Urban density change: a European perspective

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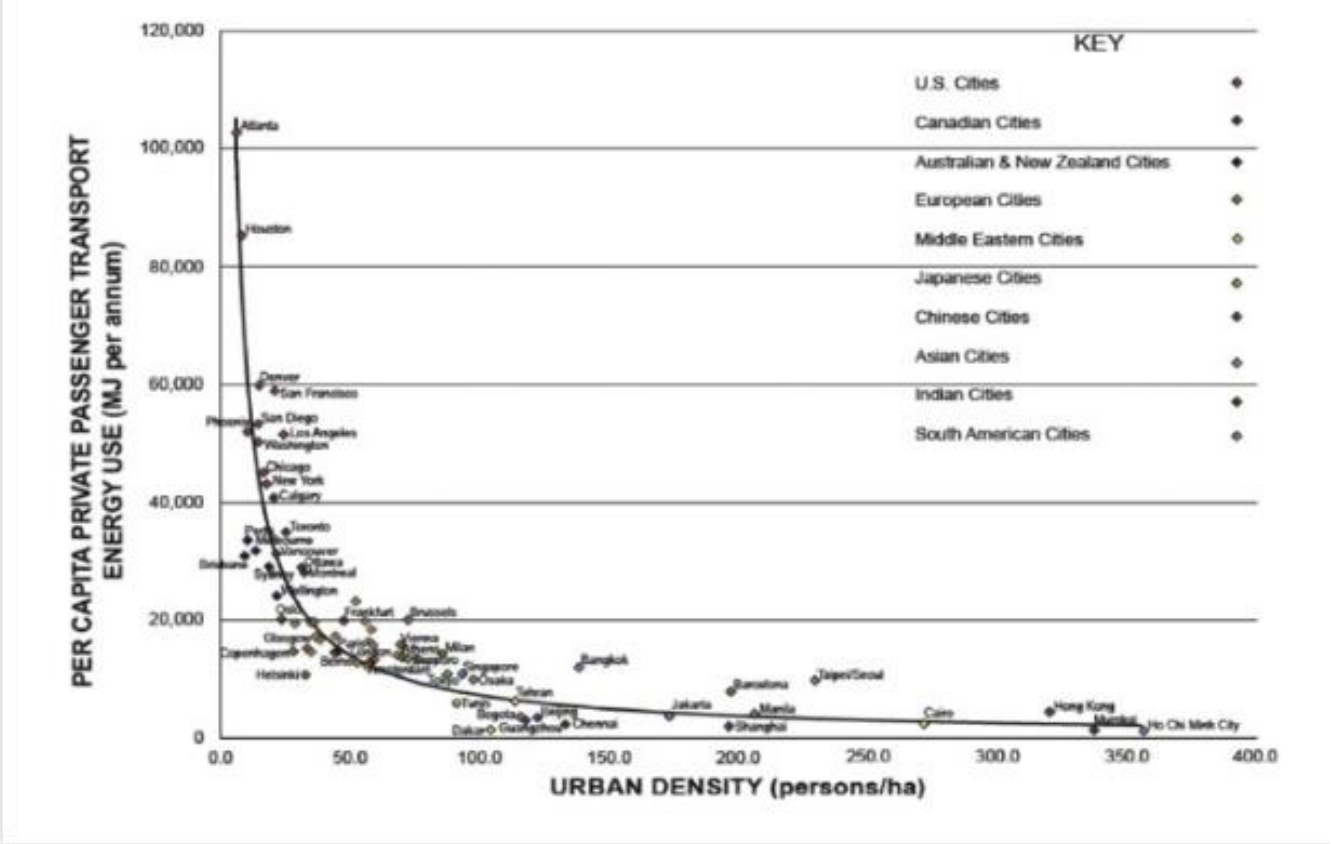
On behalf of the JRC's knowledge centre for territorial policies

European Commission, Joint Research Centre (JRC), Ispra, Italy



Source: Newman & Kenworthy, 2015

What data for measurement? What about future densities? Will densification help?

High densities often considered beneficial

Economy - Productivity assumed to rise with density

Sustainability – "a 1% increase in the share of land covered by artificial land needs to be supplemented by a 2.2% increase in the share of green infrastructure" (Maes et al, 2015)

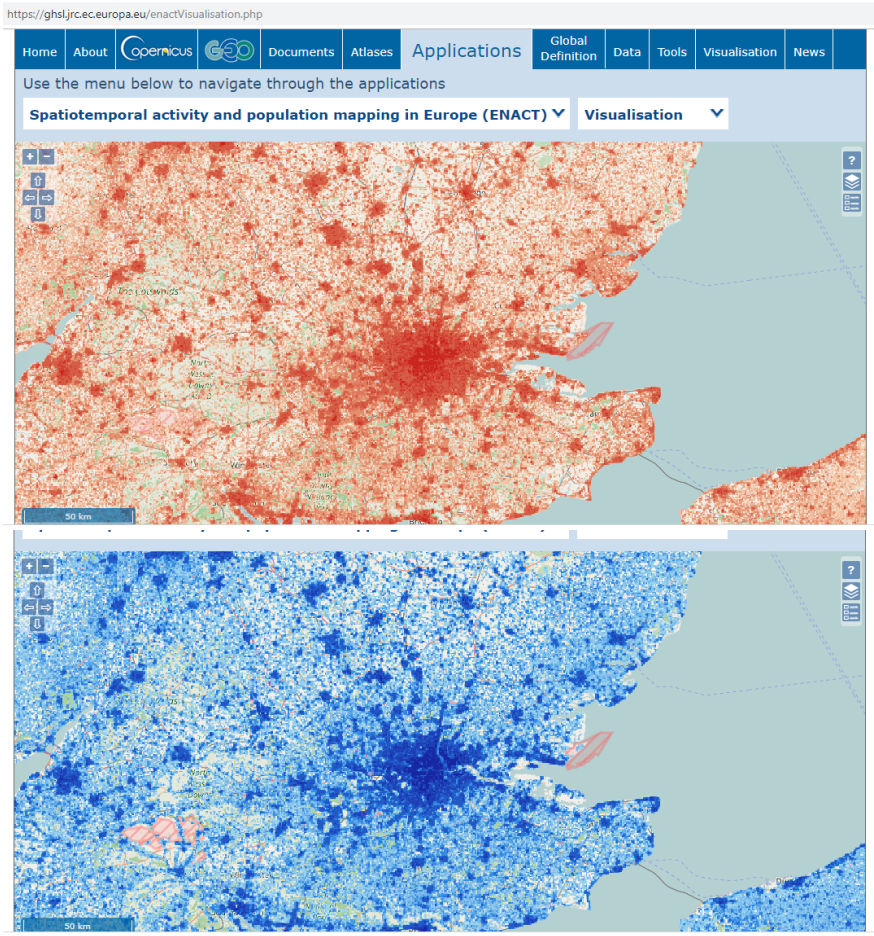
Socially – Dense enough neighbourhoods a requirement for mechanisms of selfcontrol (Jacobs, 1962; Jacobs-Crisioni et al, 2014)

Available data

DG REGIO municipal population counts 1961 - 2011

EUROSTAT census 1x1 km grid, 2011

***Soon**: JRC maps, estimated daytime and nighttime population (24 1x1 km grids)*



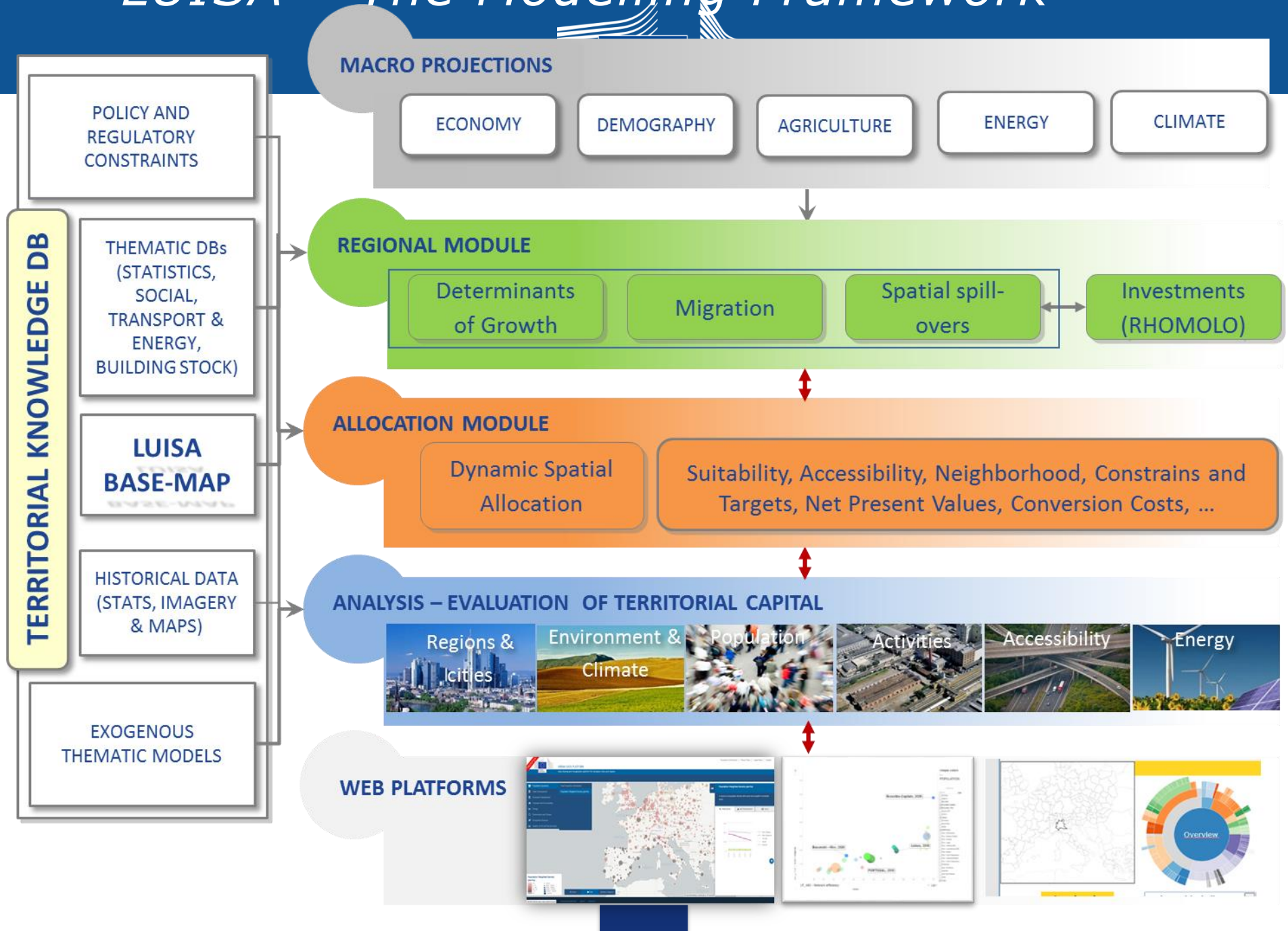
What about future densities?

EUROSTAT projections: national, downscaled to regional levels

LUISA model: creates future 100m population and land-use maps by combining regional expectations and bottom-up dynamics

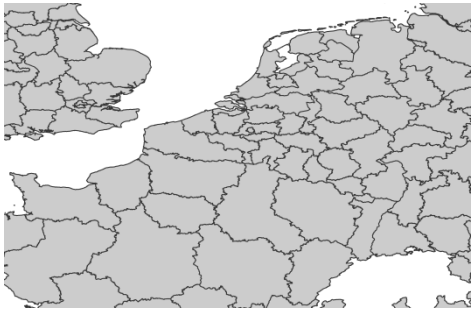
Context of the knowledge centre for territorial policies

LUISA – The Modelling Framework

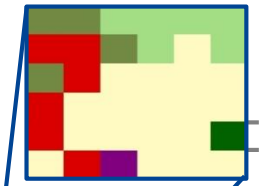


European Commission

Expectations

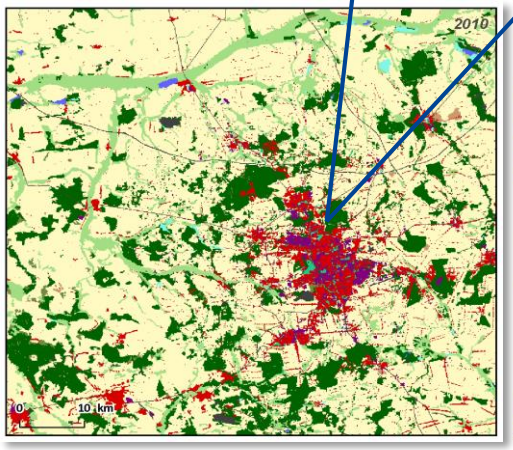


GDP, population, …

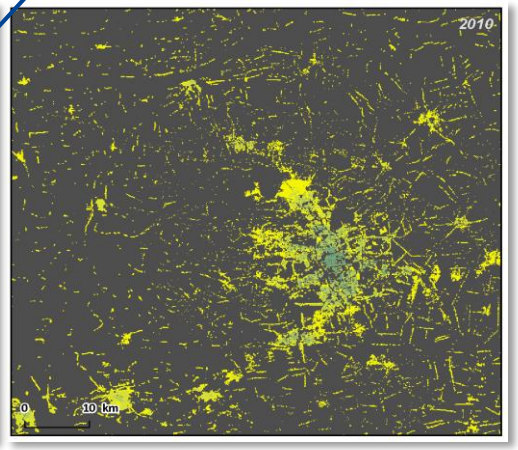


100 m

Land use changes

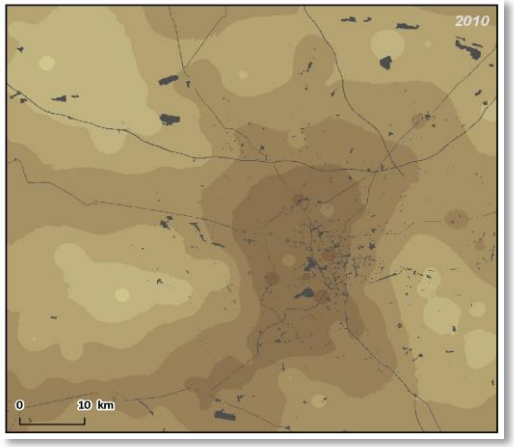


Population distribution



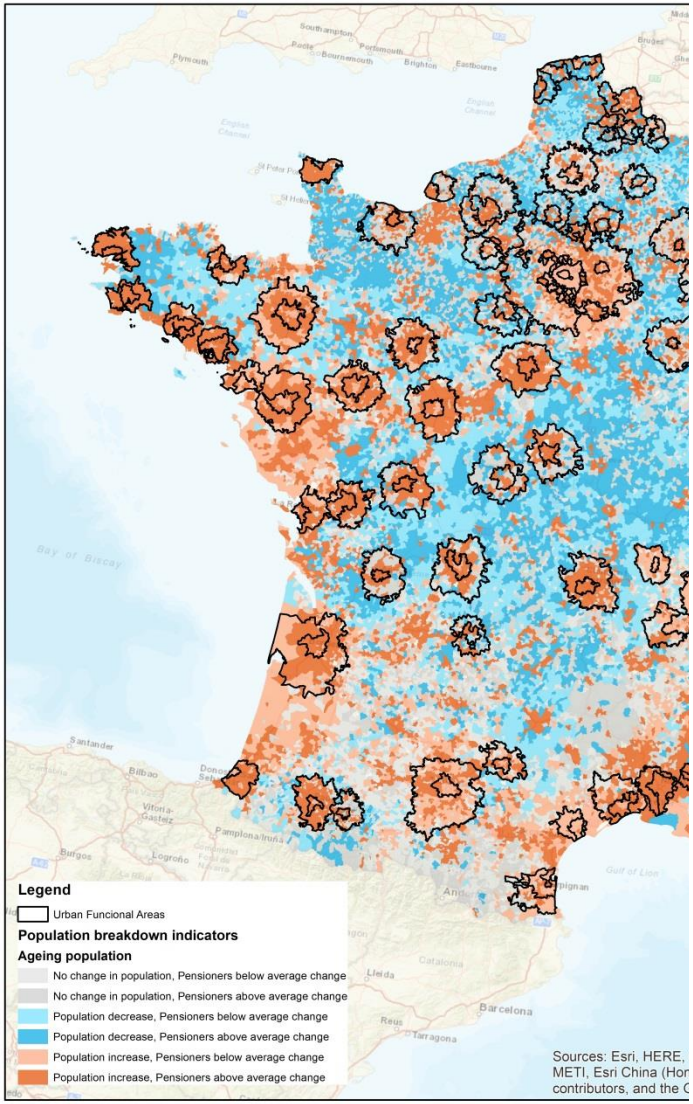
Lowest
Medium
Highest

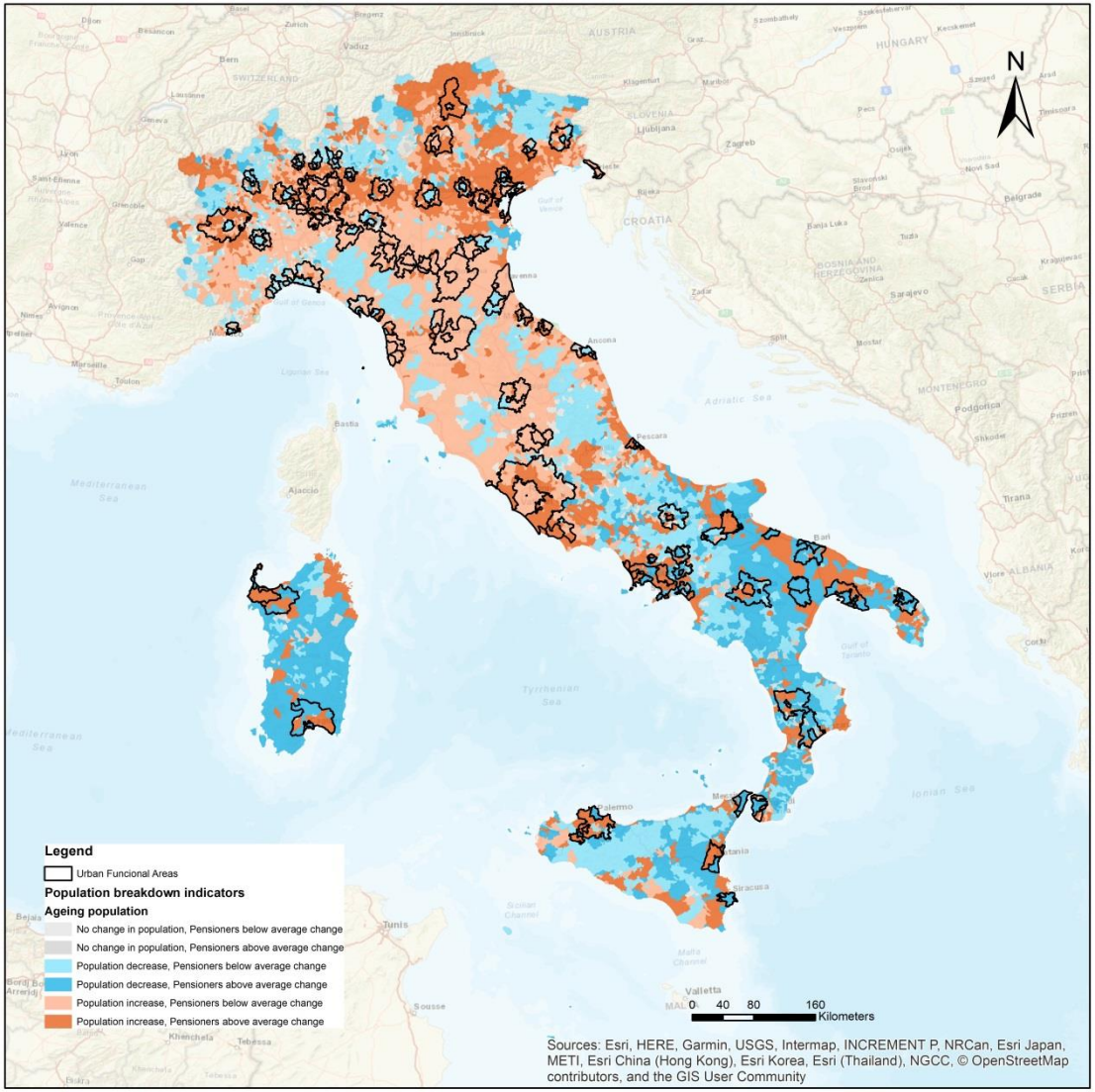
Accessibility



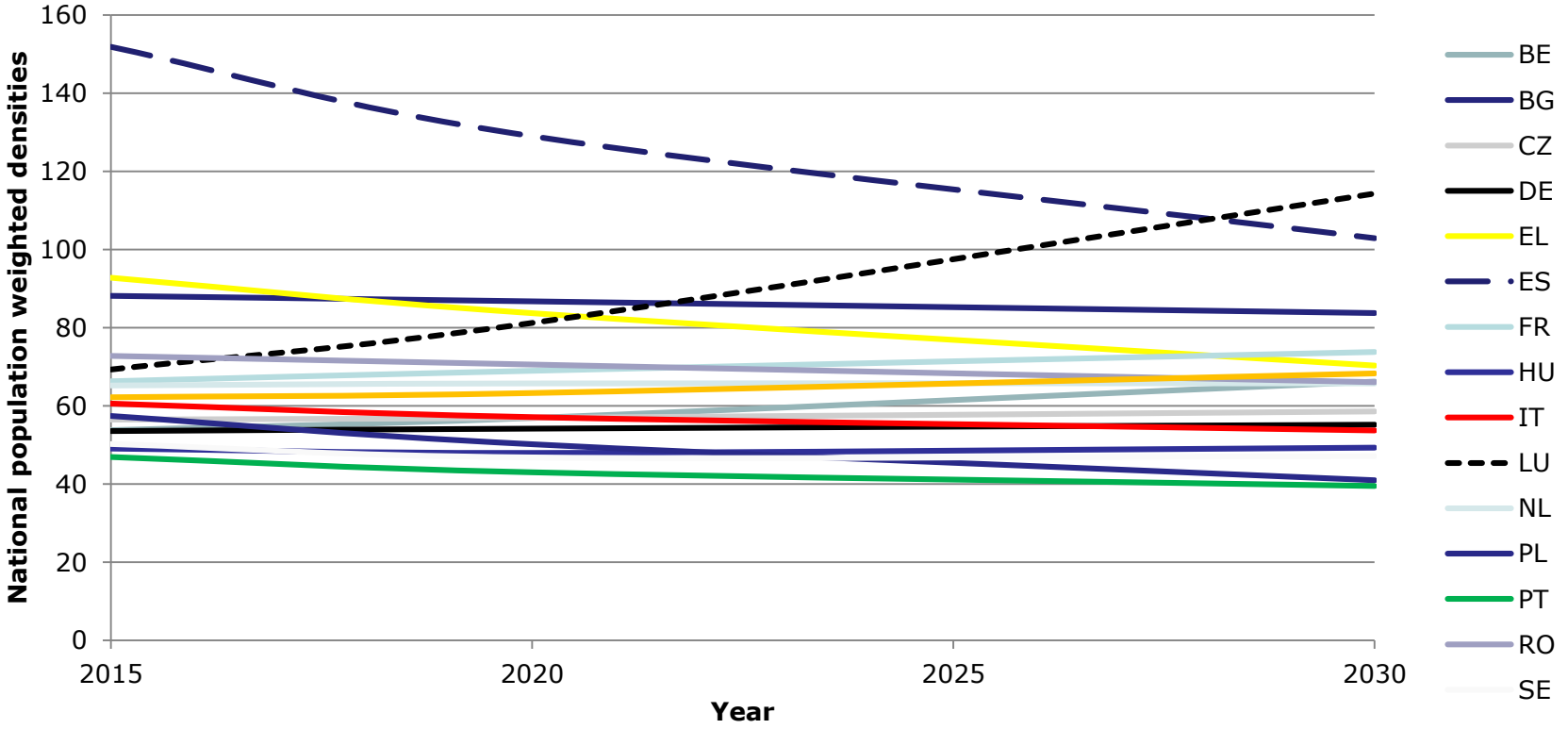
Lowest
Medium
Highest

NEW: population change per age class

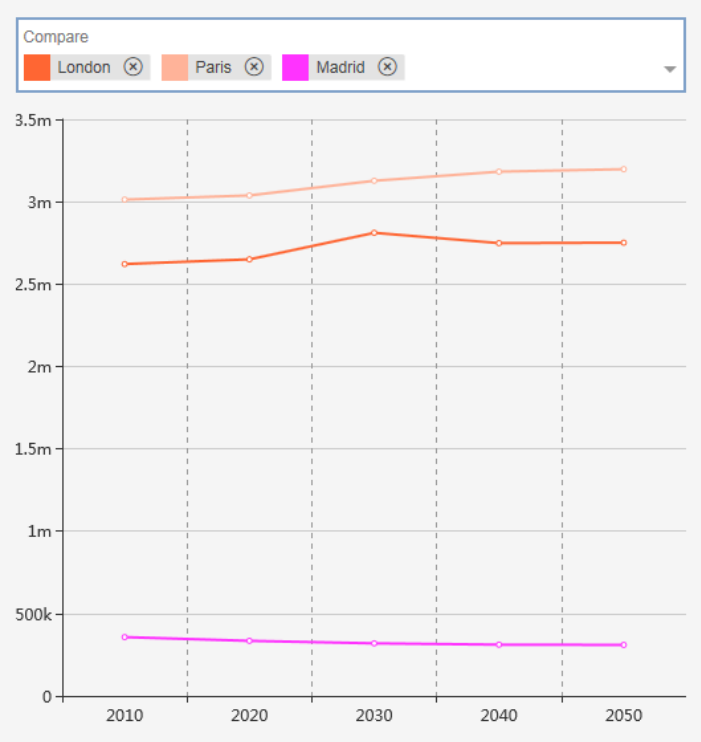




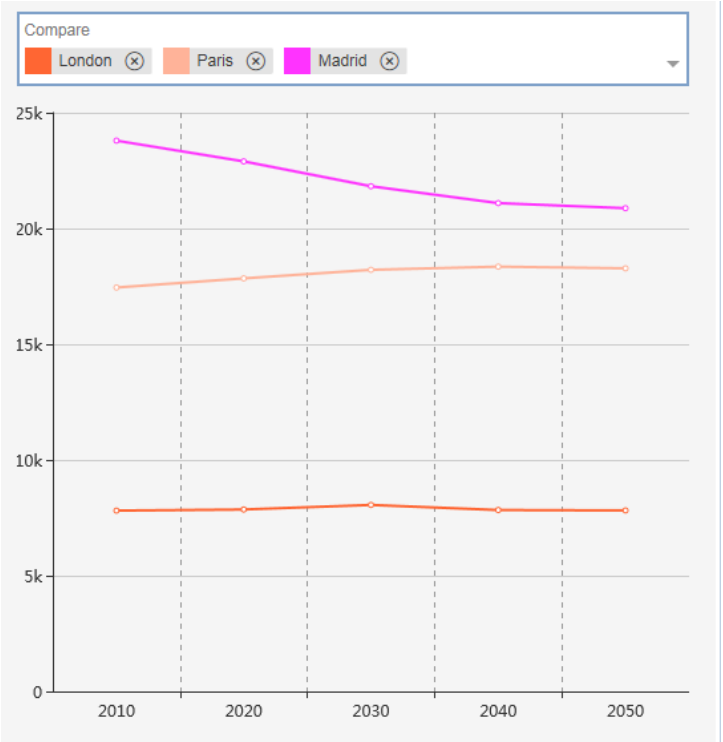
Population weighted density expectations



Many more indicators available through urban.jrc.ec.europa.eu



People exposed to annual mean concentrations of NO2 superior to 40 µg /m3 of air



Population weighted density expectations

Will densification help? A spatial interaction perspective

Are densities advantageous to agglomeration benefits, transport energy consumption, neighbourhood self control because of increased local interaction opportunity?

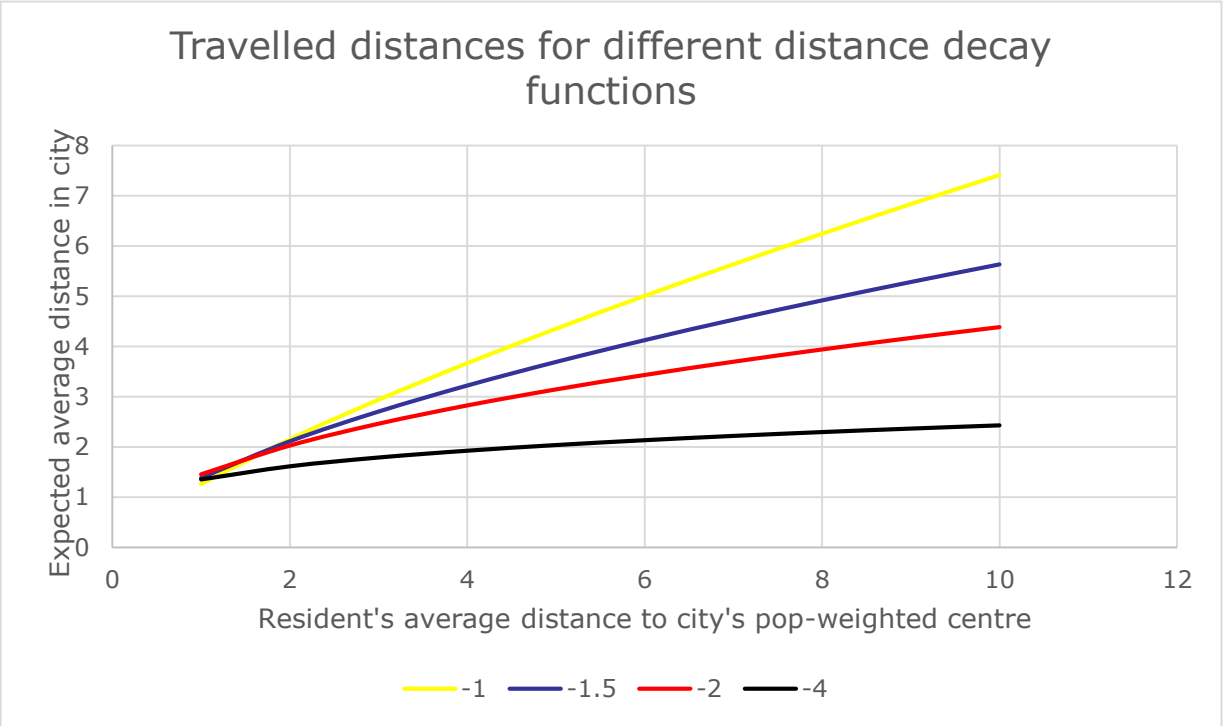
$D_i = P_i/area_i$ *vs* $A_i = \sum_{j=1} P_j/d_{ij}$

On the one hand, yes

For spatial interaction *within* a city….

… it may be expected that in denser cities:

- travelled distances go down
- opportunities for walking, cycling go up



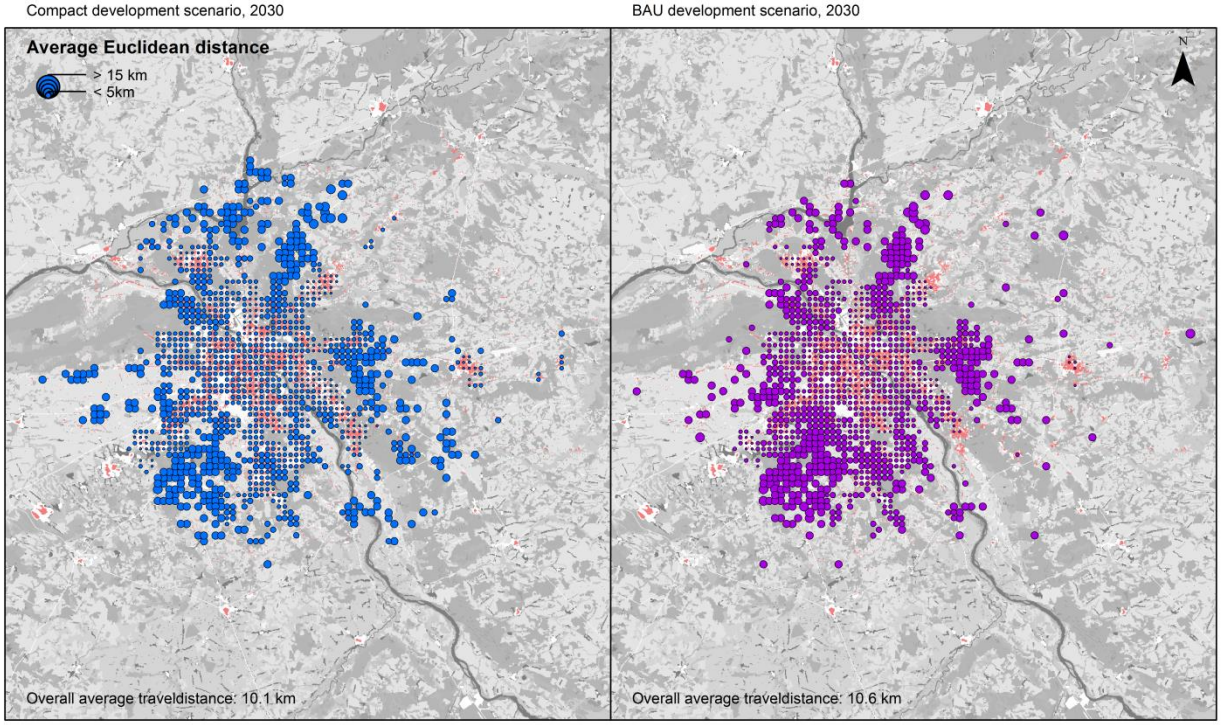
Stepniak & Jacobs-Crisioni, 2017, Reducing the uncertainty induced by spatial aggregation in accessibility and spatial interaction applications. JTrG 61: 17-29

A spatial interaction perspective

Straightforward origin-constrained SIM 1x1km

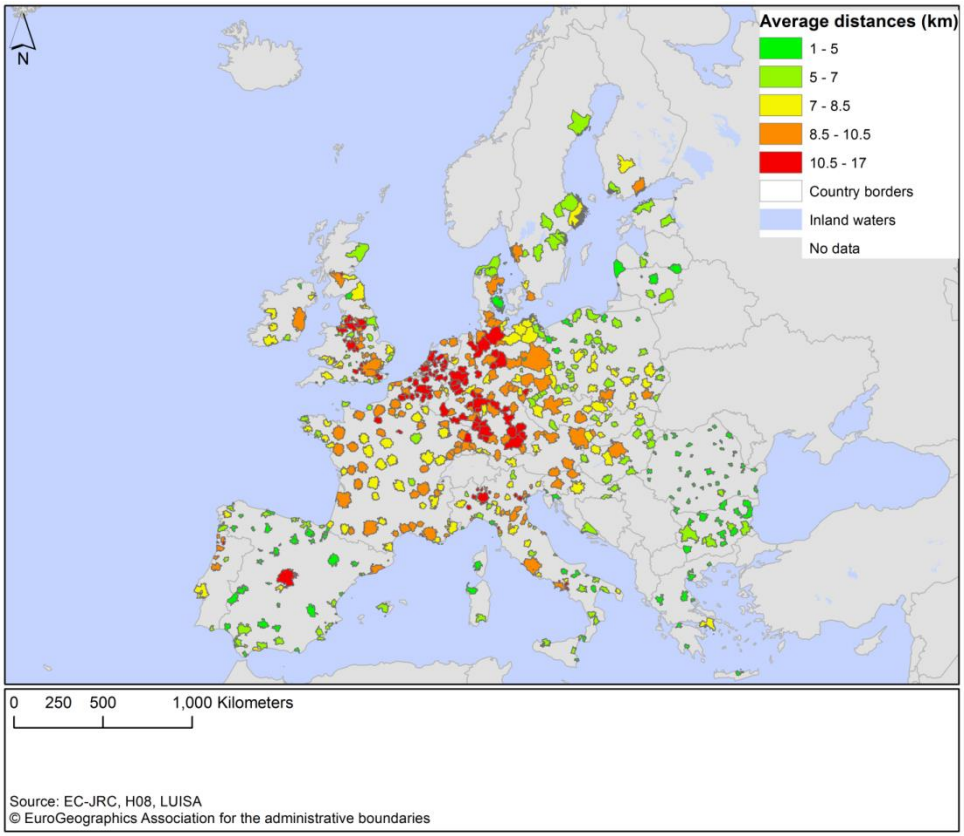
Destinations <45 min

Uniform behaviour, no elasticities



Average Euclidean distances given an origin-constrained spatial interaction model and over the road travel times.
Study area: Warsaw, Poland. Population at the origins differs as a result of different LUISA scenario assumptions.
Only points with modelled population increases are shown. Map by Chris Jacobs-Crisioni, Unit H08, JRC

Travel times used for this study from Instytut Geografii i Przestrzennego Zagospodarowania PAN, Warsaw, Poland



"cities are no islands"

Potential accessibility	2.18** (26.41)
Pop-weighted density	-2.86** (-26.04)
Constant	8.57** (61.28)
N	663
R2	0.62

* p<0.05, ** p<0.01

Thanks! Questions?

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