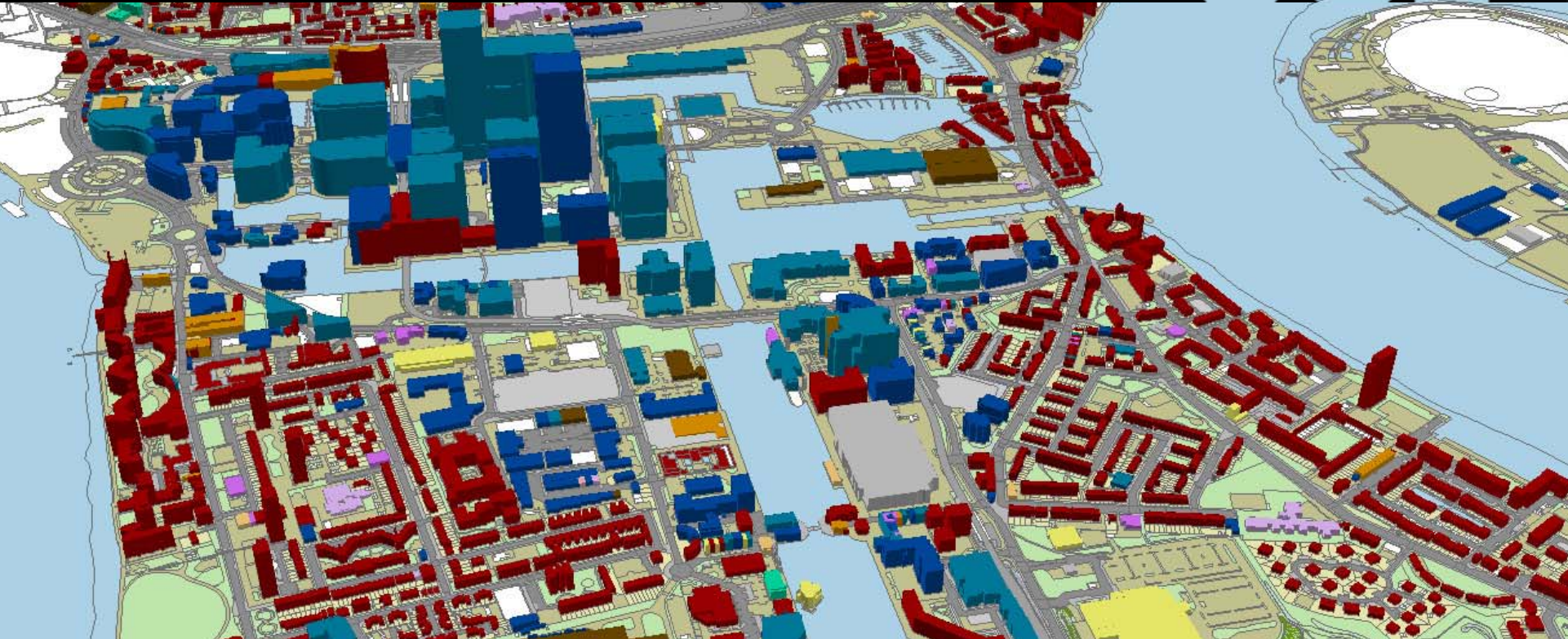


# Fine Scale Modelling of the London Housing Market



Duncan Smith, Andrew Crooks, & Margarethe Theseira

GISRUK 2008, 3<sup>rd</sup> April.



## Research Overview

### **Lack of property data**

No national cadastre on housing attributes (such as size, type and age). Restricts application of GIS in planning.

### **New datasets becoming available**

Could combining recent datasets, such as OS address data and Land Registry transaction data, begin to fill this data gap?

### **Application to Housing Market Modelling**

Could the fine scale housing database developed from these datasets be used to improve house price modelling?

## London Context

### Acute Pressures on Housing

Rapid population and employment growth. Affordability crisis as house price increases outstripped earnings. 350,000 new homes needed in next 10 years.

### Policy Context

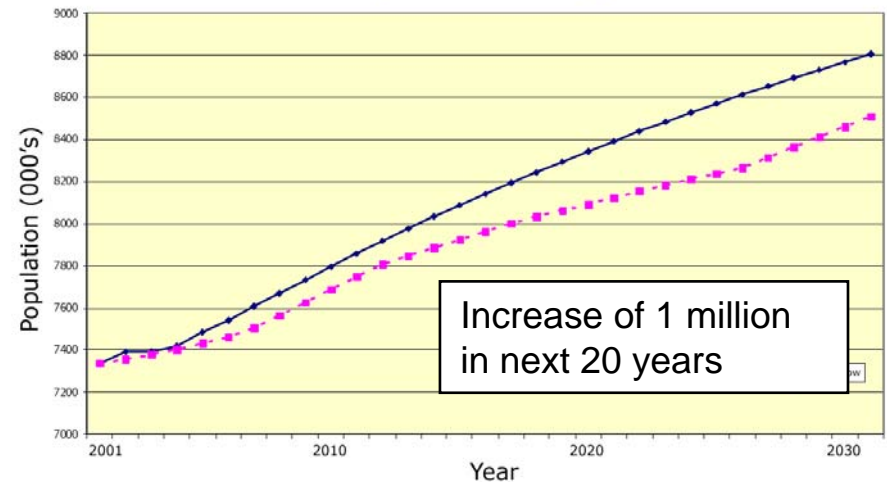
London Plan target for 30,000 new homes/year. Also target of 50% Affordable Homes (2006 average 31%).

### Growth Areas

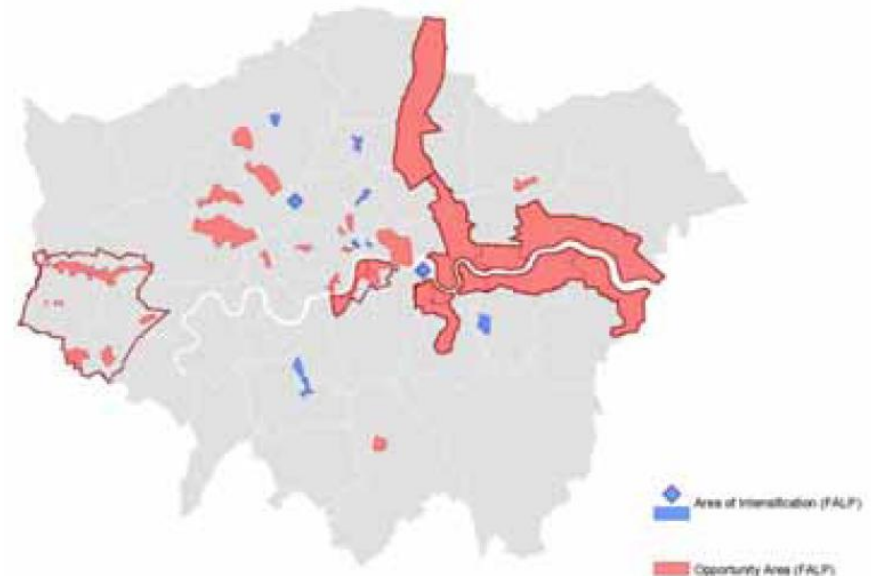
Growth directed to Inner and East London for regeneration. Densities increasing, concentrated at areas with good public transport accessibility.

**How is housing and urban form changing in these areas?**

London Population Projections



Areas of Opportunity and Intensification (GLA, 2006)



## Housing Market Geography

### Clustering of High Income Groups

Corridors of high prices, Inner London gentrification. Processes well researched in geography. Inner London also high deprivation area- aggregate values hiding variation.

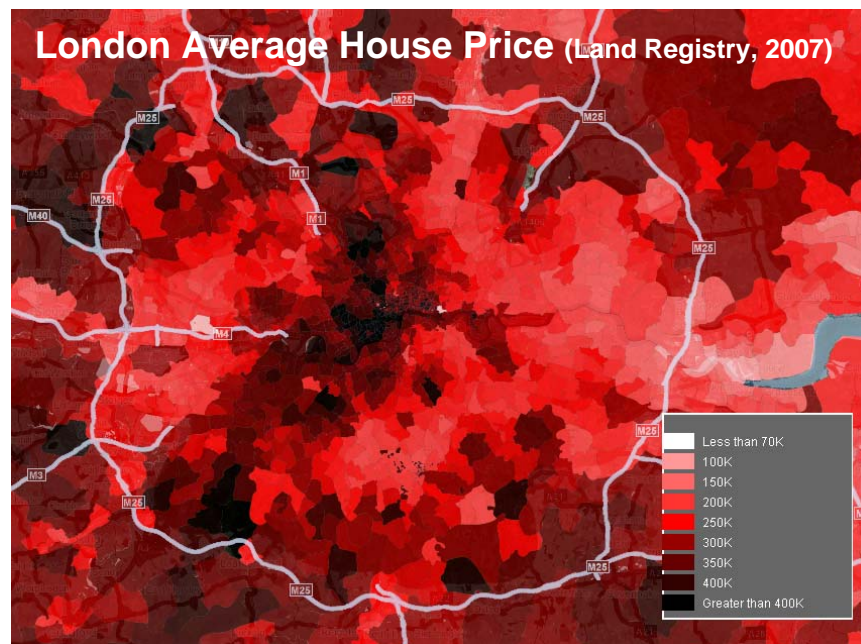
### Housing Stock Variation

Complex overlapping mix of type and quality. Type- high density flats to suburban housing- and age- historic housing, council housing, new build. Fine grain variation.

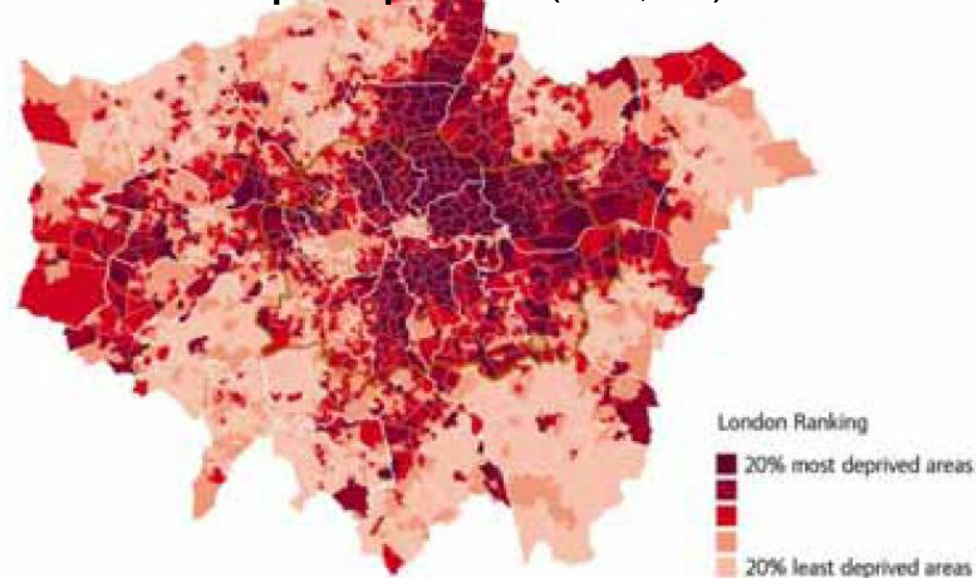
### Lack of Data on Housing Stock

No comprehensive cadastre available.

**Could combining house sales transaction data with Mastermap overcome lack of housing stock data?**



### Index of Multiple Deprivation (ODPM, 2004)



## Tower Hamlets Case Study

Develop methodology on one borough, then repeat process across London. Case study selected for contrast in housing types.

### Area of rapid change

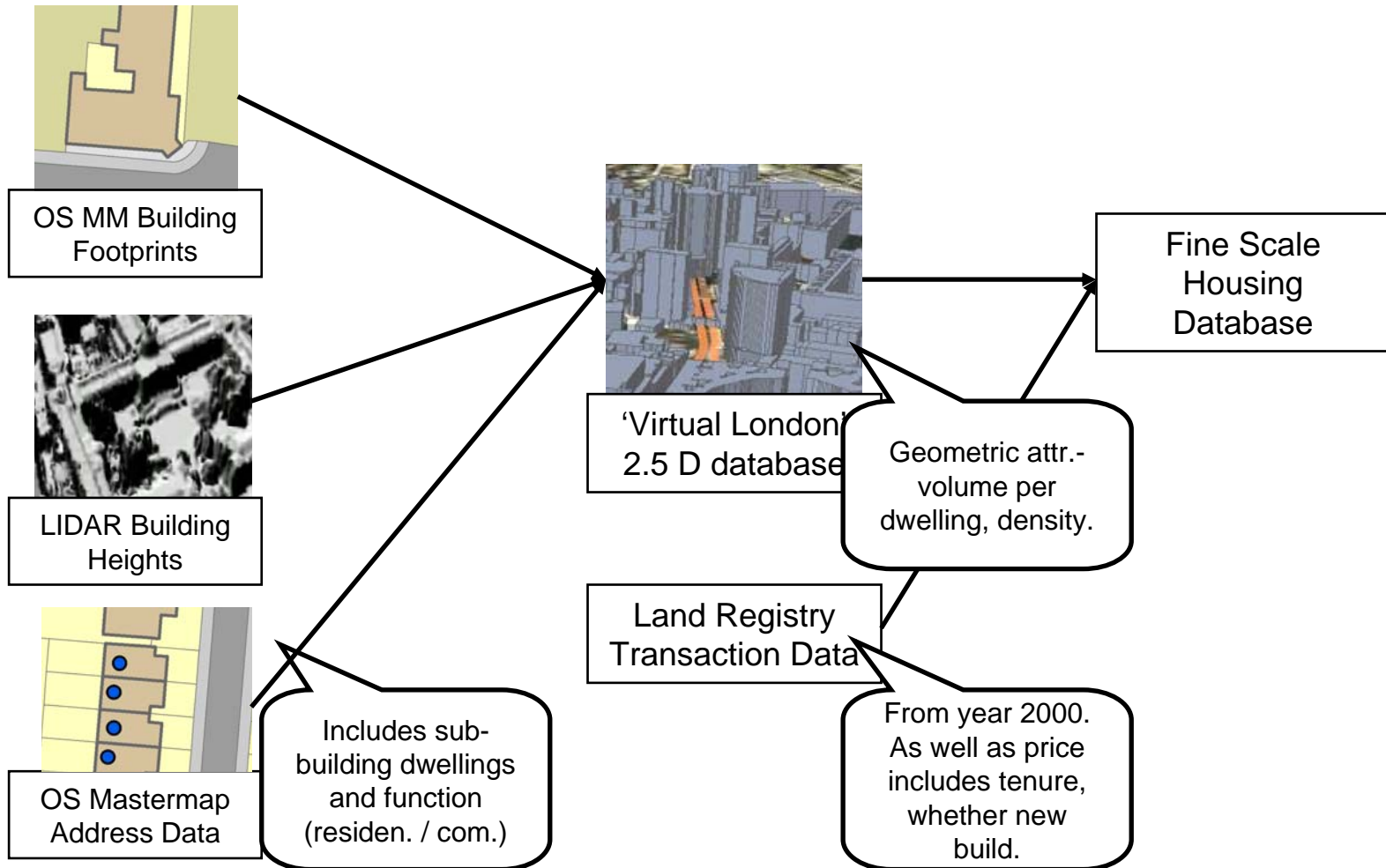
Large scale market led redevelopment of industrial land.  
Largest volume of new-build in London.

### Sharp social and physical contrasts

New luxury waterfront developments are often adjacent to areas of 1960s and 1970s social housing. Away from river larger social housing areas have lowest prices.



# Creating Housing Database



## Building and Address Data Model

In Mastermap relationship between buildings and addresses not fully specified. Each address linked to a **single** building polygon.

In reality each address can be associated with **multiple** (typically contiguous) polygons that form same building.

Need to develop data model that fully specifies relationship.



## Blocks, Buildings and Dwellings

Data Model Objects-

**Block-** group of one or more adjacent Buildings.

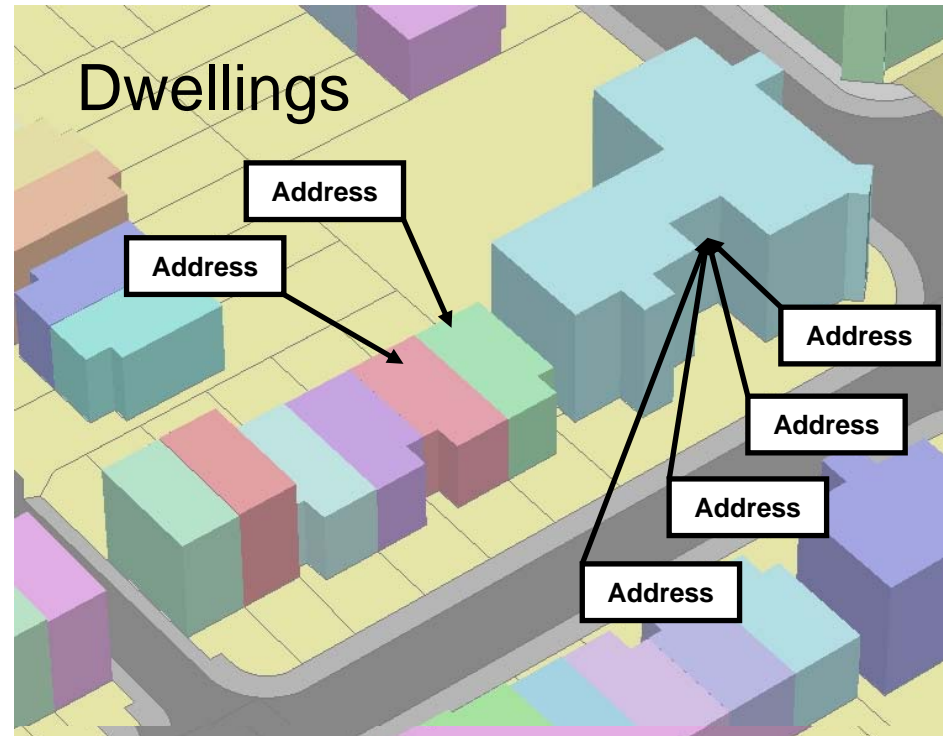
**Building-** one or more adjacent building polygons with one Building Address.

**Dwelling-** Sub-building address linked to a Building.

Objects derived from MM Topographic and Address layers through geometric and adjacency relationships.

Result is that we have fully addressed built form geography.

(Missing geometry of sub-buildings, so still effectively 2.5D).



## Housing Classification

### Straightforward classification of housing types-

**Detached housing-** 1 Building with 1 Dwelling per block.

**Semi-detached housing-** 2 Buildings each with 1 Dwelling per block.

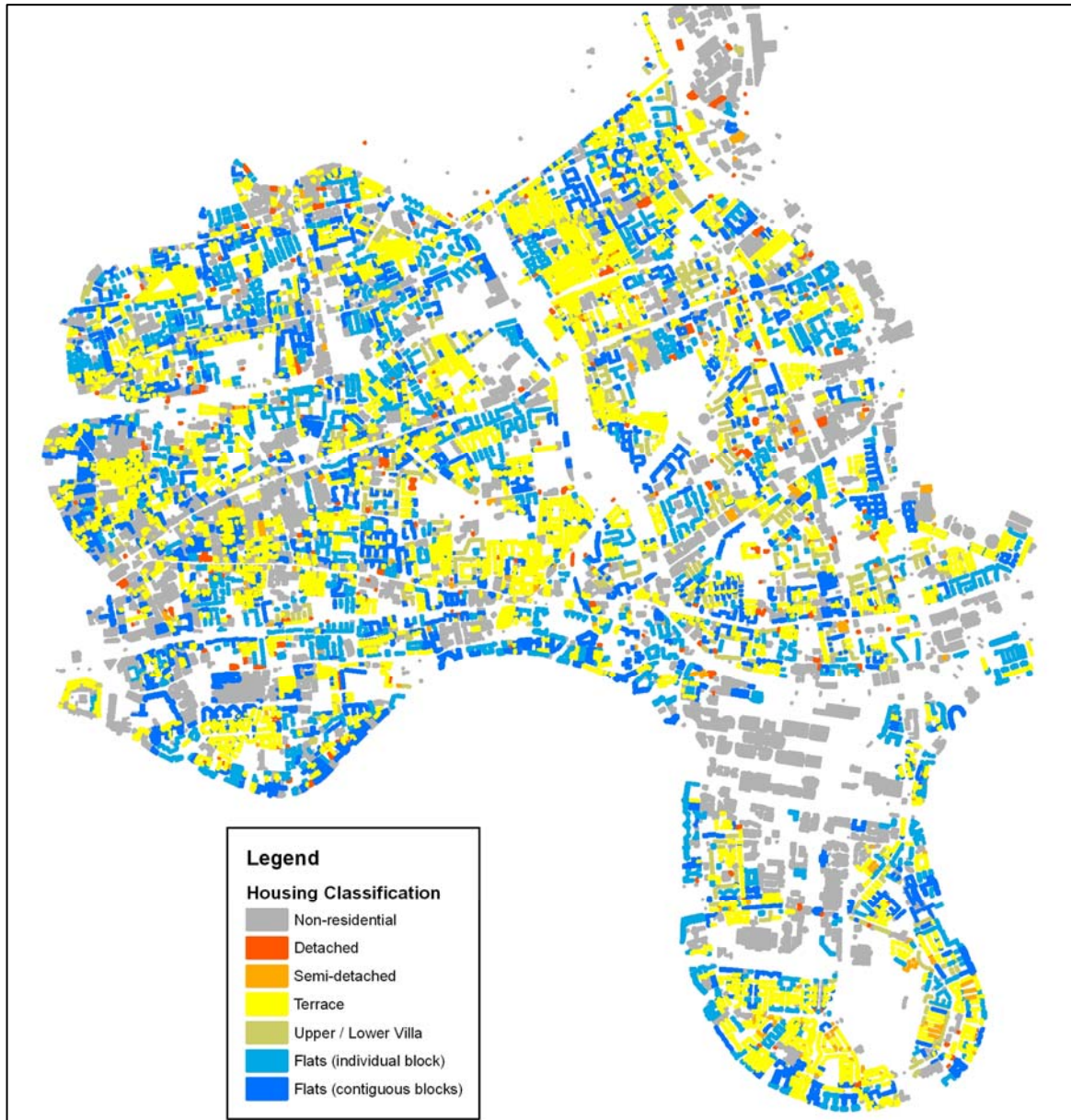
**Terraced housing-** more than 1 Building each with 1 Dwelling per block.

**Flats-** 1 or more Buildings per block with more than 2 Dwellings.

### Housing Classification Patterns

Upmarket new-build flats situated near the Thames is a common pattern in London.

Tower Hamlets dominated by flats and terraces. Varied clustering of housing types- public housing, new build.



## Density of Urban Form

### Measuring density-

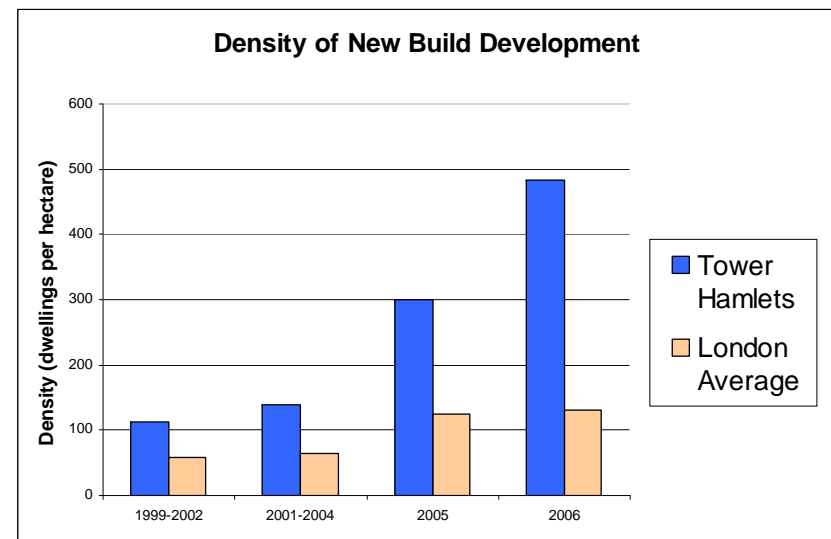
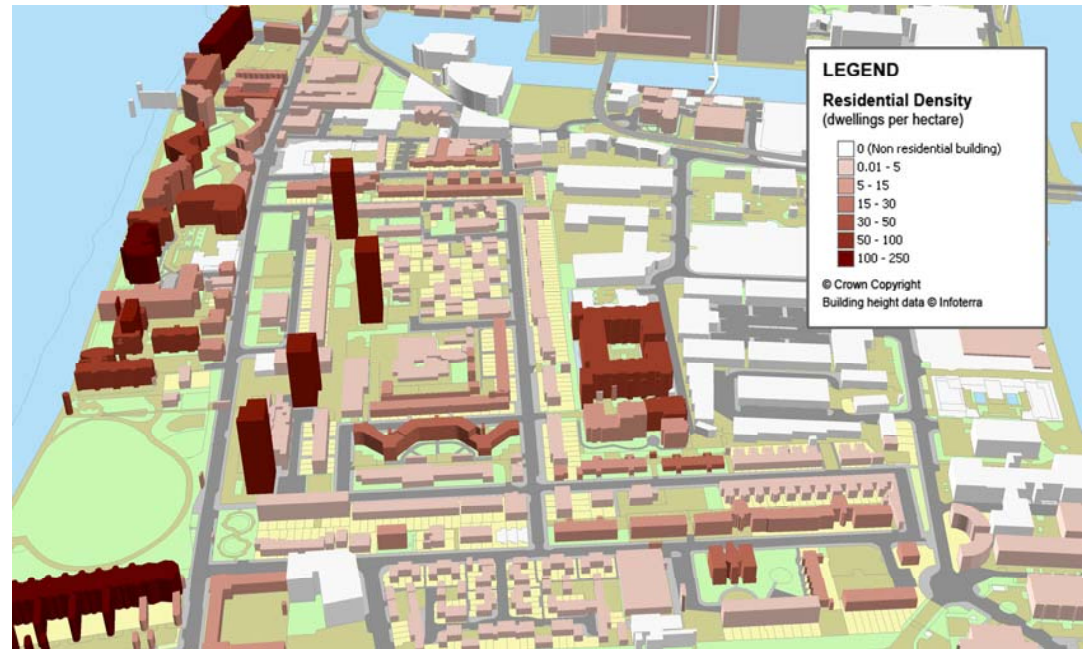
Dwelling density in buildings easily calculated from data. Useful to differentiate between flat types.

### Diverse housing stock-

Previously high density housing associated with low quality council high rises. Now increasingly associated with upmarket new-build. No straightforward relationship between density and price.

### Densities Increasing-

Tower Hamlets new-build development highest density in London.



## Relationships between House Prices and Geometric Measures

Expect good relationship between dwelling volume and price.

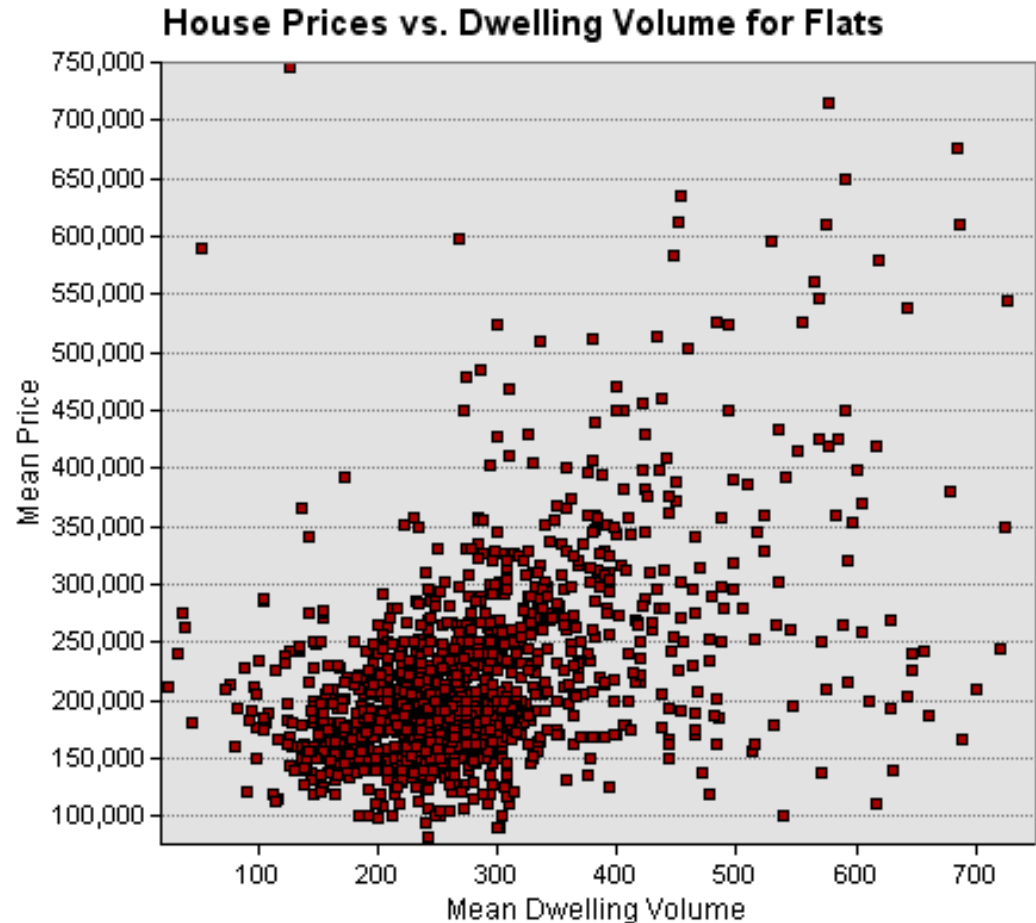
### Terrace Housing Correlation

For terrace housing there is a reasonable correlation. Useful part of hedonic model with other variables.

### Flats Weaker Relationship

Failing to differentiate between ex-council housing and new-build.

Also method of calculating dwelling volume by averaging building inaccurate for flats. High standard deviation within building price sales indicates varying dwelling sizes (e.g. new-build penthouses).



## Differentiating Flat Submarkets

### Currently Exploring Different Methods

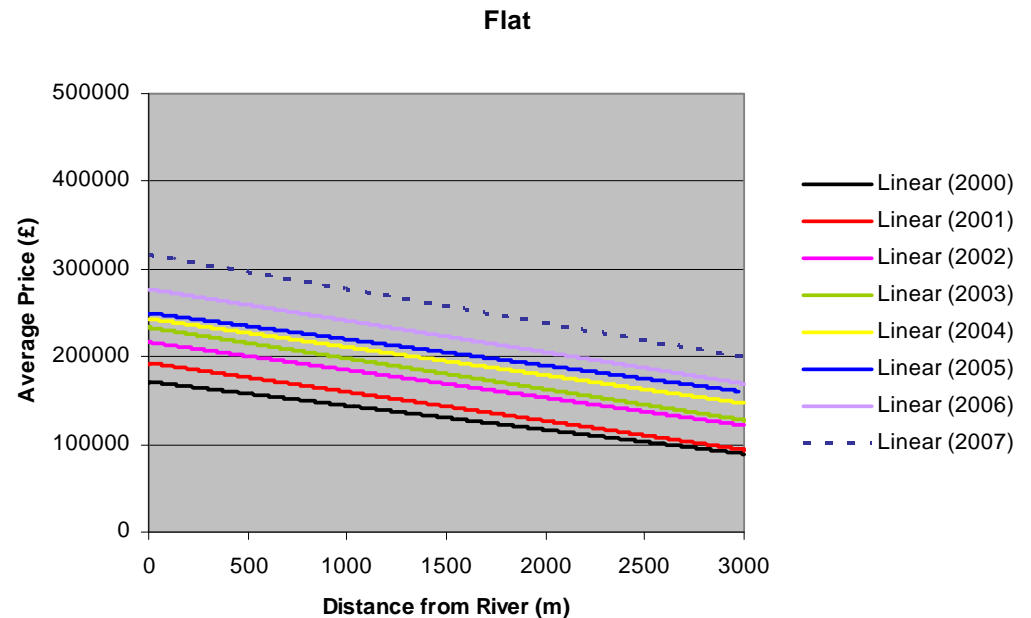
Distance from the river one proxy for luxury development.

Best approach probably use census data on proportion of council/housing association housing use this for micro-modelling.

For new-build could link to planning permissions (time consuming).

### Not enough attributes?

Transaction data lacking key attributes on dwelling size and public housing. Other datasets that do?



## Conclusion & Further Work

### Conclusion

#### **Fine scale variation in the London housing market**

Complex overlapping submarkets, mainly due to mixed housing stock, pace of development and path dependence.

#### **Automatic Classification Possible with OS address data**

Successfully shown an method for basic housing classification using address data. Can be matched to transaction data at address level.

#### **Initial Price Correlations Mixed**

Transaction prices can be compared to geometric attributes. Correlations for flats weak, need to differentiate submarkets.

### Further Work

Repeat housing classification across London.

Divide submarkets in flats, explore options.

Develop fine-scale neighbourhood characteristics in hedonic model- accessibility, services, parks and river views, negative externalities. (Garden size possible).

**Thank you for listening! Welcome comments and questions.**

We would like to thank the following data providers for this research:

Ordnance Survey

Land Registry

Infoterra

Greater London Authority