OpenStreetMap: Can it be used for 'real' GIS?

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Oh No! A presentation on OpenStreetMap??
Explaining the OpenStreetMap (OSM) Project in one slide

1) Volunteers collect data with GPS and upload to OSM database (using OSM editors)

2) Volunteers trace over aerial imagery and upload to OSM database

3) Governments/councils might donate data to OSM database

4) Volunteers edit and correct the data like Wikipedia pages

5) Repeat any of steps 1 to 4 (continuously)
OpenStreetMap is stored in a spatially-enabled database.

Insert (RDBMS, or XML aware) Application here

RENDERS

PostgreSQL

SHP, GML, KML, etc

ODBC

ArcGIS

MapInfo Professional

Google Earth
OSM data is available in a variety of formats: SHP, XML, etc.

### Downloads

Welcome to the CloudMade downloads site. This is where you can find extracts of maps from different places around the world. From here you can download:

- OSM XML extracts by country
- Garmin Map extracts (OSM.err edition)
- Osmosis country bounding polygon
- Shapefile extracts by country
- Navit maps by country
- GPX POI by country
- TomTom POI by country
- OSM XML feature extracts by country

The files provided on these pages are created from OpenStreetMap map data. Because OpenStreetMap is a work in progress, many of the countries are only partially mapped or are incomplete. The data contained on these pages has not been checked or verified by CloudMade and we don't recommend using it for any mission-critical applications. For more information please read the [terms and conditions](#).

Everything on this site is free of charge, so enjoy! If you do something cool with any of the data here, let us know.

For more information about the files contained on this page, take a look at our [FAQ](#).

### Last maps update: 21 September 2010

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Editing is usually done online or with a desktop editor (such as JOSM).
OSM often benefits from dedicated local interests...

http://tools.geofabrik.de/mc/
Many mapping and routing products have been derived from OSM
ForeverMap Europe (available on iTunes store)

Available for the iPhone and the iTouch

All Europe (1.7GB in OSM XML) is stored on the device

Off-line navigation and information services

Paid for app on iTunes
Skobbler – Navigation apps for iPhone and Android Phones

- As currently one of the largest "data consumers" of OSM, they can create publicity and awareness of OpenStreetMap
- Allow users to identify and fix errors in routes
- Contributed “turn restriction tools” to OSM
So what about the quality of OpenStreetMap......

Can we actually use it for real GIS?
Our research work is concentrating on POLYGONS – not polylines or roads

Muki Haklay @ UCL

Oliver O'Brien @
http://oliverobrien.co.uk

Dmitri Toropov. @ SOTM 2010

Alex Zipt @ Heidelberg
Which is better for LBS? Two versions of the same polygon

Depends on:
SCALE Requirements, Accuracy Requirements, Application needs
Different editors of data – different ideas (representations)

Version 1 (360 Nodes)

Area difference < 1%

Version 50 (765 Nodes)
OpenStreetMap Ireland: Heat Map of OSM Points in 5KM Grid Cells
OpenStreetMap Lithuania: Heat Map of OSM Points in 5KM Grid Cells

Visually – OSM activity follows road networks and based in high population density areas
#Users editing OpenStreetMap polygons in 5KM Cells in Ireland
Ireland OSM - Polygon Editors – Several Users are dominant contributors
Comparison of OSM National Roads vrs OSI data

1:5000 dataset from OSI
Unclassified roads in both OSM and OSI
Experiments

- **646 polygons** (water, forest, wood, farms, etc)

### Number of Polygons vs. Editing Lifespan

<table>
<thead>
<tr>
<th>Number of Polygons</th>
<th>Editing Lifespan</th>
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<td>68 (11%)</td>
<td>&gt; 3 Years</td>
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<tr>
<td>368 (57%)</td>
<td>&gt; 2 years &lt; 3 years</td>
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<tr>
<td>170 (26%)</td>
<td>&gt; 1 years &lt; 2 years</td>
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<tr>
<td>40 (6%)</td>
<td>&lt; 1 year</td>
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### Polygon Status vs. Number of Polygons

<table>
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<th>Number of Polygons</th>
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<tr>
<td>V1 (Closed) Vfinal (Closed)</td>
<td>68%</td>
</tr>
<tr>
<td>V1(Open) Vfinal (Closed)</td>
<td>31%</td>
</tr>
<tr>
<td>V1(Open) Vfinal (Open)</td>
<td>&lt; 1%</td>
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- Polygons from France, Ireland, England, Germany, Czech Republic, Switzerland, Finland, Austria, Lithuania
85% of polygons have > 5 contributors
“Open” polygons are contributed but are usually corrected quickly.

49% of polygons have an OPEN polygon at some version in their lifespan...
Versions are not necessarily distributed evenly over total edit lifespan.
In most cases polygons have nodes added over editing lifespan.

Change in Number of Nodes (first to last version)
bin size = 100
Some polygons undergo radical changes in overall spatial area.
As more contributors get involved more versions of the polygons are created.

**Relationship (contributors, versions)**

- **Number of Versions**
- **Number of Contributors Per Polygon**
Time between edits is actually surprisingly slow for crowdsourcing

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<th>No. Occurrences</th>
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<td>1 hour and 2 hours</td>
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<td>2 hours and 3 hours</td>
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<td>3 hours and 4 hours</td>
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<td>5 hours and 12 hours</td>
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<tr>
<td>12 hours and 1 day</td>
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<tr>
<td>1 day and 1 week</td>
<td>303</td>
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<tr>
<td>1 week and 1 month</td>
<td>240</td>
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<tr>
<td>&gt; 1 month</td>
<td>5669</td>
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</table>

- 19% of consecutive edits happen within 1 hour
- 37% happen between 1 hour and 1 day
- 44% more than 1 day between edits
Example: OSM_ID (20142797) (South of Exeter City, UK)
8 months later more detail added

Version 10 (red)

23-Sept-2008 @ 13:57 N=82
A further 8 months later....
2 Years on … Four times the number of nodes of original version…

Version 30 (Blue) Version 20 (Green)

06-Jun-2010 @ 20:57 N=223
Heavy editing activity over a period of 5 minutes...
Most current version – after a high number of edits in a week

11-Jun-2010 @ 12:26 N=377
(5 days after version 40)

Version 55 (Purple - CURRENT) Version 40 (Brown)
First (Black) and Last (Purple) versions

09-Jan-2008 @ 13:52 N=57

11-Jun-2010 @ 12:26 N=377
V1 and V55 of 20142797 overlayed on Google Maps

From visual ground-truth: seems as if the detail has increased but a strange change in overall polygon contour shape.
Close examination of the overlay – obvious problems with V1
Situation gets a little worse for the northern part of the forest area
Polygon 27168268 – steady and controlled evolution
This polygon is unique in that it only had one contributor.
By using shape similarity we can see when major changes to polygon shape occurs.
Polygon 26164873 – an example of a volatile evolution

High uncertainty about the reliability and quality of this polygon without ground-truth
Polygon 26164873 undergoes serious changes in structure

VERSION 1

VERSION 3
Polygon 26164873 continues radically changing
Conclusions....

- Zero “cost of entry” to try OSM data
- OSM data is still probably too inhomogeneous (cities vrs towns vrs rural) for use in national scale GIS work
- OSM data is no longer a “dissident opponent” to Mapping Agencies – many are creating their own Open Access policies
- Potentially through more widespread usage will come better quality (more 'interactive' quality improvement from consumers rather than 'passive')
Overall OpenStreetMap is a good product for use in GIS research.

Squeezable, Changeable

Extendible

Mildly addictive

http://waterflea.com/android.php#BubbleWrap