Dr Vanessa Lawrence CB
Director General and Chief Executive, Ordnance Survey

UN-GGIM High-level Forum, Qatar
February 2013
Geography: underpinning the nation
Geography has gone mobile
The Location Strategy

Published 25 November 2008

www.communities.gov.uk/Publications/communities/Locationstrategy
Place Matters: the Location Strategy for the United Kingdom

• If we can understand more about:
  • The nature of place
  • Where events happen
  • And the impacts of the people and assets at a location

  We can plan better, manage risk better and use of resources better.

• This will increase the success rate for new initiatives, assist in the reduction of the potential for future problems and give tangible financial benefits.
28. To ensure that the UK exploits the full value of its information the Location Strategy requires a programme of strategic actions which ensure that:

1. we know what data we have, and avoid duplicating it;

2. we use common reference data so we know we are talking about the same places;

3. we can share location-related information easily through a common infrastructure of standards, technology and business relationships;

4. we have the appropriate skills, both among geographic professionals and among other professional groups who use location information or support its use;

5. we have strong leadership and governance to drive through change including the implementation of this Strategy and the implementation of INSPIRE.
Knowing what data we have and avoiding duplication

29. The Location Strategy seeks to ensure that the information about the UK’s land, sea and air is collected once and then used many times in the public and private sector.

30. Each public sector organisation should record and maintain up-to-date details of its location-related datasets.

31. Each public sector organisation should make publicly available the details of its location-related datasets: even if the dataset itself is not publicly accessible or is not free of charge.
Ordnance Survey Great Britain

- Ordnance Survey is 221 years old
- Civilian organisation since 1983; 1113 staff
- Independent Government Department and Executive Agency reporting directly to a Government Minister
- Trading Fund since April 1999
- Annual Report for 2011/12: Revenue of £141.8m (QAR 810m), profit before exceptional items of £31.9m (QAR 182m), dividend £17.2m (QAR 98m)
- Headquarters in Southampton with 26 field offices around Great Britain
Ordnance Survey today

• Creates and maintains the ‘master map’ of Great Britain from which others derive benefit
• Manages complete national large scale digital data down to building level detail
• Maintains a database of 460 million features with over 10,000 changes made daily
• In 2011/12, 99.9% of real world features were represented in the database within six months of completion on the ground
• From the database, Ordnance Survey produces a range of digital data and paper maps for business, leisure, educational and administrative use

Provides the underpinning geographic framework for Great Britain
Ordnance Survey’s Vision

Ordnance Survey and its **Partners** will be the content providers of choice for location based information in the new information economy.

As a result of the vision

- 500 Partners
- Over £30m (QAR 171m) income for Ordnance Survey
- £350-400m (QAR 2000 – 2,285m) new revenues to British economy
A geographic database to connect information

- Every object represented in OS MasterMap has a unique identifier called a TOID. These TOIDs can be used to connect other information.
OS MasterMap current layers

- Imagery Layer
- Integrated Transport Network Layer
- Address Layer
- Topography Layer
Updating the Ordnance Survey database

- Field survey
- Aerial survey
- Photogrammetry
- Data from external sources

National Geospatial Database generates OS MasterMap

460 million records
10,000 daily changes

Customers
The size of the task

**Topographic Layer**
(approximate volumes)
1:1250 Scale = 17 000 km²
1:2500 Scale = 158 000 km²
1:10 000 Scale = 66 000 km²
Over one million units of change per year.

**Address Layer**
27.5 million geocoded postal addresses, with 500 000 changes per year.

**Transport Network Layer**
547,772 kms of roads,
885 881 route instructions – over 20 000 changes per month.
Basic dGPS: 0.8-3m
Standalone GPS: 10m
RTK: 1-2cm
High Quality dGPS: 20-80cm
The OS Net Network

- Complete national coverage
- 1-3cm, 3D, GPS+GLONASS positioning
- Galileo ready
- Free GPS products from; www.ordnancesurvey.co.uk/oswebsite/gps

Typical Installation
How OS Net works

Raw GPS data
from base station via leased line

GPS correction
sent via GSM/GPRS
internet or radio

GPS correction generated
• 100,000 accidents on this network every year, 5000 require police investigation
• The Highways Agency work closely with the 38 Police Forces in England to give them the tools to carry out accurate investigations
• The Highways Agency started to investigate new survey methods in 2005
• Ordnance Survey worked with Warwickshire and Surrey Police forces to pilot using OS Net GPS
• OS Net provides up to 1cm level positioning
• This is now the primary method adopted by all police forces
• Highways Agency studies have shown that, on average, roads are opened 40 minutes quicker
National Address Gazetteer Database

- Creation and maintenance of a single national address gazetteer database
  - Maintains existing local government addressing and street processes
  - Builds on investment in Ordnance Survey and local government address products
- Local Government Group and Ordnance Survey joint venture
- 50:50 Limited Liability Partnership (LLP) – creation of GeoPlace™
- The AddressBase range of products – AddressBase, AddressBase Plus and AddressBase Premium – now available through Ordnance Survey
Customer Focused Supply Models
A complete framework: Freemium Business Model

 OS MasterMap Topography Layer
 OS Explorer 1:25 000
 OS VectorMap Local (1:10,000)
 OS StreetView (1:10,000)
 OS VectorMap District (1:25-50,000)

 OS MasterMap AddressLayer
 OS LandRanger 1:50 000
 CodePoint With Polygons
 MiniScale
 Boundary Line

 OS MasterMap Integrated Transport Layer
 OS MasterMap Profile Plus
 CodePoint Open
 Meridian2
 Strategi
 Landform Panorama

 Topographic Mapping
 Business

 Address
 Location
 Route Networks
 Terrain Models

 Premium Licence
 Free Licence

 Increasing detail & specialist use
 Increasing data cost/value
Public Sector Mapping Agreement (PSMA)

What does the PSMA provide?

- A new 10 year agreement for the Public Sector in England and Wales.
- The PSMA provides access to core geographic datasets from Ordnance Survey
- The PSMA datasets are free at the point of use for all eligible public sector bodies.
- Providing common geographic framework for the Public Sector will enable sharing of information

PSMA Member licence key facts >>
18 months after launch…

Now has over 2700 members, comprising:

• 127 in Central Government, including 47 new (non-PGA) members

• 504 in Local Government, including 12 new (non-MSA) members

• 281 in the Health sector

• 1741 Town, Parish and Community Councils

• 19 Support Rescue Services

• 45 Other Authorities and Boards

… and customer/member feedback has been excellent…
Optimising waste collection using OS MasterMap Integrated Transport Network Layer

- Daventry generated new waste collection routes in all seven districts using OS MasterMap Integrated Transport Layer with Route Restriction Information.

- Daventry has been able to rationalise the number of domestic waste collection routes from nine to eight, reducing diesel costs by 12%, increasing spare capacity by 14% and eliminating overtime costs.

Photograph courtesy of Daventry District Council

‘OS MasterMap ITN Layer and Road Routing Information has made it possible for us to meet our challenges of increasing efficiency, planning for growth and reducing landfill. In Daventry alone we are on target to achieve savings of around £100 000 per year, with much greater savings expected for the whole county.’

Jo Gilford
Corporate Manager for Public Space
Daventry District Council
Welsh authorities to generate £500 000 (QAR 2.85m) of additional revenue through effective address management

A collaborative pilot project, facilitated by Welsh Government and led by Newport City Council and Cardiff City Council, is improving the management of addresses by linking electoral registration, revenue and benefits and other systems. It has delivered significant additional revenue by making the process more efficient, reducing errors, detecting potential avoidance and fraud. It has now been extended across Wales.
Cardiff Council delivers more than £1 300 000 (QAR 7.43m) savings from enhanced SEN (special educational needs) route and vehicle management, and efficient contract re-negotiation.

Cardiff Council’s Schools Transport Team supports improved SEN school routing, optimisation and efficiency using geographic information from Ordnance Survey and the Capita One Route Optimisation system, delivering huge saving from improved contract re-negotiations.

‘SEN Vehicle Management is having a major impact on how we manage transport needs. It is very easy to use and its intuitive menu system means that you don’t have to know the whole system in detail to be able to use it. It is very user-friendly.’

Stephen Gerrard, Schools’ Transport Team Leader, Cardiff Council
Utility efficiencies by linking customer records to Assets to billing

- What the asset department believes it supplies (blue)...
- Who the billing department believes they are billing (green)...
- Leaving those in red...
Northumbrian Water Limited – investing in GI

The return on investment is real and demonstrable and includes:

- Additional income alone of well over £1m (QAR 5.7m) through improved management of empty properties.

- A sustainable cut of at least £60,000 (QAR 342k) in operating costs through the call centre solve-at-source principle.

- Significant savings in time and cost in the provision of timely and accurate asset information to field technicians.

Ian Donald, Customer Services Director concludes:

‘From the customers’ point of view and from the business point of view, GIS has been of great benefit and our investment has been well worth it’.
Ordnance Survey’s commitment

To provide the Geospatial Information framework to support the operational needs of those agencies responsible for the safety and security of the London 2012 Olympic Games.
Lee Valley White Water Centre
Geospatial Information Provision needs determined

- Discussions with politicians, the Met Police and the MOD started in 2008
- November 2010, Ordnance Survey meeting, hosted by the Defence Geographic Centre
- Ordnance Survey tasked with arranging further discussions with representatives from key security services.
- User group sessions arranged to gather requirements working to a deadline of 15th December 2010.
- The resulting information was fed into Ordnance Survey business planning process.
- Requirements were described in 3 tiers based on relative priorities.
Requirements: Venues

- **Tier 1** – The main Olympic Park plus a buffer corresponding to the Olympic Coordination Zone.

- **Tier 2** – All other permanent and temporary Olympic venues, London Outside Races and Official Live Sites.

- **Tier 3** – Official hotels and athlete/press accommodation, key training venues (based on threat assessment) selected Games operational nodes outside main Olympic Park.
Requirements: Standard products

1. Frequent revision of our large scale topographic data to include all minor changes to the built and natural environment.

2. Frequent revision of our road network data.

3. Frequent revision of our address information.

4. Increased publication times for smaller scale products so as to ensure greater content synchronicity with our large scale data.
Requirements: Special Information Provision (SIPs)

1. **Street furniture** data captured within agreed areas close to key venues and sensitive sites.

2. **High resolution** ortho-rectified colour aerial imagery (12.5cm, 10cm and 5 cm resolution) for agreed targets.

3. **Simple Building Height** information for all buildings in OS MasterMap Topo within agreed areas.
Requirements: Defining extents

- These extents were refined and modified through discussion and agreement, primarily with Metropolitan Police and MOD.

Original buffered polygons refined and venue extents agreed for 87 kms.

- Olympic Park: 24 kms
- Other key venues: 51 kms
  - Weymouth: 5 kms
- Football stadia: 7 kms
The datasets

High Resolution Imagery
The datasets

OS MasterMap Topography Layer
As at 29th June 2012
The datasets

Street Furniture
Stratford main Olympic Site

157,000 features collected across 82 feature classes
Across all main venues, over 550,000 features were collected and ground verified.
Street furniture coverage around Lords Cricket Ground
The datasets

Simple Building Heights
Enabling the third dimension

- Simple Building Heights were automatically generated using in-house developed software processing a combination of OS MasterMap Topo and High Resolution Imagery.
## Simple Building Heights

<table>
<thead>
<tr>
<th>TOID</th>
<th>Ex. Ground Min</th>
<th>Ex. Roof Min</th>
<th>Ex. Roof Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>(north to south)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>osgb1000006617715</td>
<td>9.7</td>
<td>13.61</td>
<td>15.62</td>
</tr>
<tr>
<td>osgb1000006617716</td>
<td>9.7</td>
<td>13.15</td>
<td>14.98</td>
</tr>
<tr>
<td>osgb1000006617717</td>
<td>9.69</td>
<td>12.91</td>
<td>14.92</td>
</tr>
<tr>
<td>osgb1000006617718</td>
<td>9.69</td>
<td>12.81</td>
<td>14.92</td>
</tr>
<tr>
<td>osgb1000006617719</td>
<td>9.69</td>
<td>12.56</td>
<td>14.91</td>
</tr>
<tr>
<td>osgb1000006617720</td>
<td>9.74</td>
<td>12.74</td>
<td>14.91</td>
</tr>
<tr>
<td>osgb1000006617721</td>
<td>9.78</td>
<td>12.93</td>
<td>14.91</td>
</tr>
<tr>
<td>osgb1000006617722</td>
<td>9.92</td>
<td>13.2</td>
<td>15.14</td>
</tr>
<tr>
<td>osgb1000006617723</td>
<td>10.09</td>
<td>13.04</td>
<td>15.14</td>
</tr>
<tr>
<td>osgb1000006617724</td>
<td>10.26</td>
<td>13.35</td>
<td>15.06</td>
</tr>
<tr>
<td>osgb1000006617666</td>
<td>9.33</td>
<td>13.62</td>
<td>16.82</td>
</tr>
</tbody>
</table>
The datasets

Derived Data
Derived data: synchronisation of five key products

1: 10 000 Scale Raster

OS Street View®

1:25 000 Scale Colour Raster

OS VectorMap® Local

1:50 000 Scale Colour Raster
Data capture

The production effort
Remote-sensed capture and ground completion

- 1398 kms flown & processed
- Remote Sensing and Field team working in parallel
- 87 kms of urban revision to the Geospatial Content Improvement Process (GCIP) specification
- Up to 8 Remote Sensed operators working on Street Furniture at any one time
- Up to 8 Surveyors on the ground at any one time
- 200 point feature sample check per venue for Street Furniture
- Over 30 visits to Stratford site
Lee Valley White Water Centre
A combination of remote-sensed capture and field completion
Team GB

Working collaboratively across Government
Olympic GI Production Coordination Group

Aims
• To ensure that all UK Government organisations with an appropriate remit have access to the definitive and current geospatial data necessary to ensure a safe and secure running of the London 2012 Olympic Games
• To encourage collaboration across all such organisations over the creation of data and products, to ensure that the most cost-effective and efficient approach is taken by UK Government

Scope
• Specification and collection of data relating to Olympic venues & surrounds
• Definition and creation of products, including collaboration over consistent representation
• Delivery and dissemination of data and products to end users through a variety of media
Benefits of PCG

Data, product and burden sharing
- Data capture, data processing
- Common Data Catalogue

Issues tackled up by PCG include:
- Common local grid system for venues
- Shared symbology
- Portals and access to data
- Linking datasets – Olympic Torch Relay, Olympic Route Network
Symbology
Turning Geospatial Information into Geospatial Intelligence

Collaboration with Olympic Production Coordination Group partners
British Transport Police – Olympic torch relay route maps

Produced a graphic for all 70 days including Northern Ireland, Republic of Ireland, Channel Islands and the Isle of Man
Defence Geographic Centre – venue image plans (GSGS6512)

Olympic Park example based on Ordnance Survey high-resolution imagery captured: 30 June 2012
Defence Geographic Centre – Olympic field books (GSGS6542)
National Geospatial Intelligence Agency: field book
National Geospatial Intelligence Agency: 360° Imagery

Olympic Park -- Basketball Arena

Latitude: 51°32’53”N
Longitude: 0°0’51”W
MGRS: 30UYC0702415014
UTC: 2012-03-16 09:52:52Z
Defence Maritime Geospatial Intelligence Centre (UKHO): Thames Chart book
Defence Maritime Geospatial Intelligence Centre (UKHO):
Portland: Weymouth chart book
Transport for London: spectator transport and information
LOCOG: incident management plans
Operational support

Games time support
Olympic Torch Relay Route –
GPS data cleaning and matching to OS MasterMap ITN Layer
Olympic torch relay route – GPS data matched to ITN

GPS Attribution:
- ID: Day 48
- Route: Norwich to Ipswich

ITN Attribution:
For each ITN link which constitute the route…
- ID: TOID
- Descriptive Term: B Road
- Road Name: IPSWICH ROAD
- DfT Number: B1438
- Nature of Road: Single Carriageway
- Length: 442.95m
- Start Node: 4000000029211768
- End Node: 4000000029211751
- Last Change Date: 25/03/2009
- Reason for Change: Modified
Olympic Route Network (ORN) analysis
Olympic torch relay route – product generation
Torch relay products – daily detailed map
Olympic and Paralympic Games – daily map pack
Daily product: A0 venues in play overview

London venues insert

National venues insert
Daily product: A3 venues in play overview
Daily product – rail transport waiting times
Bespoke product and analysis
Protest routes and potential impact on Olympic Route Network
Crowd management at Westfield Shopping Centre

Access to Olympic Park on 04/08/12 & 05/08/12
Plume impact of major fire in East London – time series
Area at risk due to major fire in East London – time series

Barking Waste Transfer Station - Area at Risk - 12 August 2012 as predicted for 22:00

Olympic Park
North Greenwich Arena
ExCeL
Barking Waste Transfer Station
75-77 Chequers Lane Barking
PC: RM9 6QJ
Building a National Geospatial Information System: the UK perspective