Contextualizing Historical Places in a Gazetteer by Using Historical Maps and Linked Data

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Abstract. Understanding historical places involves more information than just a place name: the spatiotemporal and cultural context is needed, too. This paper introduces a solution to the problem of providing historical place names with context in a user interface, by using an ontology service that serves historical place names on modern and historical maps, with additional contextual linked data attached. The solution is being implemented in the use case of creating and managing a national level gazetteer and map service HIPLA, hosting over 800 000 historical and contemporary places in Finland.

1 Introduction

Historical geographic data [4] is important for many organizations, such as museums, libraries, archives and media companies. Historians and cultural heritage (CH) researchers often need to deal with historical place names that change in time. When a cataloger or a historian studying old materials comes across a historical place name, it is a challenge to understand the spatial and temporal dimensions of the place at stake. Historical place names can often be seen only on historical maps, and historical geographic data is scattered across multiple sources that can be incomplete and/or mutually conflicting. In order to make a reference to a historical place, while preserving data interoperability across all CH data, there is a need to be able to quickly find out if the place concept for the place at stake can be found in some of the existing place repositories. Additionally, if the correct place concept is nowhere to be found—a situation quite common with historical places—there should be a mechanism to suggest and share new place concepts among the CH community.

To tackle these challenges, we have developed a prototype called Finnish Ontology Service of Historical Places (HIPLA). Using Linked Data technologies, HIPLA provides a common search interface to historical geographic data like place names, coordinates and historical maps. Contextual information, e.g. historical events or photographs related to a geographic location, is provided to help the user to gain a deeper understanding of the historical place. HIPLA also serves as a sustainable and evolving repository of historical places by implementing Dynamic Ontology Services for Evolving Ontologies [3]. Cultural Heritage organizations can connect their legacy cataloging systems to HIPLA using a widget or an API in the same vain as in ONKI [5].

This paper first presents main features of HIPLA from an end-user interface viewpoint (section 2), complementing the crowdsourcing view to the system [3]. After this

the system architecture is outlined (section 3), and finally lessons leaned thus far in the project are discussed (section 4). The prototype is available at

`http://dev.hipla.fi`.

2 Finding and Understanding Historical Places in Context

Federated search Our first focus in developing HIPLA has been on modeling, storing and searching Finnish place names in multiple SPARQL endpoints, and on displaying them on historical and contemporary maps at the same time. The datasets used in HIPLA are stored in separate RDF graphs, which makes it possible to offer dynamic selection of data sources for the user interface or external data consumers. Table 1 presents the datasets currently connected to HIPLA, available on the Linked Data Finland platform[1] [2].

Figure 1 depicts the HIPLA user interface. For finding, disambiguating, and examining historical places, there is a autocompletion search input field (a). Place names can be searched from multiple SPARQL endpoints at the same time based of the user's choice (checkboxes above (b)) with the following functionalities:

1. Hovering the cursor over the search results shows where the places are: the corresponding marker bounces on the map.
2. A selection click on a search result label opens the info window of the place, showing its context (c).
3. A click of the menu button on a result row (a) shows the place data in a linked data browser for investigating the data in detail.

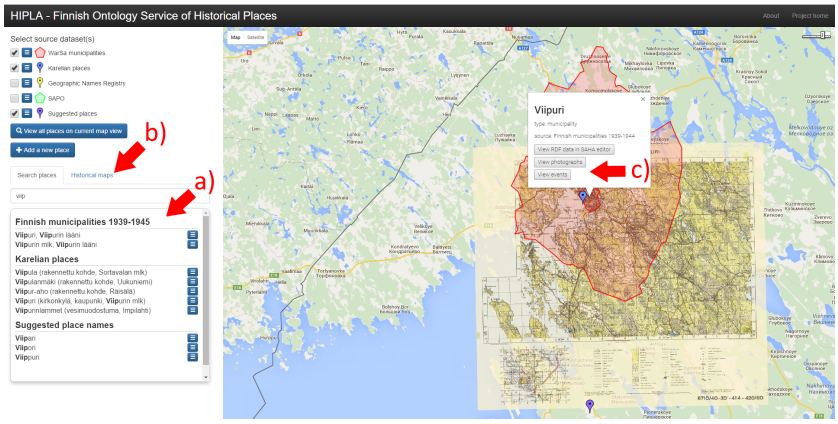

Fig. 1. HIPLA user interface

[1] http://www.ldf.fi

Multiple dataset browsing If the user does not know the name of the place, but she has some idea where the place is located, she can pan and zoom the map view to the area. After this it's possible to use "View all places on current map view" button. This way places from different datasets connected to HIPLA are rendered on the map, and the user can check if the place exists already in some of the datasets, and compare places in different gazetteers.

Fetch historical maps The "Historical maps" (b) tab provides a list of old maps that intersect the current map view. The map images are fetched from HIPLA's MapWarper service[2] and their metadata is queried with SPARQL from the map RDF graph of the HIPLA Fuseki service. Each map has a checkbox for rendering the map on the main map view, a thumbnail image, information about map series, scale and type, and a link to view the map in Map Warper. All map series are visible by default, but with the series button it is possible to filter maps by their series. Once one or more historical maps have been selected with the checkboxes, the opacity of the historical maps can be controlled with the slider that is located on the top right corner of the map. If the user pans or zooms the main map view, clicking the "Refresh map list" button updates the map list.

View contextual data When the user selects a place, contextual data (c) is provided for connecting the place to other relevant data sources. This functionality is first piloted with the spatial datasets of WarSampo, providing e.g. 160 000 historical photos related to the places during the Second World War and a timeline of historical events.

3 System Architecture

Figure 2 depicts the components of the HIPLA service. THe system is implemented using the Linked Data Finland platform [2], based on Fuseki with a Varnish front end for serving the linked data. The end-user interface of HIPLA is a lightweight HTML5 single page map application, which provides access to multiple data sources with SPARQL queries and autocomplete search functionality using typeahead.js. Embedded Google Maps view is used to visualize historical places. HIPLA's Map Warper is based on the open source Map Warper tool of the New York Public Library for georectifying old maps on top of modern ones.

4 Related Work and Discussion

HIPLA is an ontology library service [1] for historical geodata on maps. Complementing traditional gazetteers, HIPLA not only publishes the data for humans but also for machines (legacy cataloging systems) using the SPARQL endpoint API. In addition, historical maps and contextual linked data about the places is provided.

Thesauri of historical places, published as Linked Data, include the Getty TGN[3] of some 1.5 million records, 'Pelagios: Enable Linked Ancient Geodata In Open Systems'[4], and Pleiades[5]. Pelagios and Pleiades are based on crowdsourcing volunteers'

[2] http://mapwarper.onki.fi

[3] http://www.getty.edu/research/tools/vocabularies/tgn/

[4] http://pelagios-project.blogspot.fi/p/about-pelagios.html

[5] http://pleiades.stoa.org

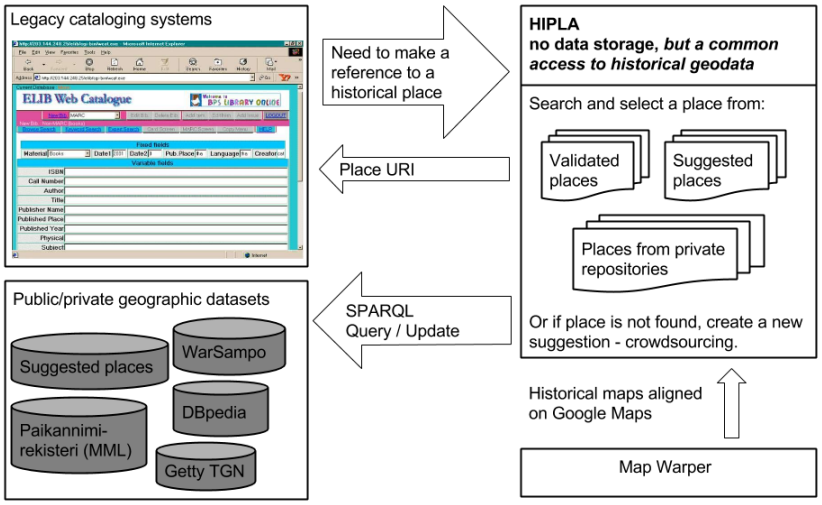

Fig. 2. HIPLA system architecture

work in ontology development. The novelty of HIPLA from an user interface viewpoint lays in the idea of combining multiple geographic data sources, offering a unified view for examining and comparing them. In addition, HIPLA makes it possible to crowdsource the creation of the gazetteer to catalogers of Cultural Heritage content, as a side effect of their daily work, as discussed in [3].

The Historical Gazetteer of England's Place-names[6] is a service of over 4 million names than can be searched and viewed on modern maps as well as on historical ones. HIPLA has a similar local flavor focusing on places in Finland, but is based on Linked Open Data. OldMapsOnline[7] is a search engine for finding historical maps covering a given area. In contrast to the systems above, HIPLA includes a map service for aligning and viewing georectified historical maps, as in the New York Public Library's Chronology of Place gazetteer[8]. HIPLA also publishes the metadata of the historical maps as Linked Open Data and the dynamic and transparent selection of data sources makes it possible to understand the origins of the data.

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[6] http://www.placenames.org.uk
[7] http://www.oldmapsonline.org/
[8] http://nypl.gazetteer.us

Table 1. Datasets connected to HIPLA

Dataset	Orignal source	Place type	Size	Description
Finnish Municipalities 1939–1944	National Archives of Finland	municipality	612	Finnish National Archives research project "Finland, prisoners of war and extraditions 1939–1955" produced a map application, from where the war time municipalites were obtained.
Karelian places	Jyrki Tiittanen / National Land Survey of Finland	village, house, etc.	34 938	Historical places in the Karelia region of Finland and Russia.
Finnish Spatio-Temporal Ontology	SeCo	municipality	1 261	A spatio-temporal ontology of Finnish municipalities.
Finnish Geographic Names Registry	National Land Survey of Finland	61 place types	800 000	The place name dataset comprises natural and cultural names whose spelling has been checked by the Institute for the Languages of Finland.
Senate atlas	National Archives of Finland	map	414	Series of maps of Southern Finland drawn by the Russian Army topographic troops in the end of the 19th and the beginning of the 20th centuries in scale 1:21 000.
Karelian maps	National Land Survey of Finland	map	47	The National Board of Survey and Topografikunta produced four-colour topographic maps in scale 1:100 000 during 1928–1951.

References

1. d'Aquin, M., Noy, N.F.: Where to publish and find ontologies? A survey of ontology libraries. Web Semantics: Science, Services and Agents on the World Wide Web 11, 96–111 (2012)
2. Hyvönen, E., Tuominen, J., Alonen, M., Mäkelä, E.: Linked data finland: A 7-star model and platform for publishing and re-using linked datasets. In: The Semantic Web: ESWC 2014 Satellite Events, Revised Selected Papers. pp. 226–230. Springer–Verlag (2014)
3. Hyvönen, E., Tuominen, J., Ikkala, E., Mäkelä, E.: Ontology services based on crowdsourcing: Case national gazetteer of historical places. In: Proceedings of 14th International Semantic Web Conference (ISWC 2015), Posters and Demos (2015)
4. Southall, H., Mostern, R., Berman, M.L.: On historical gazetteers. International Journal of Humanities and Arts Computing 5, 127–145 (2011)
5. Tuominen, J., Frosterus, M., Viljanen, K., Hyvönen, E.: ONKI SKOS server for publishing and utilizing SKOS vocabularies and ontologies as services. In: Proceedings of the 6th European Semantic Web Conference (ESWC 2009). pp. 768–780. Springer–Verlag (2009)