The importance (?) of "stories"

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Outline

Motivation: plain text vs. bar charts vs. spatial picture

Many examples of what I think we can (and should) do
- Spider analysis (where do people go?)
- High resolution accessibility (quality of locations)
- Emissions (who produces them?)
- More winners and losers

Conclusion

Motivation: Text vs. bar charts vs. spatial plots

Cordon

If we introduce a cordon toll of 20 €, the total kilometers increase to 39,747 km (+2.7%). The distance covered by heavy vehicles increases slightly by 0.6 percent (31,075 km). Carriers employ 540 vehicles (+1.7%). The number of employed heavy vehicles decrease to 410. Due to the increase in kilometers, total CO_2 emissions increase as well to 31 tCO_2 (+2.1%). Departure times are not affected by this measure.

Total kilometers in the environmental zone amounts to 2,546 km which is a significant decrease by 31.4 percent. The distance covered by heavy vehicles decrease to 1,637 km which is 46.1 percent less. Note since the number of total heavy vehicle kilometers even increased slightly, the savings in the environmental zone are more than offset by kilometers travelled outside the environmental zone. The number of vehicles accessing the zone decrease to 201 (-34.1%) (heavy: 132 (-52%)). This significant decrease is not surprising since a cordon toll is

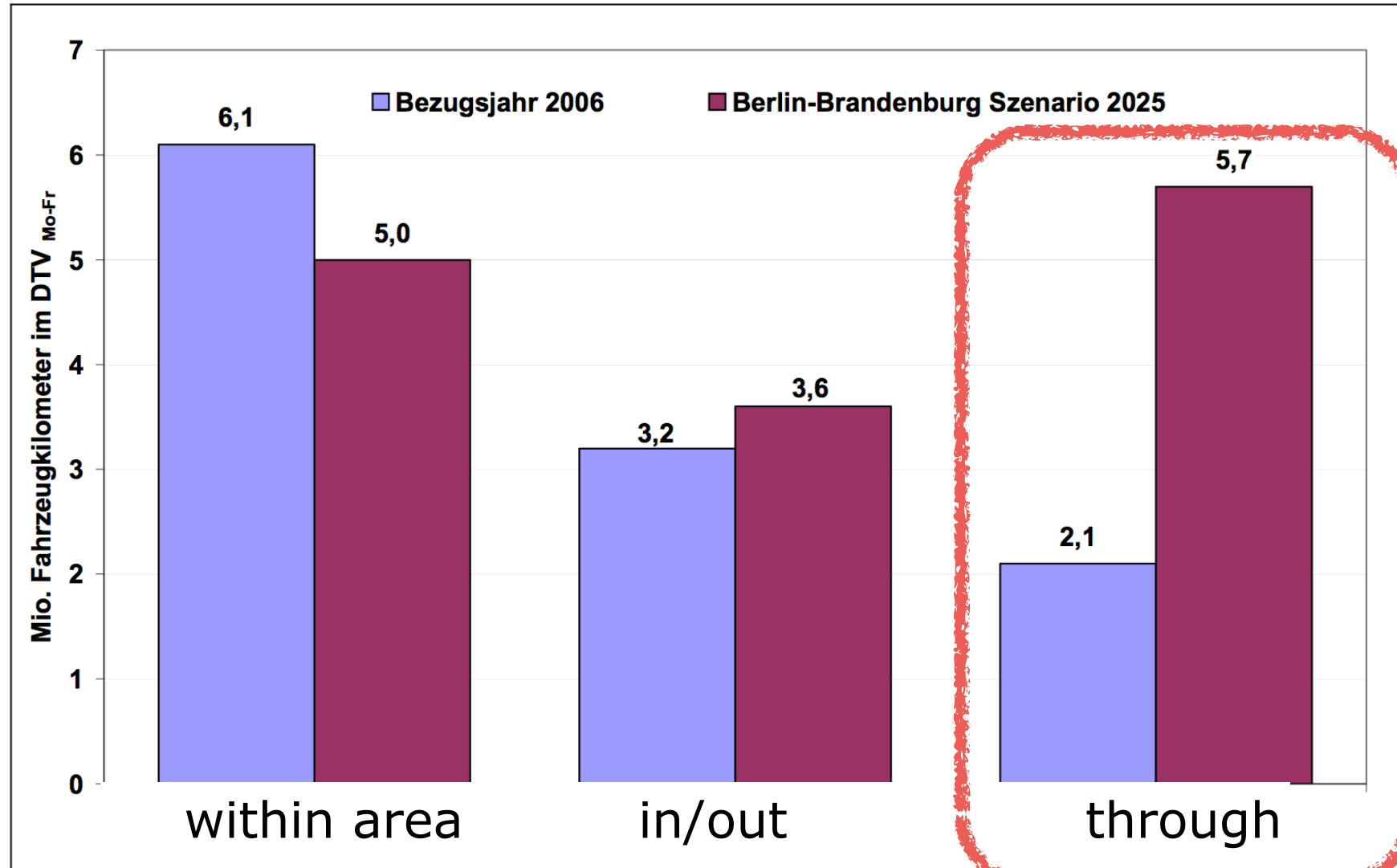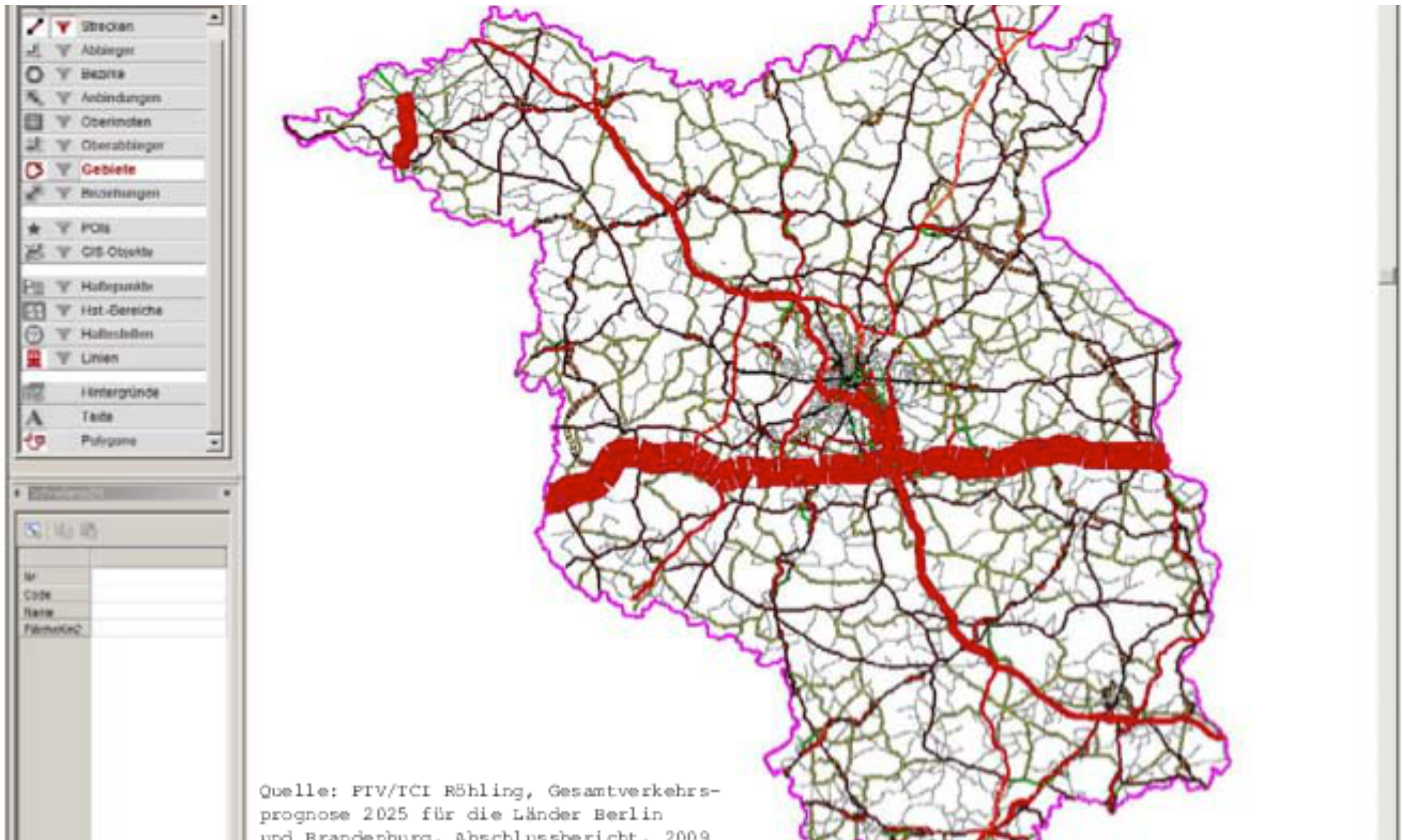→ I don't see anything. Could you please provide bar plots?

Abbildung 55: Entwicklung der Verkehrsleistung im Schwerverkehr (Lkw>3,5t zGG)

Now we have bars. But:

Why should one believe such a growth of through traffic?

Quelle: PTV/TCI Röhling, Gesamtverkehrs-
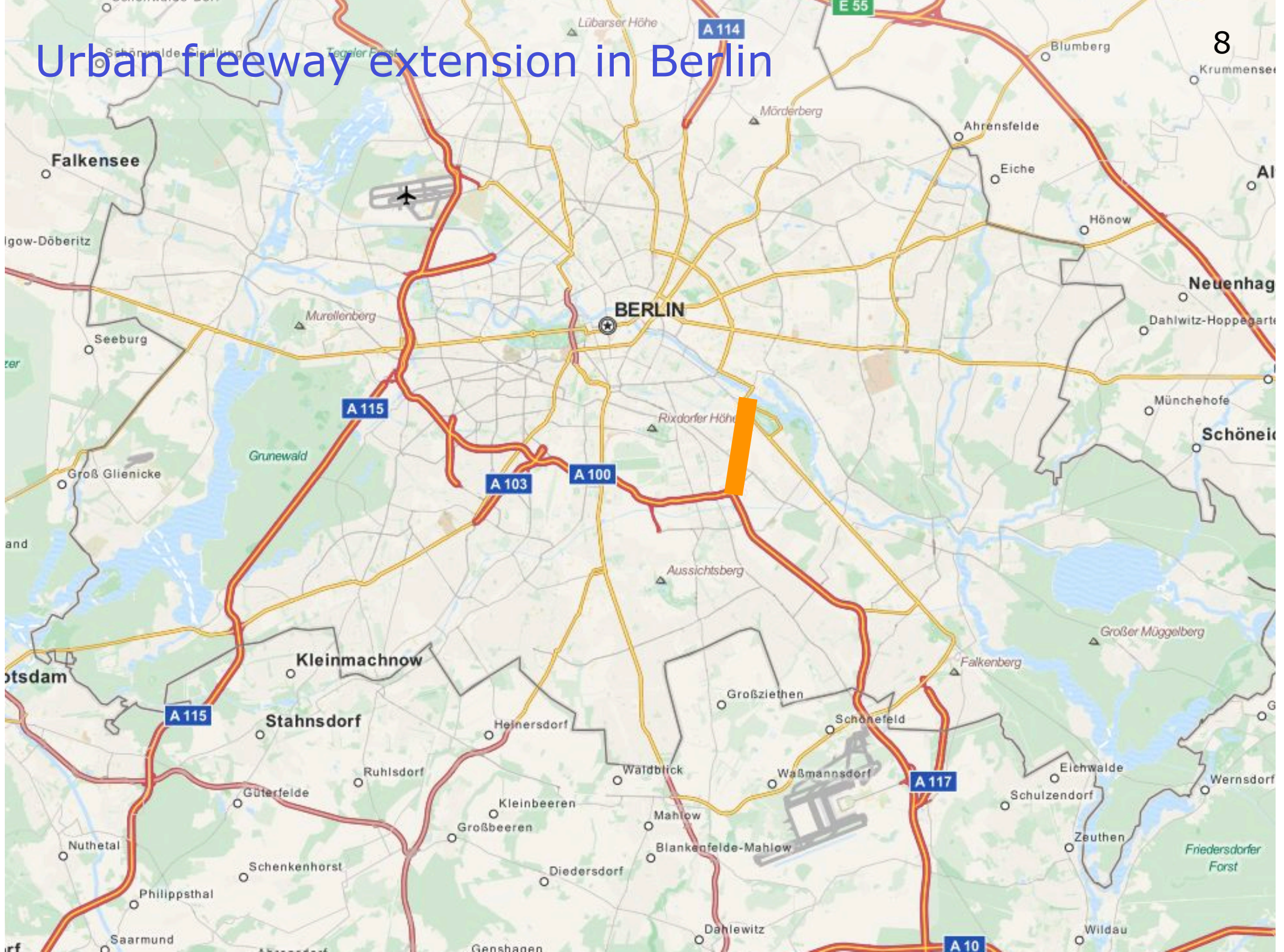prognose 2025 für die Länder Berlin
und Brandenburg. Abschlussbericht. 2009.

This I can believe (strong growth of W↔E freight traffic through Germany, which has nothing to do with local situation).
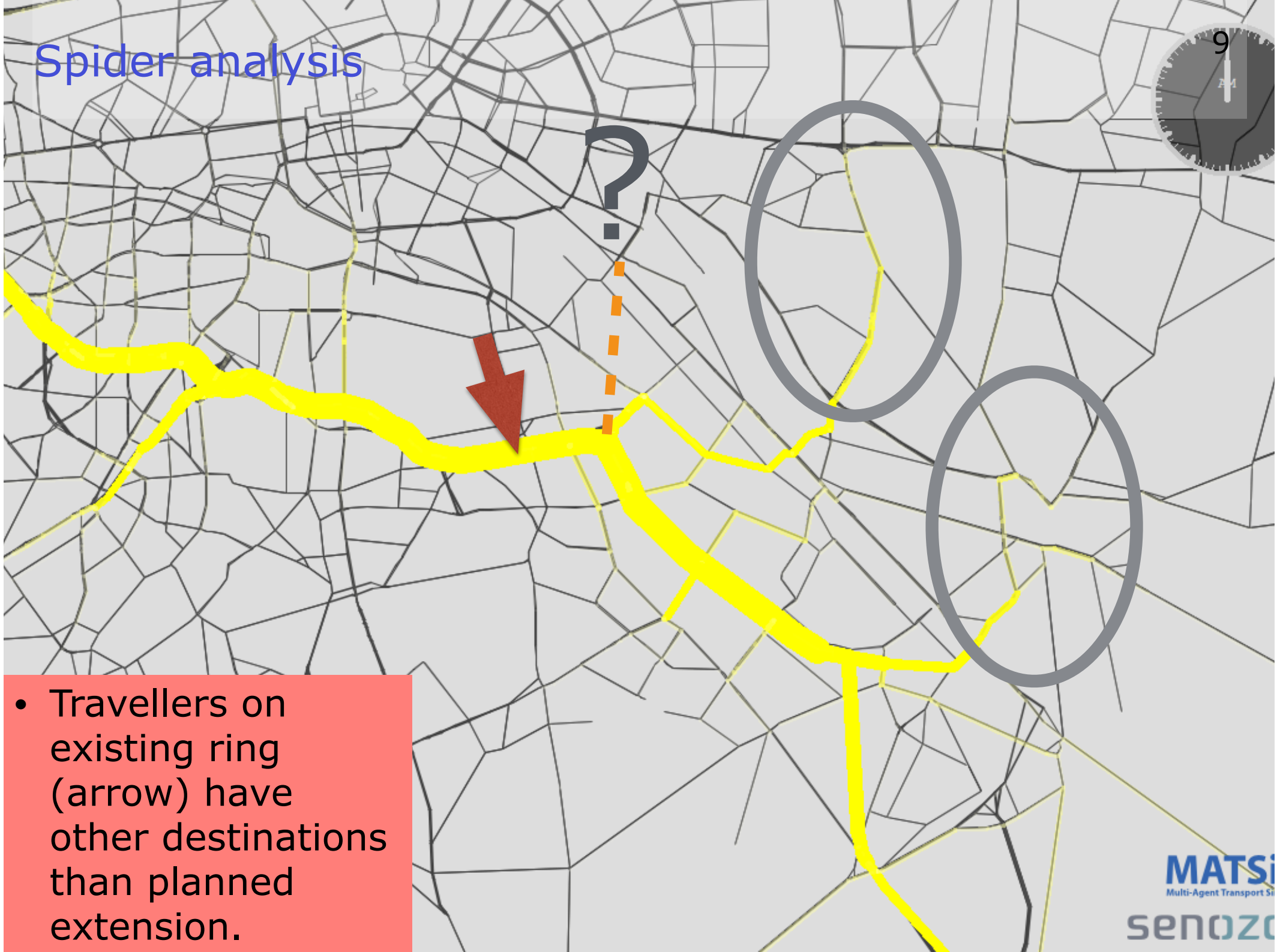
"Spider" analysis
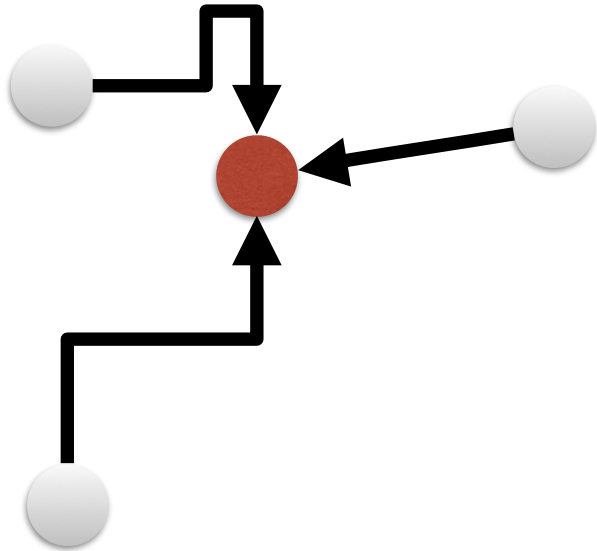
Urban freeway extension in Berlin

Spider analysis

?

• Travellers on existing ring (arrow) have other destinations than planned extension.

MATSi
Multi-Agent Transport Si
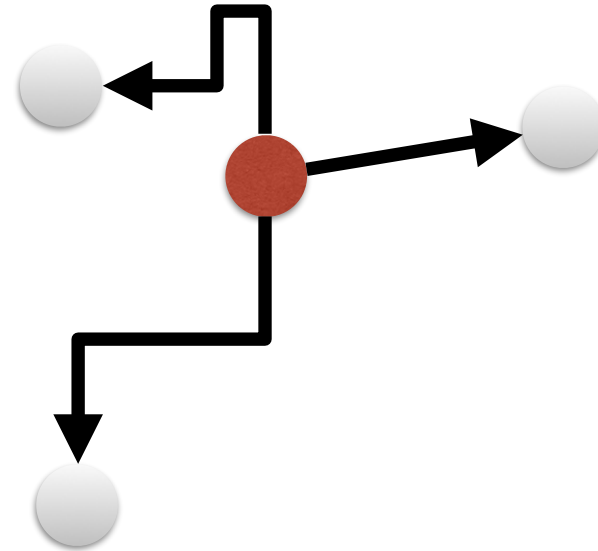
senoz

[[Show Via "live" version]]

Could (and should) do this web-based

[[google maps / senozon locations]]

Could be used for stakeholder involvement.

(make available by web)

High resolution accessibility

How well is a location accessible? Interesting, e.g., for businesses.

How well can other locations be accessed? Interesting, e.g., for residences.
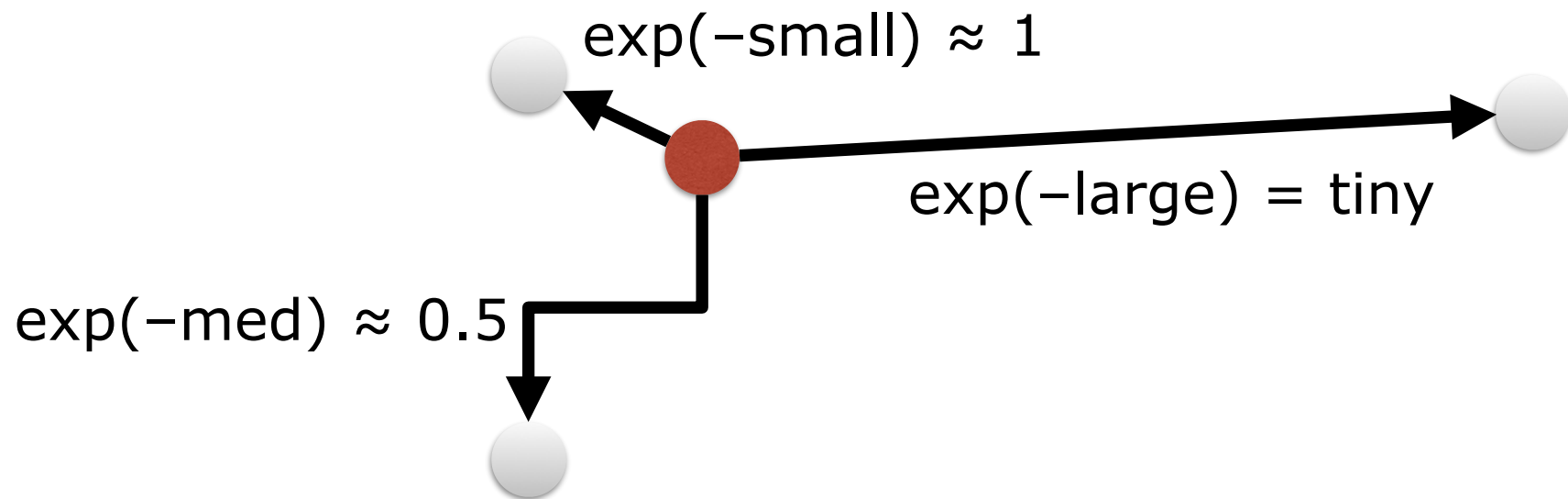
(in the following)

Econometric accessibility

Here: "econometric" accessibility at location i:
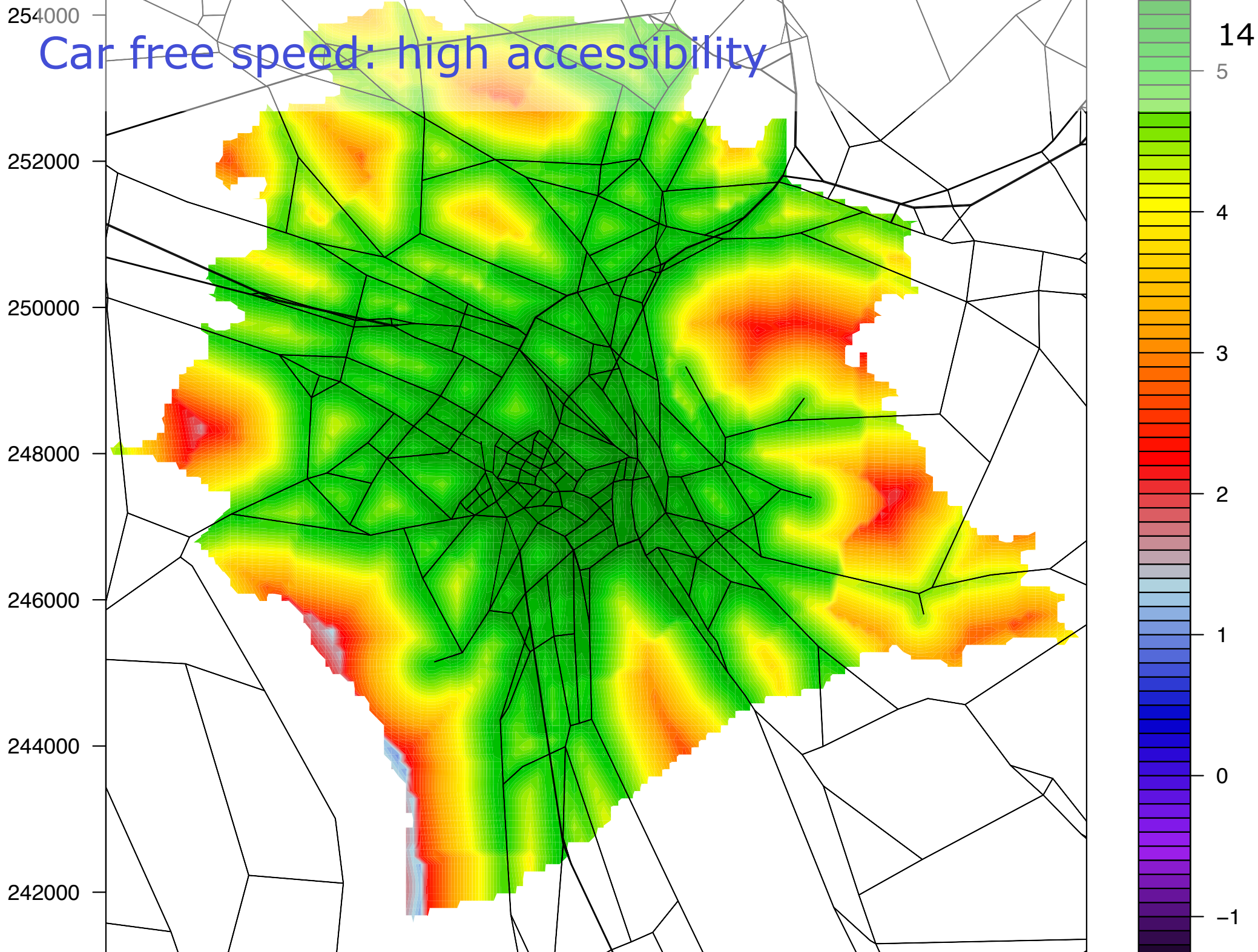
$$A_i = \ln \sum_j \exp(-C_{ij}) \, .$$

With:

- C_{ij} = effort to travel from i to j

Is an averaging operator: close locations get high weight, far away locations low weight.
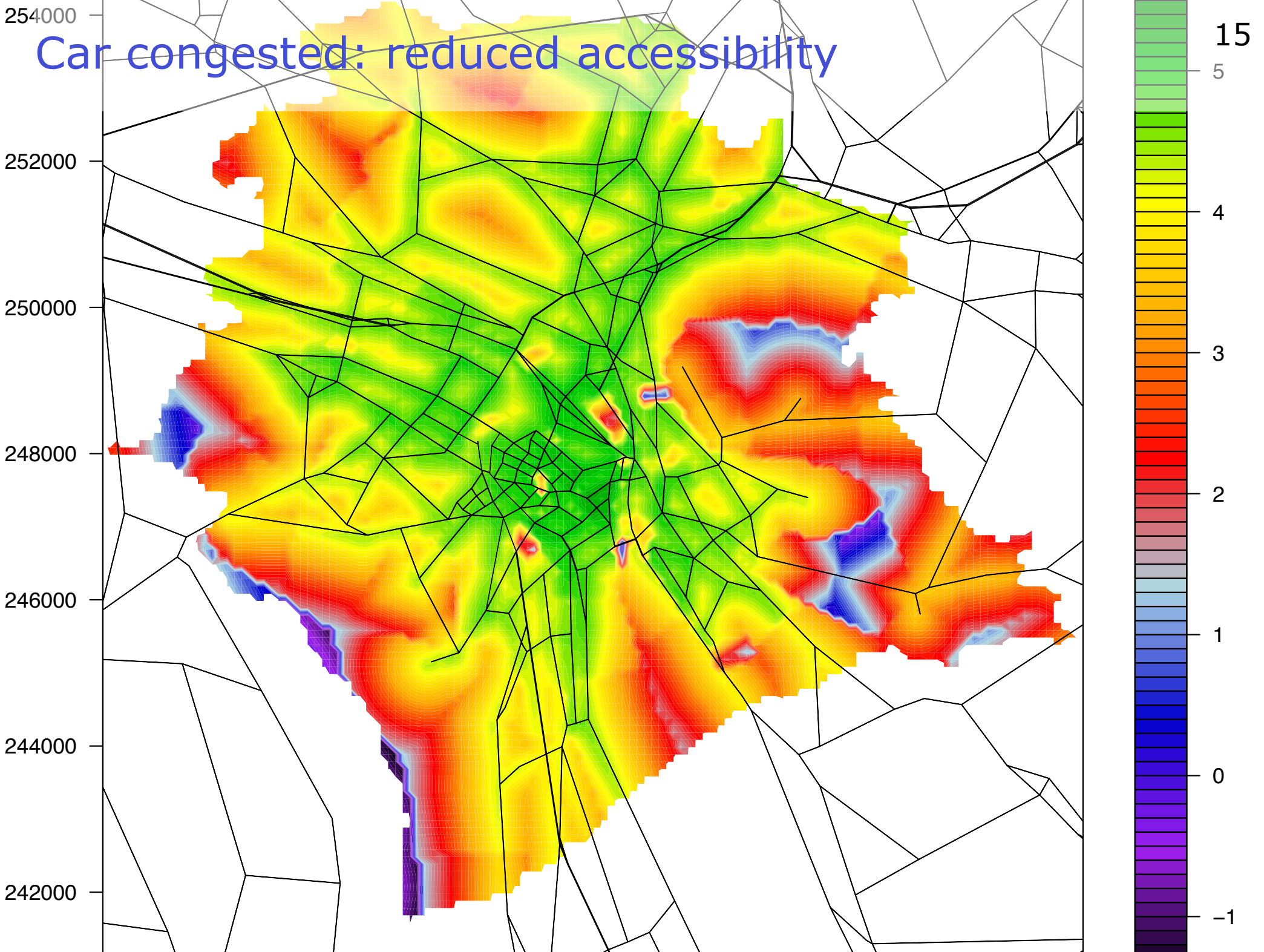
exp(−small) ≈ 1

exp(−large) = tiny
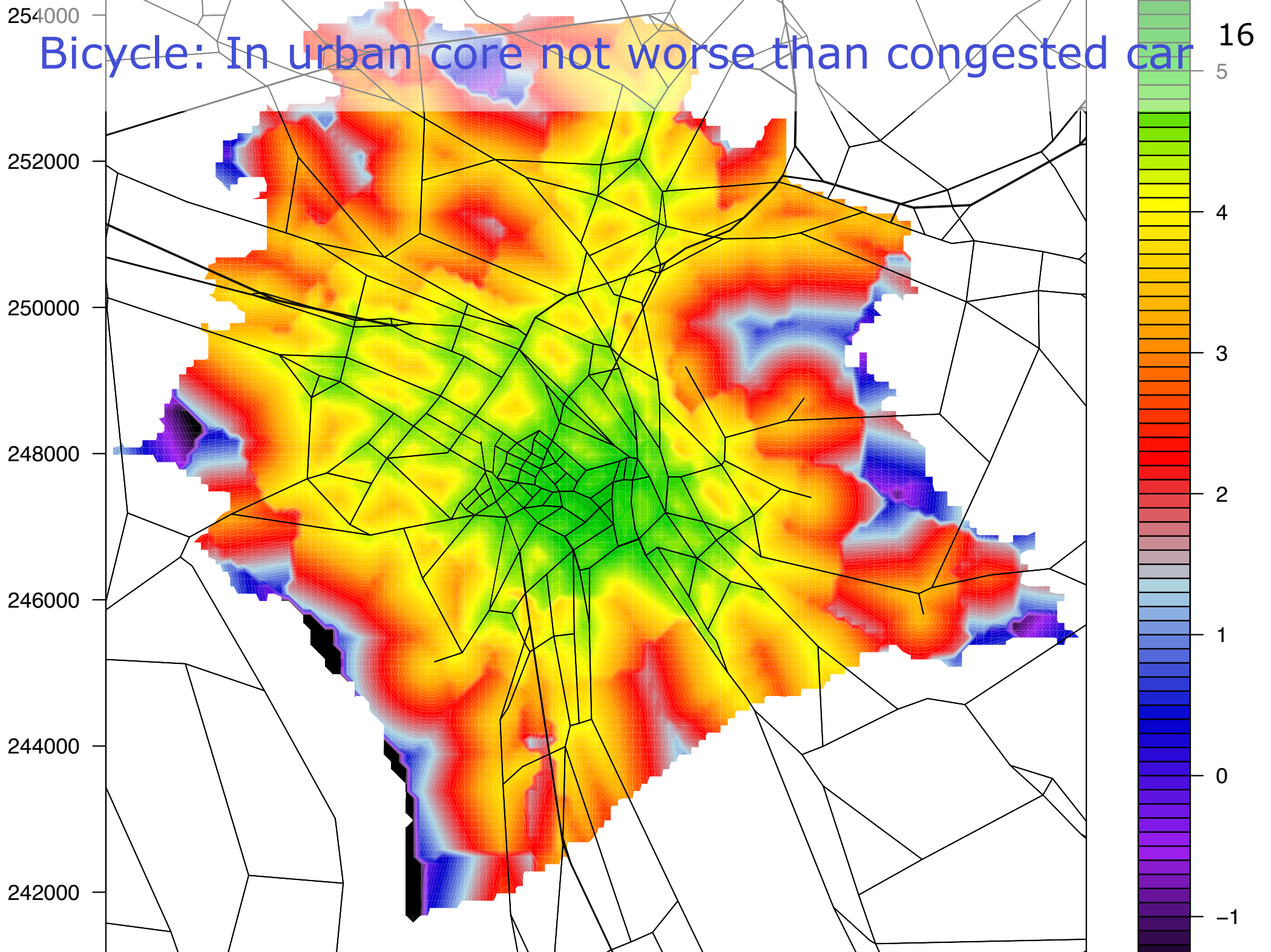
exp(−med) ≈ 0.5

In following: Accessibility to workplaces (by car ...)

Car free speed: high accessibility

Car congested: reduced accessibility

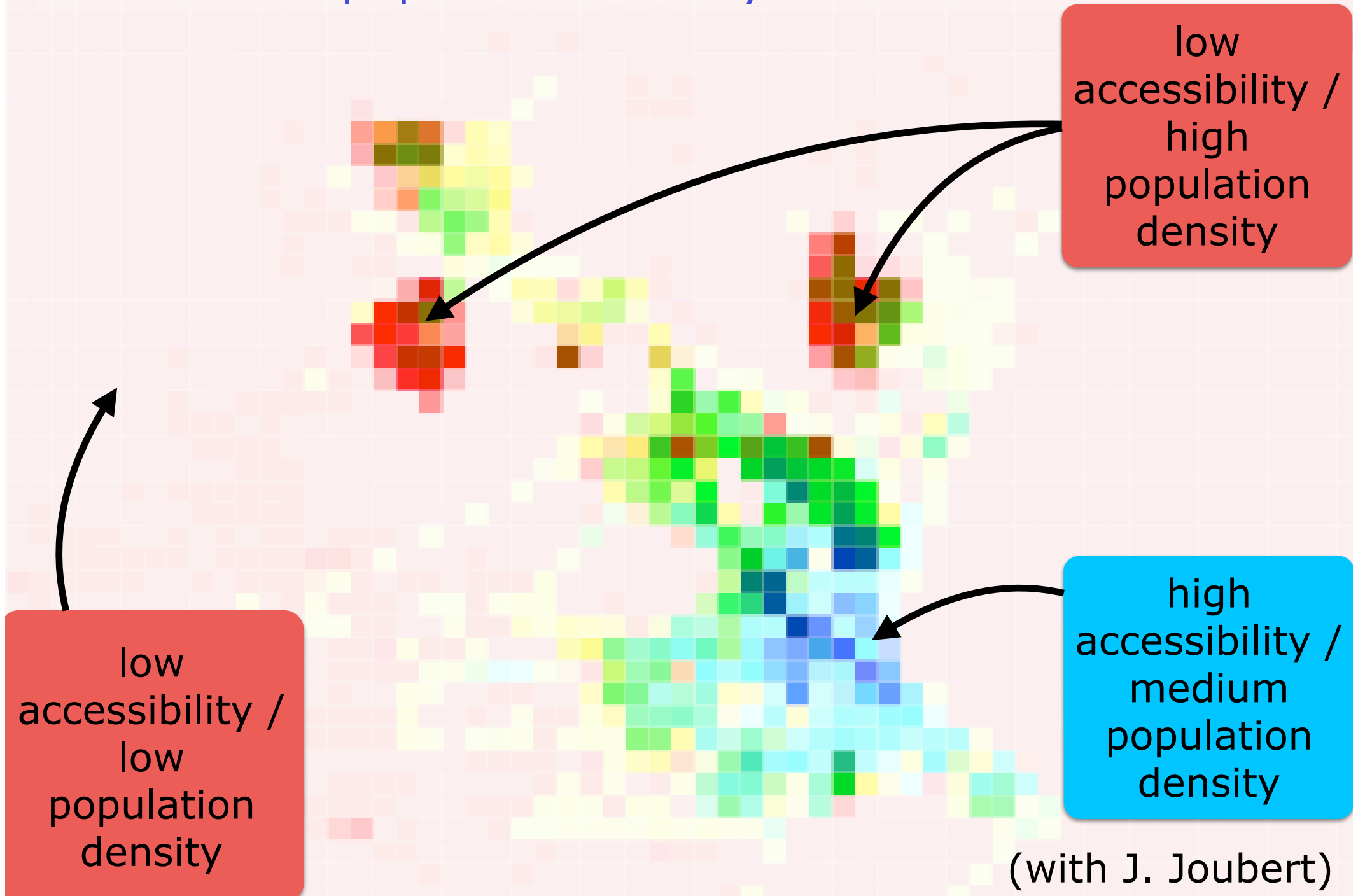Bicycle: In urban core not worse than congested car

Port Elizabeth Map

Accessibility to workplaces in NMB; red = bad; saturation = population density

low accessibility / high population density

low accessibility / low population density

high accessibility / medium population density

(with J. Joubert)

Accessibility to workplaces in NMB; red = bad; saturation = population density
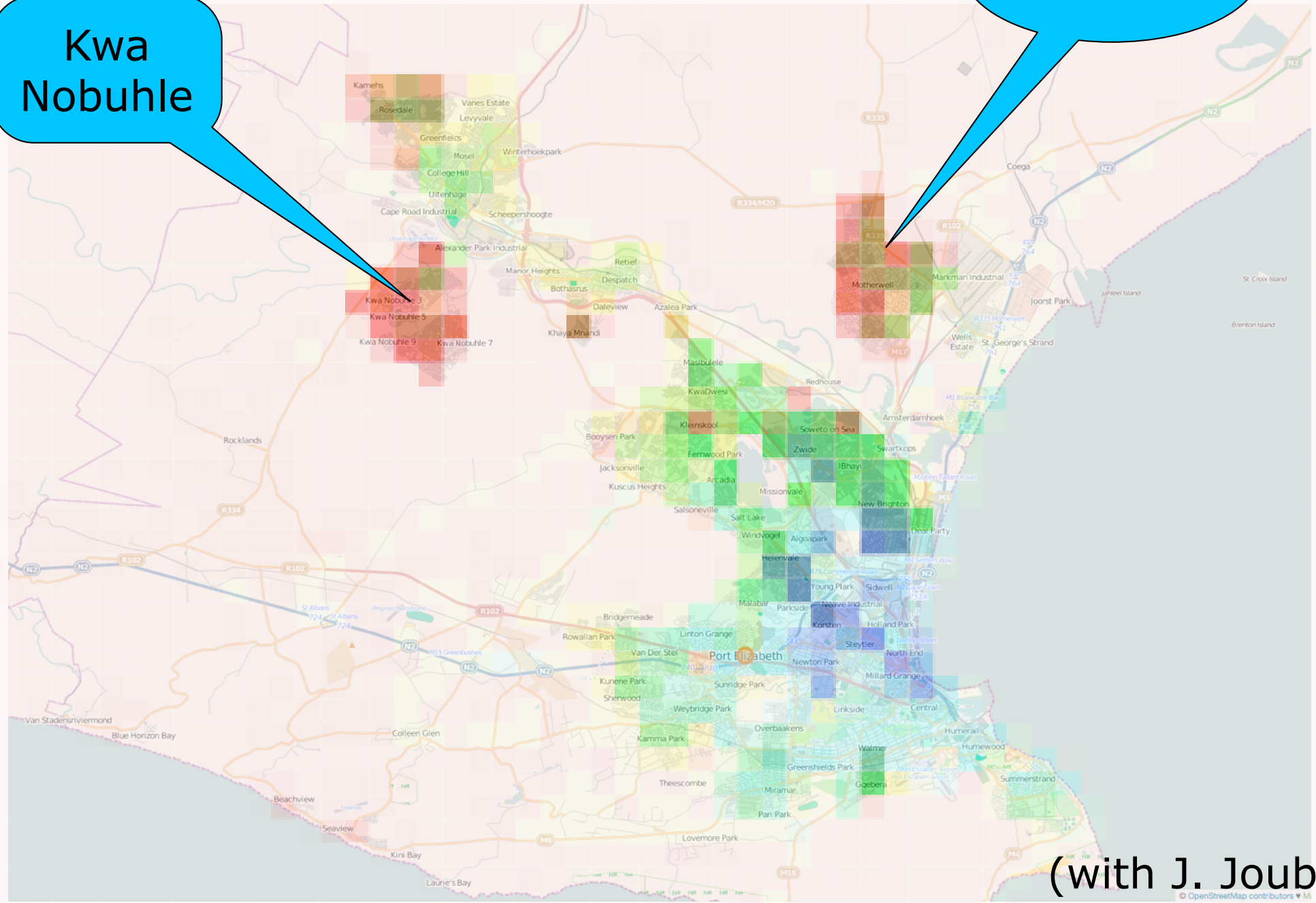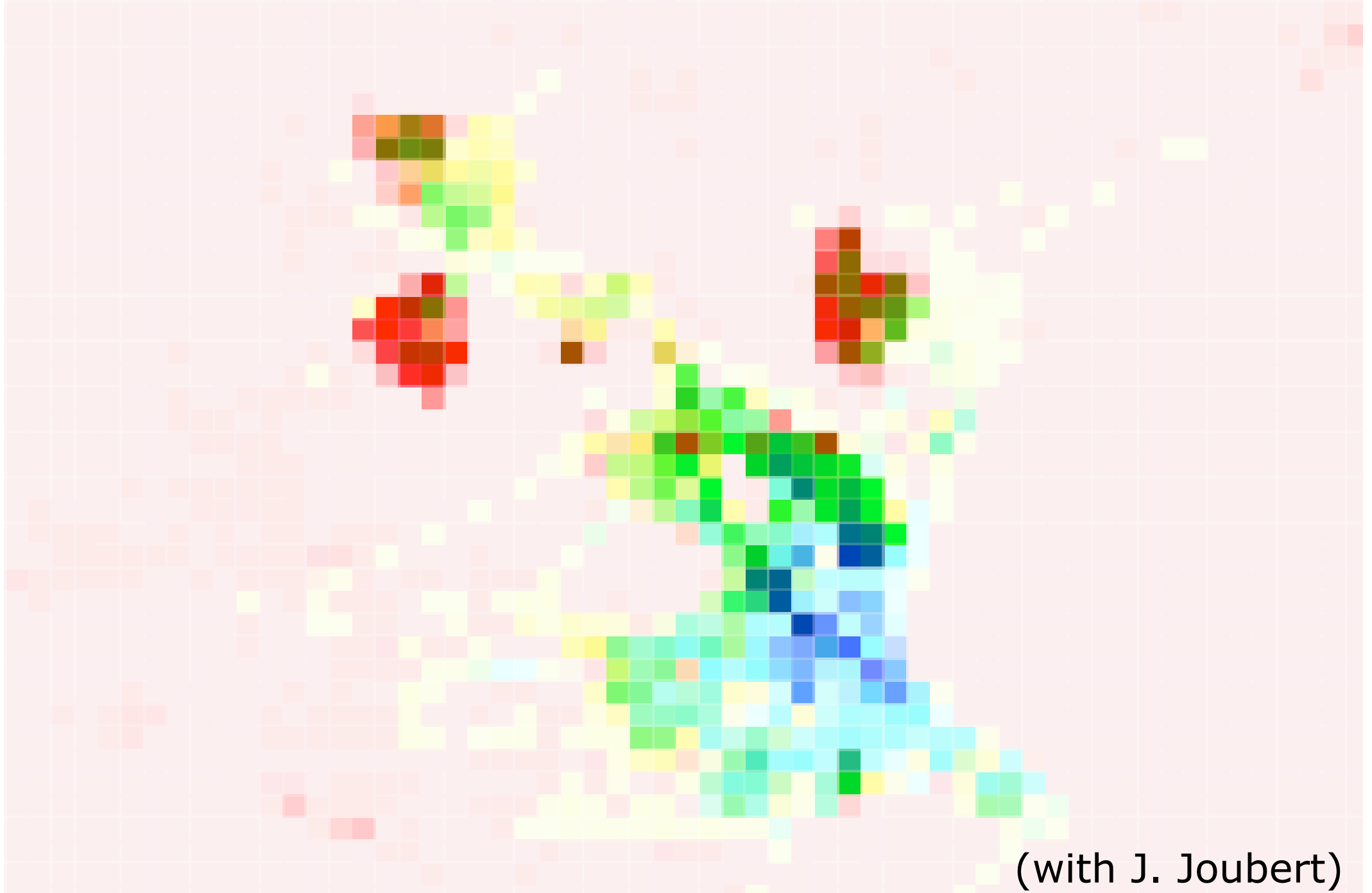

(with J. Joubert)

Accessibility to workplaces in NMB; red = bad; saturation = population density

(with J. Joubert)

Possible reasons:

- Very few workplaces locally
- Very few "registered" workplaces locally
- Bad transport connections to CBDs
- Long distance from CBD

"Bird's eye view from green table"?

- ↔ google earth is clearly useful.
- There are also clear differences between townships.
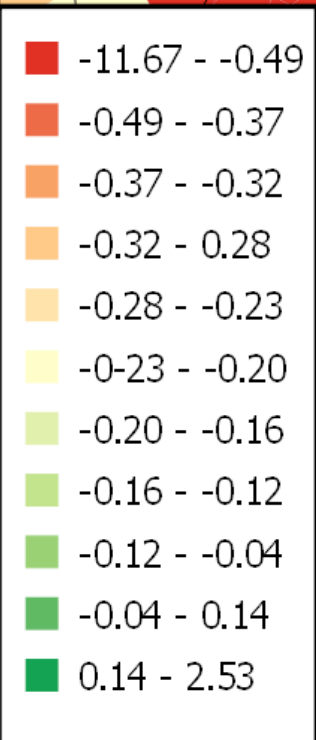- See photo …

Motherwell Township

Brussels cordon toll accessibility changes

Accessibility increase inside cordon (reduced congestion)

reduced accessibility outside cordon (toll part of travel cost)

■	-11.67 - -0.49
■	-0.49 - -0.37
■	-0.37 - -0.32
■	-0.32 - 0.28
■	-0.28 - -0.23
■	-0-23 - -0.20
■	-0.20 - -0.16
■	-0.16 - -0.12
■	-0.12 - -0.04
■	-0.04 - 0.14
■	0.14 - 2.53

blue = tolled links freeway ring is *inside* cordon

(with D. Röder, I. Cabrita)

High resolution accessibility computations

Higher resolution than (most) earlier versions.
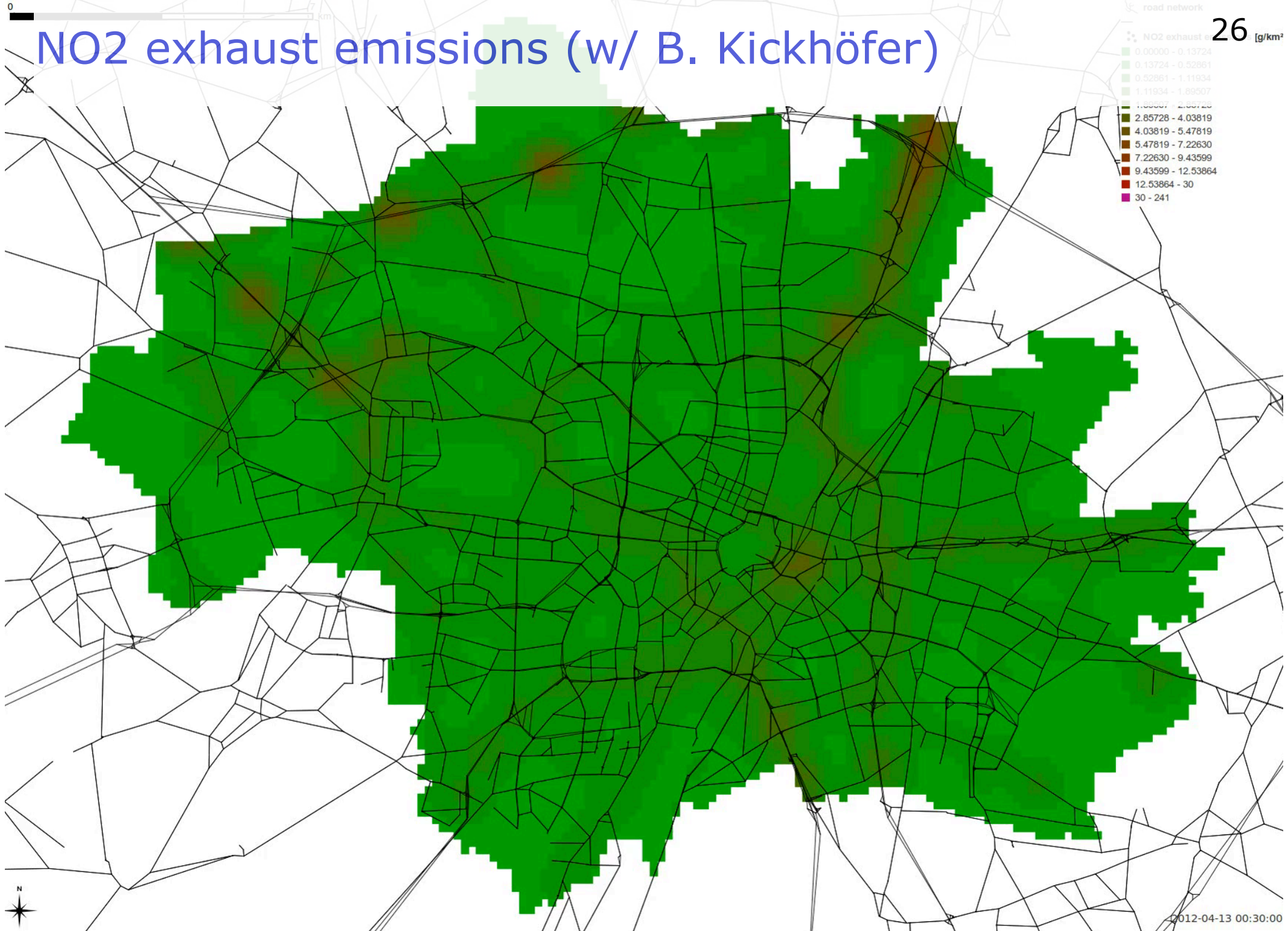
In particular, not zone based.

Based on **network travel times**, possibly congested, possibly public transit.

Base case maps can probably be **automatically generated based on OpenStreetMap**.
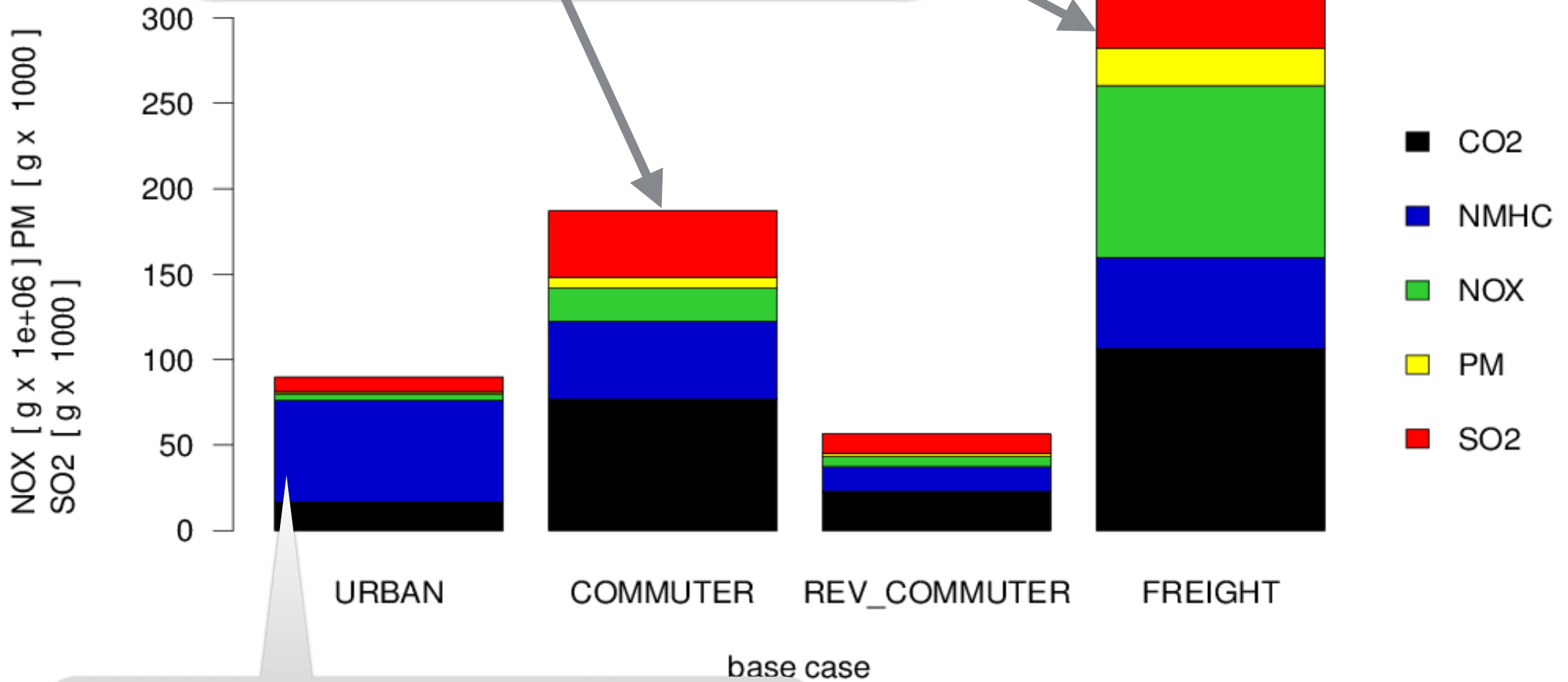
Emissions

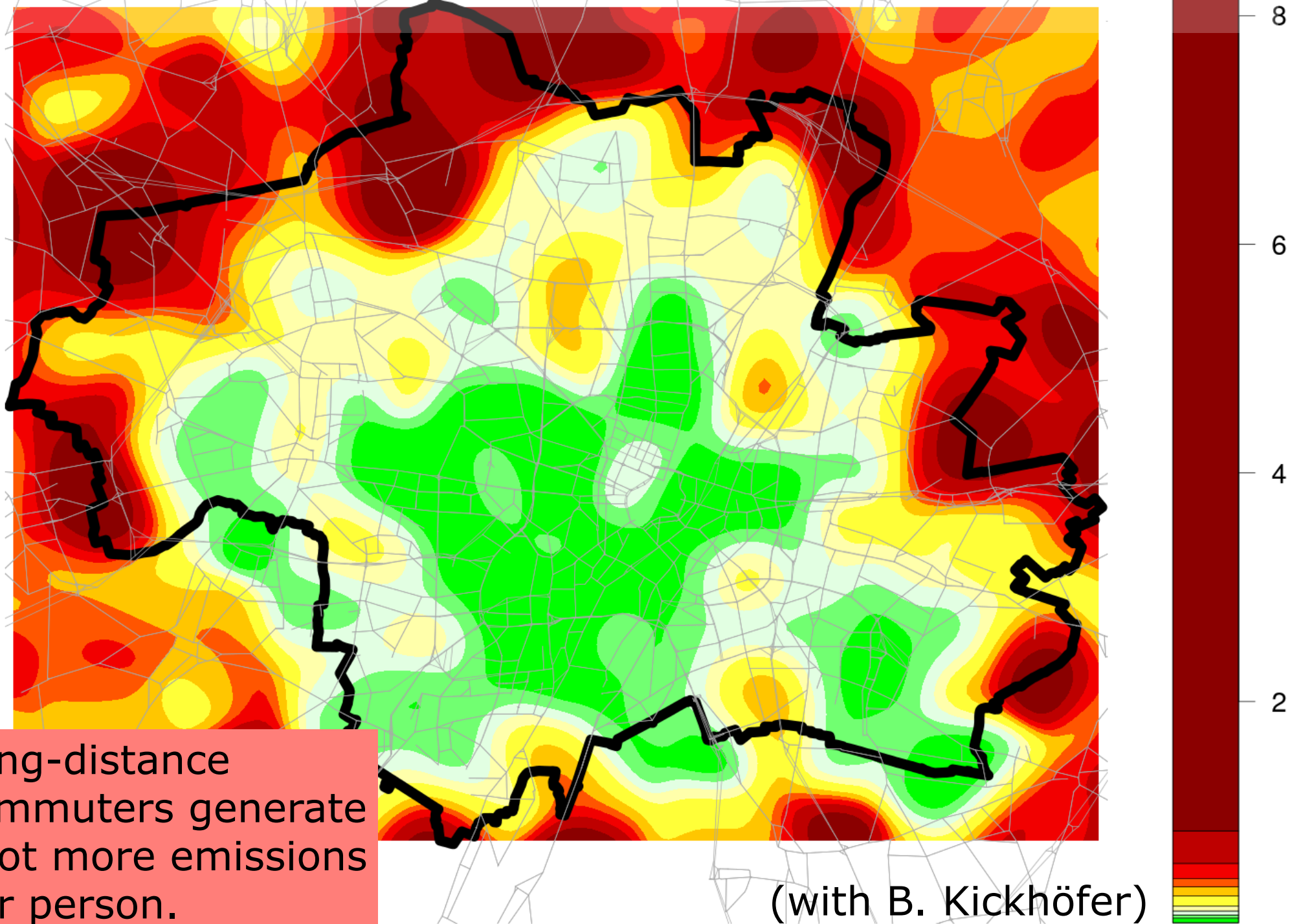# NO2 exhaust emissions (w/ B. Kickhöfer)

Commuters, freight (300k, 160k out of 2'100k) most emissions.

For "urban", NMHC (cold start emissions) biggest problem (model can trace that!).
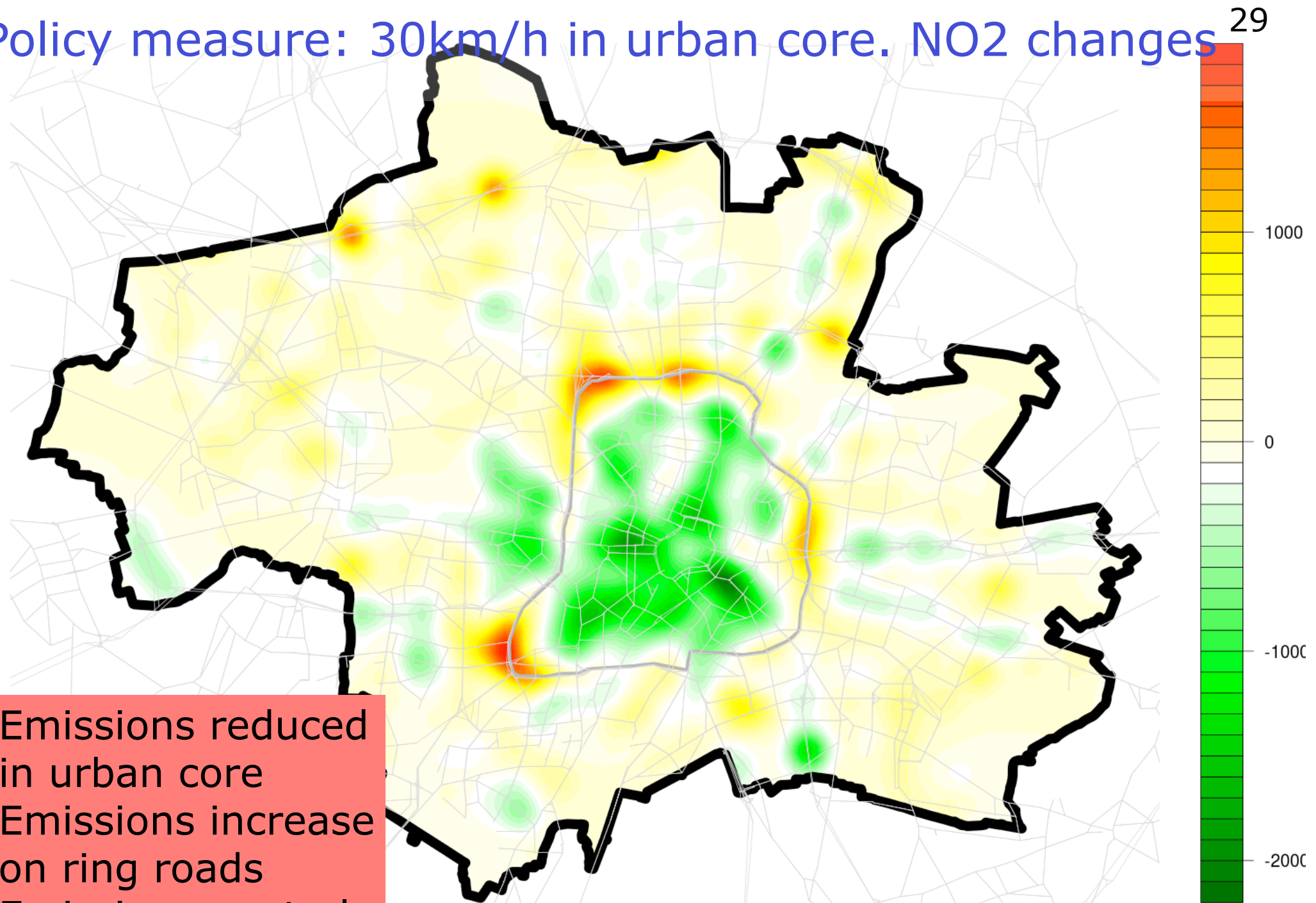
(with B. Kickhöfer)

Emissions per person (at home location, in Eu)

28
8
6
4
2

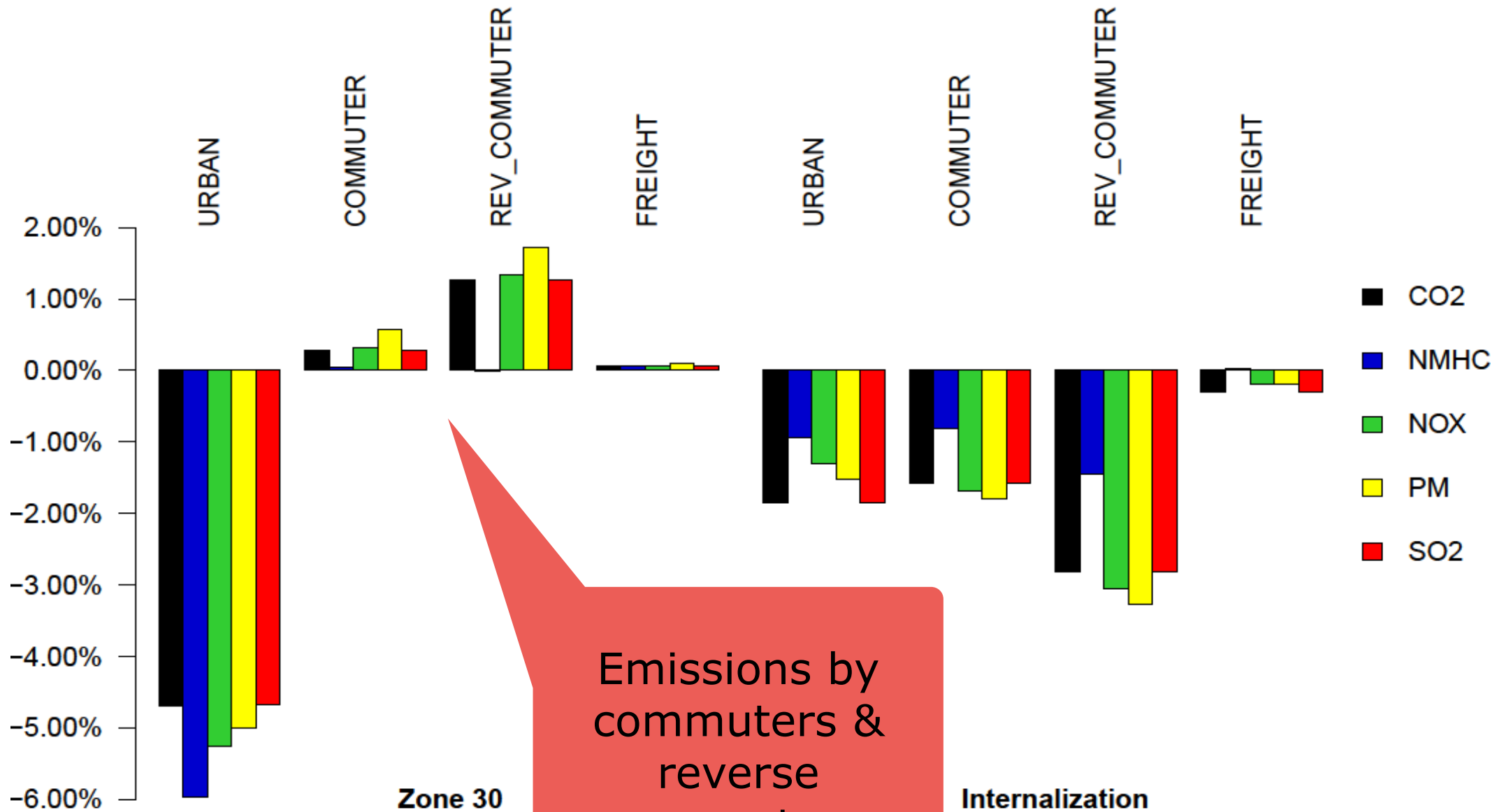Long-distance commuters generate a lot more emissions per person.

(with B. Kickhöfer)

Policy measure: 30km/h in urban core. NO2 changes

- Emissions reduced in urban core
- Emissions increase on ring roads
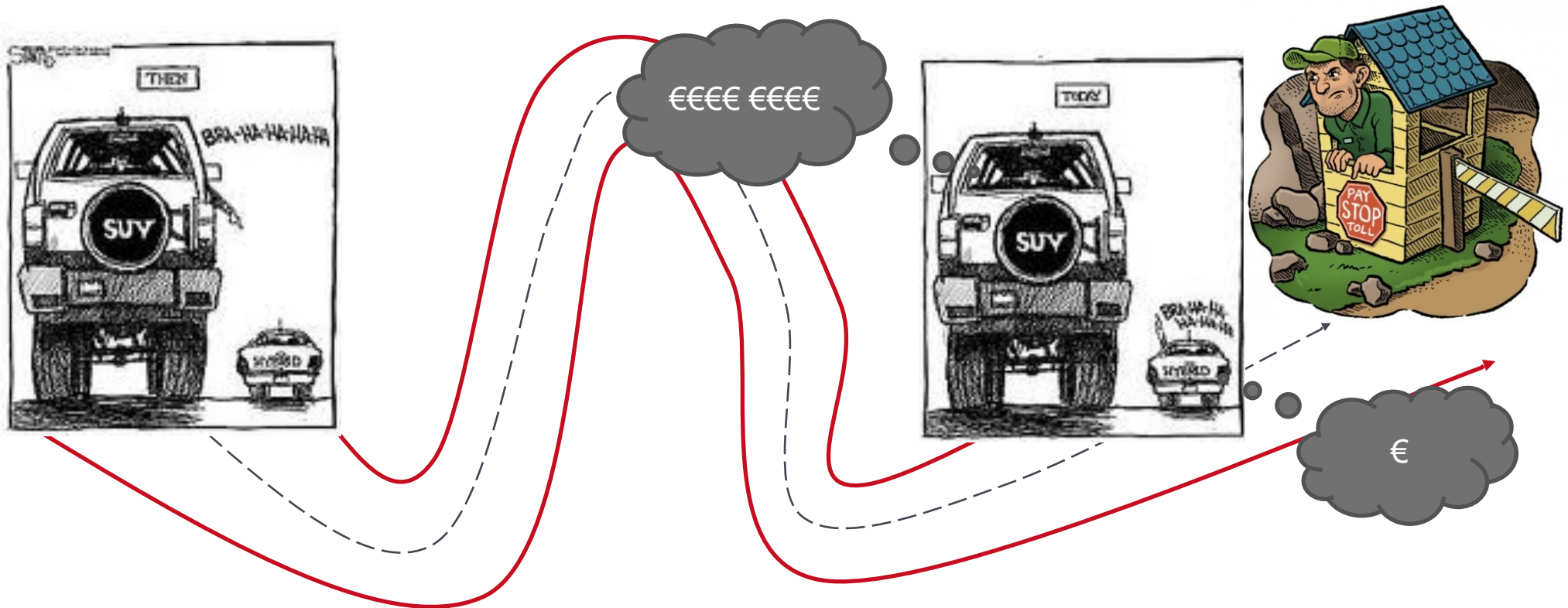- Emissions neutral everywhere else

1000

0

-1000

-2000

[g/km2]

(with B. Kickhöfer)

Left: Zone 30 (just shown); Right: alternative policy

Emissions by commuters & reverse commuters increasing

Zone 30

Internalization

Legend: CO2, NMHC, NOX, PM, SO2

(with B. Kickhöfer)

Let each driver pay vehicle-specific toll that corresponds to the external costs of its emissions

Emissions per vehicle per link

Can trace back emissions to **subgroups** or home locations
(and thus also "virtually" internalise it, including vehicle type
and engine temperature)

Commuters/freight by far largest emitters, despite low
numbers

"Zone 30" counter-productive with respect to emissions
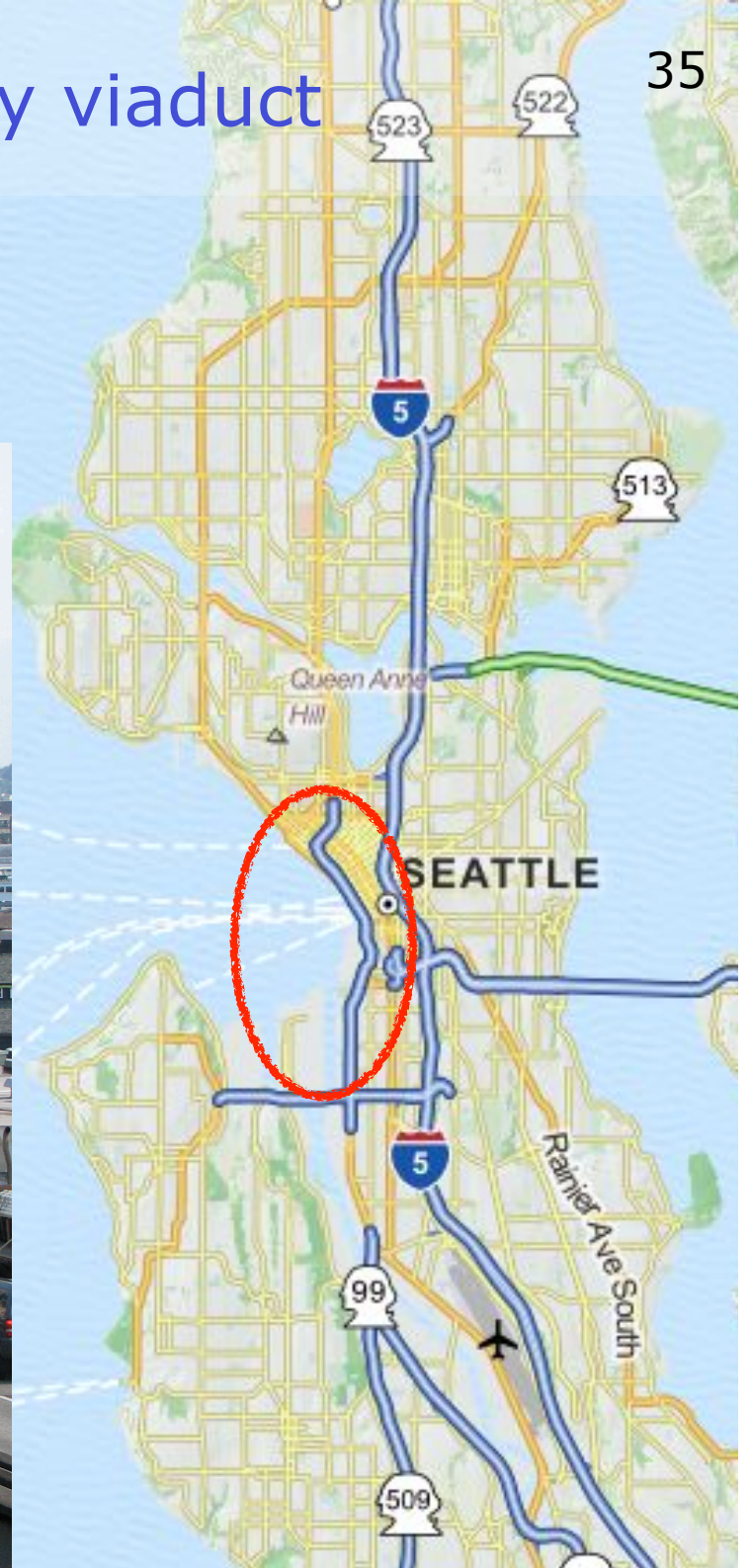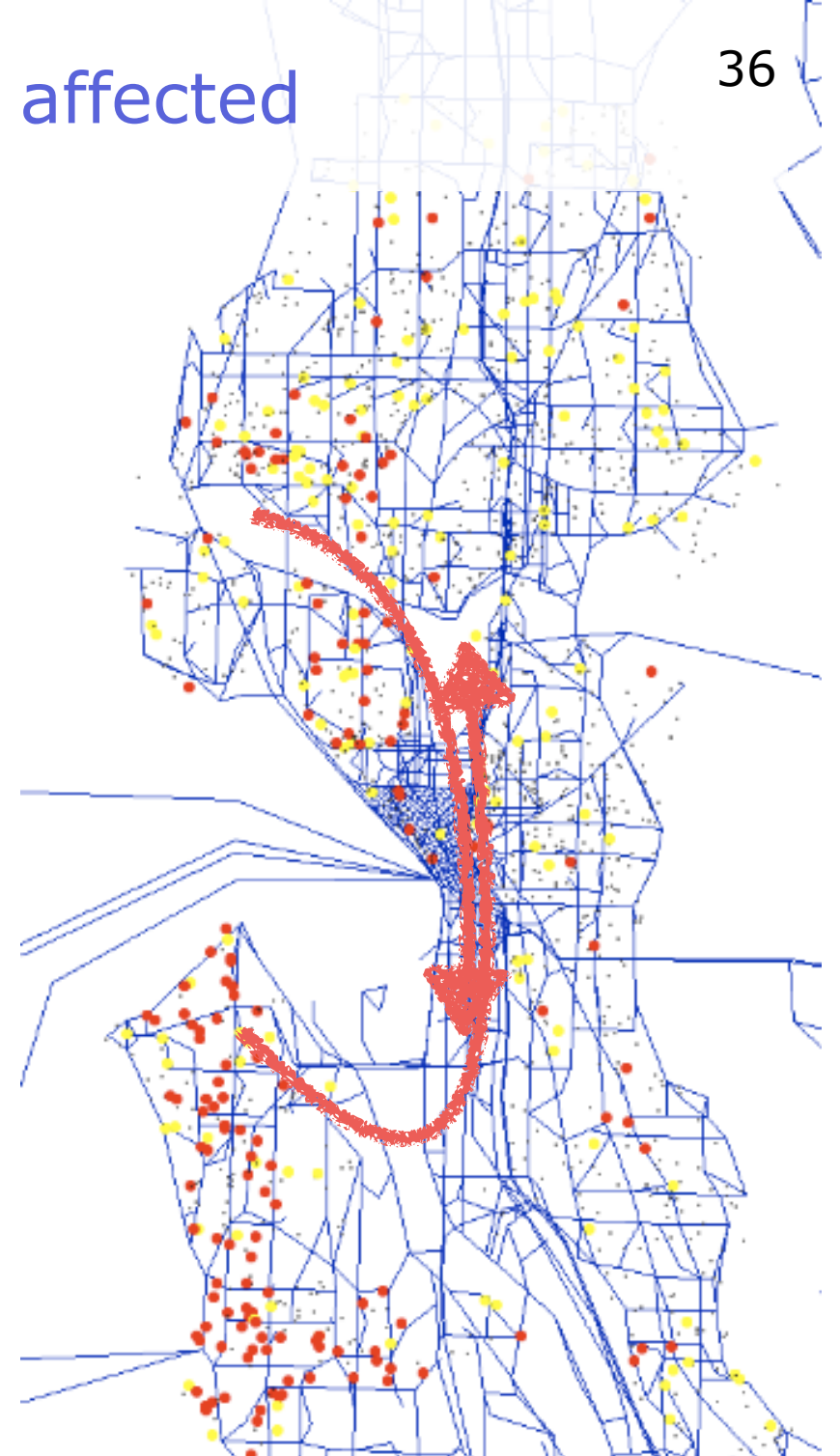May be better with respect to exposure.

More winners and losers

Since we have every agent's utility …

… we can search for agents who gain or lose a lot by a measure.

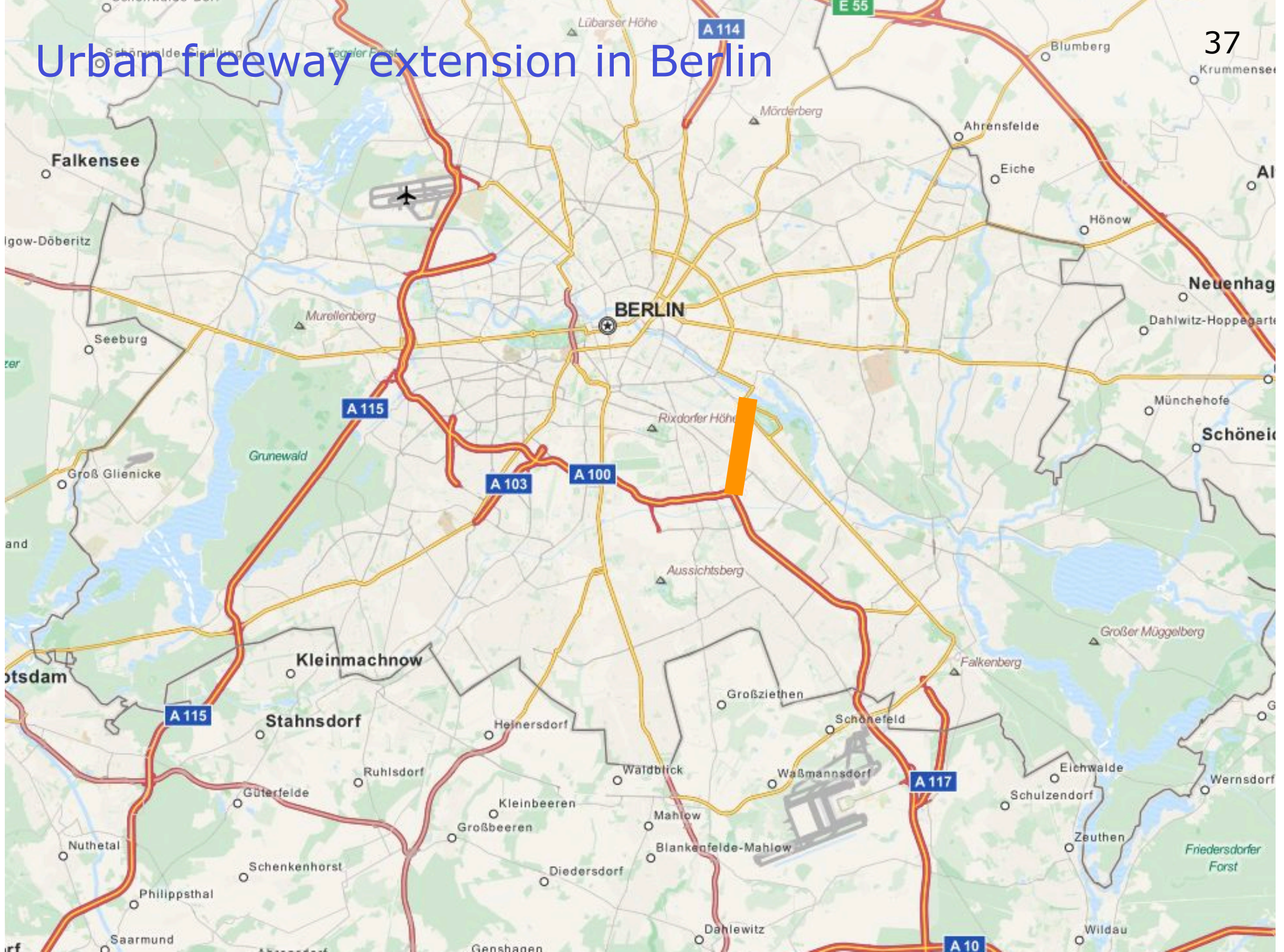# Possible removal of the Alaskan Way viaduct
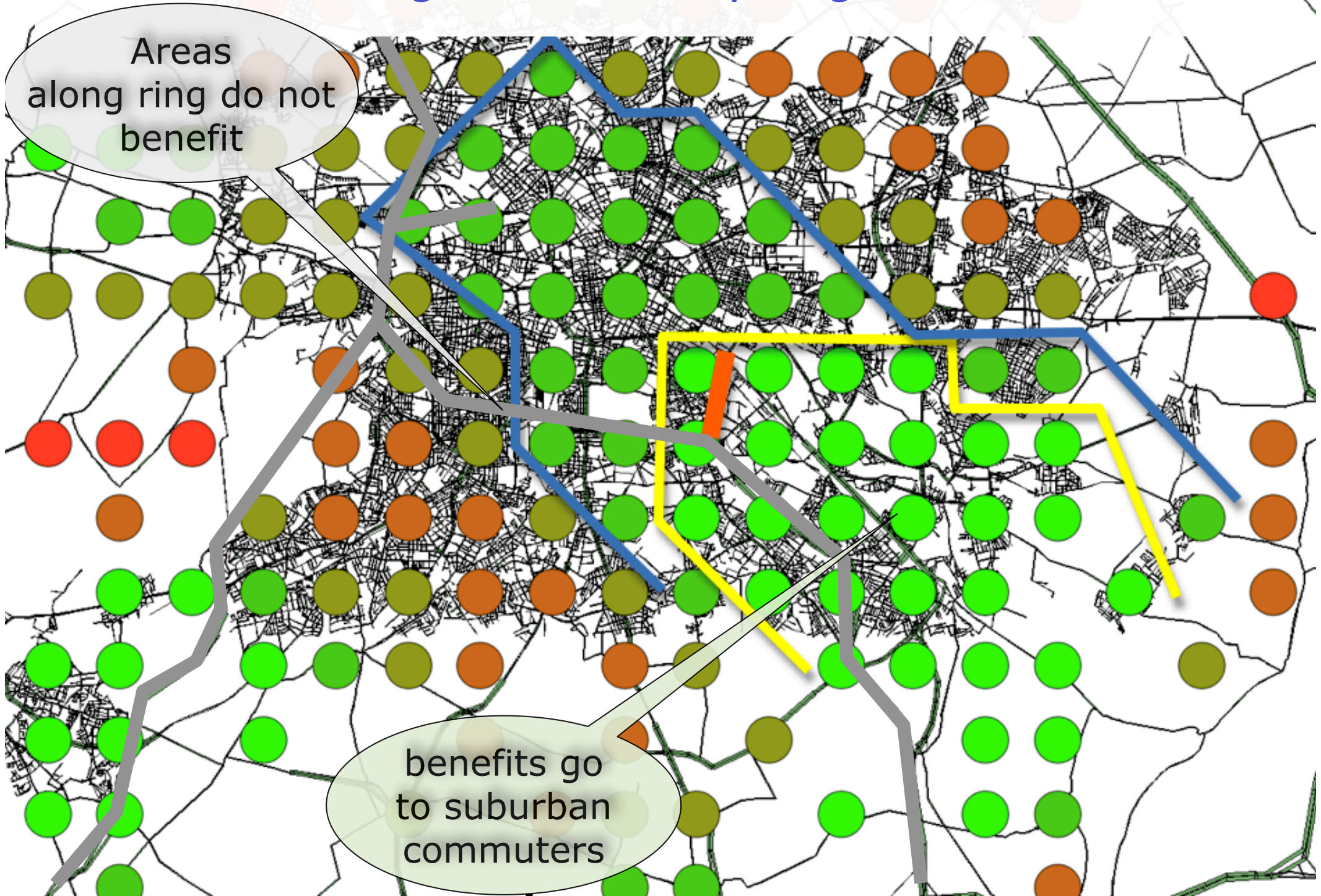
Seattle viaduct removal top 10% affected

Most affected: persons who travel "around" the bay

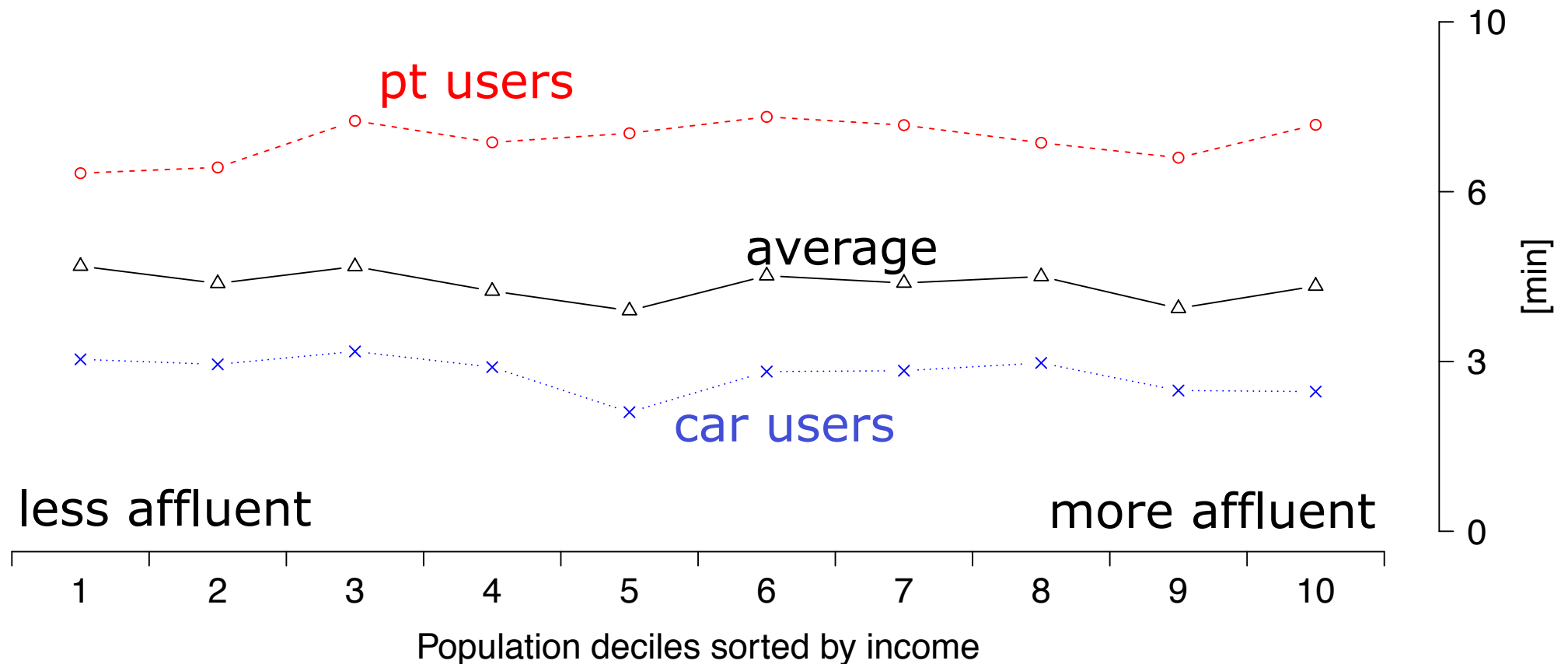w/ P. Waddell, A. Borning

Urban freeway extension in Berlin

Locations winning from freeway ring extension

Areas along ring do not benefit

benefits go to suburban commuters

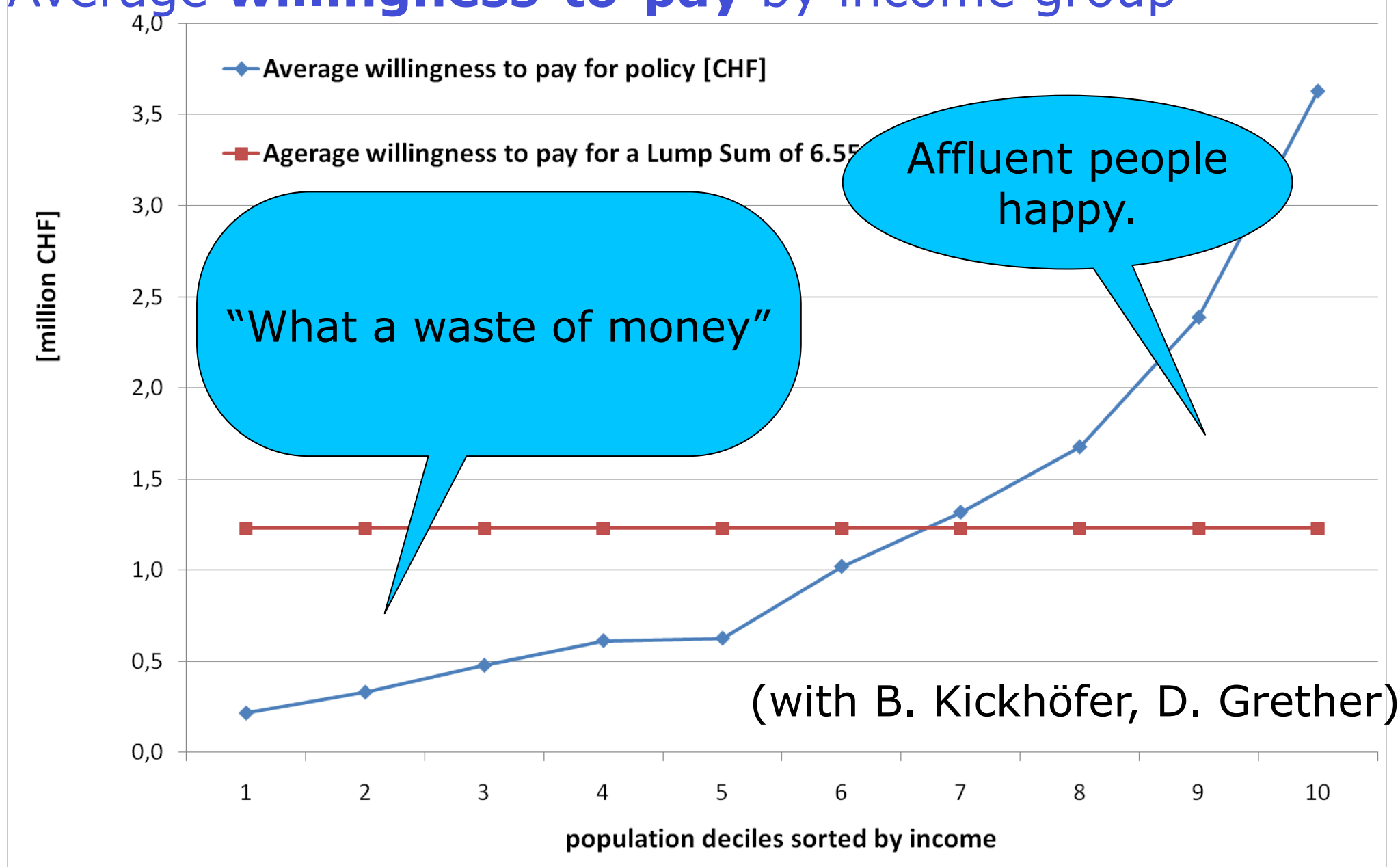- 10% pt speed increase

- Scenario Zurich

- Pt users gain about 6min per day
- Spillover to car users (3min) because of mode switchers
- No income sensitivity

(with B. Kickhöfer, D. Grether)

Measure has positive BCR, but 2/3 of population against.

Winner/loser analysis

Winner/loser analysis very **straightforward** with agent-based modelling.

Identify support/**opposition** for projects.

Benefits of **ring roads** …

- … do not go to locations along ring road …
- … but to locations outside.

Benefits of quality improvements …

- … go to the more affluent.

Conclusion

Conclusion

We have spatial models.

→ *make spatial pictures*

If no signal, maybe don't need a spatial model?

We have heterogeneous models.

→ *analyse by sub-populations*

If no signal, maybe don't need a heterogeneous model?

We (sometimes) have agent-based models.

→ *tell stories about the agents*

In my view, has to do with "believability" of models/results.

Disclaimer: addition to methodology, not replacement