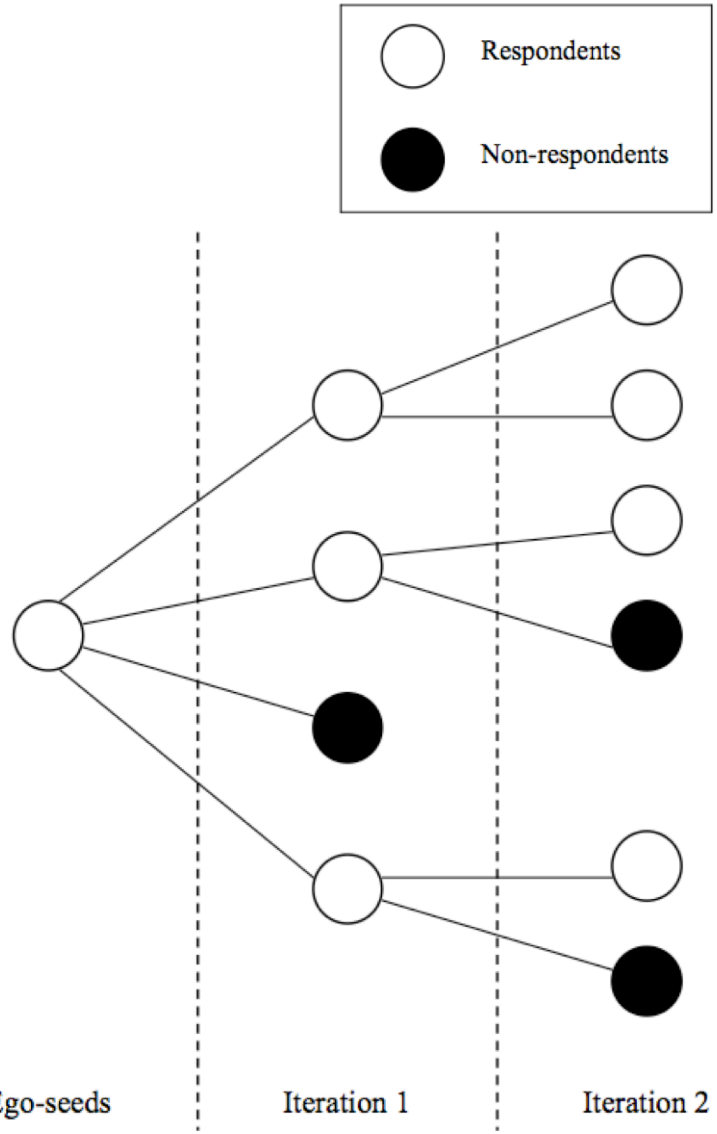
Frei and Axhausen, 2007

2010/11 Snowball survey

Challenges of snowball sampling

Challenges:

- Start with representative seeds
- Avoid selection bias
- React to homogeneous clusters
- Correct the overrepresentation of ‚socializers' and underrepresentation of ‚isolates'



Kowald and Axhausen, 2011

Response rate and response burden (IVT surveys)

Kowald and Axhausen, 2011

Behind egos' horizons: The connected 'snowball'-graph

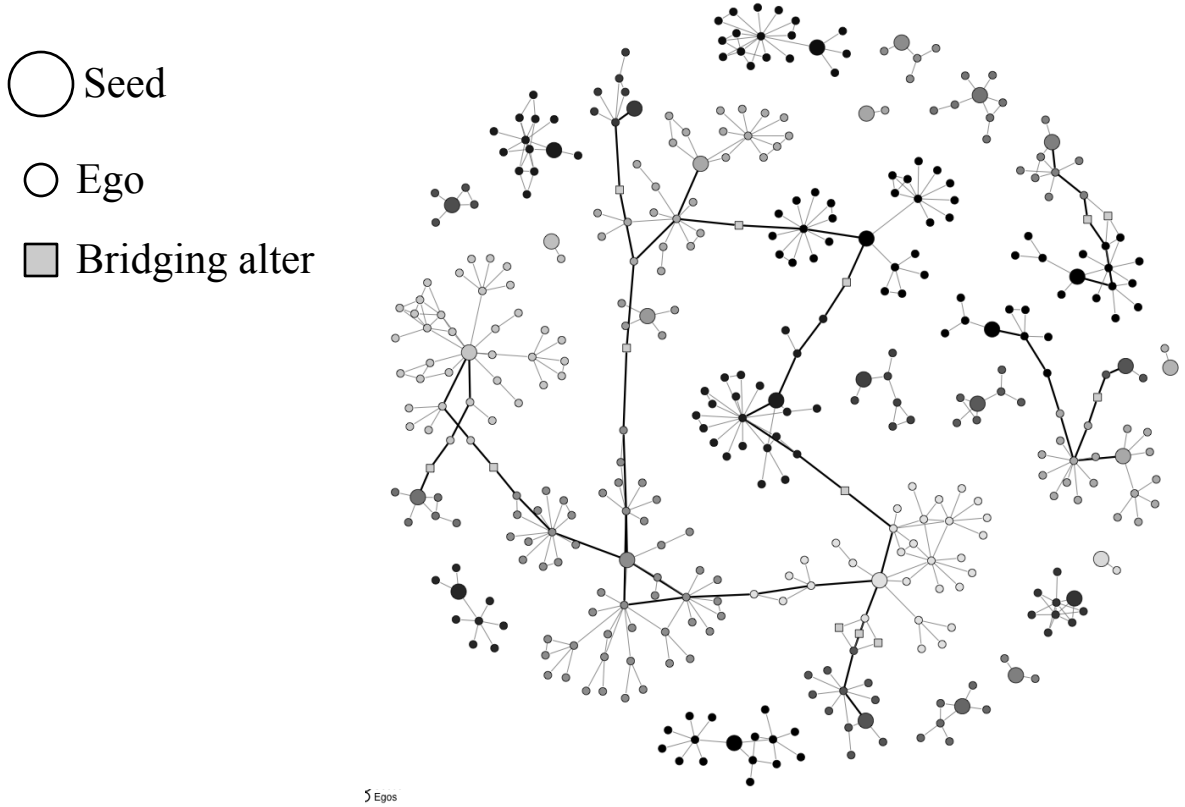
Kowald and Axhausen, 2011

	Vertices	Edges	Density	Components	Triangles
Without sociogram	6'584	7'349	0.000	19	0.017
With sociogram	6'584	32'671	0.002	19	0.518

Personal networks (of egos with sociogram)

(n = 531)	Mean	1st qu.	Median	3rd qu.	St.-dev.	Range
Number of alters	21.5	13.5	20.0	29.0	10.1	38.0
Number of relations	46.4	10.0	23.0	56.5	61.0	398.0
Isolates	6.7	2.0	5.0	10.0	6.1	33.0
Cliques	4.2	2.0	4.0	5.0	2.7	19.0
Components (w/o isolates)	2.6	1.0	2.0	3.0	1.5	8.0
Centralization	0.2	0.1	0.2	0.3	0.2	1.0
Betweenness	0.1	0.0	0.1	0.1	0.1	0.5

Behind egos' horizons: The connected 'snowball'-graph



	Vertices	Edges	Density	Components	Triangles
Without sociogram	6'584	7'349	0.000	19	0.017
With sociogram	6'584	32'671	0.002	19	0.518

Comparisons

Transport motivated social network surveys

East York, Ontario (Wellman, Carrasco et al.)

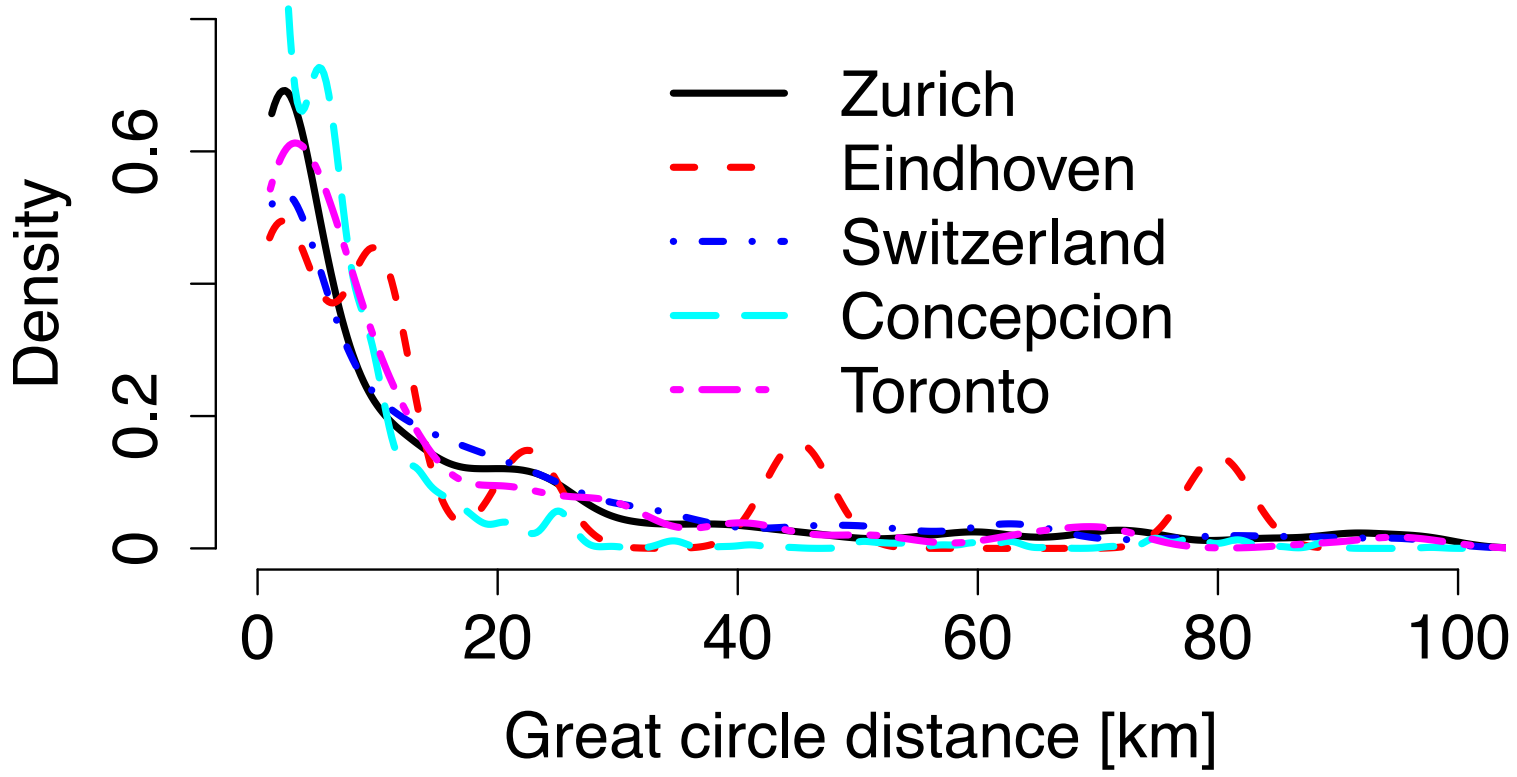
Eindhoven, Netherlands (Arentze, Van der Berg)

Concepcion, Chile (Carrasco)

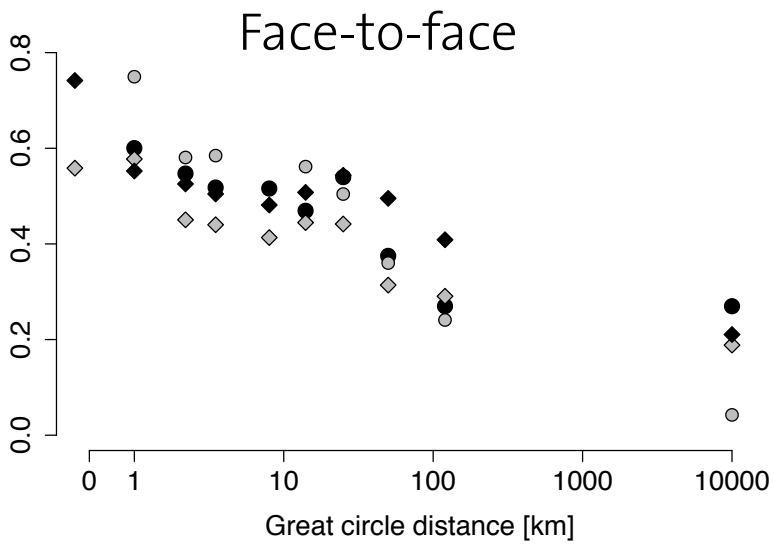
City of Zürich (Frei)

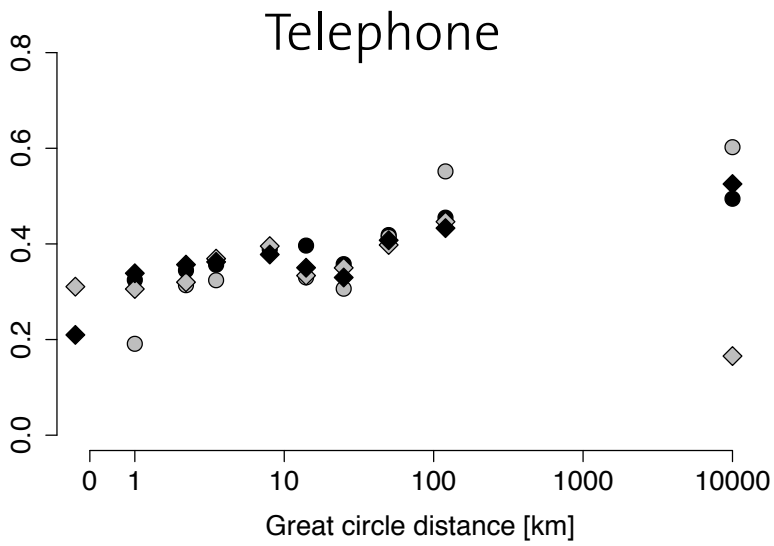
Kanton Zürich snowball (Kowald)

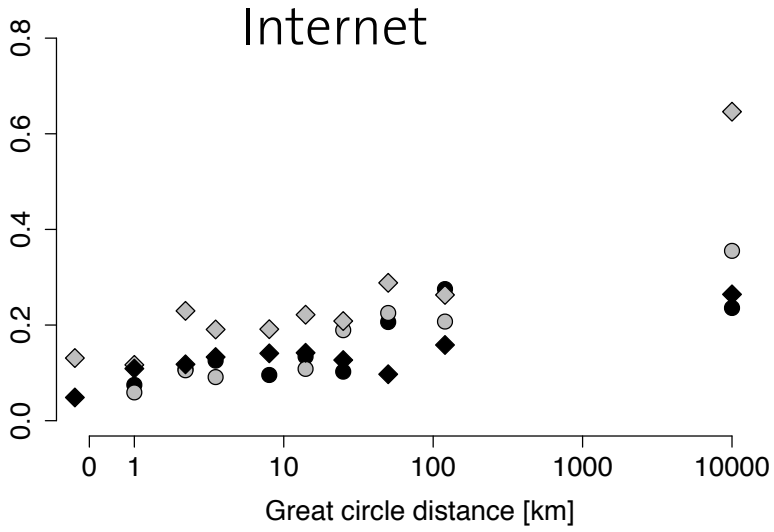
Contact “density” – shares by distance class



Shares of contact by mode







What next ?

Example: Improve impact assessment (Singapore 1.0)

Video available at http://www.vimeo.com/24822377

Next steps

- Singapore social network survey
- Generation of social networks for the synthetic population (See Arentze et al., 2011)
- New models of joint scheduling
- Measurement of local trust (See e.g. Rick Grannis)

Policy implications

Expected impacts: localised anomie

Reduced number and intensity of local contacts should reduce the local level of trust:

- Growing investment into safeguarding the person and the home
- Reduced exposure to risk during travel, i.e. less travel by public transport, cycling and walking

Expected impacts: Improved welfare

The social networks should be more homogeneous and therefore more productive for their members

But, the selectivity excludes the „less attractive“ persons who are disadvantaged through a reduced ability to travel or a reduced ability to participate in activities

When will the marginal benefits become zero ?

.... the localised anomie stresses the other mechanism of social inclusion too strongly

.... the costs of private protection become too high

.... the environmental impacts become too threatening

.... the trend in the costs of travel changes

Back to the future ?

home.t-online.de/home/k-j.lebus/cdf-hgw.htm

Questions ?

www.ivt.ethz.ch

Literature and references

Arentze, T.A., M. Kowald and K.W. Axhausen (2012) A method to model population-wide social networks for large scale activity-travel micro-simulations, paper presented at the *91th Annual Meeting of the Transportation Research Board*, Washington, D.C., January 2012

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

Axhausen, K.W. (2008) Social networks, mobility biographies and travel: survey challenges, *Environment and Planning B*, **35** (6) 981-996.

Axhausen, K.W. (2007) Activity spaces, biographies, social networks and their welfare gains and externalities: Some hypotheses and empirical results, *Mobilities*, **2** (1) 15-36.

Axhausen, K.W. and A. Frei (2007) Contacts in a shrunken world, *Arbeitsbericht Verkehrs- und Raumplanung*, **440**, IVT, ETH Zürich, Zürich.

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

Literature and references

Frei, A. and K.W. Axhausen (2011) Collective location choice model, paper presented *Arbeitsberichte Verkehrs- und Raumplanung*, **686**, IVT, ETH Zürich, Zürich

Frei, A. and K.W. Axhausen (2007) Size and structure of social netowork geographies, *Arbeitsberichte Verkehrs- und Raumplanung*, **439**, IVT, ETH Zürich, Zürich.

Dicken, P. (1998) *Global Shift: Transforming the World Economy*, Paul Chapman Publishing, London.

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

Grannis, R. (1998) The importance of trivial streets: Residential streets and residential segregation, *American Journal of Sociology,* **103 (**6) 1530-1564.

Kowald M. and K.W. Axhausen (2011) Surveying data on connected personal networks, Arbeitsberichte Verkehrs- und Raumplanung, 722, IVT, ETH Zürich, Zürich.

Larsen, J., J. Urry and K.W. Axhausen (2006) *Mobilities, Networks, Geographies*, Ashgate, Aldershot.

Putnam, R.D. (1999) *Bowling Alone: The collapse and revival of American community*, Schuster and Schuster, New York.

Schlich, R., B. Kluge, S. Lehmann und K.W. Axhausen (2002) Durchführung einer 12-wöchigen Langzeitbefragung, *Stadt Region Land,* **73**, 141-154.

Appendix

Biographies: Hypothesis 1

The style of travelling during childhood and adolescence, i.e. of the parents, forms the style of the next generation

- The emotional response to (types of) locations is transferred
- The desire for variety seeking is transferred
- The attitude to travelling is transferred

Biographies: Hypothesis 2

Action spaces grow over the duration of the life course

Assumption: They grow exponentially with the number of main locations (work places; home locations) via involvement with third parties

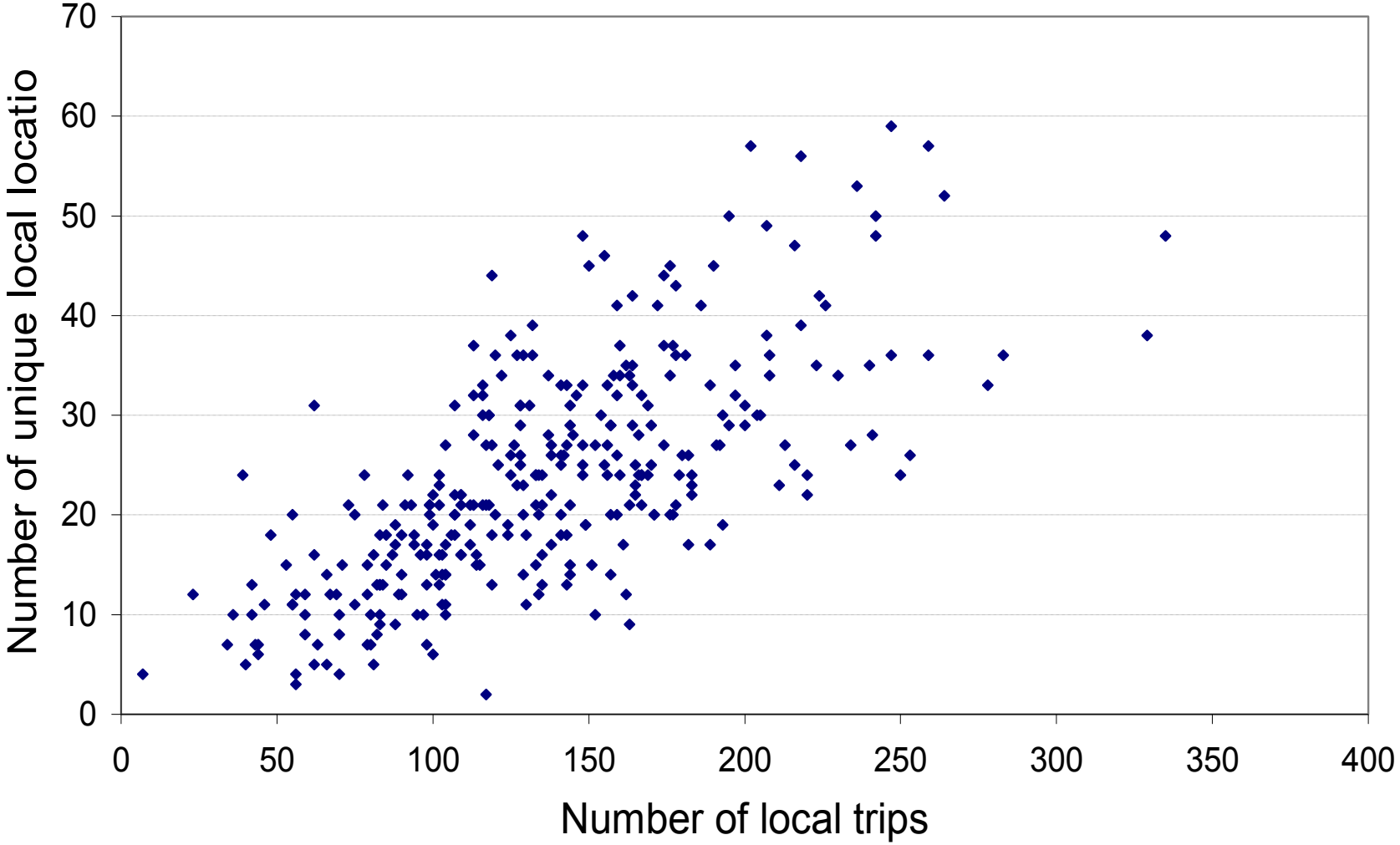
Biographies: Hypotheses 3a and b

The elements of the activity repertoire age

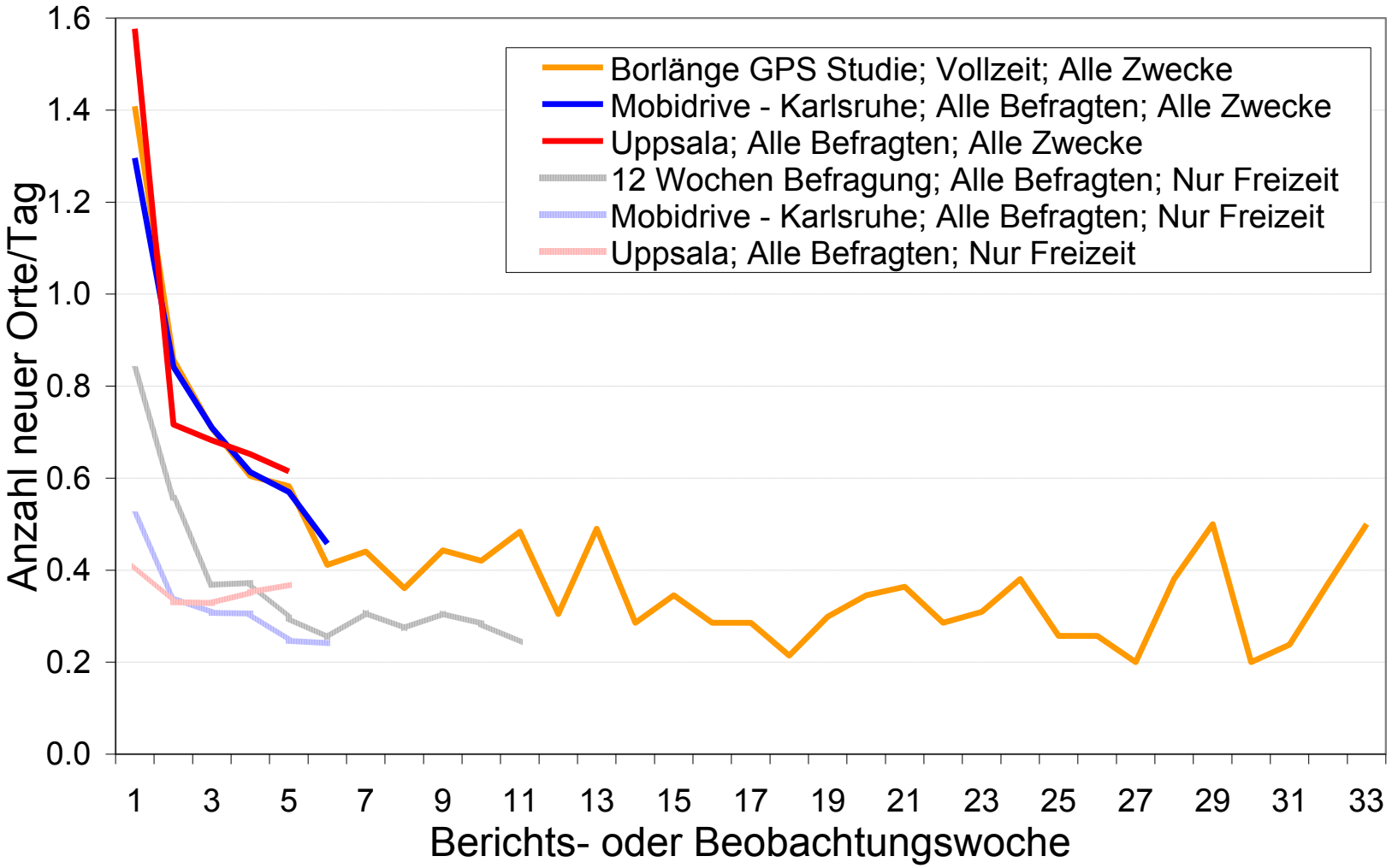
The current size of the activity space remains constant through continuous innovations

- Locations and activity supply change over time
- Idealisation of locations/activities through memory processes and generalisation

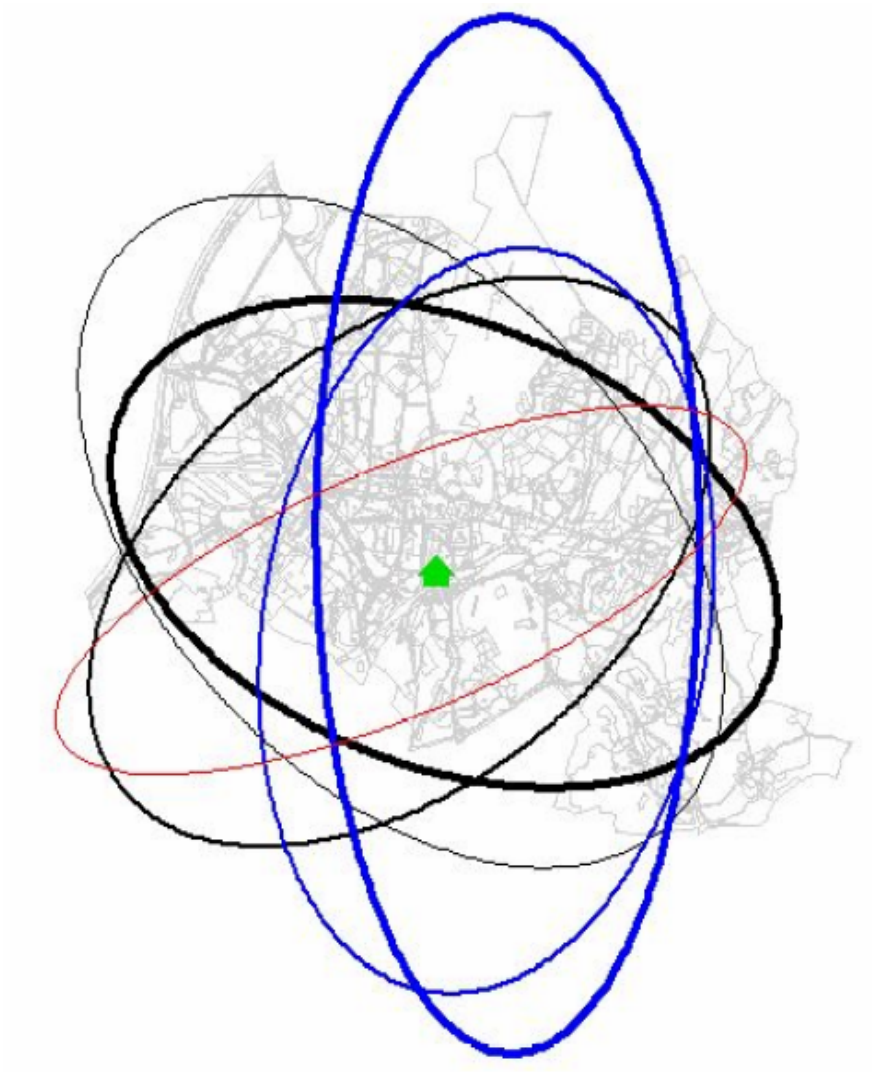
Mobidrive: Number of unique locations and trips



Innovation in destination choice



Variance of activity spaces: A Mobidrive example



Male, Full time

Black: Working days

Blue: Weekend

Line width:

Weeks 1+2; 3+4 and 5+6

Srivastava und Schönfelder, 2003

A microscopic level explanation?