

# **UK-India Workshop on “Future Cities”**

## **The UK in context**

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# The importance of cities

## Cities are uniquely important

- Majority of the world's population live in cities, trend is accelerating
- Cities directly and indirectly account for ~70% of CO<sub>2</sub> emissions
- Cities are crucibles of economic, institutional and cultural value

## Cities are uniquely vulnerable

- Growing and ageing populations
- Ageing infrastructure and supply networks
- Global/regional competition & impact of Internet
- Hostile threat and natural hazards

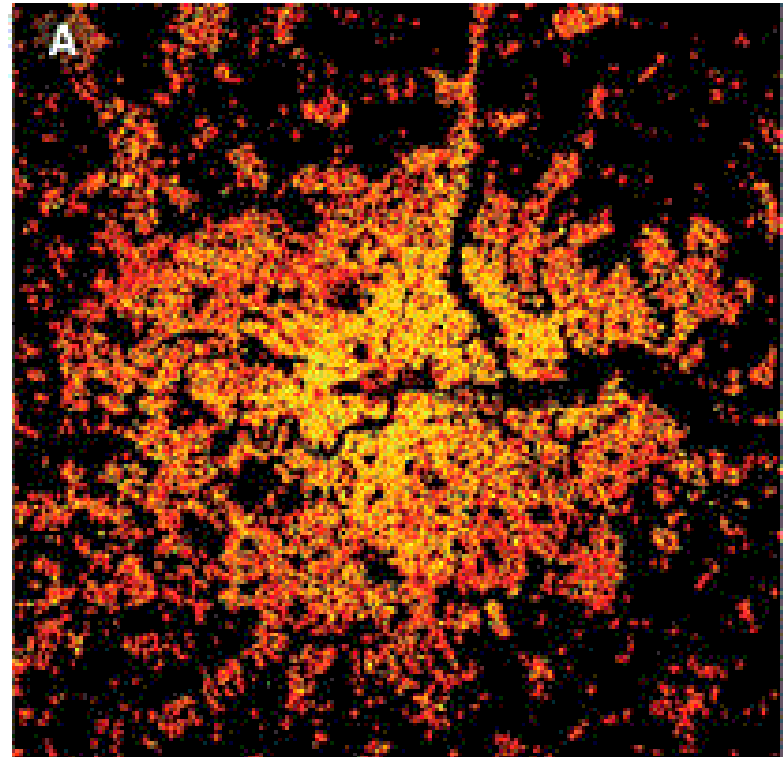
## Cities are under enormous pressure to change

- Fiscal, Balance of Payments etc
- Fragmented functions & governance (transport, healthcare, water resource management)
- Energy - prices, environment/health, security
- Mitigation and adaptation to climate change

*“Cities admit innovation, indeed they are the crucibles of innovation, they generate surprise, they display catastrophes.”*

M Batty, Building a science of cities, *Cities* Vol 29 (2012)

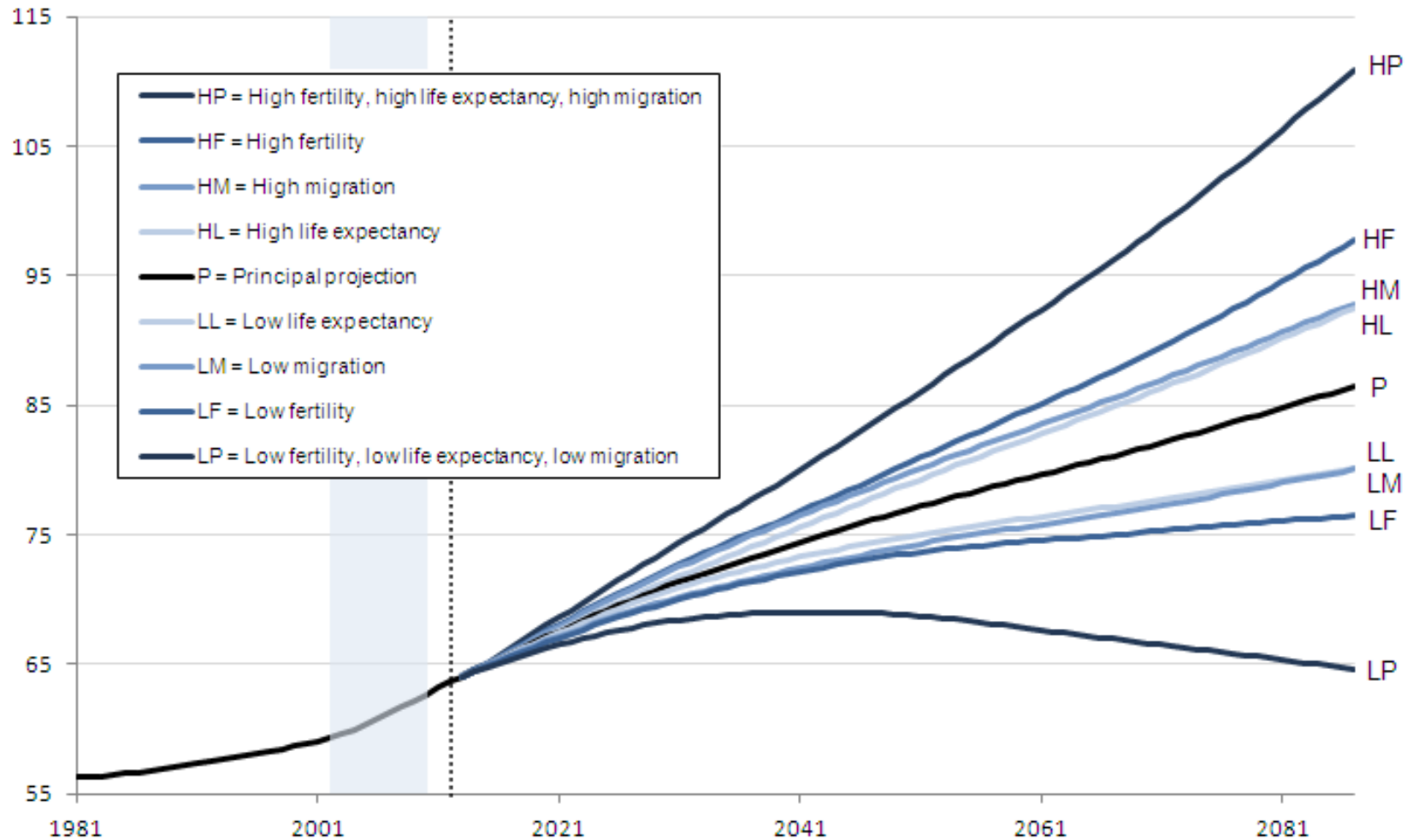
- Complex systems – self-organising
- Far from equilibrium, open systems
- Display both persistence and change
- Fractal – e.g. London’s population in picture
- Scaling reflects benefits and costs of agglomeration (e.g. congestion) and competition



M Batty, The Size, Scale, and Shape of  
*Cities*, *Science* 8 February 2008: vol. 319  
no. 5864 769-771

# UK population growth projections

Millions

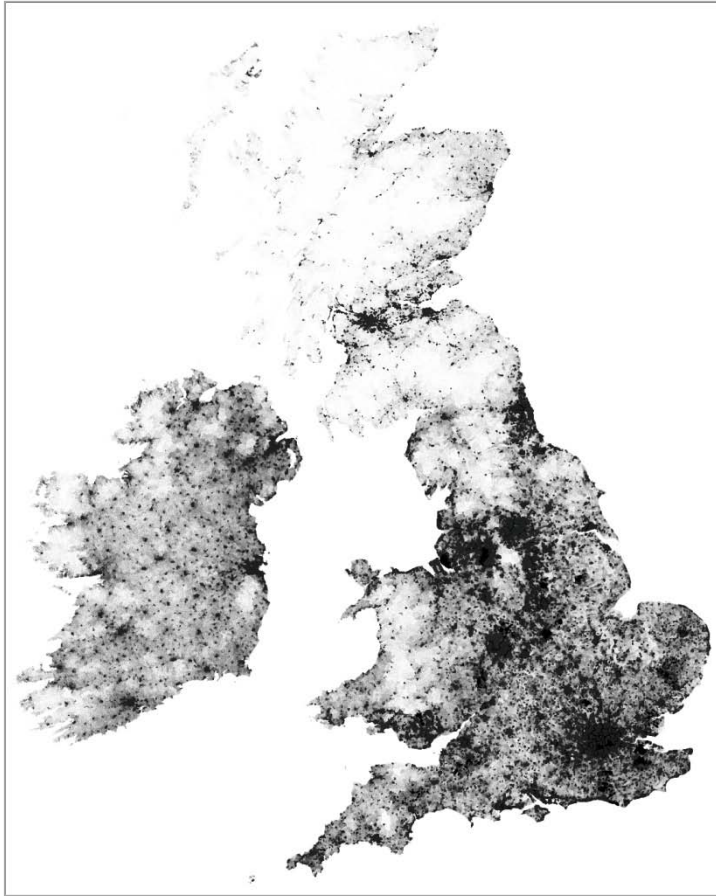


Note: Mid year estimates for Scotland for 2002-2010 are due to be revised to take account of the 2011 Census

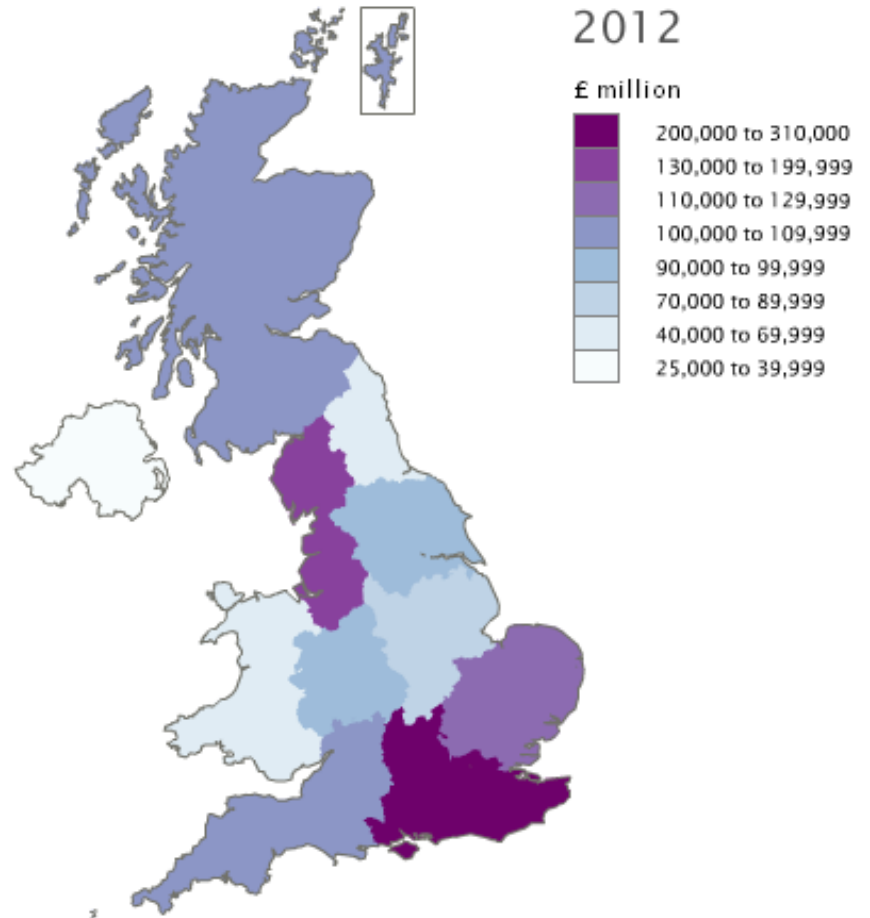
Source: Office of National Statistics, 2013

# UK population density and economic activity

Image from [http://www.tekja.com/img/about/UK\\_Ireland\\_dot\\_map\\_census\\_tekja.jpg](http://www.tekja.com/img/about/UK_Ireland_dot_map_census_tekja.jpg)



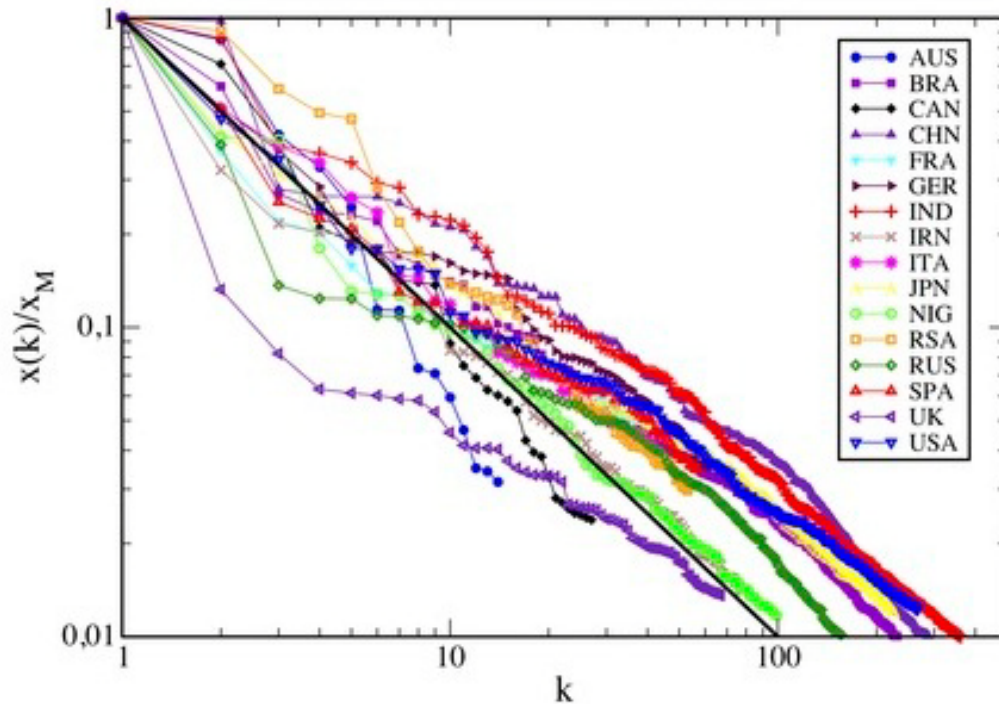
**Population density in UK & Ireland**



**Regional GVA (£m). Source: ONS**

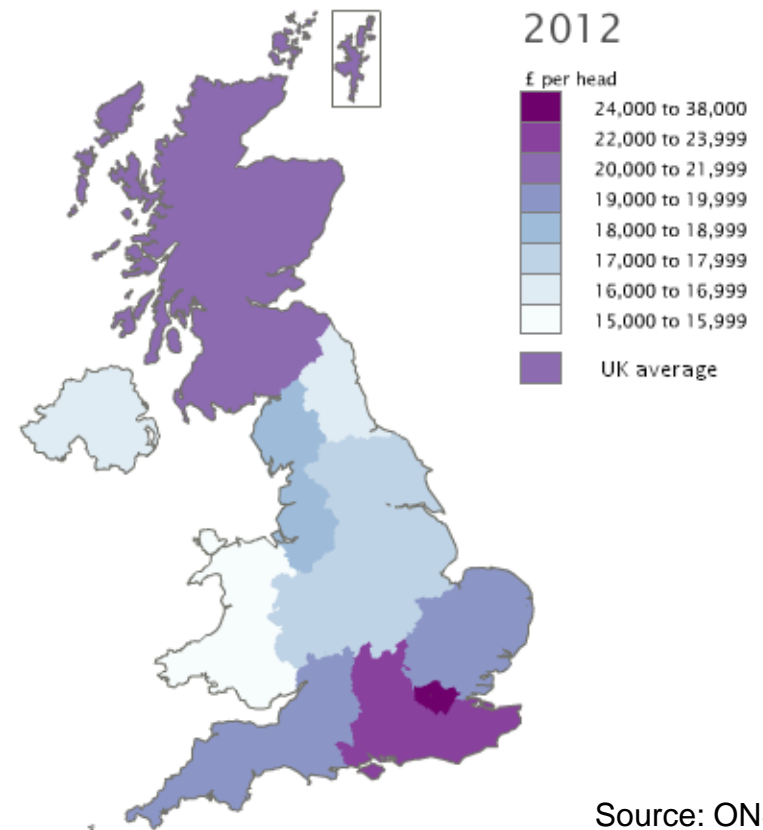
# An outlier: London's position in the UK

## Distribution of size of cities



From "There is More than a Power Law in Zipf", Matthieu Cristelli, Michael Batty & Luciano Pietronero, Scientific Reports 2

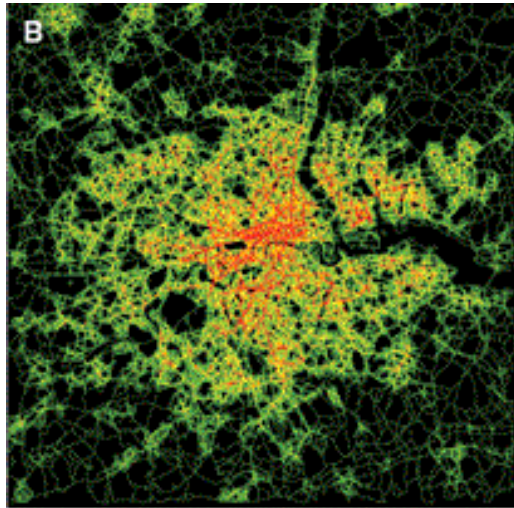
## Regional GVA per head



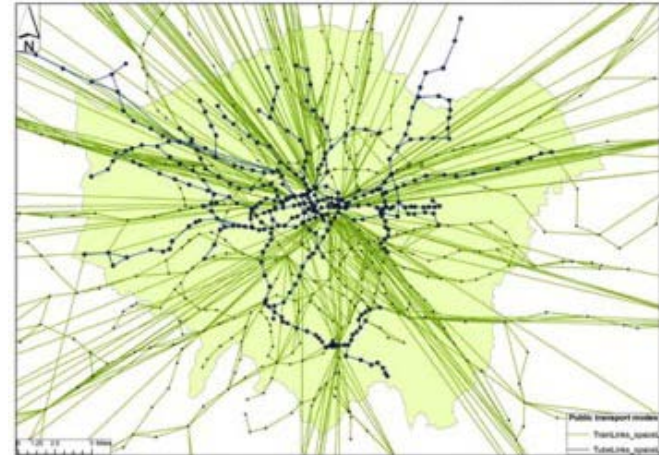
Source: ONS

# Dense, coupled transport networks

## Road connectivity

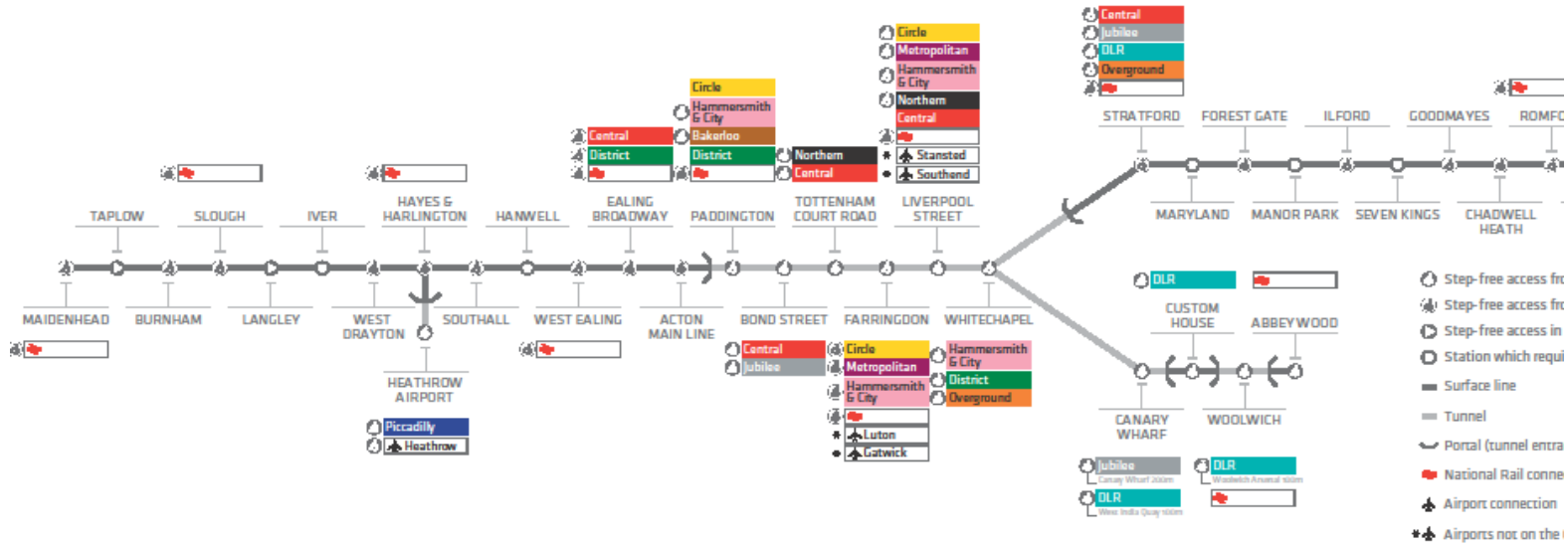


## Long distance and overground rail (green) and tube (blue)



M Batty, The Size, Scale, and Shape of Cities, Science 8 February 2008: vol. 319 no. 5864 769-771

Batty, M. (2012). Building a science of cities. Cities, 29, S9-S16.



**Crossrail** - major new heavy-duty suburban rail service will connect the City, Canary Wharf, the West End and Heathrow Airport to commuter areas east and west of the capital. From late 2018.

- Step-free access fr
- Step-free access fr
- Step-free access in
- Station which requi
- Surface line
- Tunnel
- Portal (tunnel entra
- National Rail conne
- Airport connection
- \* Airports not on the l airports passengers connecting rail servi assistance will be re Travel from Luton A Luton Airport is via

# Affordable homes

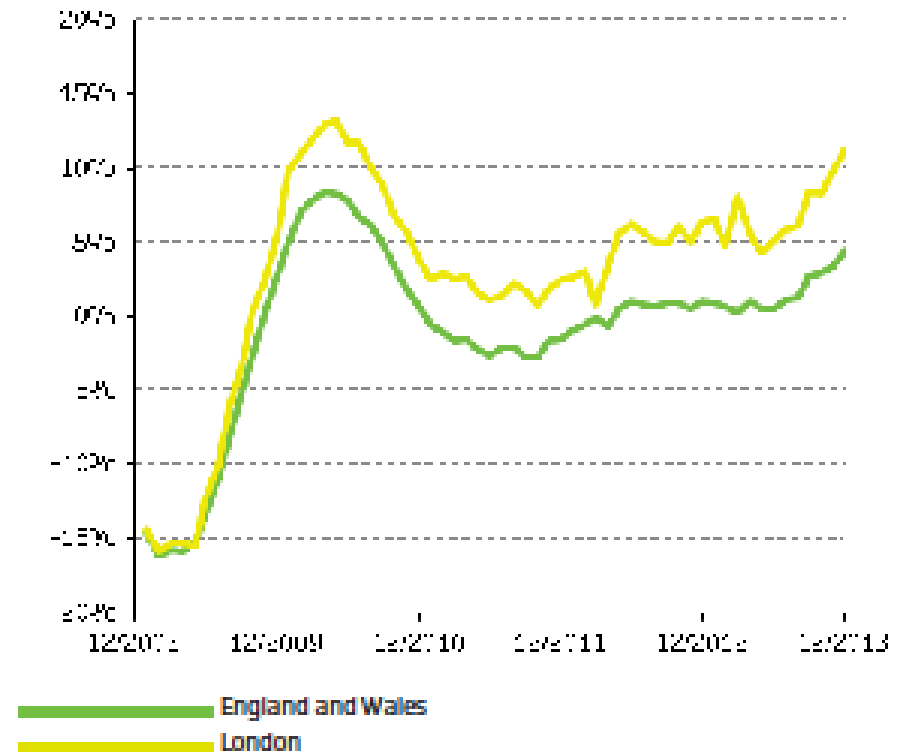
## Statement by the United Nations Special Rapporteur on adequate housing, Sep 2013

- The UK “has much to be proud of in the provision of affordable housing ... “

**BUT**

- “Increasingly, people appear to be facing difficulties to accessing adequate, affordable, well located and secure housing.”

Average annual change in residential property prices



Source: Land Registry, House Price Index Dec 2013



# “Human scale development”, Crown Street ,Glasgow



Comprises over 1,270 private sector homes, 600 socially rented homes, 80 student flats, 12 local shops and a supermarket, along with a hotel, library, a local park and 5,000m<sup>2</sup> of office space. The housing blocks are largely three and four- storey modern tenements.



The regeneration project in 1990 was the second round of redevelopment after a failure in the 1960s.

Provision of community facilities was vital in an area traditionally under-served by community services. The area has three separate health centres, a local police station and a flagship library with free internet access that has become the most popular in Glasgow. Green spaces are also available for residents without access to the communal gardens.

# Barriers to city scale innovation

- **Fragmented governance** – city systems not interconnected without clear responsibility or ownership of solutions.
- **Lack of integration** – focus by cities, businesses and academics on specific city subsystems, such as transport, water, waste and energy.
- **Many providers needed** – No single company has the skills and capability to deliver the requirements of cities in the future.
- **Missing fora** – No neutral space for city governments, business and the knowledge base to collaborate on endeavours to build integrated solutions
- **Inadequate test beds** – Investment will be limited until market solutions for integrated systems can be demonstrated and validated at scale.
- **Need for deep innovation** – Not just technological innovation – new business models and new ways of working

# Transition Experiments: Exploring societal changes towards sustainability

Suzanne van den Bosch 2010

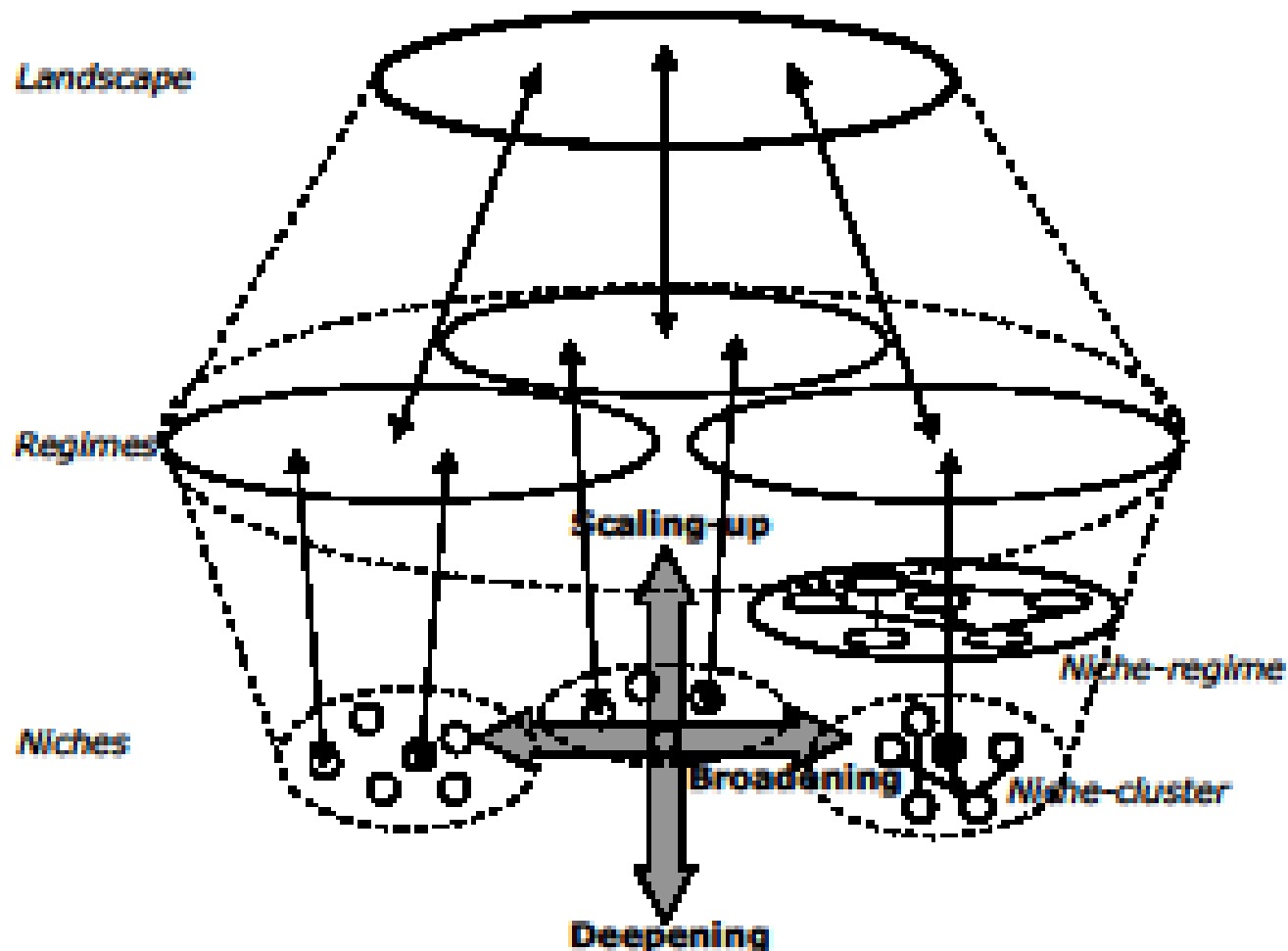
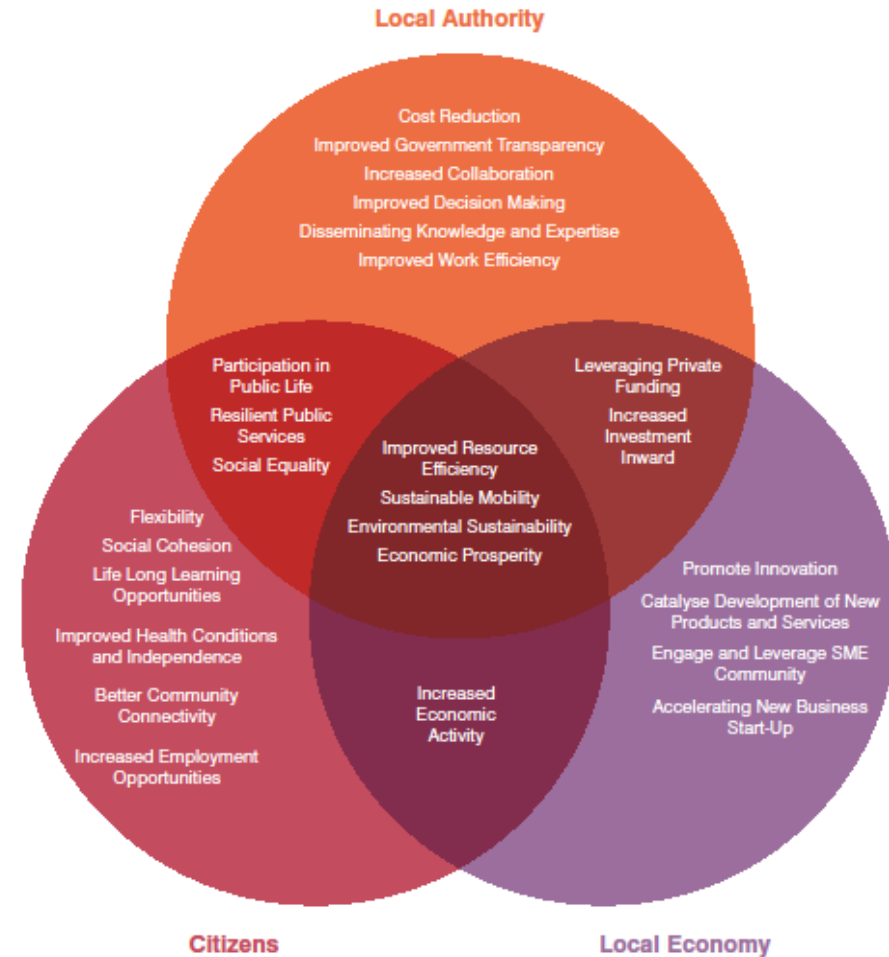


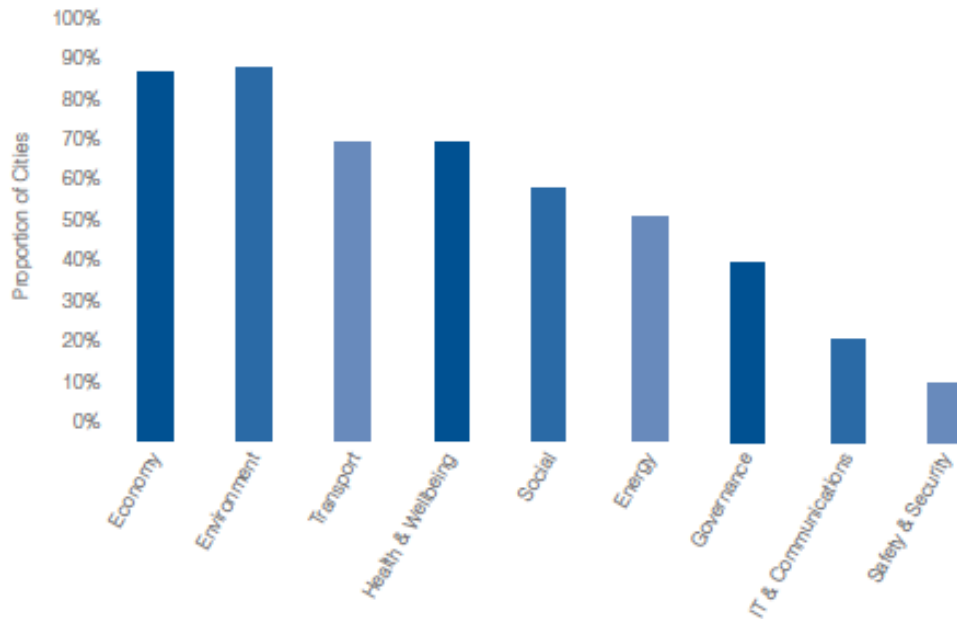
Figure 3.3 Deepening, broadening & scaling up transition experiments in niches in relation to multi-level perspective (based on Geels and Kemp 2000, De Haan and Rotmans, 2009)

# Improving cities

- Technology Strategy Board's **Future Cities Programme** award to Glasgow (£24m) to show at scale the benefits of integrating services.
- Focus on utilising open data platforms to improve access to information, facilitating delivery of new, better or more efficient services



Challenges identified by cities



# How will cities respond?

*“The social fabric of Britain is changing; our population is both growing and ageing – an unprecedented phenomenon - but how will our towns and cities change in response?”*

Foreword from “Silver Linings: The active third age and the city” by Building Futures (the think-tank of the Royal Institute of British Architects)

- TSB’s **Future Cities Catapult** aims to address the major challenges facing cities in the future.
- It will create new partnerships of cities, firms and academics to:
  - ✓ Enable innovation through partnerships
  - ✓ Demonstrate what works
  - ✓ Remove barriers to scaling
- For the benefit of citizens, the economy and environment

# Urban Energy Systems

- **Vision**

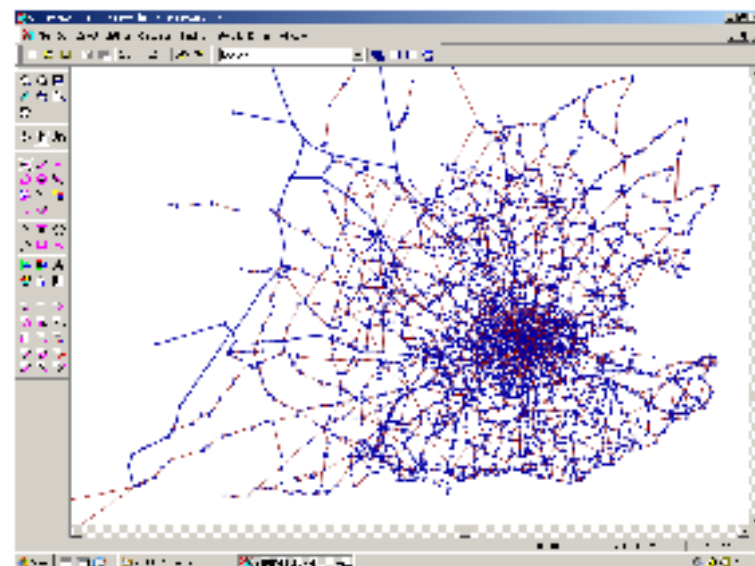
- 5 year research programme, funded by BP
- Create integrated model of energy supply, distribution and use in a city
- Quantify benefits of integrated design
- Identify pathways to implementation

- **Implementation**

- Develop novel agent-oriented model linked to design optimiser
- Leveraging state of the art methods in transport, land use and energy systems modelling

- **Application**

- A number of case study applications are underway both 'new build' and existing cities (including London, Atlanta, Beijing and Lingang)



# Acknowledgements

- I am grateful for discussions with and contributions from
  - Professor David Fisk, Director, Laing O'Rourke Centre for Systems Engineering and Innovation, Imperial
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  - Dr Stephen Lorimer, Network Coordinator for the Sustainable Society Network+ [www.sustainablesocietynetwork.net](http://www.sustainablesocietynetwork.net)
  - Dr Ed Metcalf, Research Director, Institute for Sustainability & Assembly Member of the EIT Climate KIC
  - Prof Fred Steward, University of Westminster





# Identifying innovation in the UK

Innovation not limited to traditionally high-performing business sectors or geographic areas of economic activity

## Key findings

- Six business industries are found to be persistently high performing:
  - medicinal and pharmaceutical manufacturers
  - electronics manufacturers
  - research and development on natural sciences and engineering
  - labour recruitment and provision
  - software consultancy and supply
  - other computer-related activities
- Two locations are identified as innovation hotspots: Cambridge and London NW
- Up to ten per cent of firms in sectors traditionally thought not to be innovative are found to be high performers

