

THE FUTURE OF CITIES: SCIENCE, PLANNING AND POLICY

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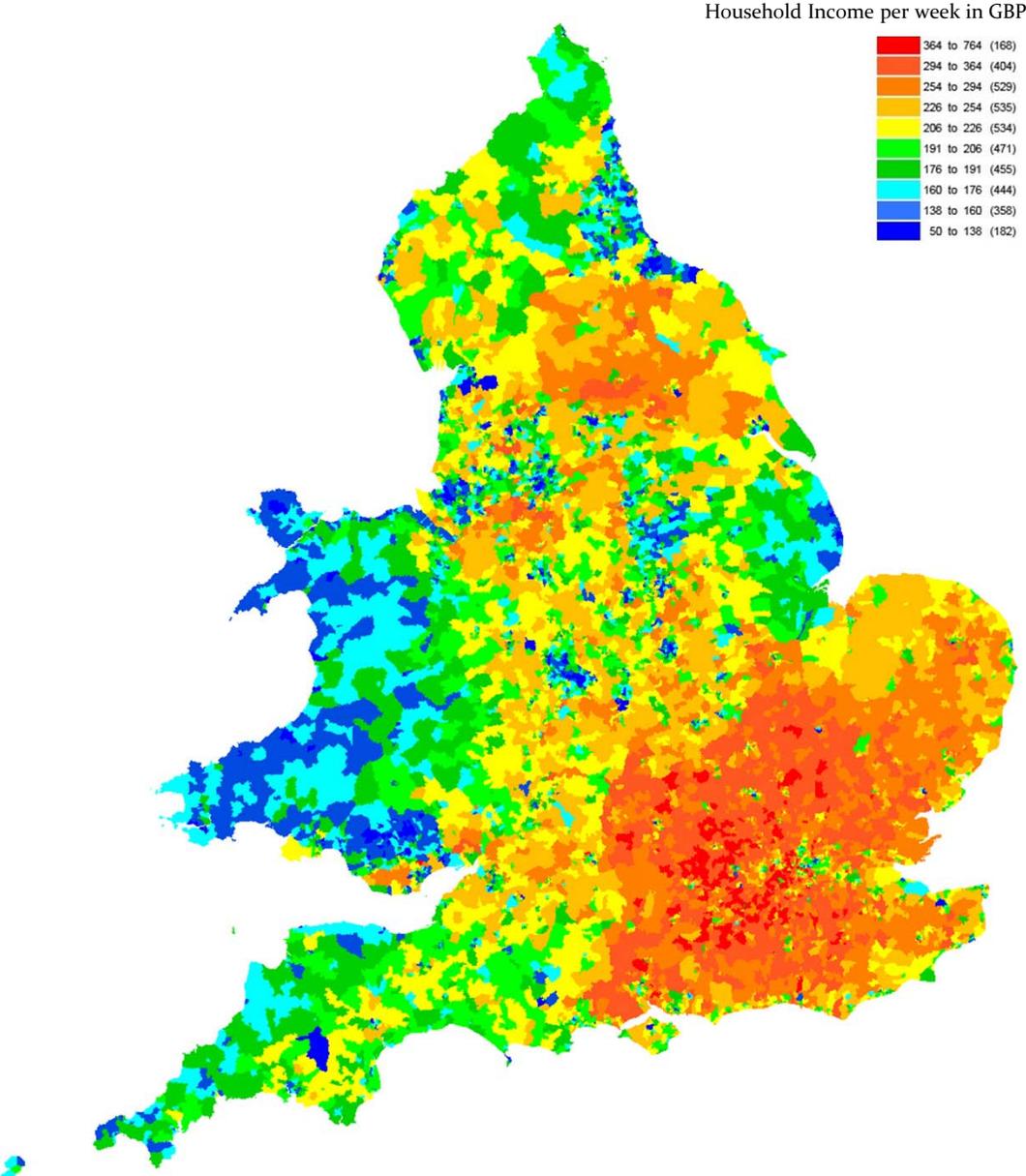
- aims:
 - to sketch an outline of the new Foresight ***Future of cities*** project
 - and to show how the science of cities and regions has developed to a point where it can make new contributions to our understanding and hence to policy development and planning

- this is a heavily populated field, highly interdisciplinary, but rather fragmented
- it brings together concepts from mathematics, computer science, physics, ecology, geography, economics, sociology and political science as well as the professional disciplines of planning and engineering
- integration, however, is challenging

Systems of interest

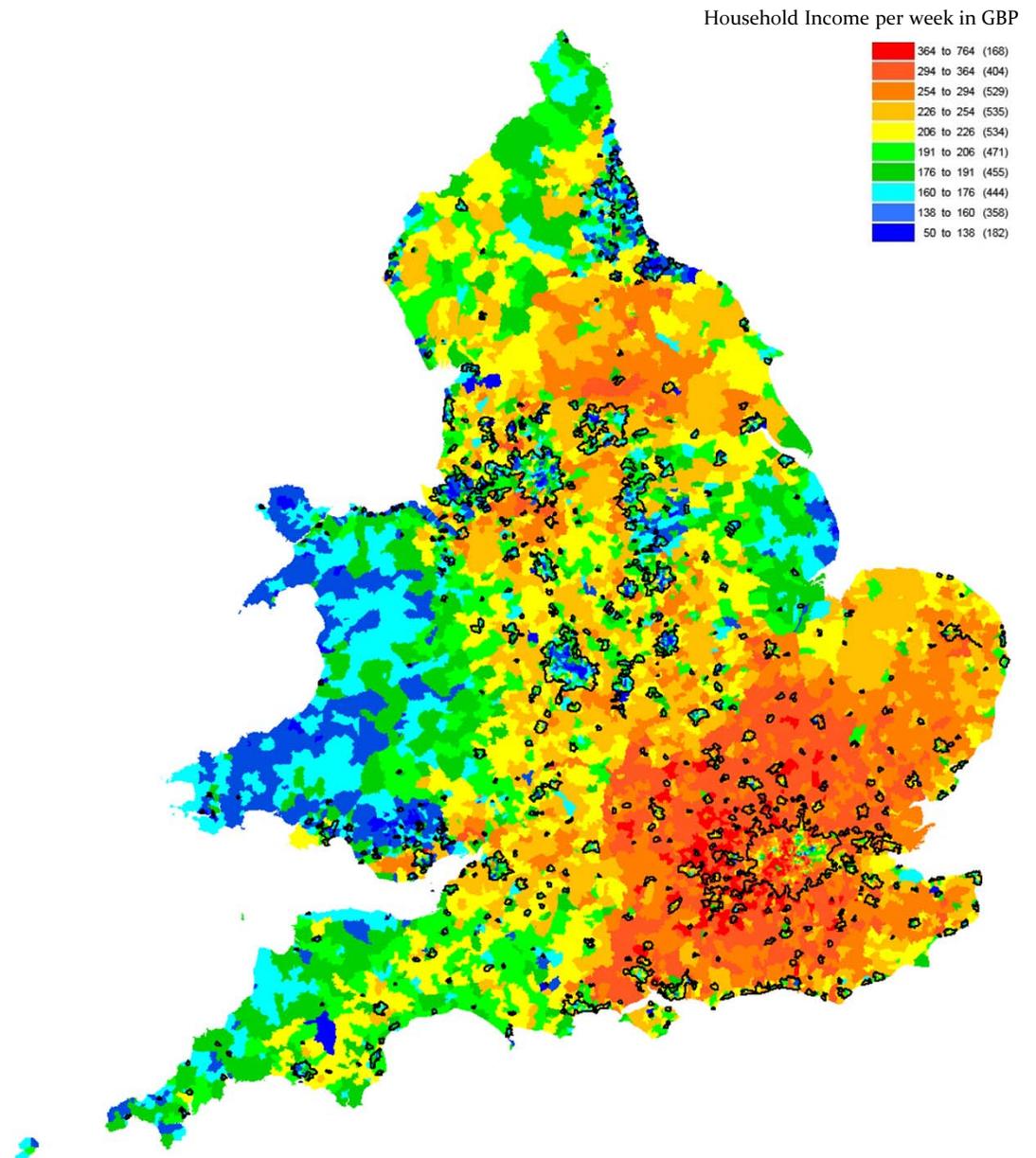
- the UK system of cities
- and some 'demonstrator' cities and regions

Income per capita at the ward level for England and Wales



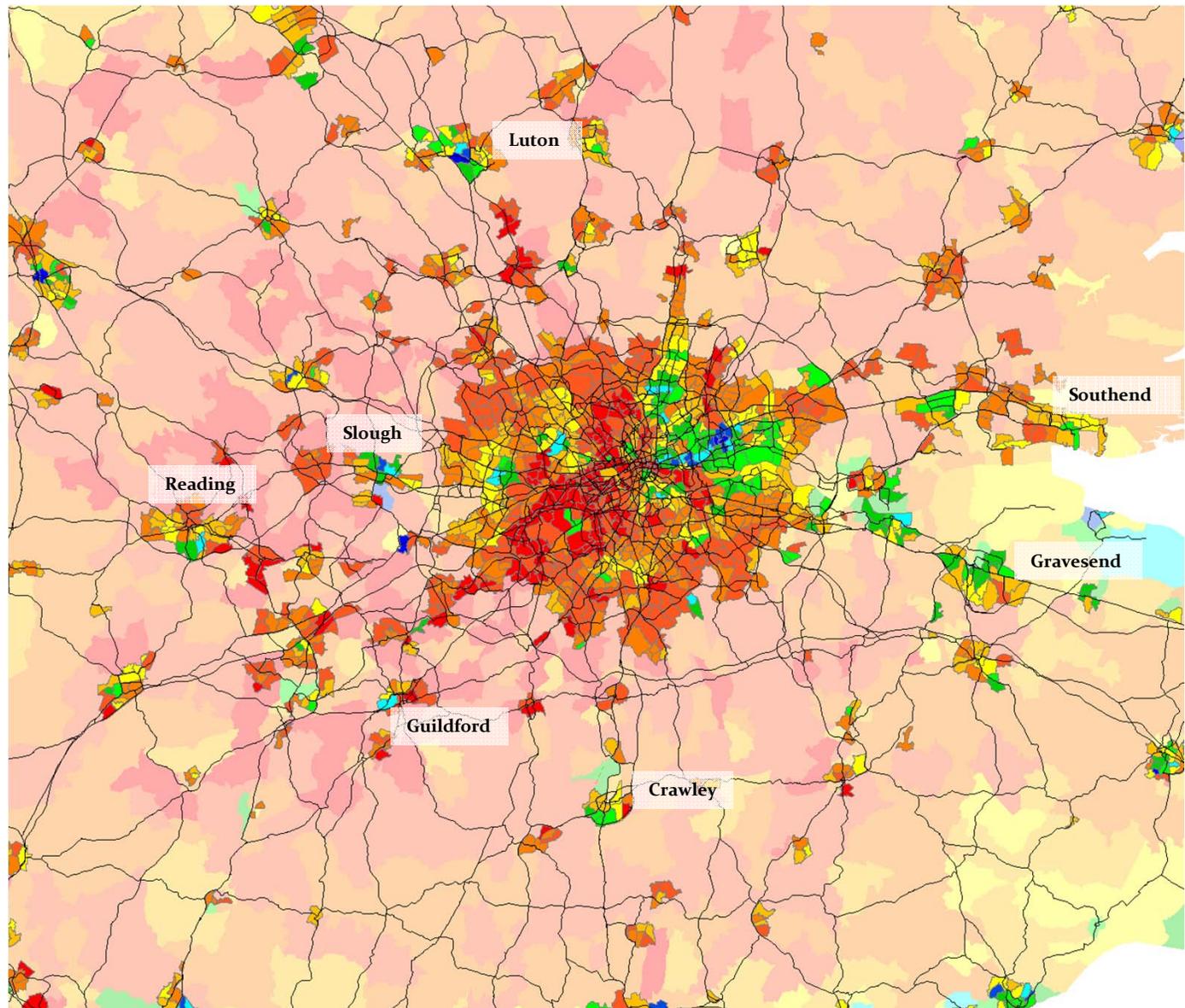
Income per capita at
the ward level for
England and Wales

City boundaries
defined by density /
morphology



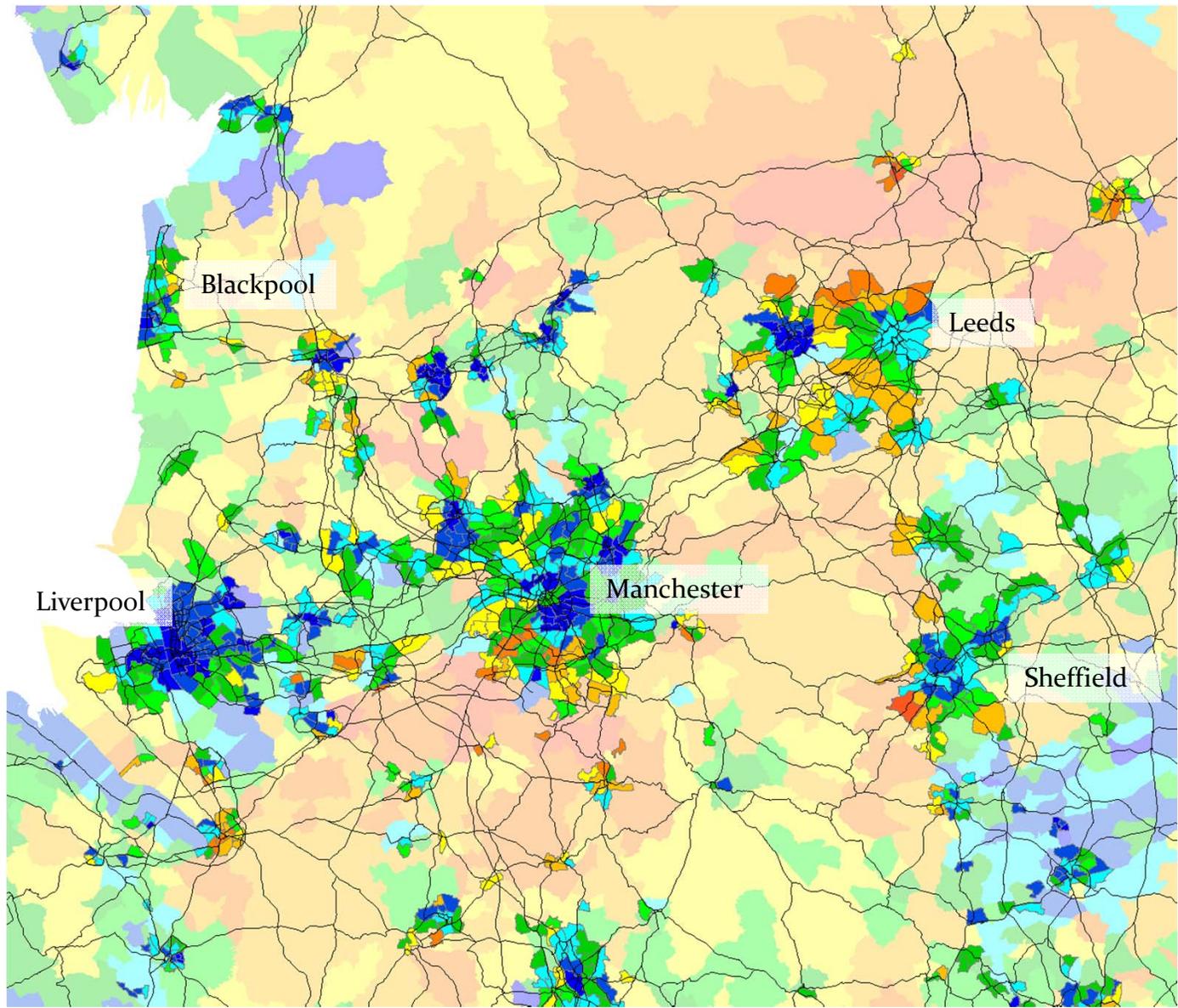
Income per capita at the ward level for the London region

Household Income per week in GBP



Income per capita at the ward level in the North West and Yorkshire

Household Income per week in GBP



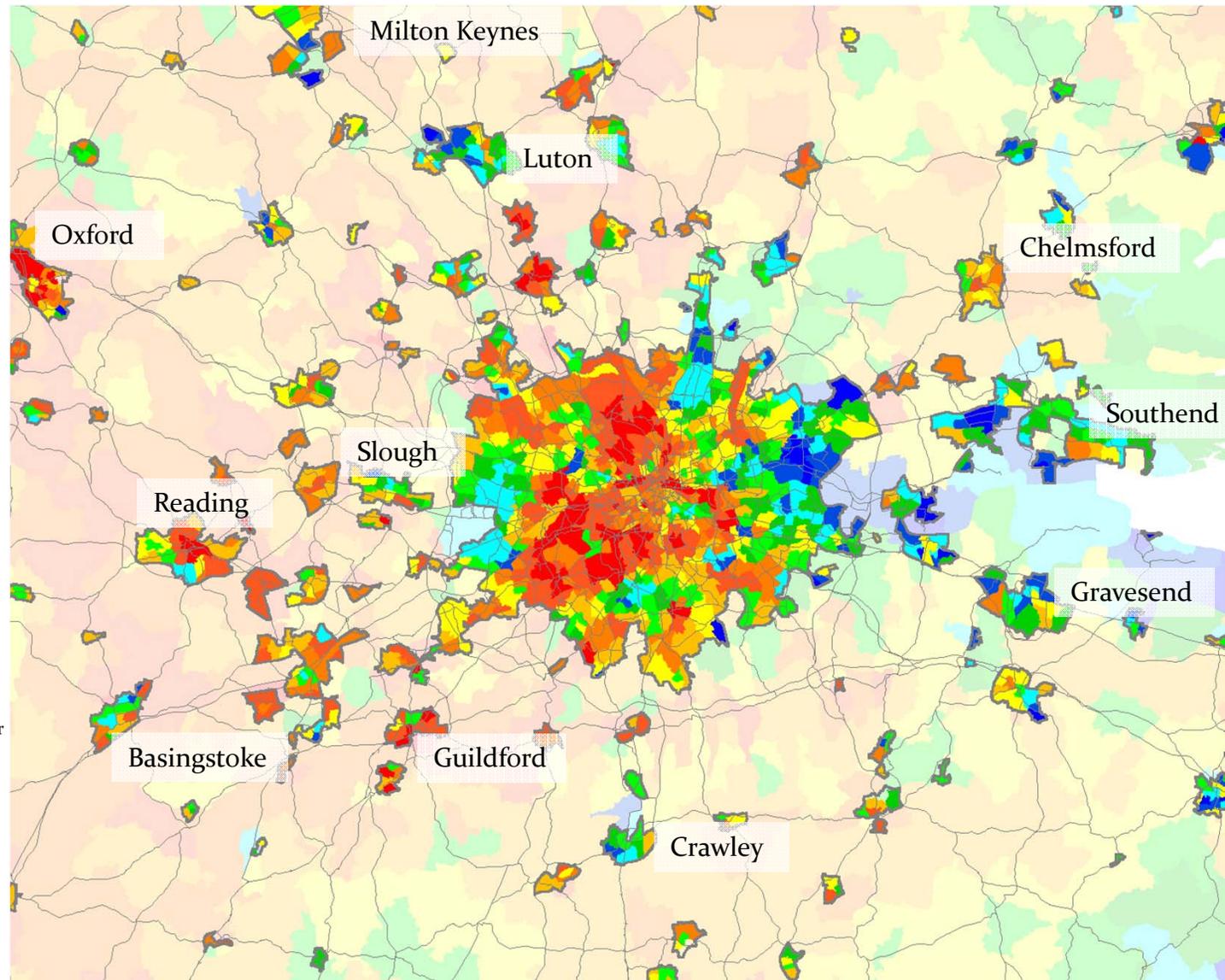
Household Income per week in GBP

364 to 764	(168)
294 to 364	(404)
254 to 294	(529)
226 to 254	(535)
206 to 226	(534)
191 to 206	(471)
176 to 191	(455)
160 to 176	(444)
138 to 160	(358)
50 to 138	(182)

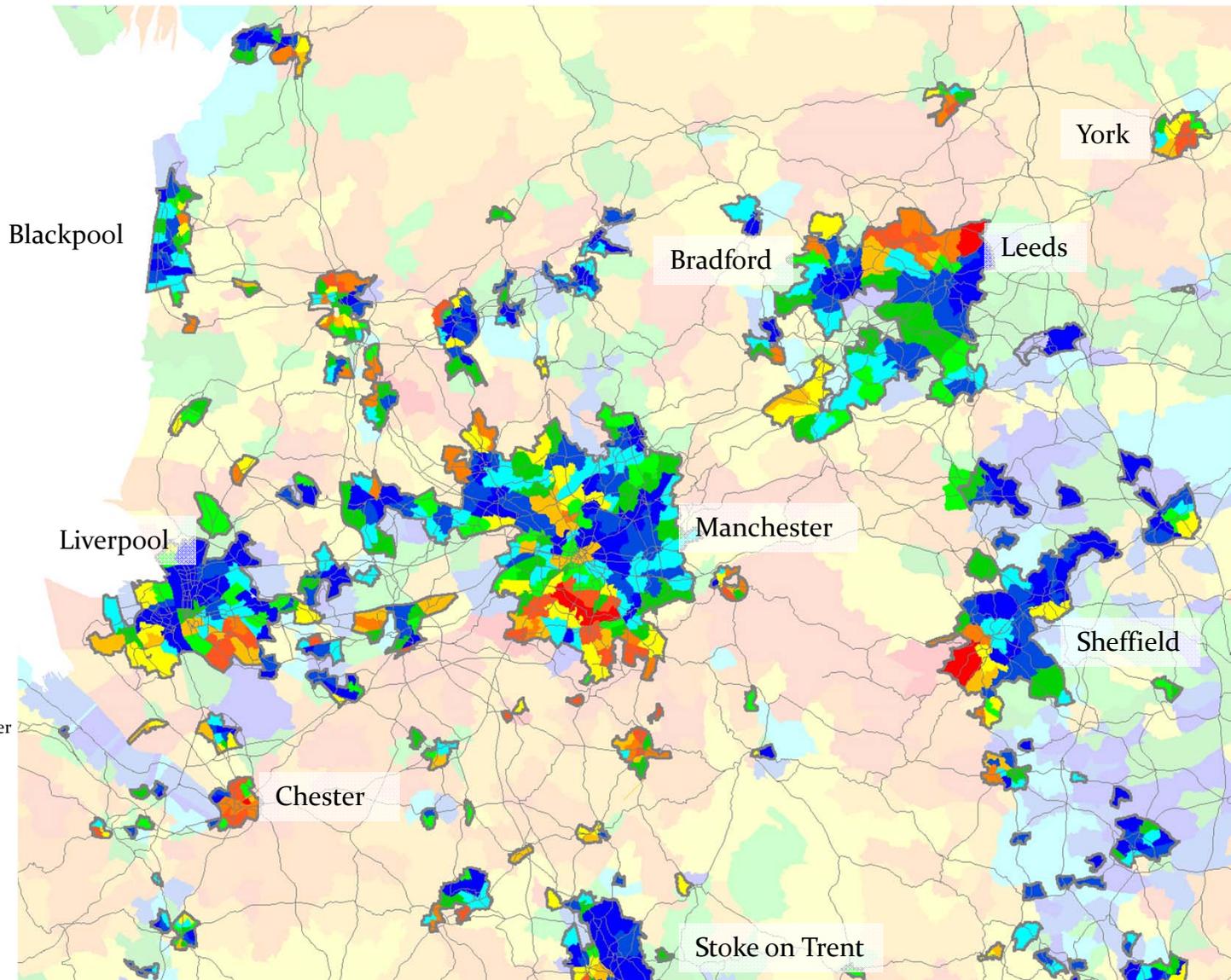
Professional services employment per 1000 residents London

Household Income per week in GBP

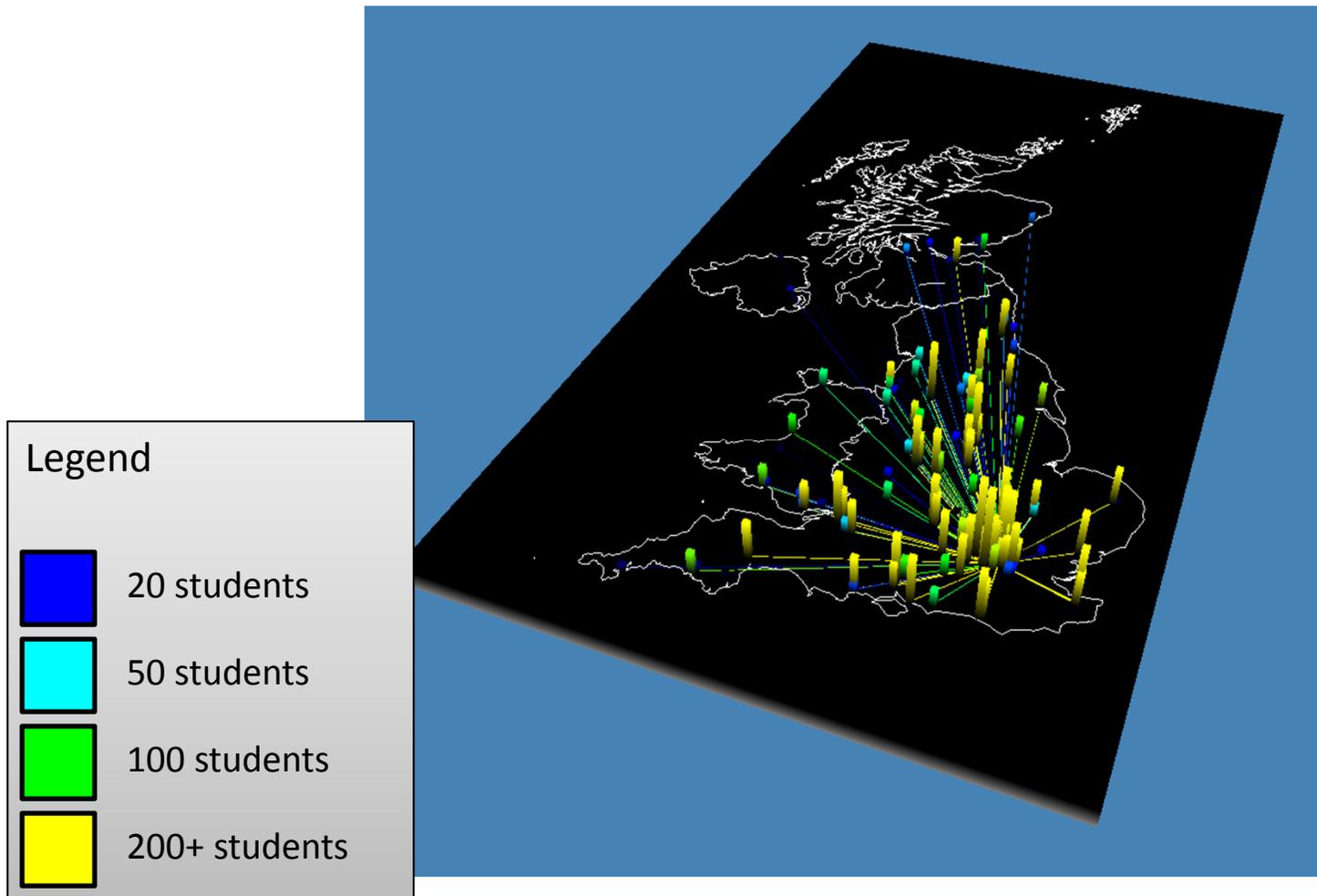
Professional services employment per 1000 residents



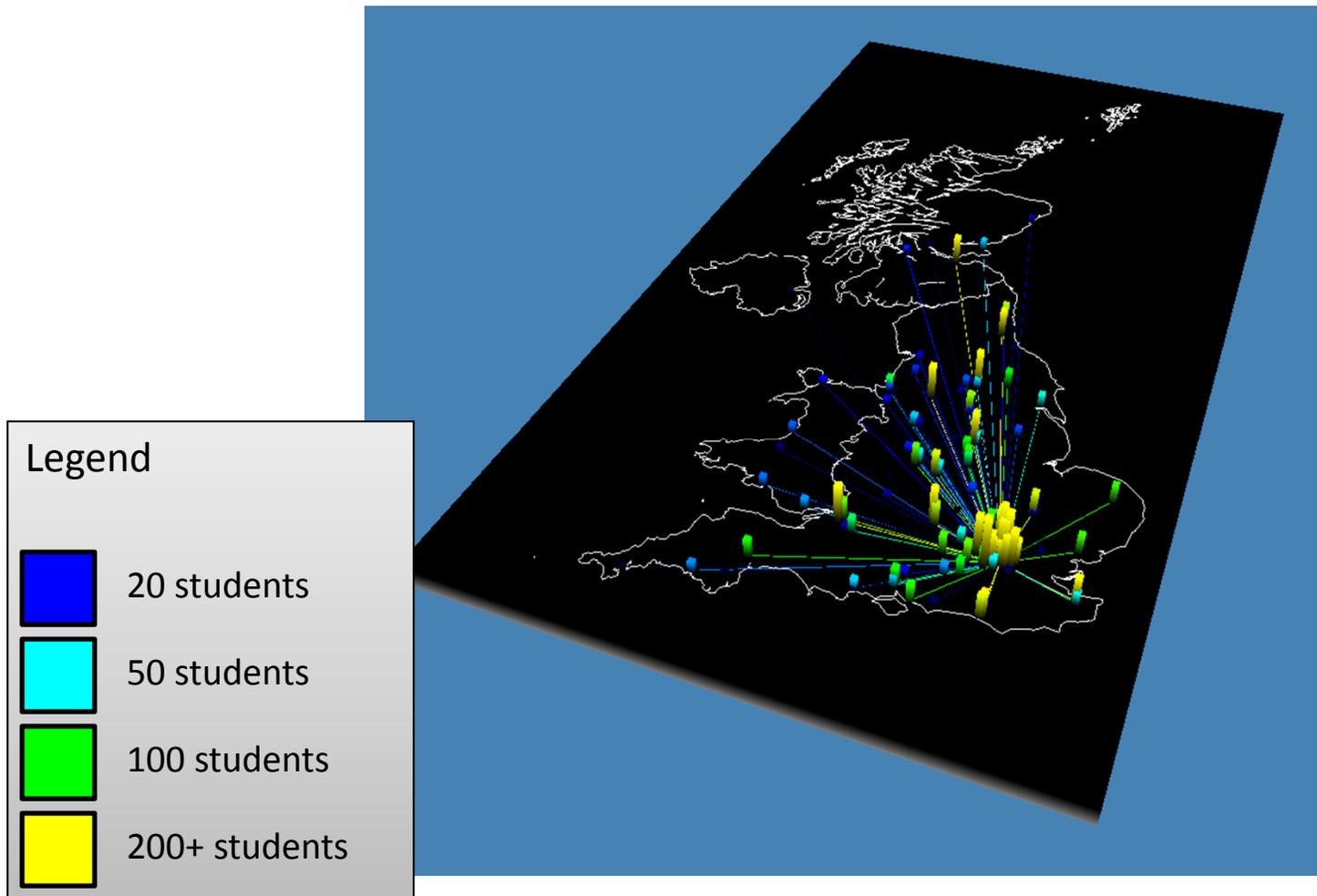
Professional services employment per 1000 residents North West and Yorkshire



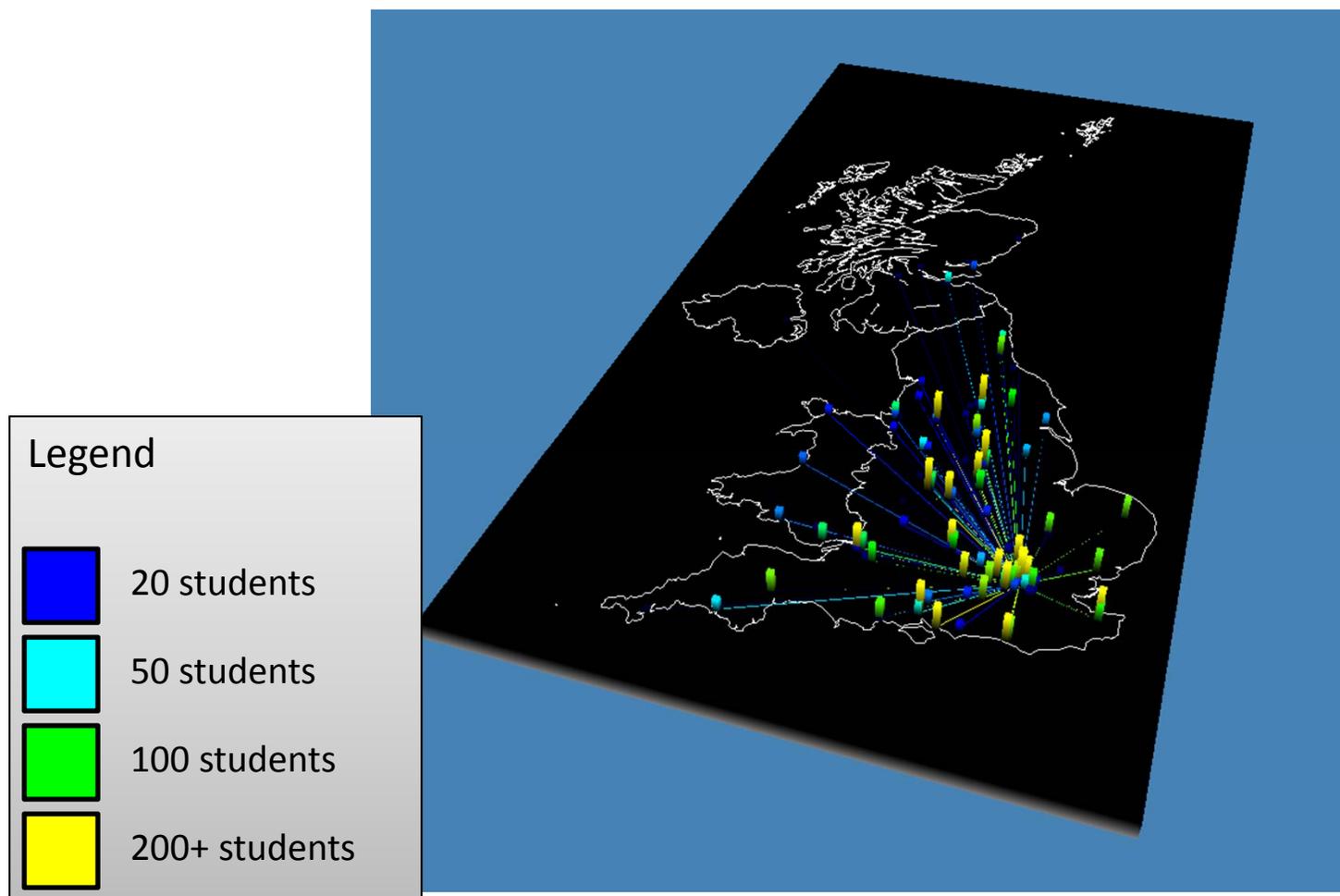
Outer London NUTS2 area student flows to university (all schools)



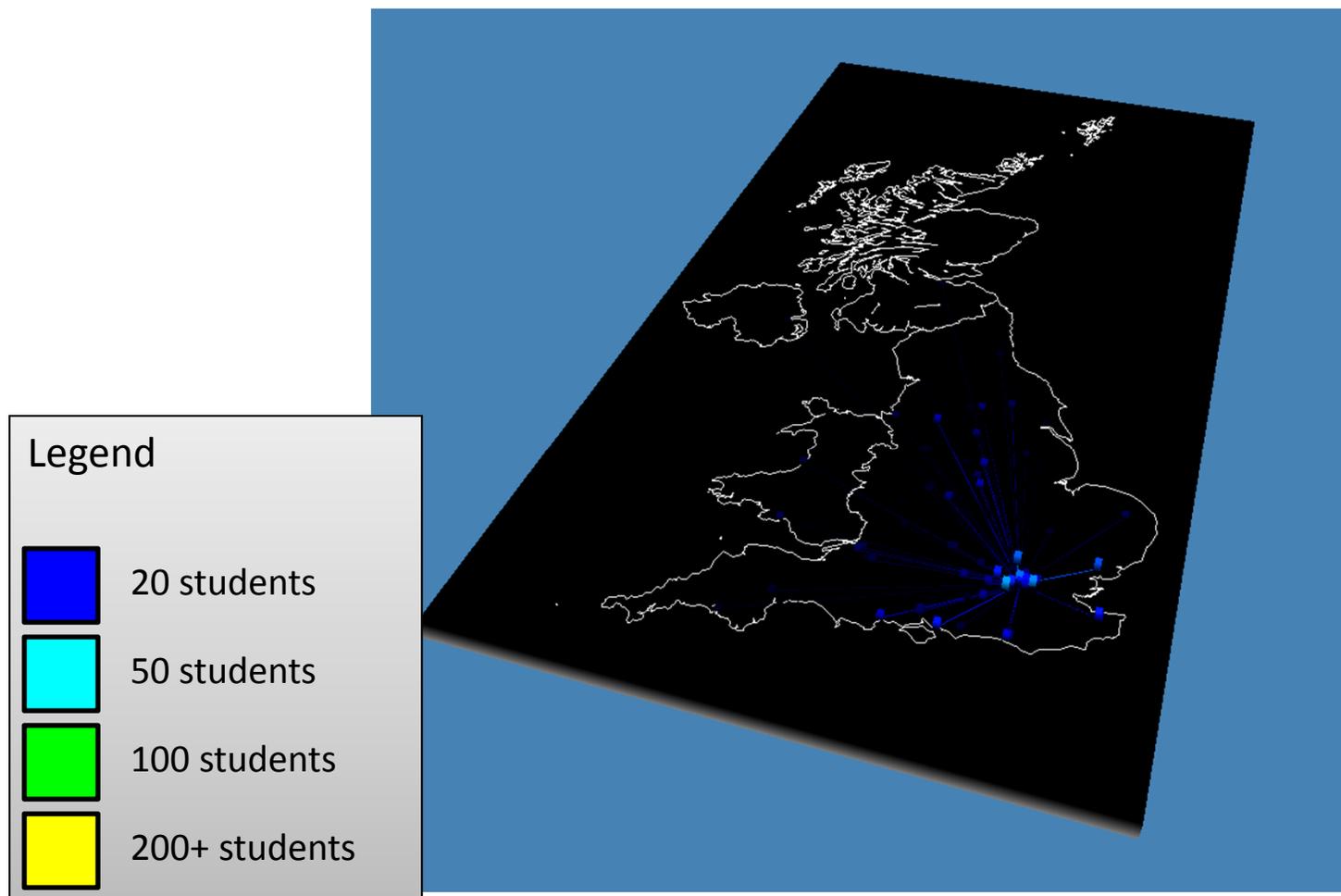
Inner London NUTS2 area student flows to university (all schools)



Inner and Outer London NUTS2 areas student flows to university (Prospering Suburbs)



Inner and Outer London NUTS2 areas student flows to university (Blue Collar Communities)



The big questions - the agenda

- what are the demographic drivers demanding in different kinds of city? (Aging, migration, social exclusion, rise of single-person households....)?
- what makes a strong urban economy?
- how will/should urban structures evolve? (Densities)
- how can cities be future-proofed: more resilient to shocks?
- what makes a successful city?

The demographic drivers and city living

- aging, migration, social exclusion, single-person households,... demand
 - jobs (and hence income)
 - housing
 - services
 - education
 - health
 -
 - and reduced 'disparities at various scales

A strong urban economy

- demands:
 - high skill levels
 - high ‘connectivity’ levels
 - clusters of economic activities
 - cultures that attract inward investment and migration
 - sustainability and future proofing

Urban structures

- questions:
 - planning and regulating spatial structures and infrastructure
 - how can densities be regulated to enable sustainable transport systems?
 - internet connectivity is ‘distance free’, but physical accessibilities?
 - city centres vs out-of-town?
 - have we been good at physical regeneration but not the social?

Future proofing

- sustainability
- resilience
- future-proofing: means satisfactory responses to most of the above!!!
- and the questions mostly apply at both scales: the UK and the city

What makes a successful city?

- governance and institutions:
 - the best models of urban governance?
 - with a centralised finance system, how do you incentive local government? Innovative financing?
 - impacts of devolution in the UK?
 - cooperation and competition between neighbouring cities?
 - policies for sustainable and resilient economic growth
 - adaptive capacity: ‘The species that survive are not the most intelligent or the most brave, but those that adapt successfully to change’

- governance and 'culture' probably top the list; the remaining factors are important but typically only seem to tell half of the story:
 - economic theory - investment, human capital (chicken and egg?), innovation, foreign direct investment
 - variables in econometric models: size and location, accessibility and connectivity, response to de-industrialisation, relative size of university sector

Wicked problems

- inner city regeneration
- 'poor' towns – e.g. seaside towns
- unemployment, long-term sickness – benefits issues
- poor quality housing stock; homelessness
- 'failing schools
- variations in levels of health provision: increasing costs
- crime, criminal justice system, prisons
- multiple deprivation
 - long-term unemployment, NEETs
 - failed in, or failed by, the education system
- responding to climate change

Where we are: baseline analysis

- a conceptual framework for analysis: the beginnings of the science
 - for the system of cities: a typology?
 - for our demonstrators: London, Glasgow, Cardiff, Belfast?
- we need an information system and useful ‘indicators’
- we need to set the future against the historical context – e.g. responses to de-industrialisation

Drivers of change

- demography and city living
- economics
- investment – public and private (innovative finance)
- technologies
- environment: the sustainability agenda
- structures: quality of assets
- evolving spatial structures

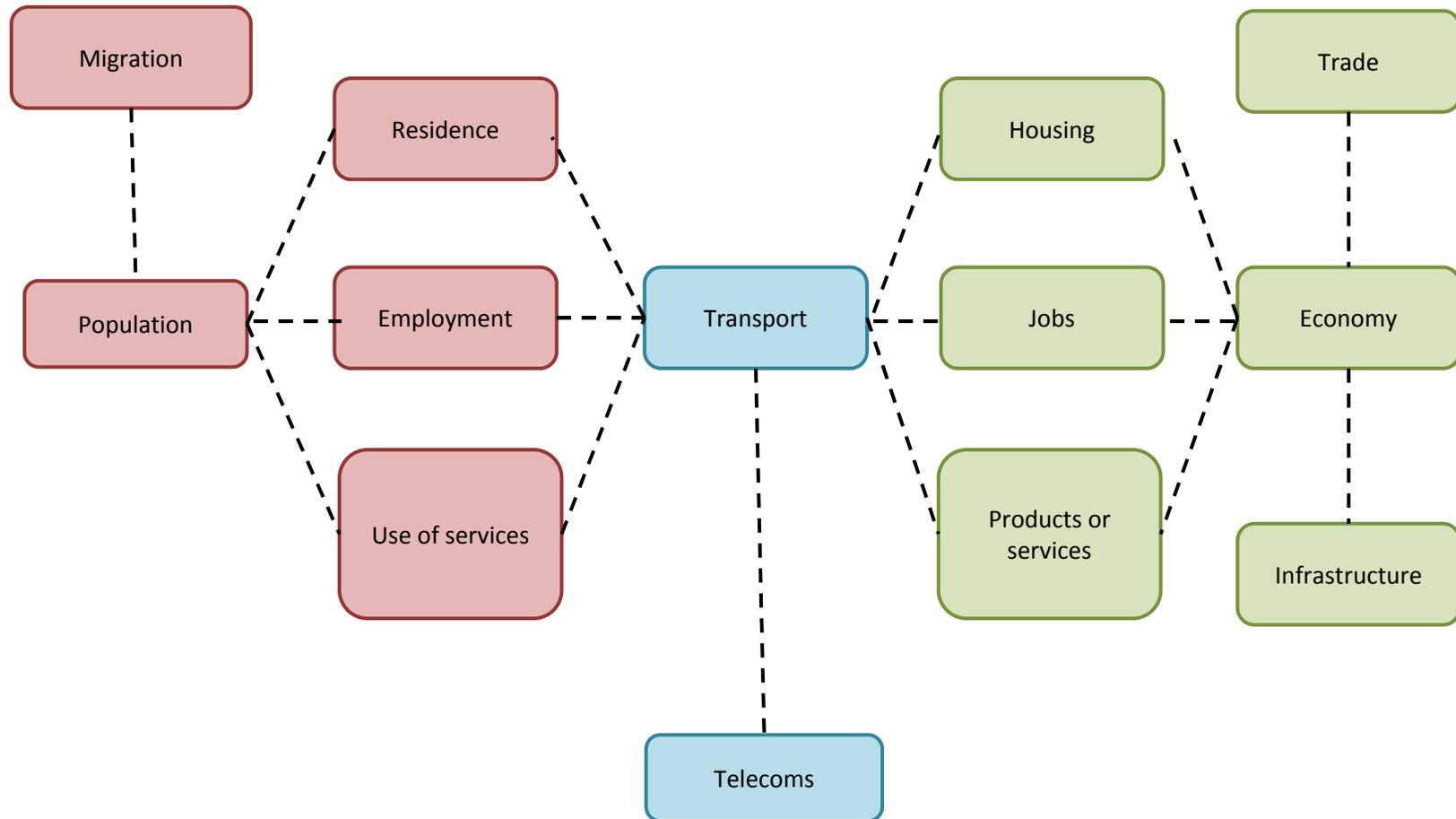
- we will aim to address
 - living in cities: winners and losers
 - the economy of cities
 - structures
 - governance
- and maybe a final chapter:
 - urban futures: win-win?

The science

- science, oversimplifying, is about understanding systems of interest; building theories to represent this understanding, often mathematical; and, in most case, building models to represent these theories to facilitate testing against empirical data
- computer models enable us to get further ‘inside’ the theories and, through the powers of modern computer visualisation, enable us to see what is going on.

- this is a familiar picture for systems of interest in physics, in chemistry and in biology for example, and the science is applied in engineering and in medicine
- it is much less developed in the social sciences but we now have an embryonic science of cities and regions – and this generates significant uses in policy development and planning. This should be seen as one of the major scientific challenges of this century
- this is not seen as ‘big science’ but it ought to be!

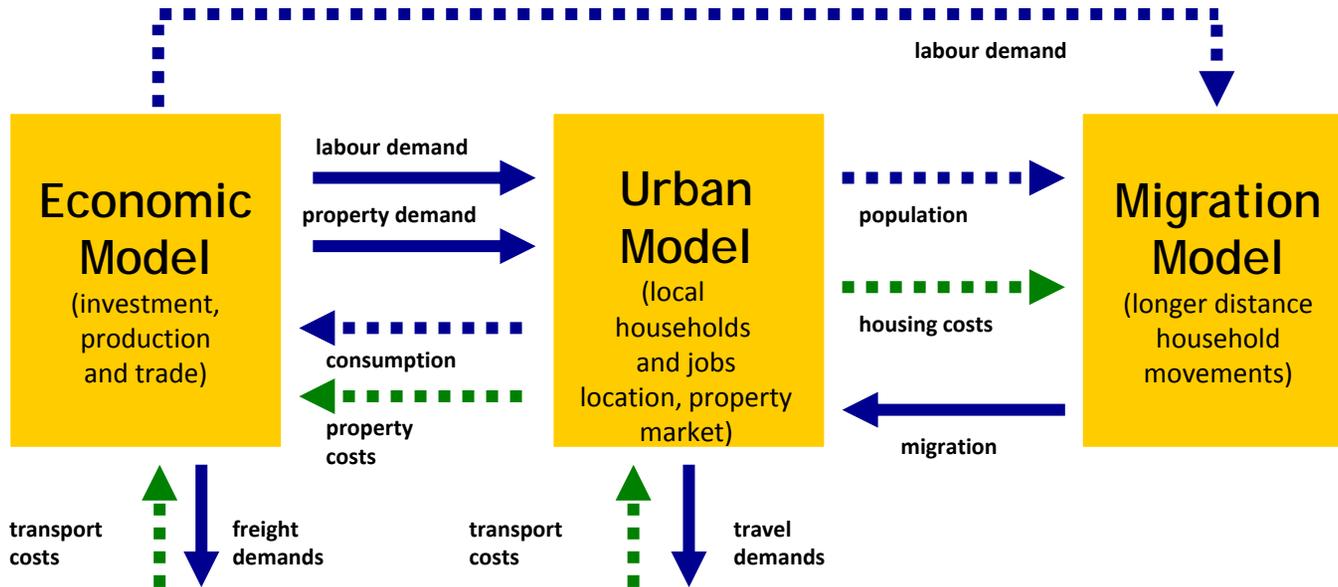
The main subsystems



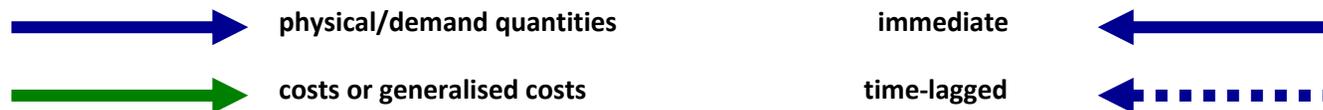
- so what do we have?
 - demographic account-based models
 - input-output models
 - spatial interaction models of the main flows
 - an ability to integrate these into transport models and to load them on to networks
 - retail and service ‘revenue’ and ‘use’ models
 - residential location models
 - and then, with more difficulty: dynamic models of the evolution of cities

- the present state of knowledge rests on the base of an extensive (mathematical) ‘methods’ toolkit, for example
 - statistical averaging, whether entropy maximising or random utility theory – one way or another ‘blurring’ implausible optimal or rational behaviour;
 - mathematical programming
 - nonlinear dynamics
 - complemented by excellent computer visualisation
 - an available comprehensive model follows

DELTA package



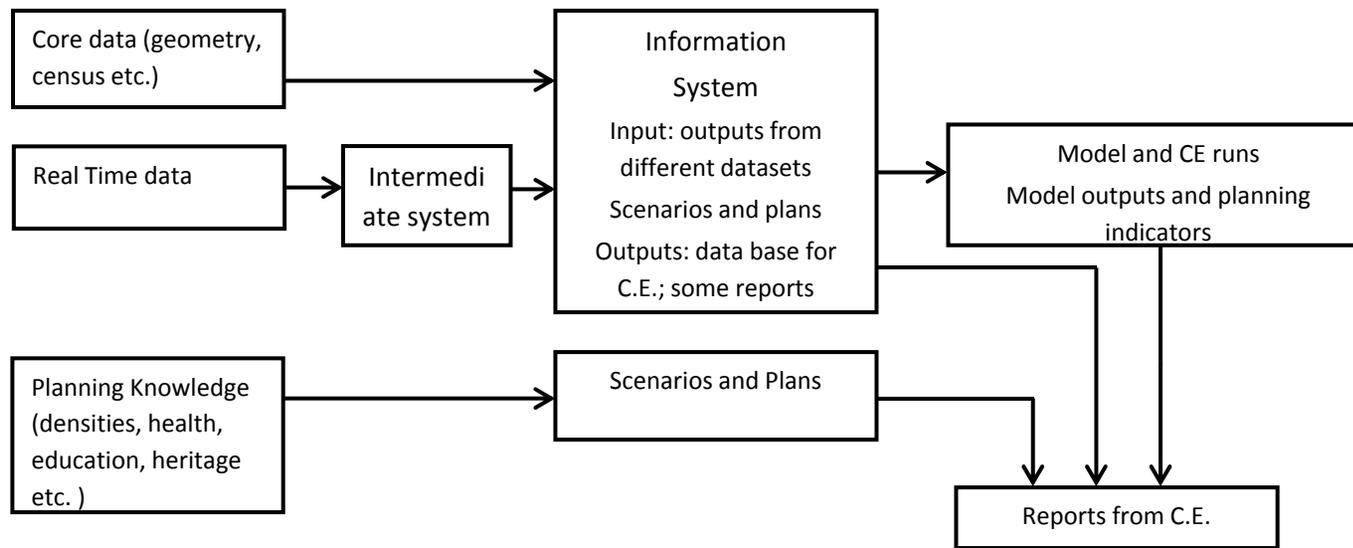
Transport modelling package



Models and 'big data'

- we are moving to a position where we could be overwhelmed by data, though the opportunities are huge
- a strength of model-based thinking is that the underpinning concepts can be used to help design the architecture of the associated information system, and this is a crucial step, as indicated on the next slide.

An interactive system of data and model and planning outputs in City Engine



In conclusion.....

- a huge challenge, but
- we can articulate the major questions
- helped by a good information system
- further helped by the core science and particularly the potential for model building
- can we point to some solutions of the 'wicked' problems?