

# 2011 census geography and beyond: what can we expect?

David Martin

*SLA Conference, 27 October 2008*



## Overview

- A quick history lesson: census 2001
  - 2001 output area design
- Where have we got to since then?
- 2011 census overview
- Challenges facing census 2011
  - Output area maintenance?
- Likely directions post-2011





## A quick history lesson: census 2001

- *Not a review of the entire census*
- Overall, a successful census
- Operational challenges (esp. address listing and enumeration failures, foot and mouth)
- High coverage but local failures (Westminster, Manchester)
- Entirely new output area geography



## 2001 census output areas

- 175,000 small areas (E&W)
- Mostly aggregations of whole unit postcodes
- Subdivisions of 2003 wards and parishes
- Building blocks for Super Output Areas (LSOAs, MSOAs)
- Freely available digital boundary data from ONS





## 2001 output area design

Census.ac.uk

E·S·R·C  
ECONOMIC  
& SOCIAL  
RESEARCH  
COUNCIL




## Pre-2001 geographies

- Enumeration-based EDs
- Wide variation in population, some sub-threshold: no data
- Significant manual redesign at each census
- No match to postcode geography
- Not 'neighbourhood' building blocks



Census.ac.uk


E·S·R·C  
ECONOMIC  
& SOCIAL  
RESEARCH  
COUNCIL



## Competing user demands



- Postcode and statutory geographies
- Uniformity of population sizes
- Control over shape
- Internal homogeneity
- Compatibility with previous census geographies!
- Freely available digital boundary data



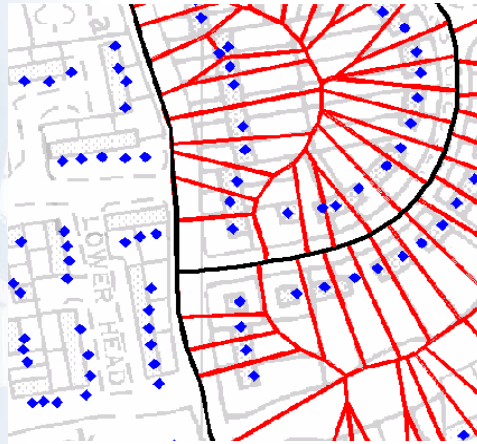
## Two key design stages

- Synthetic unit postcode building block polygons
  - Nesting within wards (Dec 2002) and parishes, incorporating topographic features
- Automated zoning procedure
  - Iteratively recombination of building blocks seeking best trade-off of design constraints

## Address-based Thiessen polygons

- Thiessen polygons around individual ADDRESS-POINTS intersected with ED, ward, parish boundaries and road centrelines



## Unit postcode building blocks

- Address polygon boundaries dissolved to form unit postcode polygon building blocks



## AZP (Openshaw, 1977)

- Initial random aggregation of building blocks into output areas within ward or parish polygon
- Compute design statistics
- Evaluate effect of possible swaps of building blocks between output areas
- Keep swaps that improve the overall solution

Census.ac.uk

E·S·R·C  
ECONOMIC  
& SOCIAL  
RESEARCH  
COUNCIL

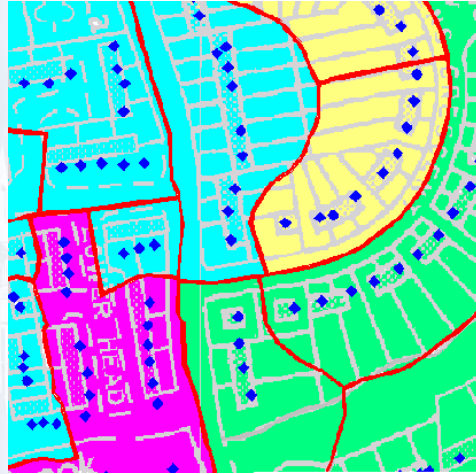
## OA design (1)

Initial random aggregation of postcodes into potential output areas



## OA design (2)

Choose one  
postcode at  
random as  
candidate for  
swapping into a  
different output  
area



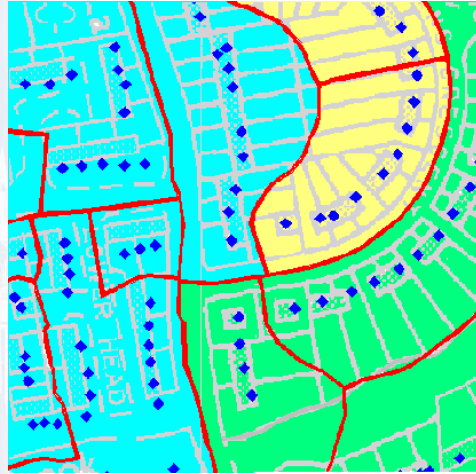
## OA design (3)

Make the swap  
and evaluate the  
impact on the  
overall solution



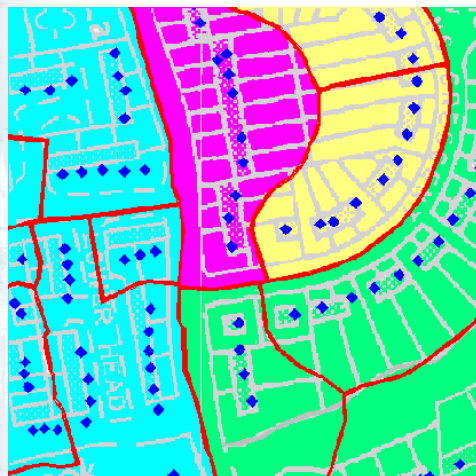
## OA design (4)

If swap does not result in an improvement, go back to the previous configuration



## OA design (5)

Choose another postcode at random as candidate for swapping into another output area



## OA design (6)

If the swap results in an overall improvement, keep it as part of the solution and examine a new potential swap...



## Digital census geography

- 2001 Output Areas (England and Wales)
- Mean 297 persons; 123 households
- Same methodology in NI, different in Scotland





## Where have we got to since 2001?

Census.ac.uk

E·S·R·C  
ECONOMIC  
& SOCIAL  
RESEARCH  
COUNCIL



## Where have we got to since then?

- Resolving the Westminster and Manchester
- Neighbourhood Statistics  
Geography – Super Output Areas
- 2011 consultations
- TsC “Counting the Population”
- Statistics and Registration Service Act 2007
- Address matching work for 2009 rehearsal



Census.ac.uk

E·S·R·C  
ECONOMIC  
& SOCIAL  
RESEARCH  
COUNCIL



### TsC "Counting the Population"

- Urgent need for definitive address listing
- New and more timely data sources, esp. for migration
- 2011 as last [conventional] census
- Develop new systems based on continually updated administrative data



## 2011 census planning

- Broadly conventional census, with internet completion channel
- Mail-out and mail-back
- Flexible enumeration effort focused on most difficult areas
- Extended imputation methodology
- Overall cost ~£500m
- Importance of address listing...
- What will the output geography be?

Census.ac.uk

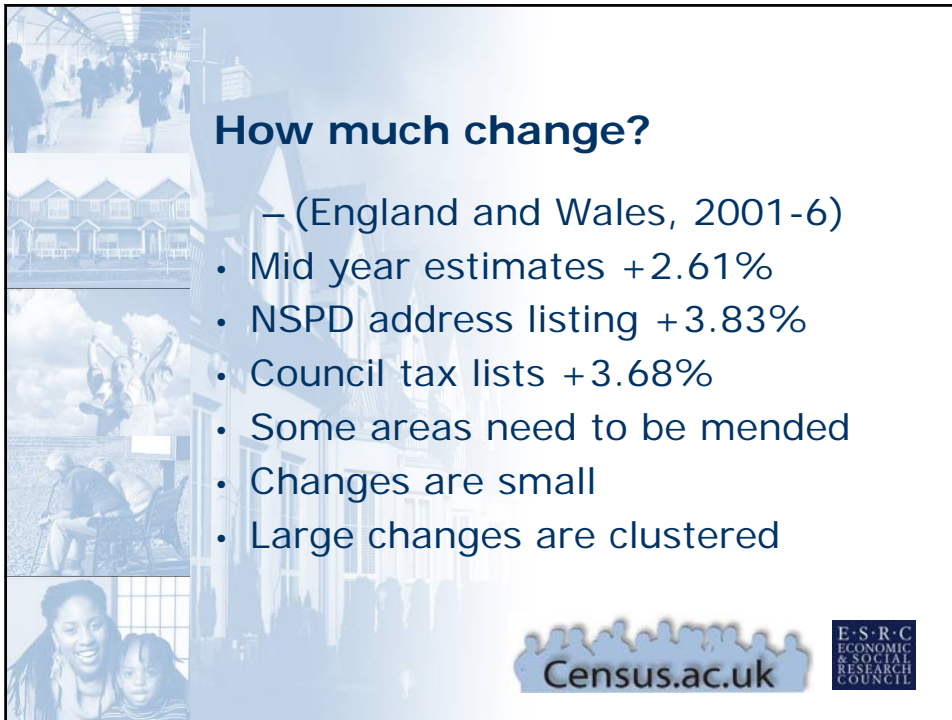


## 2011 output geography issues

- All the same demands and more:
- Strong demand for stability, vs pressure to redesign
- Relationship between boundaries and real world/Ordnance Survey features
- Tie-in with Neighbourhood Statistics geography, wards, LADs

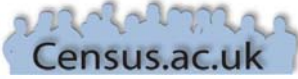

Census.ac.uk

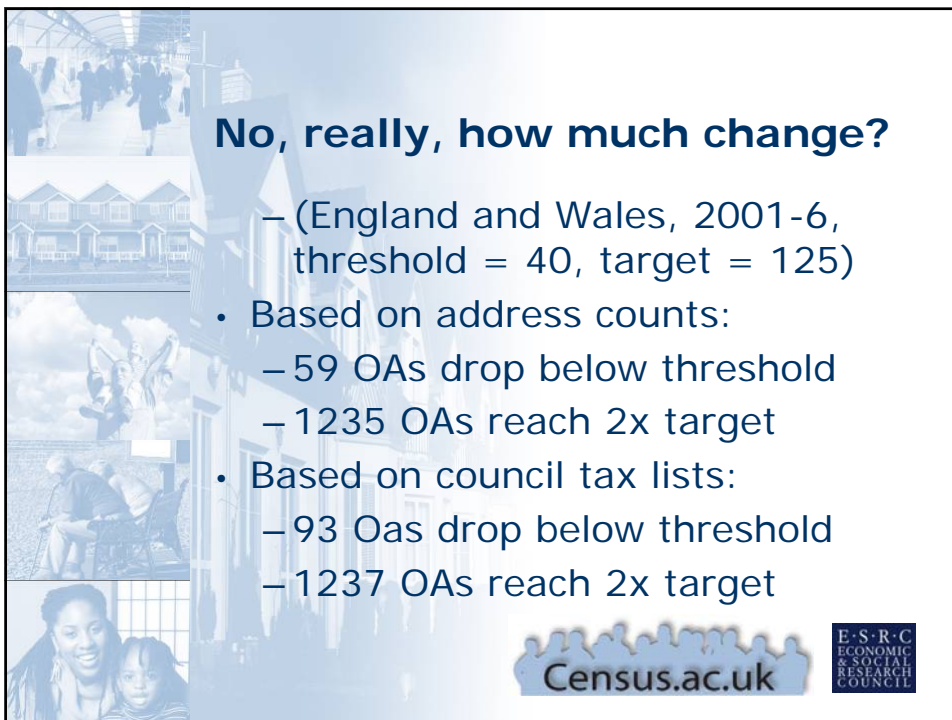




## How much change?

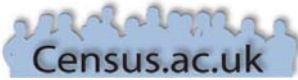

- (England and Wales, 2001-6)
- Mid year estimates +2.61%
- NSPD address listing +3.83%
- Council tax lists +3.68%
- Some areas need to be mended
- Changes are small
- Large changes are clustered


 



## No, really, how much change?

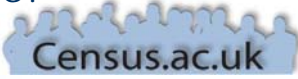

- (England and Wales, 2001-6, threshold = 40, target = 125)
- Based on address counts:
  - 59 OAs drop below threshold
  - 1235 OAs reach 2x target
- Based on council tax lists:
  - 93 OAs drop below threshold
  - 1237 OAs reach 2x target



## Developing geography strategy

- Maintain stability as far as possible
- Essential splits and mergers to accommodate population change and 2001 design errors
- Contain revisions within OA/LSOA hierarchy
- Revise less than 5% OAs
- Refine features?

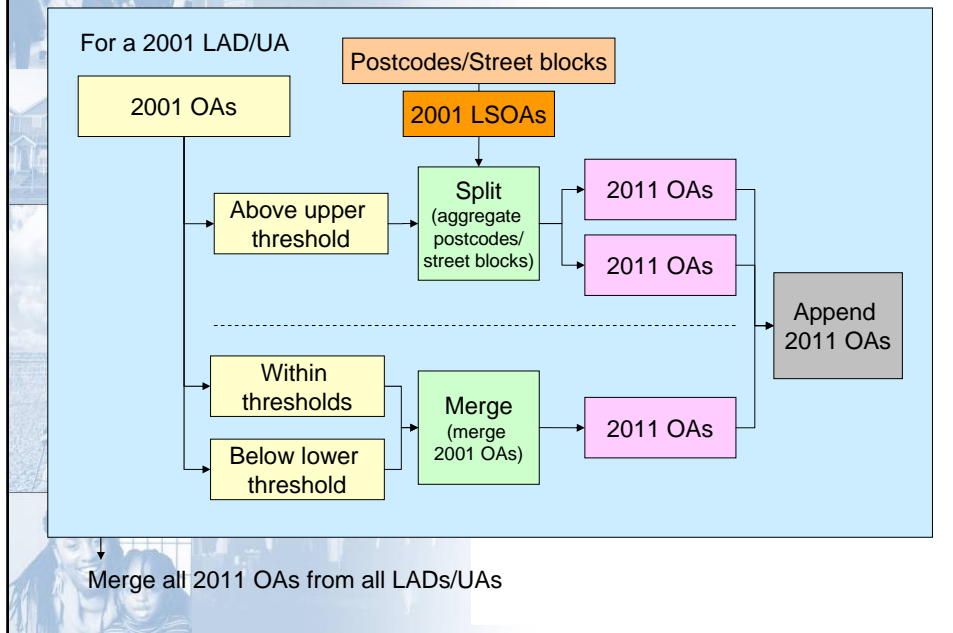


## Current developments

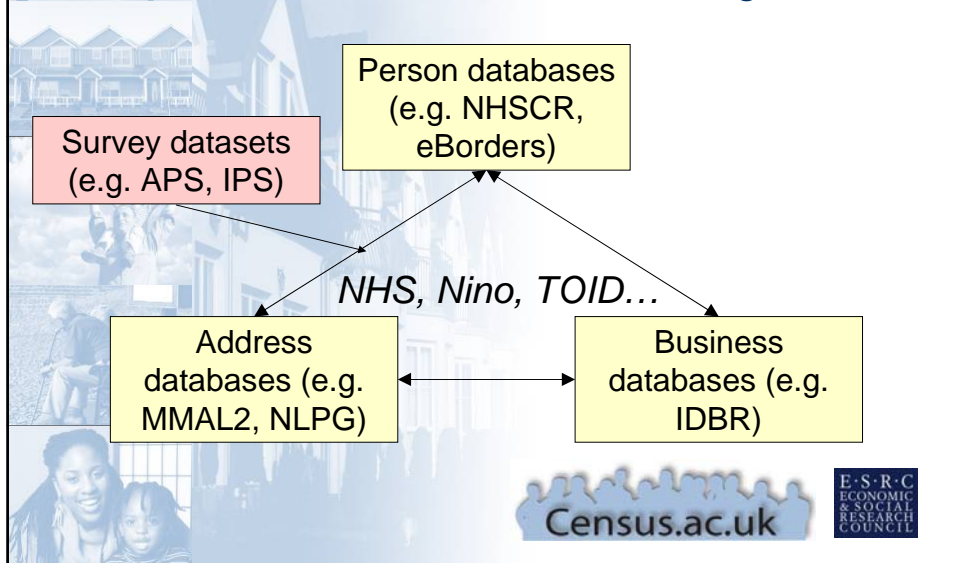
- 2009 Census rehearsal
- Address-listing projects, local government involvement
- OA maintenance project
- Discussions over licensing – based on 2011+ more redistribution?
- Scotland and Northern Ireland
- Administrative registers projects

## Mechanism (Figure: Samantha Cockings)



## Future administrative system?





## Summary

- 2011 geography: fundamentally familiar
  - But not simple to implement
- Post-2011 emphasis on non-census sources
  - SRSA '07 facilitates but does not provide answers
- Output geography for increasingly complex statistical system

