New GI technologies for historical maps

Chris Fleet, National Library of Scotland
NLS Map Images website – http://maps.nls.uk
NLS Digital Mapping components

Users

Find By Place Viewer
OpenLayers Viewer
Explore Georeferenced maps Viewer
WMS / WMTS Services, API

Shapefiles / bboxes
Descriptive Metadata
Derivative Images
Georeferenced Images

Digital Objects Database metadata
TIFF master images

Maps
New GI technologies for historical maps

1. Improving access – GeoServer and bounding boxes

2. Georeferencing – Mosaics, Web Map Services, API, GeoReferencer

3. Open-source technologies – GDAL, OpenLayers, IIImage

Chris Fleet, Senior Map Curator

Chris Fleet, National Library of Scotland
1. Find by Place Viewer - http://maps.nls.uk/geo/find
1. Find by Place Viewer

Find a place:
Gazetteer / NG Ref: 
or
County: Choose...

Choose a map series:
- Maps of Scotland - 1560-1912
- Pont maps - ca. 1593-1614
- Gordon maps - 1630s-1650s
- Blaeu maps - 1654
- Moll maps - 1745
- Thomson maps - 1820-1830
- Other county maps - 1830-1892
- Taylor and Skinner - 1775-8
- Bartholomew Survey Atlas - 1912
- OS Quarter Inch - 1921-23
- OS County Indexes - 1854-86
- OS 1 inch - 1856-1912
- OS 1 inch Popular - 1921-1930
- OS 1 inch Popular (NG) - 1945-48
- OS 1 inch New Popular - 1948-47
- OS 1 inch 7th series - 1952-1991
- OS 1:25,000 - 1937-1961
- OS 1:6 inch - 1843-1882

Results:
- Bartholomew, John G., 1880-1920. Title: Economic Map of Central Scotland. Published: 1912
1. Find by Place Viewer
1. Find by Place Viewer
1. ESRI ArcIMS applications – 2004-2011

OS 6-inch to the mile maps, 1840s - 1880s

Small-scale 1920s maps - zoom in to display six-inch to the mile maps

1. Locate your area (use map or search methods below).
2. Keep zooming in on map to display seamless layer of six-inch 1840s-1880s maps, or
3. Select using buttons above to display original map sheets.

County: [Select]  Go
Parish: [Select]
Gazetteer: Please Enter Place Name: [Search]

60 Ellisters
1. ESRI ArcIMS applications – 2004-2011
1. ESRI ArcIMS applications – 2004-2011
1. ESRI ArcIMS applications – 2004-2011
1. Problems of ArcIMS

- Expense – annual licensing costs of ca £5,000 - £6,000
- Limited web-mapping functionality
- Instability – difficulty in handling high usage spikes
- Fixed screen for map interface (500 x 500 px)
- Basis on British National Grid rather than Spherical Mercator
1. GeoServer – adding shapefiles as layers

<table>
<thead>
<tr>
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<th>Store</th>
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</table>
1. **GeoServer – previewing shapefiles and fields**

![Image of GeoServer interface](Image)

- **Tiling:** Single tile
- **Transition effect:** None
- **Antialias:** Full
- **Format:** PNG 24bit
- **Styles:** Default

**Filter:** CQL

---

**Scale:** 1:10M

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# GeoWebCache – for rapid display

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1. CCS Sheetfinder for OS map extents
GDAL: using gdallindex to create a clickable graphic index
1. NLS OS 25 inch sheet boundaries in ScotlandsPlaces
1. NLS map sheet boundaries in OldMapsOnline
2. Georeferencing – Mosaics, Web Map Services, API, GeoReferencer

- Preparing georeferenced overlays or mosaics of historical maps
- Web Map Services
- Historical Maps API
- Georeferencer
2. Tiling the world...

CONVERSION OF COORDINATES FOR GOOGLE MAPS (GLOBALMAPTILES.PY MODULE)

GEODETIC COORDINATES
LATITUDE LONGITUDE
WGS 84 (EPSG:4326)

SPHERICAL MERCATOR
METERS
EPSG:3785 / EPSG:900913

PYRAMID COORDINATES
XYZ PIXELS / ZOOM
WEB VIEWERS

TILE INDEX
XYZ TILE / ZOOM
TILE MAP SERVICE
2. Web Tile Map Services
2. Explore Georeferenced Maps Viewer - http://maps.nls.uk/geo/explore
2. Explore Georeferenced Maps Viewer - http://maps.nls.uk/geo/explore
2. Explore Georeferenced Maps Viewer - [http://maps.nls.uk/geo/explore](http://maps.nls.uk/geo/explore)

View a selection of historic maps as overlays on a modern map base.
2. Explore Georeferenced Maps Viewer - http://maps.nls.uk/geo/explore
Great Escapes of Moray - http://geo.nls.uk/search/elgin

Historical maps of Elgin and Lossiemouth (1747-1938)

Please choose a seamless historic map overlay below, and then zoom in on the map to view the overlay.

Different modern base map layers (upper right) can also be viewed by sliding the Transparency Slider (upper left on map).

1. Please choose an historic overlay:
   - Roy Military Survey, 1747-52
   - Robert Ray's Plan, 1838
   - Ordnance Survey, 1866-78
   - Ordnance Survey, 1901
   - Ordnance Survey, 1930
   - Geological, 1876
   - Land Utilisation, 1935
2. Bartholomew exhibition interatives

Online versions at:
digital.nls.uk/bartholomew
2. Gazetteer for Scotland with Historical Maps via WMS from NLS
2. OpenStreetMap WMS layers for Great Britain

National Library of Scotland

The National Library of Scotland (NLS) has a large collection of georeferenced Out-of-Copyright maps available online. Additionally, it has other non-georeferenced maps, especially in Scotland, which may be of interest.

NLS is keen to have OpenStreetMap make use of these georeferenced maps for additional information, especially in Scotland. There is more dialogue between NLS Senior Curator of Maps, Chris Fleet, and a number of OSM mappers in Scotland, England, and Ireland, to continue this process. NLS also gratefully acknowledge support from the Wilbour Associates of Sheffield who have funded map scanning and georeferencing work from 2011 (further information).

NLS has a Historic Maps set of maps of Great Britain from the 1820s to the 1940s (including 1.1 million to 1,63,366 map series) which means you can add map layers to your own map instance or other services. Map tile delivery is currently free from the NLS servers, available under CC BY-SA 3.0.

There are a number of Out of Copyright map overlay layers which are useful to OpenStreetMap mappers. All overlays currently available can be viewed on the NLS mosaic viewer. You can select OpenStreetMap Mapnik layer as the background.

Using the NLS historical mapping for OSM editing

You can manually add the following TMS layers to JOSM TMS (via preferences). These will be available automatically. Addition to Polatch is coming soon. When using these sources for OSM editing it is requested that "source=NLS Historic Maps" tag or similar.

- NLS - OS 6-inch County 1842-1882 - Max zoom 16 (This layer is Scotland only)
  
  tms: http://geo.nls.uk/maps/os/six_inch/{zoom}/{x}/-{y}.png

  
  tms: http://geo.nls.uk/mapsdata2/os/25000/{zoom}/{x}/-{y}.png

  
  tms: http://geo.nls.uk/mapsdata2/os/seventh/{zoom}/{x}/-{y}.png

OpenStreetMap Collaboration - Ireland

Bartholomew Quarter Inch to the mile
(1: 253440) 1940

British War Office One Inch to the mile
(1:63,360) 1941-43 - (GSGS 4136)

Available in Potlatch2 and JOSM
http://wiki.openstreetmap.org/wiki/WikiProject_Ireland
2. Visualising Urban Geographies - geo.nls.uk/urbhist

About the Project

Visualising Urban Geographies is a project that provides mapping tools for historians. It enables them to use digitized and geo-referenced maps in conjunction with historical information based on either addresses or districts. This spatial dimension enriches historical understanding and analysis, and can also be applied to other subject areas. The focus on Edinburgh is deliberate: to explore the potential of the mapping tools where there is available data and a wide range of suitable maps.

The project operates on several levels.

1. **Inspection**: Bringing together geo-referenced maps in a single place enables change over time to be identified by overlaying maps of different periods. Distance, area and altitude are built in features.

2. **Mapbuilder**: this enables users to use a geocoder to obtain latitude and longitude for their address-based data and plot it on a suitable historical map.

3. **Configuring Mapbuilder**: in conjunction with a Google account this allows users to publish their own maps to the web.

4. **Thematic mapping**: using boundaries and jurisdictions for the city, registration and other districts you can use data collected by area to develop charts and maps representing changes in demographic, social and political data.
Guides for:
- georeferencing maps
- transforming maps between projections
- drawing lines and points
- putting georeferenced maps online

...using ArcGIS and QGIS for desktop use
Resources

Georeferenced maps of Edinburgh (1765-1950) freely available as:

- Tile Map Services
- JPEGs/JPW
- KML
- Web Mapping Services
Bartholomew’s *Chronological Map of Edinburgh* as KML Superoverlay
AddressingHistory -
http://addressinghistory.edina.ac.uk/
1:1 million, Great Britain, 1933

Quarter-inch to the mile, Scotland, 1921-1923

Quarter-inch to the mile, England and Wales, 1919-1921

One-inch to the mile, Popular edition, Scotland, 1920-1930

One-inch to the mile, New Popular edition, England and Wales, 1945-1947
API Tools: MapTiler and TileServer

MapTiler - Map Tile Cutter
Map Overlay Generator for Google Maps and Google Earth

Tile Server
TileServer is a hosting technology for fast web 2.0 interactive online maps, derived from geospatial data, orthophotos or scanned maps. The maps are distributed from multiple servers, the service is much faster and more reliable than the traditional forms of online publishing of maps and the system is able to handle large number of visitors.

Klokan Technologies GmbH

API: User Communities : Outdoor Leisure

Wheres the Path - http://wtp2.appspot.com/wheresthepath.htm - 388,000 views
User Communities: Outdoor Leisure

**Outside Maps**

**Otopia WindowsPhone app**

OS Maps provides you with the UK Ordnance Survey maps for walking, biking or cycling. New sites include OS Roadmap and Calem/Bartholomew London street plan.

- 52400 ' topo ' OS maps
- OS Roadmap and Calem/Bartholomew London street plan
- 1930s OS Map
- GPS Location enabled
- Compass and current heading indicator
- Location search
- Display addresses for given location
- On-screen Lat/Long and OS Grid Ref
- On-screen speed indicator
- On-screen distance and direction to journey
- Map legend and scale options

Buy for £1.29
2. Crowdsourced georeferencing - NYPL MapWarper
2. NLS Map Georeferencer -
http://maps.nls.uk/projects/index.html
NLS Map Georeferencer – selecting a map

Map Georeferencer
County Maps of Scotland, 1580-1928

Applications | Overlays | Georeferencer | API | Maps of Scotland home

The Georeferencer application is a new, easy and enjoyable way of georeferencing historical maps, so that they can be displayed as an overlay in Google Earth and the Google Earth browser plugin.

Ungeoreferenced

Please select a map below to start georeferencing:

Georeferenced

Please select a map below to view it in Google Earth or improve on the georeferencing:
NLS Map Georeferencer – split-screen for georeferencing
NLS Map Georeferencer – adding control points

Georeferencer: Online Georeferencing Tool
Click on three or more equivalent places on both maps
NLS Map Georeferencer – saving…
Moltes gràcies a tots! 

Girona ha estat una de les primeres a georeferenciar els mapes de la Cartoteca, on 24 deu han georeferenciat els 890 mapes de la zona plena.

El mapa actual mostra el mapa del món.

Les cinc seccions més actives són: 

1. Marc Norta 
2. Marc Norta 
3. Xaver Companys 
4. Marc Norta 
5. Miquel Grau 

Si us plau, preveure-vos en contacte amb nosaltres a l'email: cartoteca@igual. 

La galeria dels mapes actuals.
2. Collaborative projects: ScotWays heritage paths
2. Collaborative projects: ScotWays heritage paths
3. Open source technologies

Main software:

OSGeo suite
GDAL
GDAL2Tiles /
MapTiler
QGIS
GeoServer
OpenLayers
IIPlmage
### 3. GDAL / OGR open source commands

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<thead>
<tr>
<th>Command</th>
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<tr>
<td>gdalinfo</td>
<td>information about raster image</td>
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<tr>
<td>gdaltindex</td>
<td>create shapefile of raster image extents</td>
</tr>
<tr>
<td>gdal_translate</td>
<td>convert raster images between formats</td>
</tr>
<tr>
<td>gdaltransform</td>
<td>convert raster images between projections</td>
</tr>
<tr>
<td>ogrinfo</td>
<td>information about vector file</td>
</tr>
<tr>
<td>ogr2ogr</td>
<td>convert vector files between formats</td>
</tr>
</tbody>
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New MrSID OpenLayers Viewer - 2009

LizardTech Express Viewer problems:

- Fixed image extents on screen
- Non-Ajax based viewing
- Limited ability to display image in wrapper
- Printing and downloading limitations

New customised OpenLayers viewer addresses these problems and uses other open-source Javascript programs including, Prototype, Gears, and XMLHttpRequest
3. Open source technologies

Advantages of open-source software:
• cheaper, more open standards-compliant
• delegated development and customisation
• greater opportunities for collaboration
• improvements in functionality and aesthetics of applications

Disadvantages of open-source software:
• greater need for programming knowledge
• fewer bespoke applications, and more need for development
• more time-consuming to develop and support
• possible need for paying for external development
New GI technologies for historical maps

Useful links:

- e-Perimetron: http://www.e-perimetron.org/
- Old Maps Online sites: http://help.oldmapsonline.org/


Exhibition

Putting Scotland on the Map: the world of John Bartholomew and Son

Until 7 May 2013
National Library of Scotland, George IV Bridge, Edinburgh