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OPEN HISTORICAL MAPS OF IRELAND

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Final Semester research paper
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Declaration of Authenticity

I declare that the work which follows is my own, and that any quotations from any sources (e.g. books, journals, the internet) are clearly identified as such by the use of 'single quotation marks', for shorter excerpt and identified italics for longer quotations. All quotations and paraphrases are accompanied by (date, author) in the text and a fuller citation is the bibliography. I have not submitted the work represented in this report in any other course of study leading to an academic award.

A handwritten signature in black ink that reads "Noel McLoughlin". The signature is fluid and cursive, with "Noel" on the first line and "McLoughlin" on the second line.

Student:

Date: 30/May/2020

Word Count

This project contains 7634 words.

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Abstract

*Everything is related to everything else,
but near things are more related than distant things (Tobler's law).^[1]*

Geographic information systems (GIS) are part of mainstream.^[2] GIS is designed to capture, store, analyse, modify, and present all types of spatial data. Cartography is the practice of studying and creating maps.^[3] Modern cartography underpins the theoretical and practical foundations of GIS, allowing geographical data to be used in novel and powerful ways.^[4] Open Access to digital data is now common. Open digital data freely accessed, used, and shared by anyone. Governments, businesses, and society harness open data for social, economic and environmental benefit.^[5]

Open access to cultural, historical, and archaeological geodata is also desirable. Historical GIS could reinvigorate almost all aspects of historical geography, if used appropriately, critically and innovatively.^[4] However the availability of open archaeological and historical data lags behind. Archaeological data is not easy to monetize or standardize.^[6] While many fragmented web-GIS experiences targeted at specific historical projects have emerged, no open access platforms for world historical, cultural, and archaeological data have emerged. One important aspect of an Open Access platform is the availability of tools to share and reuse historical data.^{[2][6]} Finding novel ways to explore heritage using digital connected devices and open standards is worthwhile.

I have no knowledge or experience of Geographical Information Systems (GIS), or mapping, so I only approach this topic as a computer scientist and historian.

This paper explores open access platforms and tools for sharing and reusing cultural, historical, and archaeological open data. It suggests OpenHistoricalMap can become the standard open public participation historical mapping platform, bringing value to historical, archaeological, and cultural geospatial data. Finally, I discuss some use cases on the theme of mapping Gaelic Ireland.

Acknowledgements

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Thanks to my wife Dorota for supporting my studies.

Introduction

Cartography

Cartography, being at least two thousand years old, is clearly different to GIS.[7] Maps are fundamental tools to help the human mind comprehend the universe at various scales.[8] They can be considered from several aspects; a scientific report, historical document, research tool, and piece of art.[9] These dimensions do not exhaust the importance of maps in human terms, as Robinson and Petchenik elaborate-

There are specific maps and general maps, maps for the historian, for the meteorologist, for the sociologist, and so on without limit. Anything that can be spatially conceived can be mapped-and probably has been.

Maps range in size, ... monochrome or multicolored, simple or complex.

They need not be flat-a globe is a map; they need not be of earth - there are maps of Mars and the moon; or for that matter, they need not be of any place real-there have been numerous maps made of imaginary "places" such as Utopia and even of the "Territory of Love".[10]

Maps are symbolic models of any space, showing pictorial relationships between elements such as objects, regions, or themes. People make maps to tell other people about places and spaces they experienced or imagined.[10]

Ideally, maps show spatial relationships and form of landscape: where it is, what it is, when it is, what is nearby, how far away, which direction, how I get there, what else is there, and how things are related? The best characteristics of all maps are- location in two-dimensional space, attribution, qualities or magnitudes such as language or temperature, and modeling of reality, since 1:1 scale maps are not useful.[7]

GIS

Computer-assisted cartography is one type of GIS. It helps cartographers style their own Maps and tell stories.[2] Open GIS demands open standards.[11] Popular file formats such as PDF, DOC, PPT, and DWG, are natively unsuitable for open data. Raster datasets must also be geo-referenced (addition of location information) to be usable as GIS layers. Finally, the Base map and data layers in Google maps are not open data.[12]

Open Geospatial Consortium (OGC), an international consortium and standards organization formed in 1994, produces “*royalty free, publicly available, open geospatial standards*”.[11] The International Standards Organisation published the ISO19115 standard, the schema describing geographic information and services.[13] Relatedly, the Open Design Alliance (ODA), a design industry consortium, promotes design format interchange (DWG, Autocad, etc). Photoshop, CAD, Autocad, and Illustrator are design tools whose native data formats are unsuitable for open data. [14]

The most important Spatial Data Formats and Standards are listed.[11][12]

- *File formats*
 - *Shape files in GIS.*[15]
 - *GeoTIFF imagery.*[16]
 - *GPX for GPS Tracker and Waypoints.*[17]
 - *KML/KMZ in Google Earth.*[18]
 - *GeoJSON DB.*[19]
- *Web Services - power map data over the Web.*
 - *WMS (Web Mapping Service) for Raster Imagery.*[20]
 - *WFS (Web Feature service) for Vector Features.*[21]
 - *TileServer, serving Cached Map tiles.*[22]
 - *PostGIS/PostgreSQL for Backend DB.*[23]
 - *Open Layers, or Leaflet, web mapping client.*[24][25]

All GIS generated maps are a combination of three essential geographical building blocks listed below, for constructing geographical features.[12]

- *Points/Nodes*
 - *single point with Latitude-Longitude coordinate*
 - *points of interest, Rivers, and waypoints from GPS devices*
- *Lines/Ways*
 - *Series of points in a path*
 - *Roads, Boundaries, Rivers, Tracks from GPS*
- *Boundaries/Polygons*
 - *Closed Geometry in GIS (Nodes and Ways in OpenStreetMap)*
 - *Plots, Features, Territorial, Boundary.*

Public Participation GIS

There is much demand for open-licensed map data. On the ground surveys give unique datasets. Traditional GIS was concerned with read-only maps, produced and consumed by experts. The term **NeoGeography** has since emerged, encapsulating a movement towards read-write maps, online access (Web 2.0), and crowdsourcing trends.[5] The phrase "public participation GIS" is also used, in consequence of increased research on the societal impacts of technology. The phrase binds various approaches in making GIS and spatial decision-making tools more openly and equitably available, to society and marginalised groups.[2] *The conceptual difference is "how we treat the map".*[12]

Activists, non-profits, and traditionally marginalized people embraced gis as a tool for social change. The terms GIS/2, and GIS 2.0, are also coined around the idea gis should represent different measures and visions of places, integrate local knowledge, and support cultural and language distinctions.[26] Google's Maps (and Earth) sat somewhere between, helping democratize the use of maps and availability of satellite images, but providing only read-only maps.[12][27]

OpenStreetMap

In 2004 a citizen-created database called OpenStreetMap (OSM) emerged. OSM started as a community effort to make free geographical data available in the United Kingdom, Raw map data held by Ordnance survey, could only be licensed at great cost.[12] The Ordnance survey business model is arguably contrary to

the principles of open data.[28] From modest beginnings, OSM gained widespread adoption, a true example of public participation GIS. Mappers all over the world contribute and maintain geodata on human environments. *The OSM website boasts "OpenStreetMap powers map data on thousands of web sites, mobile apps, and hardware devices."*[29][30]

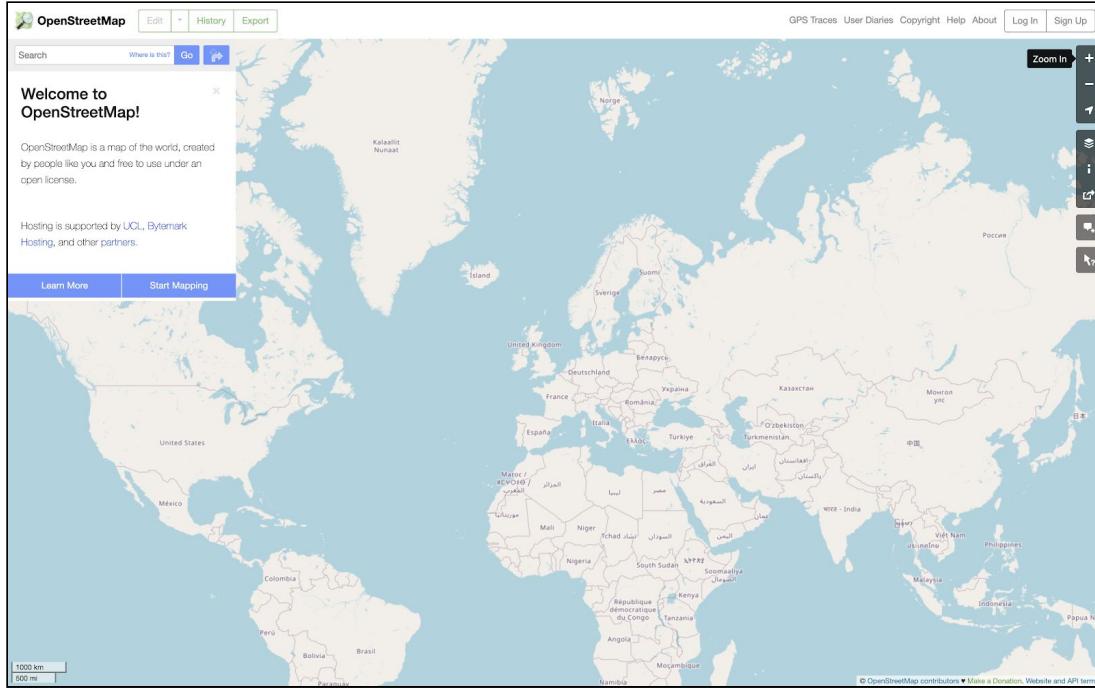


Figure 1: OpenStreetMap: <https://osm.org>

The OSM emphasis is local knowledge, collection of open geospatial data, and citizen cartographers.[29][30] OpenStreetMap Foundation, an international not-for-profit organization, supports the OSM project.[31]

OpenStreetMap is an initiative to create and provide free geographic data, such as street maps, to anyone. The **OpenStreetMap Foundation** is an international not-for-profit organization supporting, but not controlling the OpenStreetMap Project. It is dedicated to encouraging the growth, development and distribution of free geospatial data and to providing geospatial data for anyone to use and share.[31]

The term Volunteered Geographic Information (VGI) is also used. Concerns surrounding the perceived accuracy of VGI data are raised, not least because most volunteer mappers lack the sufficient cartographic training.[32] *Maps can be large, very detailed, need careful study, or be hard to interpret.*[12]

A comprehensive 2010 study highlights specific quality issues in OSM, but the authors caution "*traditional measures of spatial data quality are often not applicable to OSM*".[32] And a 2009 study of Greek data in OpenStreetMap showed overall quality as good in comparison to official cartography data sources, but quality of name completeness and type accuracy was poor.[33]

Applications of OSM seem endless. The OpenStreetBrowser tool makes the geospatial data in OSM browseable by category. The emergence of more

end-user applications using OSM data promotes growth and quality of OSM data. A curated list of services based on OSM is available online.[34]

Major events such as the Superbowl, Olympics, and World Cup, probably encourage volunteer activity on related OSM data. Humanitarian mapping in response to major events such as Haiti earthquake, Ebola disaster, Nepal earthquake, and Covid-19 global pandemic, may also trigger activity.

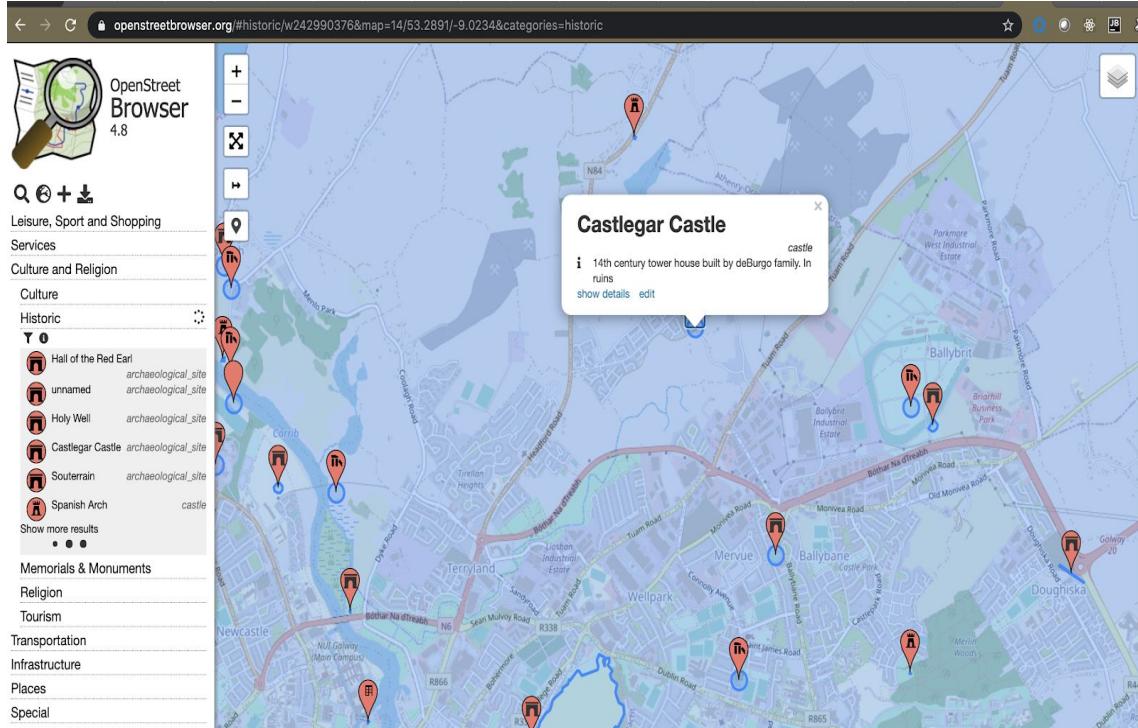


Figure 2: OpenStreetBrowser:<https://www.openstreetbrowser.org>

Open GIS

Open source technological developments in Neo-Geography are discussed.

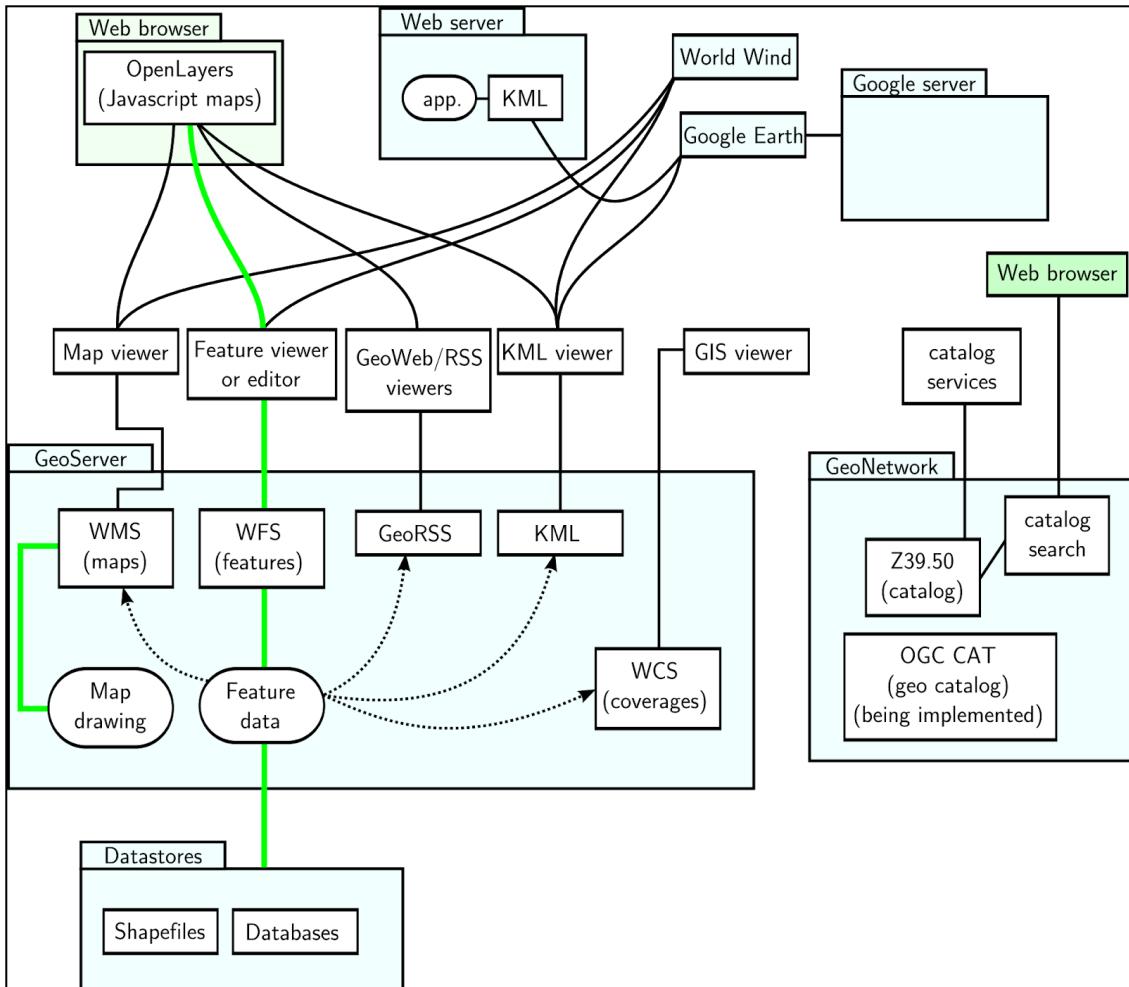


Figure 3: OSGeo projects communication ecosystem.[35]

OSGeo

In 2006, the Open Source Geospatial Foundation (OSGeo) was established, their not-for-profit mission being to "foster global adoption of open geospatial technology by being an inclusive software foundation devoted to an open philosophy and participatory community driven development". The foundation also pursues more open access to government-held geospatial data.[36]

Map Warper

We sometimes need to digitize old digital maps. To avoid digitising each street individually, we can rely on OSM data which is likely to have higher spatial accuracy than direct digitisation can achieve. The process is simple. Find old maps or other imagery, perhaps from Wikimedia Commons, upload to a service called Map Warper tool, and click rectify to geo-reference old maps of any scale against modern digital maps. Map Warper was created by Tim Waters.[37]

The screenshot shows the homepage of Map Warper (<http://mapwarper.net>). At the top, there's a navigation bar with links for Home, Browse All Maps, Browse Rectified Maps, Find Maps by Location, Upload Map, Browse All Mosaics, Find Mosaics by Location, Add Mosaic, and About. A message at the top states: "Update, May 2020: Server is running out of disk space again :(I deleted around 200 maps which were untouched and unrectified to free up a bit of space. Please be patient." Below the navigation is a search bar with dropdown menus for "Search" (set to "Title") and "Year" (set to 1500), a date range slider from 1500 to 2040, a "SEARCH" button, and radio buttons for "All maps" (selected) and "Rectified". To the right of the search bar is a link "BROWSE ALL MAPS". On the left, there's an "Overview" section with text about the tool and a "UPLOAD MAP!" button. Below that is a "What is it?" section with developer information and a "Tags" section listing various map-related terms. The main content area is titled "Last Rectified Maps" and displays three entries in a table:

MAP	TITLE	YEAR	LAST UPDATED	STATUS
	Gattinara Part of Italy 1:50,000 Series 4229 (In 1 layer)	1944	33 minutes ago	22 control points
	City of Humboldt Iowa	1875	about 2 hours ago	60 control points
	Deer Run at Stone Canyon 3	2020	about 2 hours ago	4 control points

Each row in the table includes links for "View Map", "Rectify Map", and "Download KML". A "SEE ALL MAPS" button is located at the bottom of the table.

Figure 4: Map Warper <http://mapwarper.net>

JOSM

Java OpenStreetMap Editor (JOSM) is a feature rich, extensible editor for OpenStreetMap (OSM) and OpenHistoricalMap (OHM) on Java 8+. JOSM supports loading GPX tracks, background imagery, and OSM data from local/remote sources.[38] Another option is Overpass API.[39]

OpenMapTiles

Open source project reusing existing open-source components and open standards from OSM, FOSS, Mapbox and other third parties. You can build an OpenStreetMap tiles server to use in your own websites or products.[40]

Mapzen

Mapzen projects form an open mapping platform, focused on core geo-platform components of search, rendering, navigation, and data.[41]

Other GIS Applications

QGIS is a Open Source Geographic Information System (GIS) licensed under GNU GPL, and official project of the Open Source Geospatial Foundation (OSGeo). It runs on Linux, Mac, Windows, and Android, and supports numerous vector, raster, and database formats and functionalities.[42]

Merkator is an open source OSM editor, written in C++ and Qt.[43]

GvSIG is available as a Desktop application licensed under the GNU GPL. Well documented, it has mobile application, CAD tool, and 3D capability.[44]

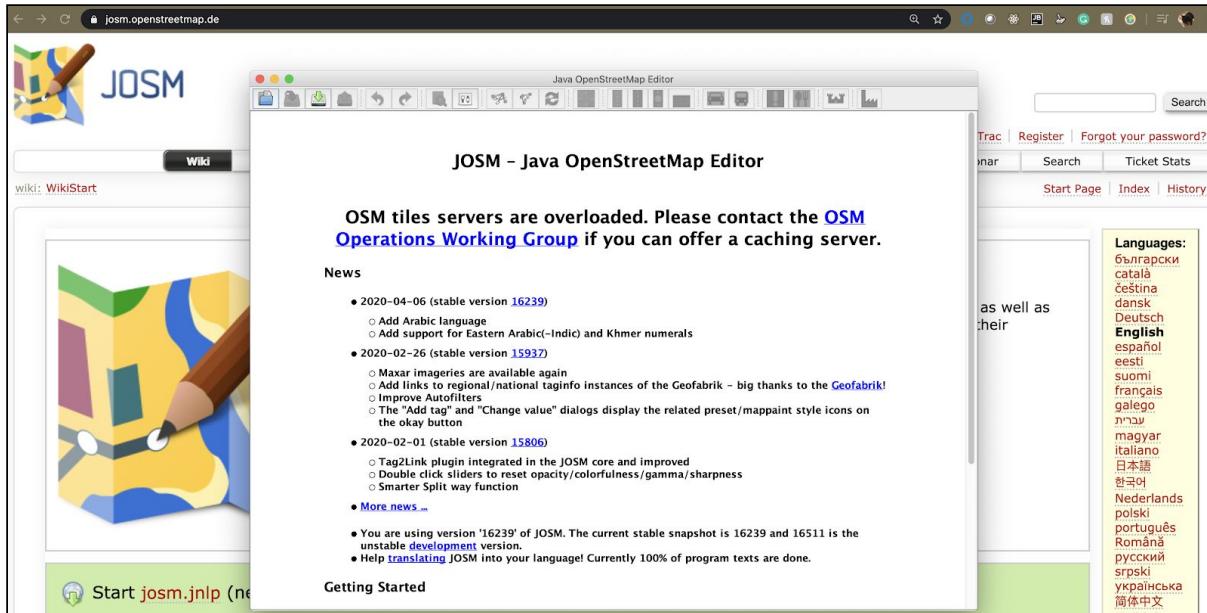


Figure 4: JOSM, Java OpenStreetMap Editor, splashscreen

Other openGIS tools include: Grass GIS, ILWIS, SAGA GIS, GeoDa, Whitebox GAT, MapWindow, uDig, OpenJump, FalconView, OrbisGIS, and DivaGis.

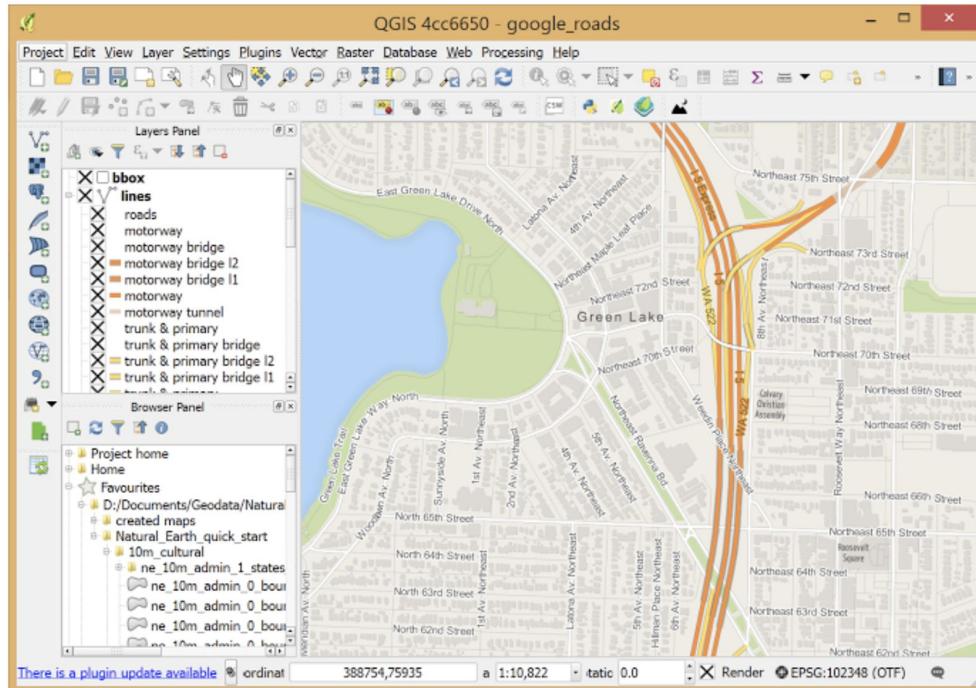


Figure 5: QGIS, Open Source GIS desktop application

Commercial enterprises have emerged from Open GIS. For example, Geofabrik GmbH uses free geodata to generate solutions for clients, and open source tools.^[45] Other examples of OSM-derived enterprises may be common.

Open Historical Map(s)

Historical technologists and researchers began to promote an open historical mapping approach as OSGeo technology matured. Open GIS momentum was accelerating, but the historical, cultural, and archaeological geospatial Web lagged behind. There are challenges securing access, conversion, tagging, presentation, and storage of historical data. *Urban data is all about space, but historians often need to scrape data to help build urban spatial databases.*[12]

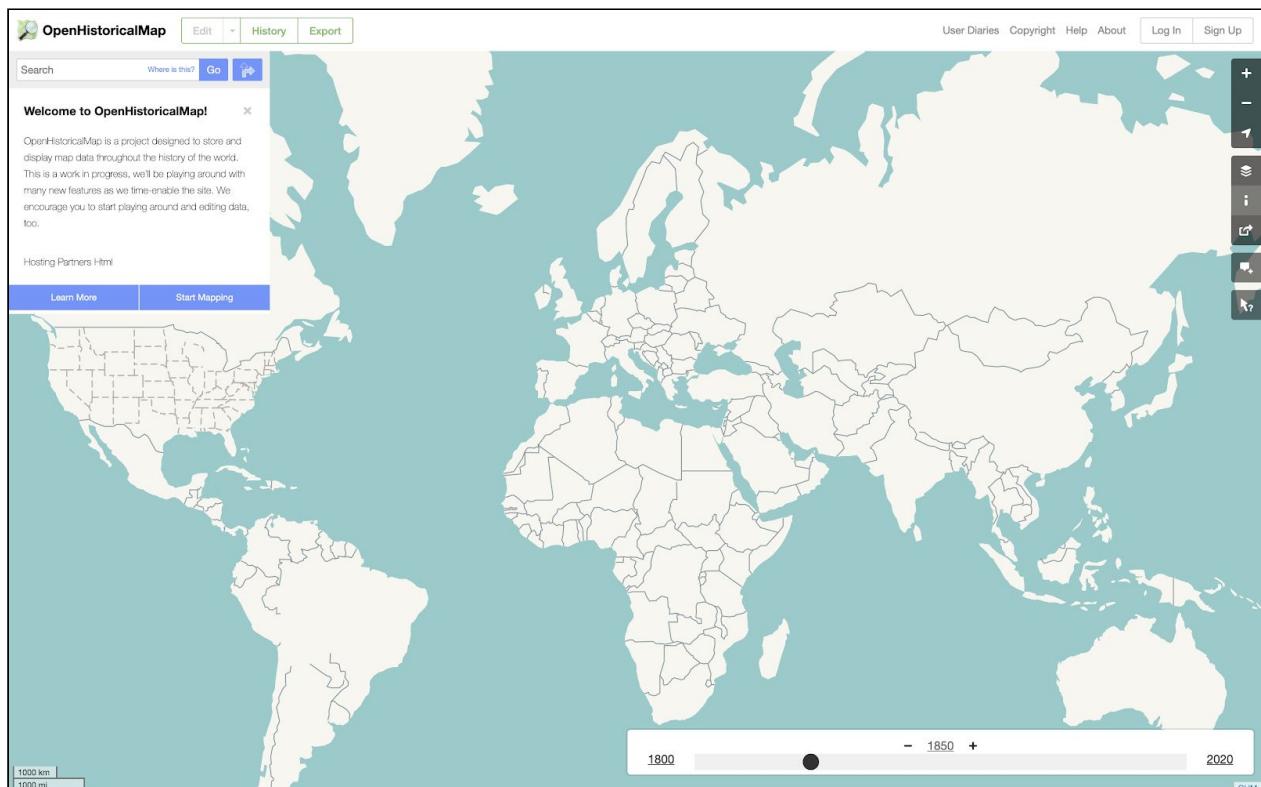


Figure 6: Open Historical Map (note slider): <https://www.openhistoricalmap.org>

OpenStreetMap was a possible solution. However the OSM community was not ready for historical GIS. For example, a proposal to add support for Historical Events in OpenStreetMap ("Historic_Event=Any event of historical significance, even if there is no physical evidence of the event left.") was rejected in OSM.[46]

"Do not map objects [in OSM] if they do not exist currently, and do not map the location of historic events, because such features cannot be verified. If ruins are left (and thus verifiable), then map the ruins (i.e. historic=ruins)".

*Clearly a separate platform was needed.[47][48] **Open Historical Map** (OHM) was launched in 2012, and billed as "The world's most out of date map".[49][50]*

"OpenHistoricalMap collaboratively stores and displays map data throughout the history of the world, built by a community of mappers and historians that contribute and maintain data about the history of the world".

Montanari et al (2015) also proposed an **Open History Map** platform to "facilitate both the sharing of archaeological information as well as the reuse of

the generated data", to facilitate public participation in Archaeology, integration with webGIS platforms, and open data access to archaeology and historical research. The **Open Historical Map (OHM)** project is unmentioned.[6] The domain www.openhistorymap.org is registered,[51] but a 2017 grant application was unsuccessful.[52]

Another group in Berlin launched Open Historical Data Map (), a database to store objects "which have (or had) a footprint on mother earth". This academic project originated in the Berlin University of Applied Science circa 2014.

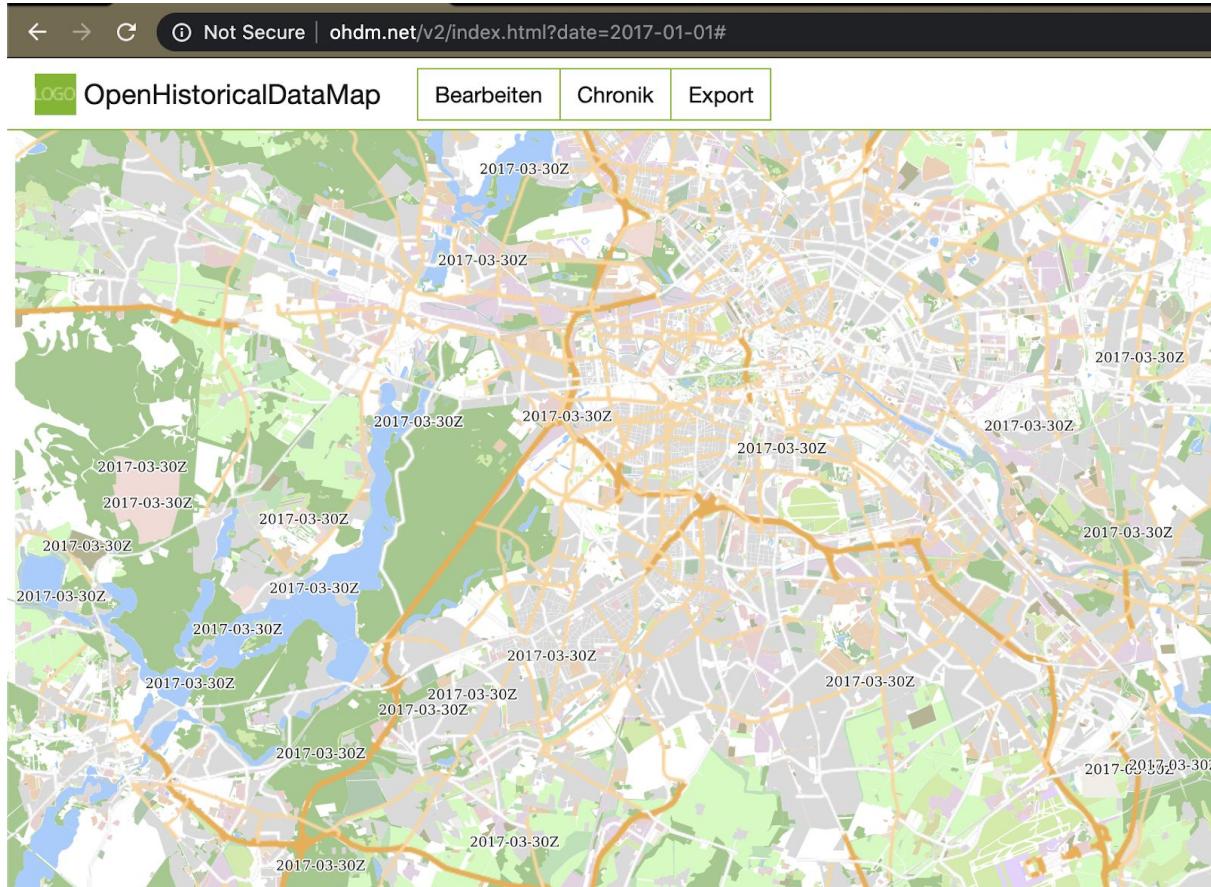


Figure 7: Open Historical Data Map, <http://www.ohdm.net>

Hopefully these groups will collaborate, since their goals overlap.

Mapping Timelines

American historians stated maps "*constitute a common language used by men of different races and tongues to express the relationship of their society.. to a geographic environment.*".[8] This statement illuminates why historical GIS is an independent new medium, treating archaeology, history, and culture as new media; combining digital humanities, web archives, digital libraries, volunteer enthusiasm, and open source software.

Historic maps require tools and standards.[36] Digital maps change over time, unlike printed maps. Introducing a time-slider to show how a place changes over time is useful. Comparing old maps to new maps is fun, but cartography has

greatly changed over time. Time is central to history. Dates are often inscribed on buildings or in Archaeology.^[53] OSM supports “start_date=” and “end_date=” tags, but they are not used.^{[54][55]} Nonetheless, historical GIS must consider various time-based values and attributes, as this list illustrates.^[53]

- **Start Date:** start_date=
- **End Date:** end_date=
- **Change in name:** old_name=
- **Change in use:** amenity=cinema becomes sport=bingo
- **Change in scale:** highway=unclassified to highway=primary
- **Change in Accessibility:** bicycle=yes
- etc

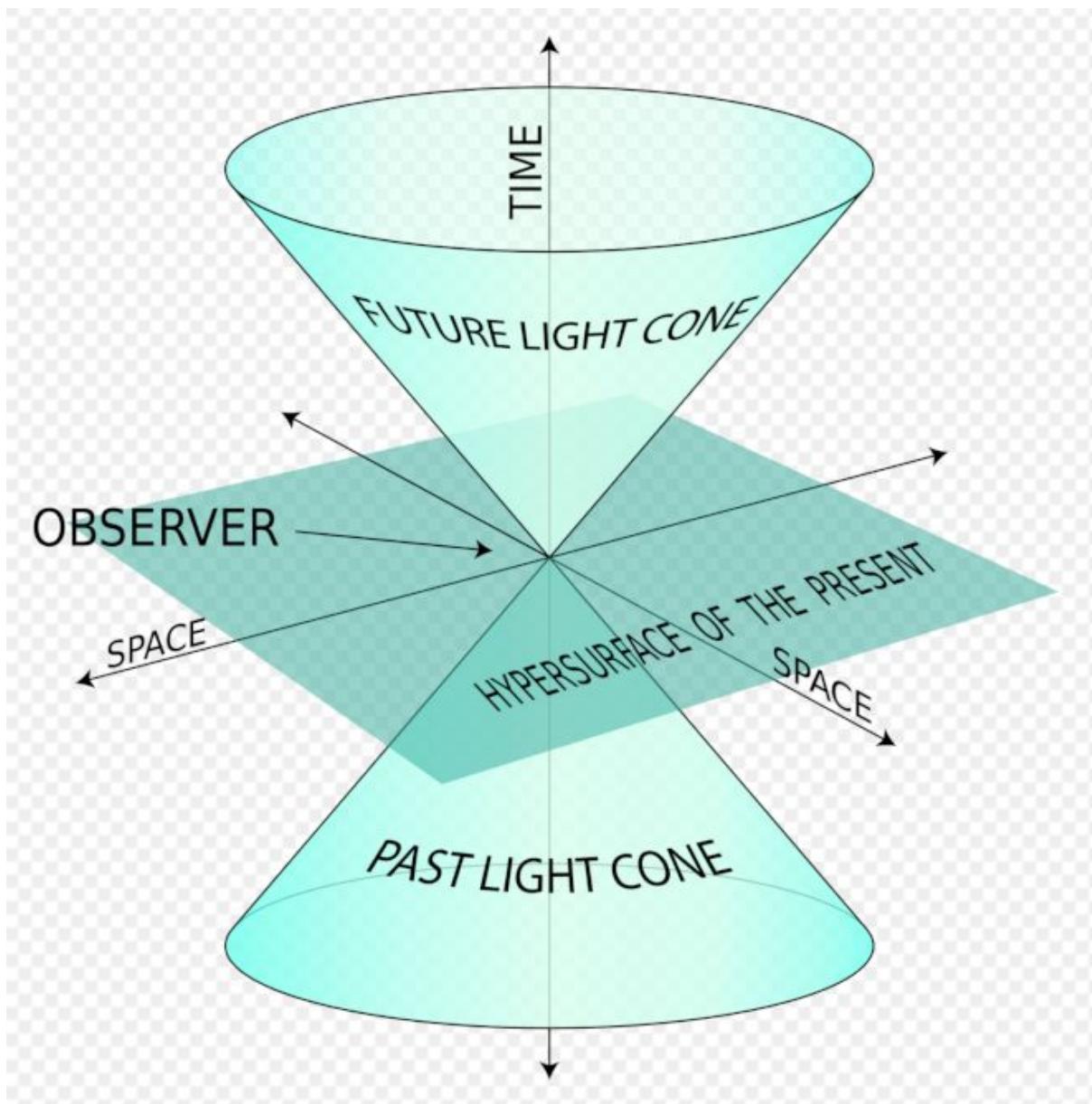


Figure 8: Past, Present, Future - How to map this?

GeoSpatial Data Sources

Open Public data is spatial data. It includes civil infrastructure, Aerial and Satellite imagery, census, land, and other Government data. *Local government map data is often beautiful and comprehensive, but not spatial, geo-referenced, or enclosed polygons.*[12] The historical GIS movement empowers developers and encourages an ecosystem of different third parties doing interesting stuff with history.[13] The Internet facilitates access digital libraries containing spatial data.

The primary sources/type of open spatial data include-

- Raster Imagery:
 - Scanned and Drawn maps and plans
 - Remote-sensing, satellite and aerial imagery
- Vector Features
 - Geometries: Points, Lines, Polygons; feature building blocks.
 - Attributes: Values such as text or numbers
- Attributes and tables
 - stored in Linked Tables in GIS and Relational DataBases
 - Stored as key-value pairs in OpenStreetMap.

Some projects contributing data to Open Historical Map include-

- Muinin Project, World War I.[56]
- Ghost Race Tracks on Open Historical Map.[57]
- Semantic Computing Research Group (SeCo), History.[58]
- NYPL Map Warper, Geo-reference historical maps.[59]
- GWHT, Global World History Atlas.[60]

The screenshot shows the homepage of the Electronic Cultural Atlas Initiative (ECAI). At the top, there is a horizontal banner featuring various historical and cultural images, including a globe, a statue, an arch, and several maps. Below the banner, the title "Electronic Cultural Atlas Initiative" is displayed. A navigation bar with links for "About ECAI", "Activities", "Community", "Atlases", "Research", "Technology", and "Participating" is visible. The main content area is divided into sections: "Projects" (with links to "Maritime Buddhism Project" and "Editorial Practices and the Web"), "Upcoming Events" (listing "ECAI Workshop" and "PNC 2019 Annual Conference and Joint Meetings"), "Past Events" (listing "ECAI Workshop" and "International Symposium on Grids and Clouds & Soundscapes Conference 2019"), and "Heritage and Cultural Conservation - Digital and Physical". There are also sections for "The Blue Dot Project, Text Analysis and Pattern Detection: 3-D and Virtual Reality Environments" and "Context and Relationships: Ireland and Irish Studies". Logos for NEH and the National Endowment for the Humanities are present. The footer contains copyright information and links to "ECAI / ApSTI Workshop" and "ISGC 2018".

Figure 9: Electronic Cultural Atlas Initiative <http://ecai.org>

Since 1998, the Electronic Cultural Atlas Initiative (ECAI) is a cultural GIS project, a digital humanities initiative dedicated to creating a networked digital global atlas of cultural information.[61] Their data could be valuable. ECAI research interests include the following.[61]

- The Atlas of Maritime Buddhism;
- Data/Content Archive and Access Tools;
- Dictionary Translation Projects;
- Text Analysis;
- Cultural Data Visualization;
- Research-driven data management, Heuristic Network;
- Mapping and timelines.

The Roy Rosenzweig Center for History and New Media works on the creation of websites and open-source tools to preserve and present the past, advance history education, and encourage public participation in historical GIS.[62]

Wikipedia Commons is a digital library of public domain, multi-language educational media content (images, sound and video clips). Restricted-license content is not allowed, so everything is open licensed and free to use. This is clearly an immensely valuable source for historical themed content which could be mapped in Open Historical Map.

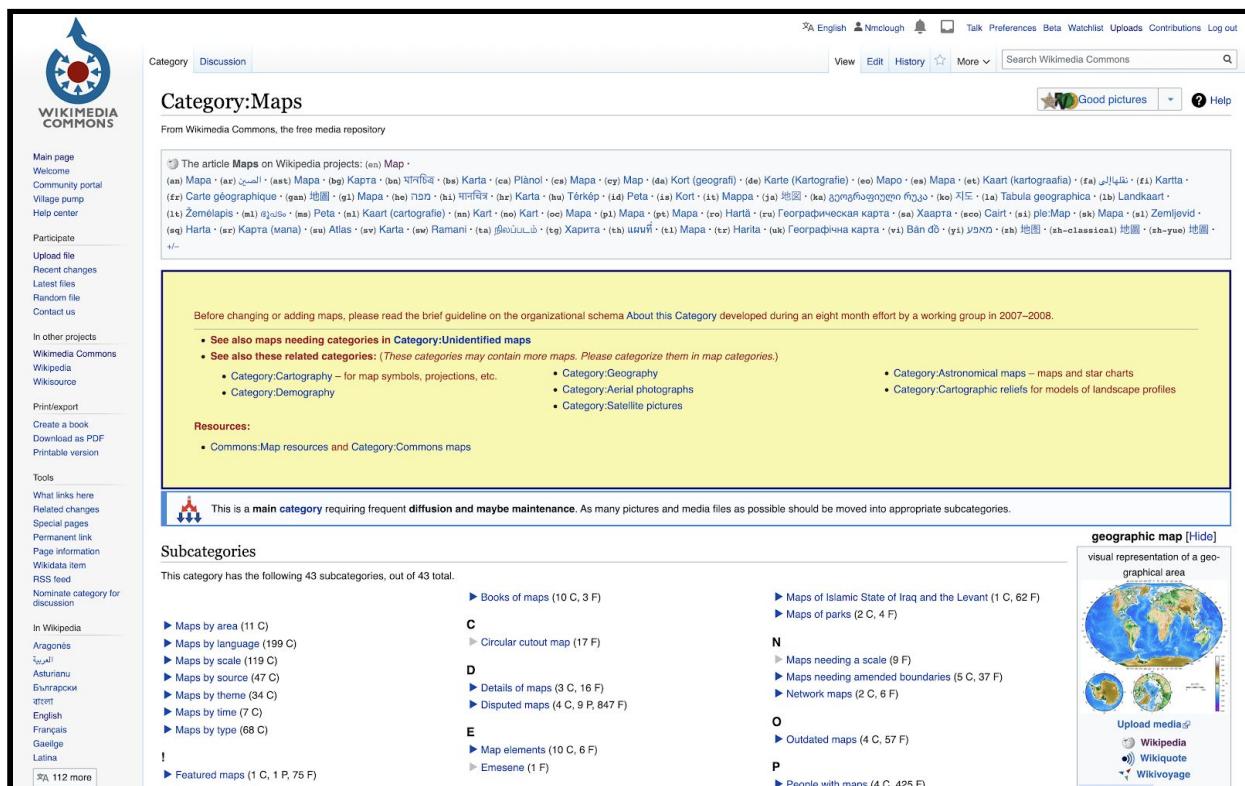


Figure 10: Wikimedia Commons, <https://commons.wikimedia.org/wiki/Category:Maps>

Academic subscription-based digital libraries are increasingly accessible. ITHAKA, a non-profit organisation advancing access and preservation of knowledge of the global higher education community, has four services.[63]

- **JSTOR** provides access to millions of academic journal articles, books, and primary sources in 75 disciplines".[64]
- **Ithaka S+R** provides research and strategic guidance to assist academic and cultural communities during digital transformation.[65]
- **Portico** libraries and publishers preserve scholarly content.[66]
- **Artstor** is a digital image library collaborating with the world's museums, archives, scholars, and artists.[67]

The screenshot displays the ITHAKA Services website with four main sections:

- JSTOR**: Describes it as a cloud-based library where scholars, students, and the public can access thousands of journals, books, images, and other content. It includes a list of statistics:
 - 11,000 institutions
 - 170+ countries
 - 12 million articles
 - 80,000 ebooks
 - 3 million plant specimens
 - 244 million content accesses per year
 - 145 million search requests per year
- ITHAKA S+R**: Provides research and strategic guidance to help academic and cultural communities serve the public good and navigate economic, technological, and demographic change. It includes a list of activities:
 - Reports on the effectiveness and affordability of online and hybrid forms of education
 - Multi-institutional collaborations focused on increasing the degree attainment of low-income college students
 - Analysis of the changing research practices of scholars in different disciplines
- PORTICO**: Created in 2002 to ensure the world's scholarship is preserved. It includes a list of statistics:
 - 1.7 billion files preserved
 - 88 million journal articles preserved
 - 4 million digital collection items preserved
 - 1 million e-books preserved
 - 650+ participating publishers
 - 1,000+ participating libraries
- ARTSTOR**: Specializes in digital collection solutions for universities, museums, schools, and libraries. It includes a list of statistics:
 - 2.5 million licensed images
 - 2 million open images
 - 1,800 institutions
 - 700,000 downloads per year

Figure 11: ITHAKA Services

Government agencies release digital map datasets. This is a requirement of modern open-gov data strategies.[5] For example, Ordnance survey Ireland (OSI) provides open data under six main themes (listed).[68]

- National Statutory Boundaries
- National Placenames Gazetteer
- Regional Water – from EuroGeographics data

- Regional Transport & Facilities – from EuroGeographics data
- Regional Geographic Boundaries – from EuroGeographics data
- Regional Geographic Placenames - from EuroGeographics data

Internet Archive is a non-profit library of millions of free books, and more. I find this site to be very useful for historical research, and perhaps, for old maps.[69]

Other data sources worth mentioning include the following (URLs included):

- John C. Nelson received a BA Degree in History in 1964, serving the US Navy, and worked as a computer programmer. On retirement in 1997, he pursued web-based GIS projects. His work is available <http://www.worldhistorymaps.com>, <http://www.civilwarhistorymaps.us>.
- Christos Nüssli, a specialist in historical digital cartography, sells some impressive looking historical maps at <https://www.euratlas.net>.
- Prof. Emerita Frances W. Pritchett, of Columbia University, Asia historical maps: <http://www.columbia.edu/itc/mealac/pritchett/00maplinks>.
- Thomas A. Lessman produced world historical maps since 2004, all licensed under as free to share, attributed, non-commercial, non derivative. His work is <https://worldhistorymaps.info>.

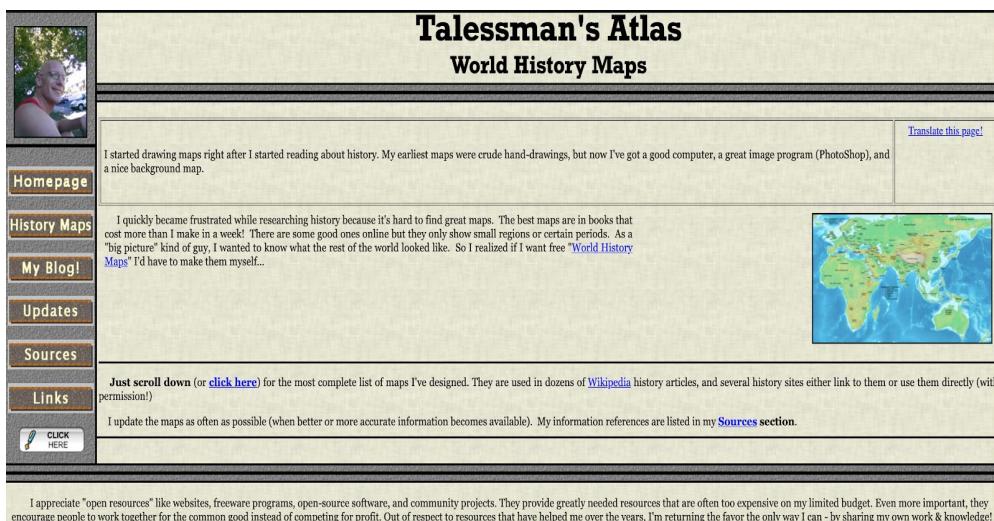


Figure 12: Talessman's Atlas, World History Maps

- Joseph E. Schwartzberg, a historical Atlas of South Asia: <https://dsal.uchicago.edu/reference/schwartzberg>.
- OldMapsOnline began as a collaboration between Klokan Technologies GmbH, Switzerland and The Great Britain Historical GIS Project. The project is now volunteer-run. <https://www.oldmapsonline.org>
- Old Maps UK <https://www.old-maps.co.uk>.

- Running Reality - allows educators to explore history with their students, hosted at <https://www.runningreality.org>.

GeoSpatial Licenses

The Open Knowledge Foundation states “*Open knowledge is what open data becomes when it’s useful, usable and used.*”.[70] This reminds us that open geospatial data licensing is important. Years ago, a decision was made to move OSM from a CC-BY-SA license to the current ODbL license.[71][72] A number of mappers disagreed, and there were several forks from the last CC-BY-SA version of the OSM database but none reached critical mass of active mappers. A few websites on the WWW are remnants of this forking activity, for example <http://fosc.org>, <https://informationfreeway.org>, both plain-old slippy maps. Slippy Map is a term describing modern web maps that allow zoom and pan (the map slips around when you drag the mouse).[73]

OSM uses ODbL, while OpenHistoricalMap encourages CC0 license. This raises concerns about copying data from OSM into OHM. We could contact each OSM user who contributed a needed OSM relation, and ask them to release their work as CC0. This could be feasible with smaller datasets. An alternative to copying OSM data into OHM, is to find or obtain free datasets. For example, Natural Earth has some free geospatial data for mapping.[74]

“Natural Earth is a public domain map dataset available at 1:10m, 1:50m, and 1:110 million scales. Featuring tightly integrated vector and raster data, with Natural Earth you can make a variety of visually pleasing, well-crafted maps with cartography or GIS software.”.[74]

Historical maps in OSM?

The Openstreetmap community actively discourages any type of historical mapping in OSM.[75] Instead OpenHistoryMap exists to serve that purpose. However historic objects do exist in OSM. There is an atlas of historic sites based on OSM.[76] Another great visualization is the HistOSM website created by Michael Auer & Alexander Zipf, a “*WebGIS application to visually explore historic objects stored in the OpenStreetMap database.*”. [77][78]



Figure 13: HistOSM website, <http://histosm.org>

Open Historical Maps of Ireland

History is people and events. Maps are places. Historical maps are people, places, and events. This section explores an open historical map of Eire, otherwise Gaelic Ireland. The history is very rich. Humans have lived here for thousands of years. I'm a hobbyist local historian, interested in creating open historical maps of Ireland, particularly Gaelic kingdoms of ancient times. This chapter discusses case studies on the theme, open historical maps of Ireland.

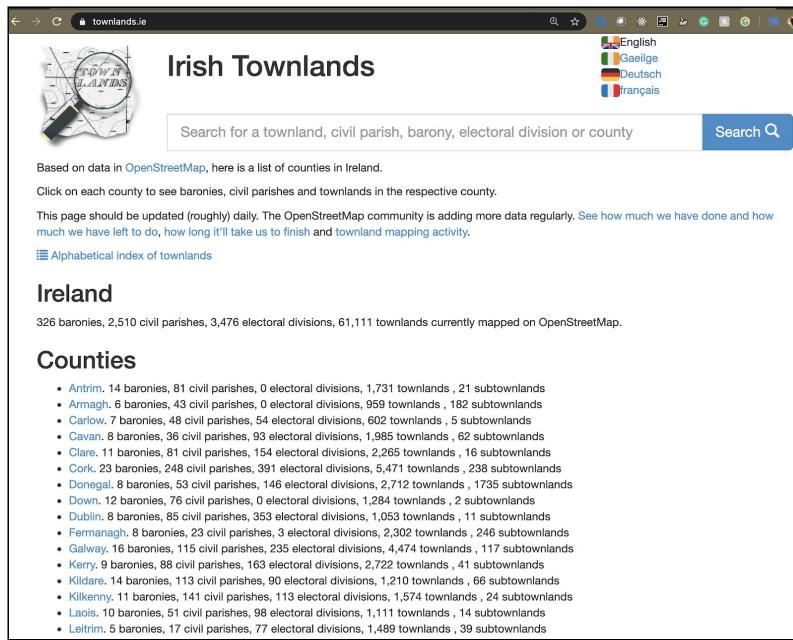


Figure 14: Irish Townlands (from OSM data), <https://www.townlands.ie>

Geospatial Data Sources

The Irish Annals are compilations of old Irish writings up to and shortly after the end of the 17th century. The original entries were originally used by monks to determine the yearly chronology of feast days, but include obituaries, and more importantly, notable political events.^[79] Manuscript copies of some annals are extant. The primary curators of these datasets in Ireland are:-

- **Corpus of Electronic Texts (CELT):** "CELT, the Corpus of Electronic Texts, is Ireland's longest running Humanities Computing project. It brings the wealth of Irish literary and historical culture to you on the Internet, for the use and benefit of everyone worldwide. It has a searchable online textbase consisting of over 19 million words, in 1636 contemporary and historical documents".^[80]
- **School of Celtic Studies,** Dublin Institute for Advanced Studies: "The School of Celtic Studies is dedicated to the study of Irish and the other Celtic languages, both written and spoken, throughout their history, as well as related areas of cultural, social and legal history".^[81]
- **Irish Texts Society:** "Irish Texts Society/Cumann na Scríbhéann nGaeilge was established in 1898 to advance public education by

promoting the study of Irish literature. The focus of the Society from the beginning has been on the publication of texts in the Irish language, accompanied by introductions, English translations, glossaries, notes".[82]

The old texts are rich and comprehensive, repositories of Irish history written when the Gaels ruled Eire, today Ireland. These datasets contain large volumes of geospatial data about Gaelic Ireland, **but no maps!**



Figure 15: CELT, <https://celt.ucc.ie>

It is challenging to locate quality maps of Ancient, or Gaelic Ireland. Some examples were found in the data sources mentioned by this paper. Most are raster or vector images (JPG, etc). The accuracy of geospatial data used to create the image can be hard to assess. Sometimes no source or reference is given. Using OSM tags to define historical geospatial to a common agreed standard on OpenHistoricalMap is a potential solution.

The Archaeological Survey of Ireland (ASI) is a unit of the National Monuments Service, maintaining an inventory of the known archaeological monuments, and storing the geospatial information on a database and a series of paper files, that collectively form the ASI Sites and Monuments Record (SMR).[83] The **Historic Environment Viewer** is an on-line digital service to facilitate improved access to SMR geospatial archaeological data.[84]

Case Study 1: Belfast 1820AD

Let's create a 1820 map of Belfast. Does this already exist? Searching data sources (google, wikipedia, etc), the earliest example I found is one dated 1887.[85] Lets upload into Map Warper, and rectify against a modern data to produce an accurate geo-referenced image.[37][59] We see which modern streets existed in 1887, and assume they also existed in 1820. This is a starting point. We could draw a polygon around the built-up area of the old map - in JOSM use the **jsom-poly-plugin** to save as a poly format.[86]

However, the geometry of existing roads in OSM is better than anything we can do with rectification. Can we construct a 1820 historic map from modern OSM data? We can try. The next section describes a method for OSM mappers.[87]

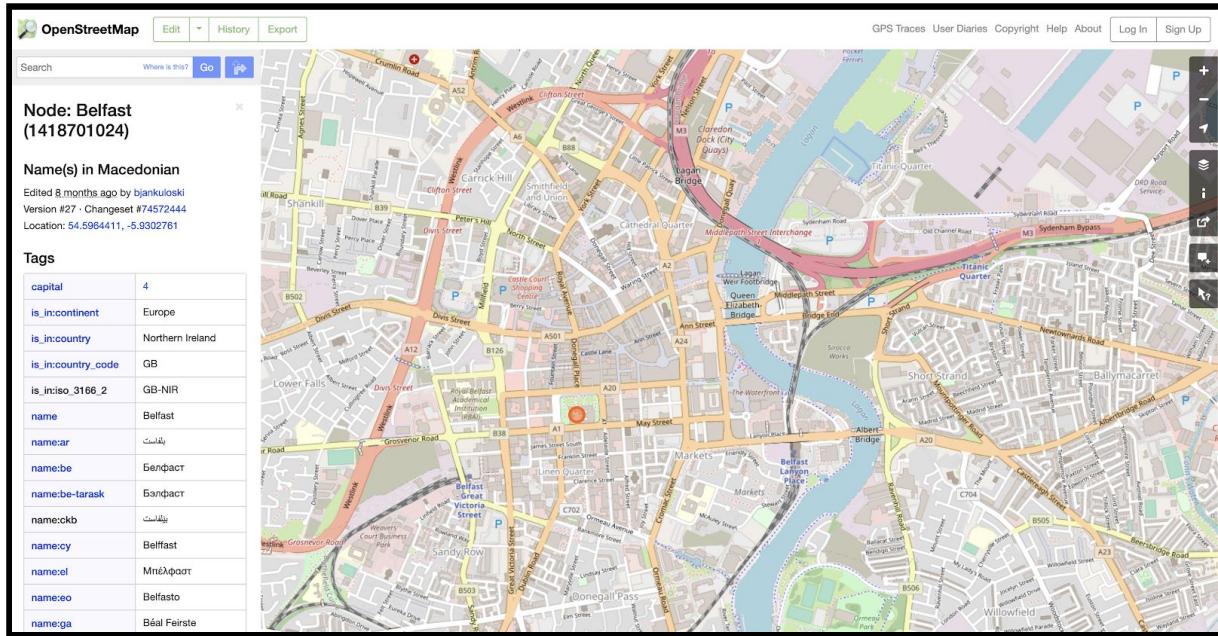


Figure 16: Belfast in OSM, <https://www.osm.org/node/1418701024>

From the modern OSM dataset we need to remove nearly everything except streets and highways, to obtain an envelope of Belfast. Most modern OSM tags were not important in 1820, for example street surface, bike lane, parking restrictions, but the basic classifications in OSM (major/minor road) are correct. We can download a GeoFabrik OSM data extract.[88] Next we use **osmosis** or **osmconvert** tools to extract the subset/envelope of Belfast.[89][90] Finally we use **osmfilter** to remove everything except tracks, streets, highways.[91]

Remember to add OHM recommended tags:

- start_date=1/1/1820, end_date=31/12/1829.[54][55][87]

We could repeat the process to step back/forward if we had maps for every decade. However, every historical mapping use case is different.[87] However it could be easier to draw the 1820 map from scratch using OSM tools because it's more interesting/practical/fun, or we need a different license to OSM.

Case Study 2: Battle of Connacht 1270AD

My interest is the Gaelic history of Ireland, particularly the south Leitrim, and north Roscommon districts. The River Shannon, a major world river, divides both places. Fording points are strategically important, since ancient times. In 1270 a major battle occurred at Ath an Chip (ford of the tree stump) on the River shannon. I recently self-published a book on this battle - here's the abstract.[92]

Seldom has a victory been so successfully erased from the history books as the Irish victory over the Normans at the battle of Áth an Chip in August 1270.

Exactly one hundred years after conquering, and settling most of Ireland, Norman's gathered to crush the defiant gaels of Connacht. A massive army of knights and foot-soldiers, led by no less than the Justiciar of Ireland, marched through county Roscommon, over the River Shannon, into south county Leitrim. Following days of drama and skirmishes, the Gaelic champion Aedh O'Conchobar launched a surprise attack, wiping out the entire Norman army at Áth an Chip. Here, for the first time, the iconic Battle of Connacht at Áth an Chip, and the heroic leadership of both Aedh O'Conchobar and Turlough O'Briain can be revealed.[92]

Research was complicated. The battle occurred a long time ago, is forgotten and uncelebrated. Controversy over the location of the battlefield has dogged the story for centuries, and still remains. My friend Prof Natalie Stromer described the battle as an epochal event in Irish history. The Irish Annals contains very detailed narratives of the battle, but uses long obsolete place names.[92] Identifying ancient place names is hard without geospatial research.

Two outstanding geospatial projects in Ireland are the Placenames Database of Ireland (loganim), and Northern Ireland placenames project. Both contain high quality geospatial data for Ireland.

- **Loganim** was created by Fiontar & Scoil na Gaeilge and Placenames Branch (Department of Culture, Heritage and Gaeltacht). It's an excellent management system for data, archival data, and places names research conducted by the Irish state.[93]
- **Northern Ireland place-names** include historical administrative names (six counties, 60 barony and district names, 269 civil parishes, 9,600 townlands) and over 20,000 non-administrative names (rivers, etc).[94]

Combining research and luck, with local knowledge, I identified locations of forgotten place names mentioned in 1270 narratives. My dataset needs to be added to some database, before I can attempt to create my historical map of 1270AD. Which one is the best choice?

Loganim database

The Placenames Database of Ireland (loganim) is important, because the data is validated and supported by the legislature. The Logainm Application Programming Interface (API) pre-release is now available, with accompanying developer docs and data dictionary.[95][96] This is interesting.

The Place Names Branch has published its acceptance notes for inclusion in their database. These are critically important/relevant for Historical mapping.[97]

- **Validated names** - "Placenames or geographical names whose official, legal Irish versions are specified in various Place Names Orders in accordance with the Official Languages Act 2003. Certain place names in Northern Ireland are also included in this category, such as counties, cities, towns and various other population centres".[97]

- **Non-validated names** - “Place Names or geographical names for which provisional Irish forms have been recommended by the Placenames Branch on the basis of research but which are not specified in Placenames Orders in accordance with the Official Languages Act 2003”.[97]
- **Historical names** - “Historical forms of place names or obsolete place names.”.[97]
- **Local names** - “Local forms of place names which are variants of official names. In certain cases there is a change to another name or to an Irish-language form of a name”.[97]

The battlefield is in south Leitrim today, a place named Conmaicne (Rein) in 1270. However the loganim database has no historical name records for the various Conmaicne districts, the ethnic group who dispersed around Connacht. My research identified the exact location of over twenty obsolete place names mentioned in Irish Annals for 1270. I would like them added as “historical name” records. Therefore, I submitted a research report to the Placenames Branch of Ireland to advocate for their inclusion in loganim.[98]

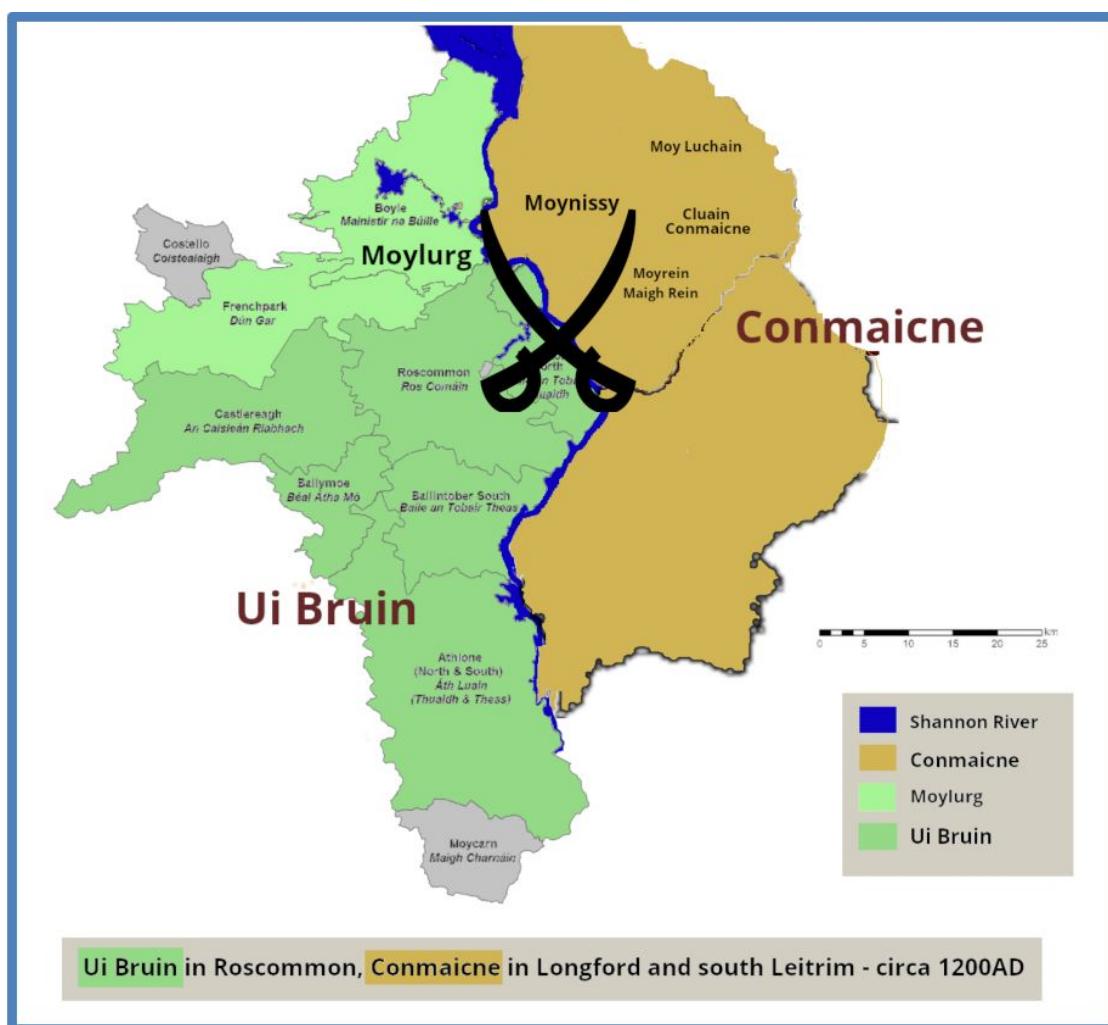


Figure 17: South Leitrim was named Conmaicne in 1270

Meitheal-Loganim Database

Meitheal Loganim is a crowd sourced place names database in Ireland.[95] This is certainly an option but being able to add custom tags would be helpful. We need time dimensional attribute support in historical mapping. Data quality is important for serious historical maps - loganim is more reputable.

"We are inviting the public to enter Irish and English names, as well as other data, regarding minor place names on this website. This is an opportunity for people to preserve and share the minor place names in their native areas".[99]

OpenHistoryMap

This could be the best option for historical mappers. We can add the necessary time-related attributes/values as custom tags. However, the OHM community and academics need to research which tags are necessary. I have not researched what standards, if any, exist for historical mapping. But the Historical mapping community would benefit from standards-based protocols governing open historical mapping.

My maps of 1270AD

I am studying how to map my 1270 dataset. And which database to use. Before creating 1270AD open historical maps, I need to learn more about OSM/OHM mapping. Meanwhile, I created raster image maps using GIMP Image Editor.

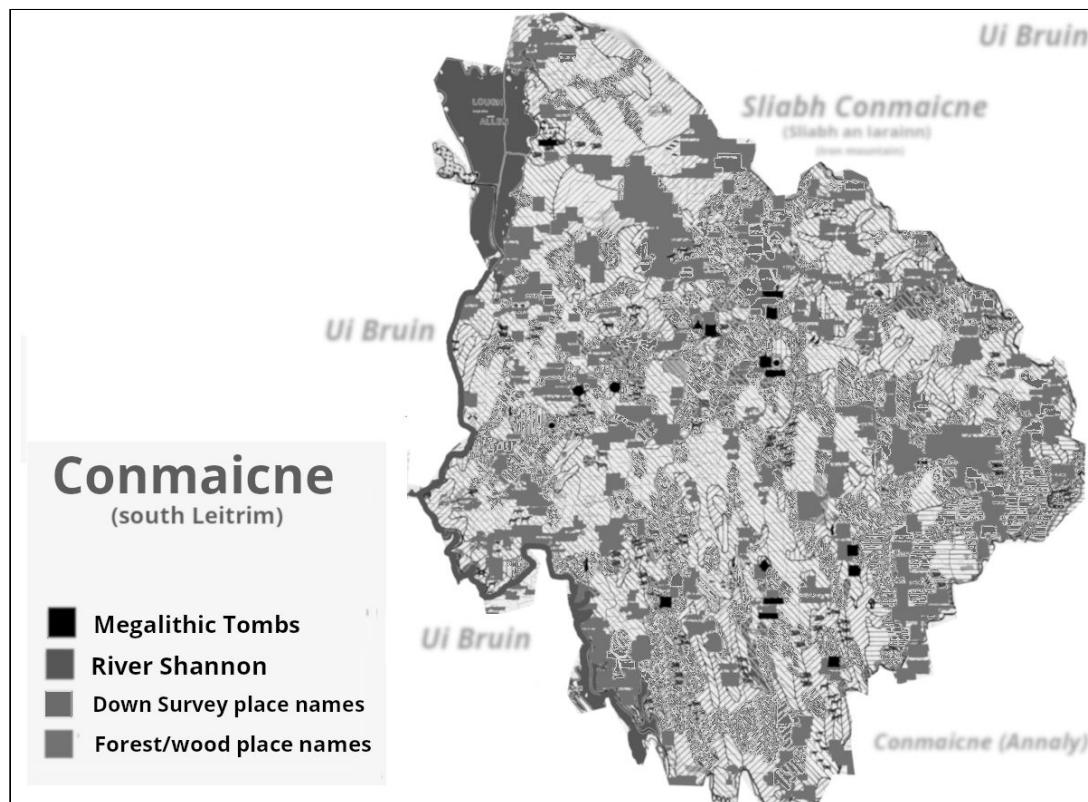


Figure 18: Townland usage from Downs Survey, and Loganim

Battle Bridge (<i>mionainum</i>)		Béal Átha an Chatha/Áth an Chip [?] <i>'ford mouth of the battle' / 'ford of the troops'</i>	
G 947 052			
1245	1. Caislén Atha an chip ⁵⁷⁵	ALC	i,368
1245	2. Caislén Átha an Chip ⁵⁷⁶	ARÉ	iii,314
1270	3. co hAth in Chip ⁵⁷⁷	AConn.	p.154
1270	4. go h-Ath an chip for Sinuinn ⁵⁷⁸	ALC	i,462
1270	5. go rangadar Ath an Chip ⁵⁷⁹	ARÉ	iii,410
1316	6. o Ath in Chip ⁵⁸⁰	AU ¹	ii,428
1316	7. o Ath in Chip & a hUachtur Tiri, & in tir uili do loscad & do milled ⁵⁸¹	AConn.	p.248
1316	8. o Ath in chip ⁵⁸²	ALC	i,588
1316	9. im Áth an Chip ⁵⁸³	ARÉ	iii,514

Figure 19: Battlefield name research for 1270AD

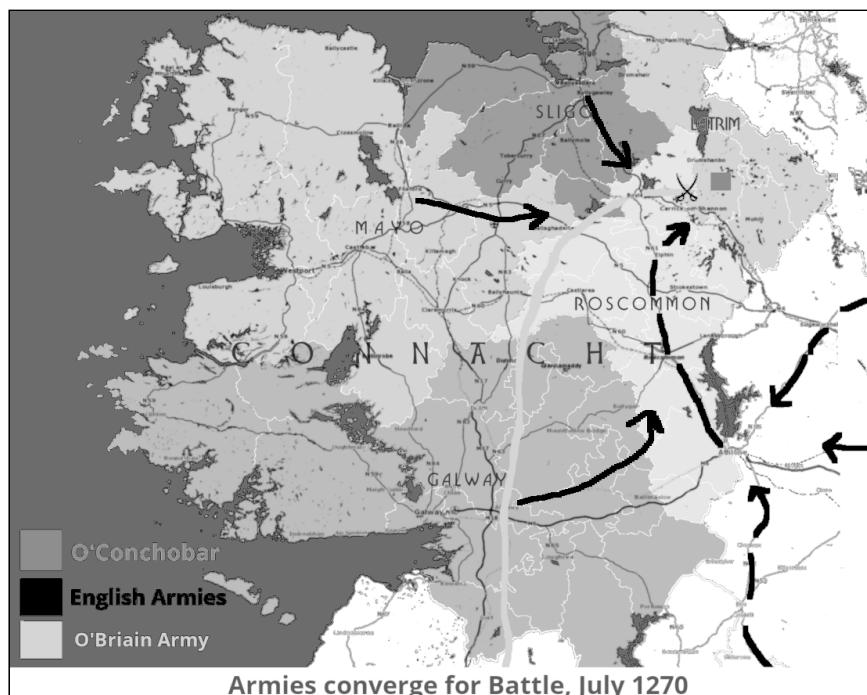


Figure 20: Troop movements, 1270AD

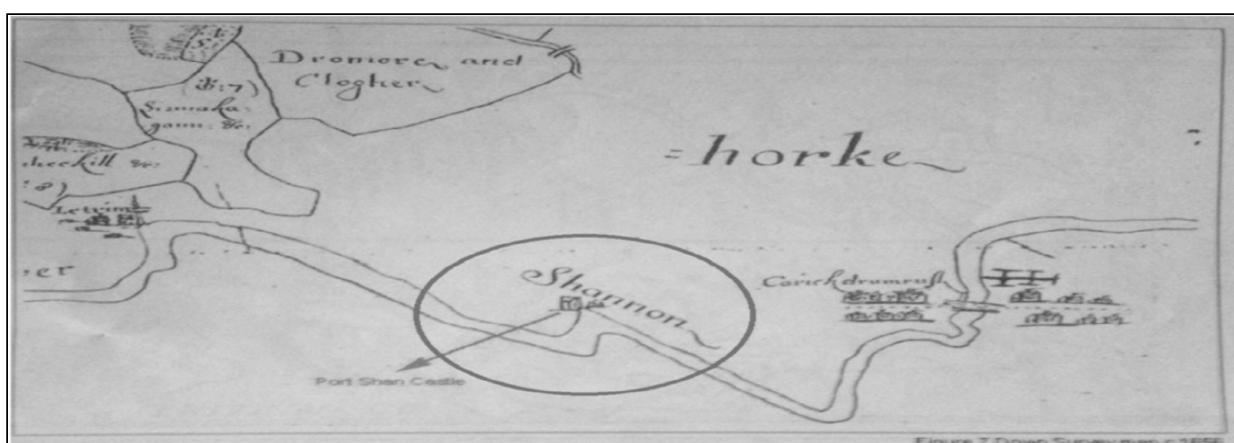


Figure 21: Norman castle? 1247AD

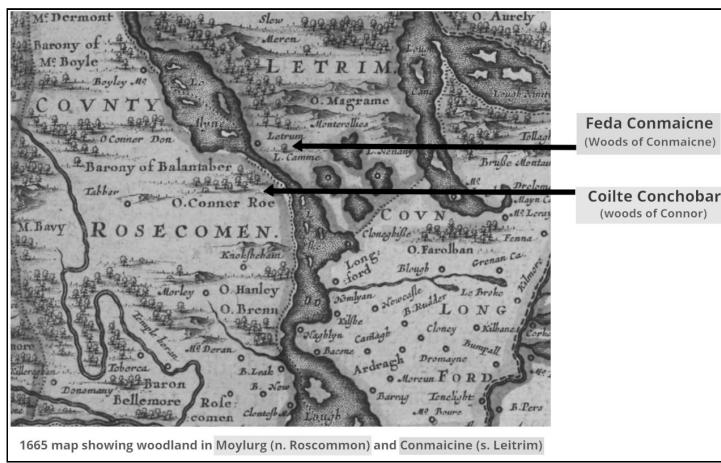


Figure 22: Obsolete forests, 1270AD

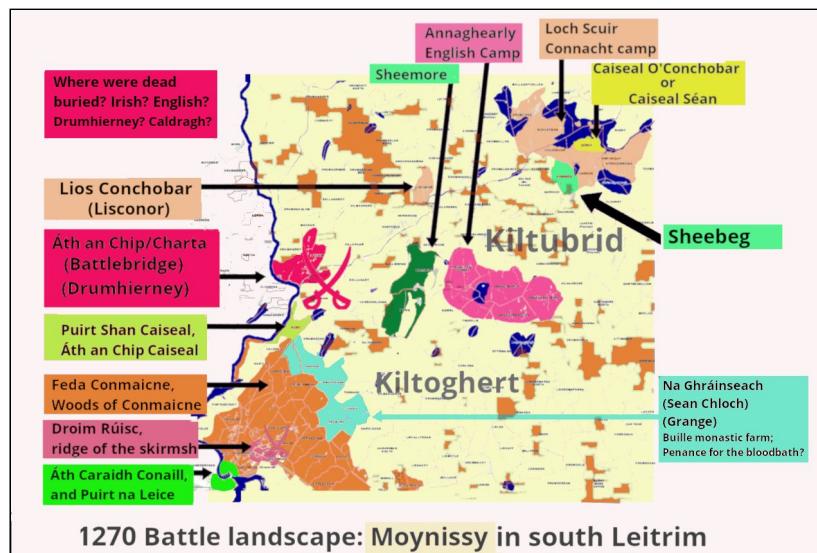


Figure 23: Potential tourism sign

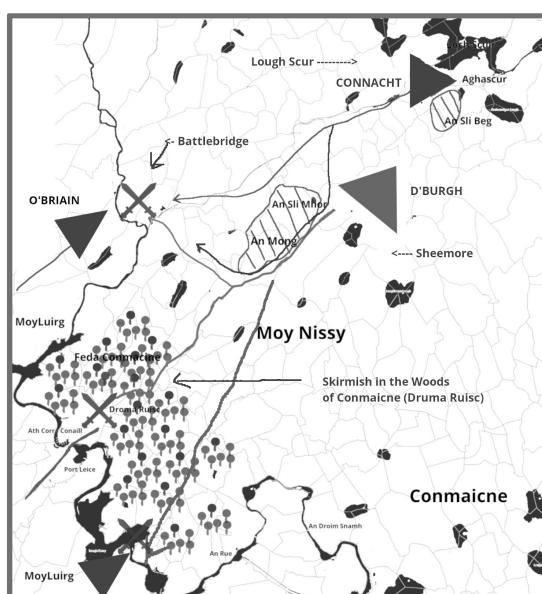


Figure 24: Map of 1270AD

Case Study 3: Eire 2000BC-1800AD

Ireland is in OSM, but Eire is not in OHM. On the 6th July 1975, the Irish times newspaper published a letter by Caitlin Ni Mhadadain entitled "**The name of our Country**". This inspirational letter discussed the origin of the name of the Island of Ireland, and explained its name is Éire since about 2000BC.[100] In OHM we could create the Eire polygon, setting **start_date=-2000** or whatever format the ISO standards recommend. This can be reused in many historical maps.

"No one who realizes that Eire has been the name of our country for over 4000 years can fail to take pride in that name and in being able to state his or her nationality as Eireannach.". [100]

We could map Darcy & Flynn's reconstruction of Ptolemy's Hibernia.[101] The places (town, river, promontory,) can be distinct entities, but connected to Éire using relations. Ptolemy's map is dated within Éire's start/end date window.

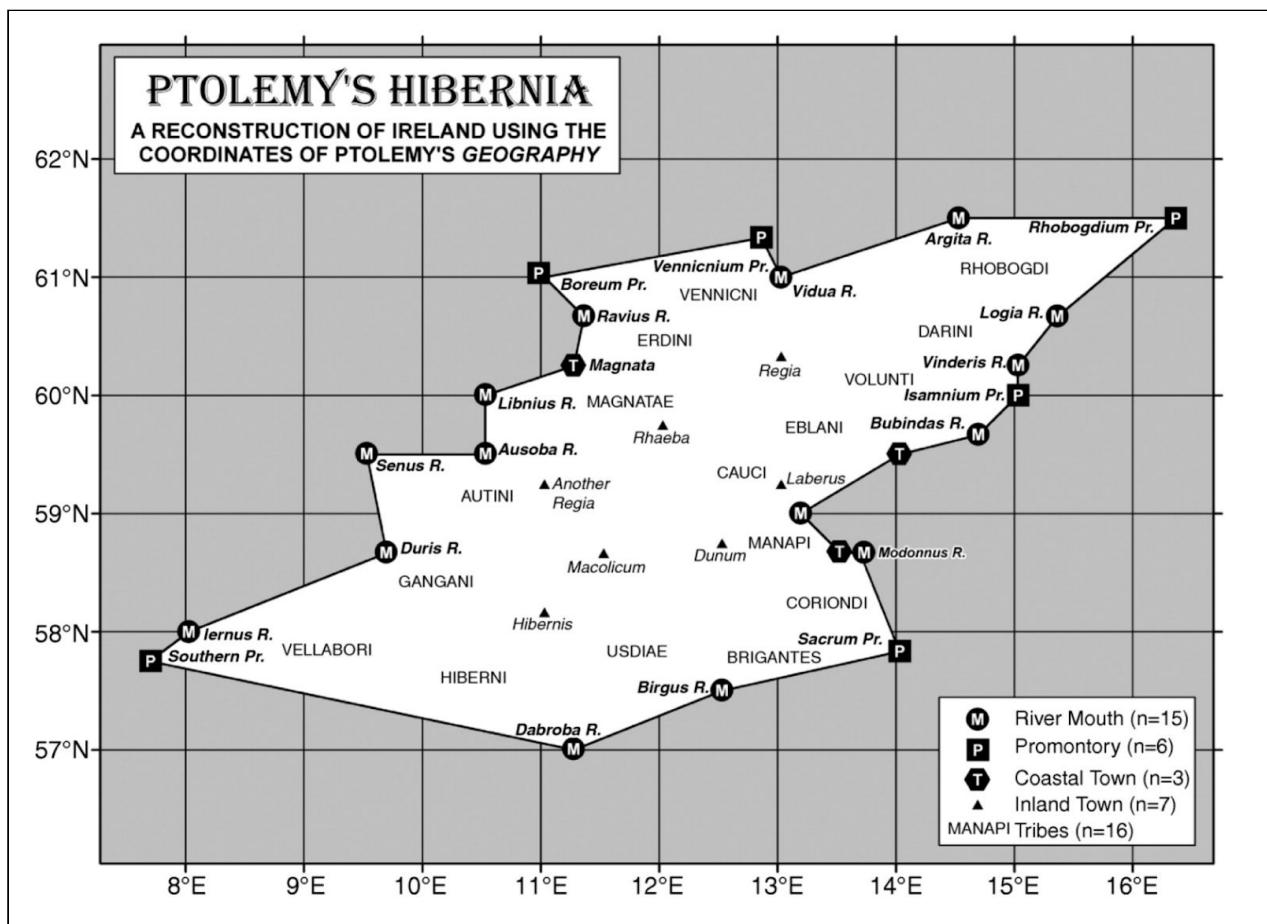


Figure 25: Ptolemy's Hibernia, by Darcy/Flynn (2008)

Creating records in OpenHistoryMap from sourced, referenced, or peer reviewed datasets improves the quality of OHM data. I can reuse Éire in my 1270AD map of the Battle. Éire is sourced, referenced, and peer reviewed because it is included in loganim, a reputable governmental database for place names.

The screenshot shows the Logainm.ie website interface. At the top left is the logo 'logainm.ie' with a small blue map icon. To its right is a search bar with the placeholder 'Search' and a magnifying glass icon. Further right is a link 'téarma.ie'. Below the header, a navigation bar includes links for 'Glossary & Distribution maps', 'Resources', 'Education', and 'About'. A breadcrumb trail at the top of the main content area reads 'Logainm.ie » Search » Éire/Ireland'. The main content area features a blue button labeled '(no category)'. To the left, a sidebar says 'Not the place you were looking for?'. The central content area contains two entries: 'Éire' (genitive: na hÉireann, Irish) and 'Ireland' (English). Below these are social sharing icons for Facebook, Twitter, and Google+. A section titled 'Archival records' includes a blue button 'Open scanned records (3)' with a document icon. At the bottom is a 'Permanent link' section with the URL 'https://www.logainm.ie/1420121.aspx'.

Logainm.ie Meitheal Logainm.ie

Glossary & Distribution maps Resources Education About

Logainm.ie » Search » Éire/Ireland

(no category)

Not the place you were looking for?

Éire
genitive: na hÉireann
(Irish)

Ireland
(English)

f Share t Tweet g+ Share

Archival records

Open scanned records (3)

Permanent link
<https://www.logainm.ie/1420121.aspx>

Figure 26: Éire record in Logainm, <https://www.logainm.ie/1420121>

Conclusions and Recommendations

Open Historical Maps could be crowdsourced. Contributors could be controlled by historical schemas, versioning, and dispute resolution. Time could be added to GIS, features could be chronological annotated using tags. OpenHistoryMap was born from many competing ideas about historical mapping. It uses its own Database, as opposed to OpenSeaMap (marine). OHM adds its own prefix to tag namespaces (ohm:military:wireObstacle). OHM uses the same toolchains as OSM with minor modifications. Different rendering styles may be required (NATO, Archaeological, etc) - Hazmat Map styles. OHM/OSM are great data integration points for other databases (wikipedia, etc).[47]

Green (2009), argued "*there are no rules about how to publish, present, cite or otherwise catalogue datasets*".[102] The same is true for Historical geospatial datasets, and open historical mapping. The OpenHistoricalMap community can consider these issues. Meanwhile, the open mapping of historical datasets is largely an experimental discipline. I have a lot to learn about Geographical Information Systems (GIS), historical mapping, and OSM.[103]

I have given my current perspective on open access platforms and tools for sharing and reusing cultural, historical, and archaeological open data. Further research into the use of the geospatial data from open humanities digital libraries is warranted.

I believe OpenHistoricalMap is the standard open public participation historical mapping platform. However it must add support for standards-based mapping of historical attributes, perhaps even DOI name support for maps.[102][104]

The academic community may need role-based access control, protected namespaces (default, historical, archaeology, culture) where peer reviewed published maps live, and governance of the academic namespace. Further research into the requirements of academic historical maps is needed.

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