

Census2011Geog:

Developing automated maintenance methods for creating the 2011 Census output geographies in England & Wales

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Overview

- **Background – 2001 Census (E&W)**
- **What has changed since 2001?**
- **What do we want from 2011 geogs?**
- **Census2011Geog project**
 - Aims
 - Methods
 - Further work
- **What is happening in Scotland and Northern Ireland?**





2001 Census geography – E&W

- **Completely new geography from 1991**
- **Enumeration geography different to output geography**
- **Automated zone design**
 - Building blocks
 - Iterative recombination to optimise objective function, trading off competing design constraints

2001 zone design methods

- Synthetic postcode polygons
 - Address-based thiesen polygons dissolved to create postcode polygons
 - Nested within wards/parishes
 - Respecting road centrelines where possible
- Output Areas (OAs) optimised for:
 - Population/household thresholds
 - Homogeneity of population size
 - Homogeneity of accommodation type and tenure
 - Shape
- Keep split postcodes within same output area

2001 Output Areas (E&W)

- 175,000 output areas
- Mean 297 persons;
123 households
- Building blocks for
“neighbourhood”
geographies: Super
Output Areas (LSOAs,
MSOAs)
- Freely available digital
boundary data from
ONS



Changes since 2001

- Population growth, especially migration
- More and smaller households
- Newly built properties
 - Greenfield/new land
 - Brownfield/in-filling
- Sub-division of existing properties
- Changing socio-economic characteristics of areas





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How much change by 2011?

- 2001-2005 threshold breaches, based on mid-year population estimates

- Output Areas: **0.1%** **0.3%**

	2005 below	2005 within	2005 above	2001 totals
2001 below	221	228	1	450
2001 within	147	173553	682	174382
2001 above	0	78	506	584
2005 totals	368	173859	1189	175416

Population thresholds = 2.5 * household thresholds
 OAs: lower = 100 people; upper = 2 * target = 625

0.2%

99.1%

0.7%



How much change by 2011?

- Lower Layer Super Output Areas:

	2005 below	2005 within	2005 above	2001 totals
2001 below	6	8	0	14
2001 within	34	34242	58	34334
2001 above	0	3	27	30
2005 totals	40	34253	85	34378

99.6%

Population thresholds = 2.5 * household thresholds

OAs: lower = 1000 people; upper = 2 * target = 3000

How much change by 2011?

- Middle Layer Super Output Areas:

	2005 below	2005 within	2005 above	2001 totals
2001 below	3	4	0	7
2001 within	8	7178	0	7186
2001 above	0	0	1	1
2005 totals	11	7182	1	7194

99.8%

Population thresholds = 2.5 * household thresholds

OAs: lower = 5000 people; upper = 2 * target = 15000



Key messages

- Most output areas (and LSOAs, MSOAs) will not be broken by 2011
- BUT, changes clustered geographically, so could break badly in some areas
- Some areas known to be problematic already in 2001

What do we want from 2011 geogs?

- Stable ... but reflecting change ...!
- National Statistics Small Area Geography Consultation (2007)
 - Stability preferred over change (mostly)
 - Retain postcodes v use street blocks
 - Better alignment with real-world features
 - Better representation of “neighbourhoods”
 - Fix known problems e.g. Manchester, Westminster





Challenges for 2011 output geography design

- Stability at what level? OA, LSOA, MSOA?
- Building blocks? Postcodes or street blocks?
- Constrain within wards, LADs?
- Retain links to previous geographies?
- Same design criteria as 2001?
- Align to real world features?
- Mean high water and/or extent of realm?
- BUT: balance against licensing issues
- Automation of processes



Census2011Geog project

(June 2008 – July 2009)

- Develop automated procedures for maintaining (splitting, merging, re-designing) the 2001 census output geographies in order to create 2011 output geographies for E&W
- Assess the implications of using different building blocks (e.g. postcodes, street blocks) for these maintenance procedures





Census2011Geog: Methods

- Select study areas
- Create test data
- Developing automated maintenance procedures
- Evaluate alternative methods and building blocks





Study areas

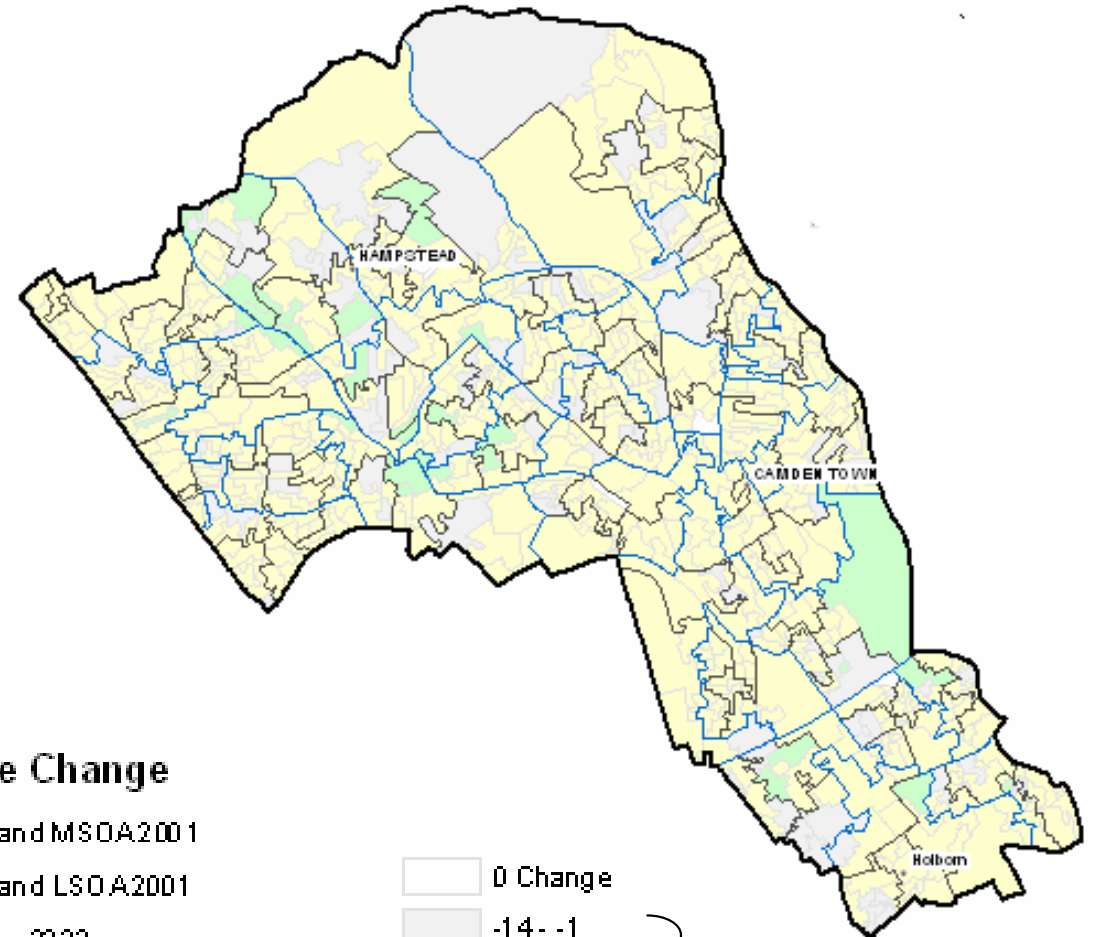
- Six LADs/UAs: Anglesey, Camden, Lancaster, Liverpool, Manchester, Southampton
- Criteria:
 - magnitude of change
 - type of change
 - number of breaches of thresholds
 - nested breaches
 - urban/rural
 - geodemographic characteristics
 - challenging for automated zone design e.g. coastal
 - Census test and/or rehearsal areas
 - local knowledge



Absolute population change 2001-2005 (mid-year estimates)

Southampton UA

Camden UA



Absolute Change

England MSOA 2001

England LSOA 2001

1751 - 3233

351 - 1750

41 - 350

21 - 40

1 - 20

0 Change

-14 - -1

-29 - -15

-59 - -30

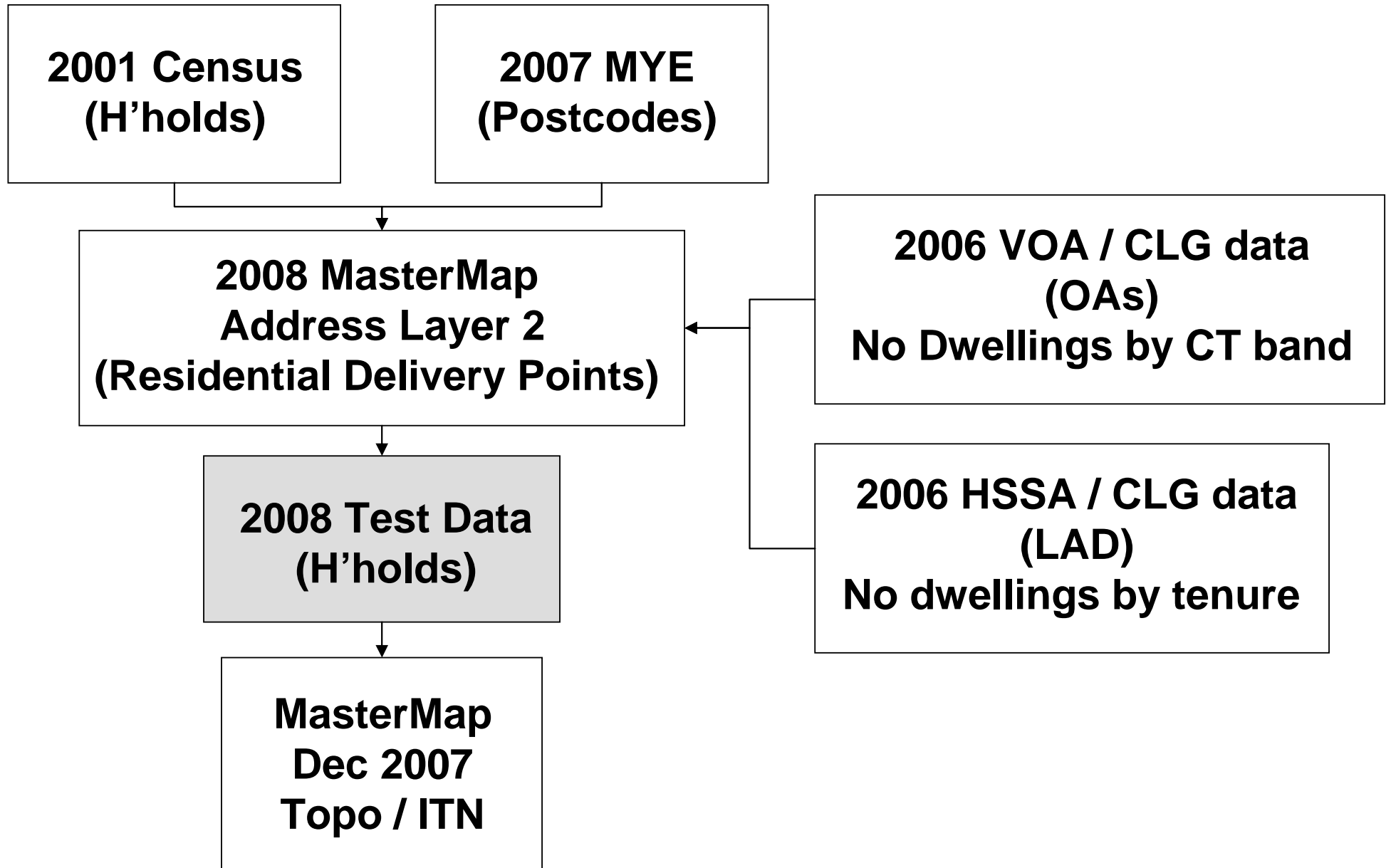
-349 - -60

-794 - -350

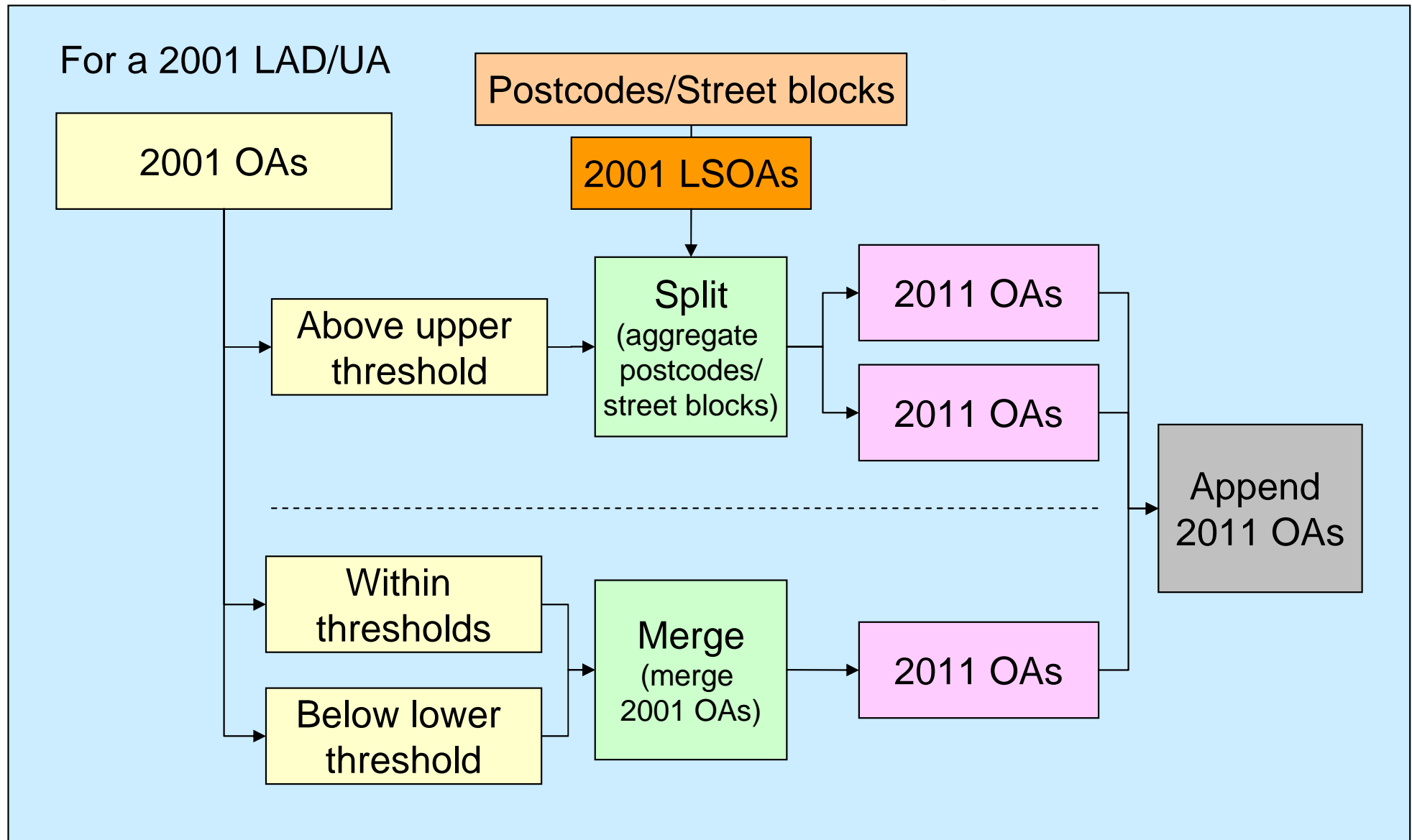
Increase

Decrease

Create test data



Automated maintenance procedures



Merge all 2011 OAs from all LADs/UAs



Next stages of project

- Develop and implement automated maintenance procedures
- Evaluate robustness of methods
- Evaluate alternative methods and building blocks





Summary so far (E&W)

- Much of output geography in E&W not likely to breach thresholds by 2011
- But, changes concentrated geographically and some areas with known problems
- Learning lots about types and size of changes and issues related to address data and 2001 zone design methods
- Address registers hopefully improving for 2011 – ONS using PAF, NLPG, AL2 and VOA data
- Research will inform users and ONS
- Final decisions on implementation lie with ONS



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What is happening in Scotland?

- 2001 output geographies
 - Postcode-based
 - Postcodes – Output Areas – Higher Geogs
 - Data zones – Neighbourhood Statistics
- History of maintenance and stability already – since 1991
- Thresholds lower than E&W
- 2011 methods likely to be similar?
- Essential splits or mergers of OAs only?

What is happening in Northern Ireland?

- Complete re-organisation of administrative boundaries prior to 2011
- Complete re-design of output geographies
- Experimenting with automated zone design methods and different building blocks (e.g. street block faces)





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