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Development of metadata for historical cartographic resources associated with the Paris Peace Conference (1919–1920)

Abstract. In the era of interdisciplinary research supported by IT solutions, a special role is played by digital source repositories. The digital turn has contributed to their considerable development, and the application of new technologies has largely changed the current methods of research work. This facilitates pooling and structuring dispersed collections e.g. as part of thematic repositories, which collect and share thematically related resources. Metadata, which allow effective searching and identification of resources, are an important element of their function. The objective of the article is to present a procedure for the development of metadata aimed at creation of a thematic database of dispersed sources remaining after the Paris Peace Conference ending World War I. Based on the metadata development procedure, the author discusses the diagnosed problems associated with e.g. the specificity of the analyzed sources.

Keywords: metadata, historical cartographic sources, thematic repository

1. Introduction

Collections of sources available in archives, libraries, or museums are the basis of historical geography research. The digital progress, referred to as the ‘digital turn’ in the literature, has provided a plethora of digital copies of cartographic sources (Shepard, 2014; Open Education Database, 2021). This has contributed to enhancement of research opportunities and resulted in a considerable increase in the interest in interdisciplinary research due to the easier access to sources (Bomba, 2013).

Open-access digital repositories are currently a very dynamically developing element of digital humanities. To date, institutional digitization with online access to resources has been the main driving force of this process. As indicated by data from the Registry of Open Access Repositories (ROAR, n.d.), 81% of all European repositories are institutional archives and 12% are thematic repositories. The analysis of the

current definitions of a digital library (in the sense of a digital repository) conducted by A. Brahaj, M. Razum, and J. Hoxan (2013) has shown that most of the definitions associate the repository with collections with emphasis on their specification. This refers to such terms as targeted collection, managed collection, or organized collection.

The creation of thematic databases of historical sources collecting and structuring the material for analysis, since the sources available at present are often scattered, incomplete, and inconsistent, seems to be an important trend in research (Gregory & Healey, 2007). However, there may be difficulties in finding a specific map of interest, as the user may either find a large number of results or no results at all (Kuźma & Bauer, 2020).

The digital database of historical sources developed as part of the project “Shaping the borders of independent Poland in the light of cartographic documents” will be analyzed

scientifically (critical description of the content and purpose of the source), and its content will be made accessible (on-line). The source material comprises thematically related documentation in a form of historical cartographic sources (e.g. printed and handwritten maps) and descriptive historical sources (e.g. reports, protocols, expert opinions), which were created by the Polish delegation to the Paris Peace Conference in 1919–1920. The material was collected through queries of archives and library resources conducted in Poland and abroad (Konopska, 2016; Konopska & Barwiński, 2019).

The proposed solution is an example of a new thematic collection type in contrast to institutional (museum or library) collections, which have diverse and often local resources. In the era of the second digital turn (Carpo, 2017), access to digital resources has become widespread, and the multitude of data often hampers proper identification and use thereof (Kuźma & Bauer, 2020). One of the ways to facilitate searches is to create thematic collections (e.g. Europeana Collections, n.d.; Polona, n.d.) that allow researchers from various disciplines to find and use historical sources easily. The designed digital source database provides infrastructure for the aggregation of sources from various non-affiliated libraries and archives, e.g. the Polish Library in Paris, the Archives of Modern Records, the President Woodrow Wilson Library and Museum (more information in Konopska, 2016), and the most important function of the digital collection is not storage but thematic structuring and providing access to data. The user will gain access to the database of sources about the establishment of the borders of independent Poland, which are scattered and partially inaccessible at present. Additionally, many of the resources have been digitized and will be available online for the first time since the collection thereof.

The availability of resources facilitates their use not only by researchers from various scientific disciplines but also by individuals interested in issues presented in cartographic sources (Kuźma & Mościcka, 2020). As noted by D. Youngblood (2006), due to the universal language of cartography and the possibility of space perception, maps are the subject of attention of a wide audience as a useful expression of knowledge in each of the main

academic disciplines. Hence, in order to be found, identified, and used efficiently, these sources must be described as metadata. They contain basic information, e.g. the title, content, and accessibility, which helps users to discover and determine the suitability of the sources for e.g. research, education, or popularization purposes (Federacja Bibliotek Cyfrowych, 2016).

The main objective of the article is to present a procedure of development of metadata of historical cartographic sources, which were created for the purposes of establishment of Poland's borders during the Paris Peace Conference. The stages of compiling the collections are presented and problems resulting from the specificity of the sources are discussed.

The descriptive and spatial metadata will be made accessible through a map interface. The implementation of such a solution facilitates an intuitive and effective search for old maps of a specific research area (Mościcka & Ziwirowicz-Rutkowska, 2018), as confirmed by the available repositories, e.g. David Rumsey Collection (n.d.), Old Maps Online (n.d.), or USGS Historical Topographic Map Explorer (n.d.).

2. Metadata and their role in access to resources

Currently, there are many metadata schemas and standards for the description of cartographic resources (Kuźma & Mościcka, 2020). Depending on the institution, the level of detail in the resources and the form of access varies substantially (fig. 1). Standard ObjectID, Dublin Core (DC, n.d.), Encoded Archival Description (EAD) can be chosen for the description of content metadata of e.g. documents and culture objects (Ziwirowicz-Rutkowska & Mościcka, 2015). To manage the diversity of metadata formats in cataloging maps, digital libraries use the updated ISBD (International Standard Bibliographic Description for Serials) and MARC21 (Biblioteka Narodowa, n.d.; Library of Congress, n.d.) standards. This issue was discussed in greater detail by Kuźma and Mościcka (2020). The diversity in the use of metadata has long been the subject of attempts to develop mechanisms unifying various standards of description of resources in digital repositories (Chan & Zeng, 2006) In Poland, interoperability is implemented as part of the development of a metadata standard in the

Title	Poland railway map = Polska mapa sieci kolejowej = Polen Eisenbahnkarte
Attribution	drawn by John Yonge.
Author / Creator	Yonge, John, 1932- >
Variant title	Polen Eisenbahnkarte Polska mapa sieci kolejowej
Published	Exeter, U.K. : Quail Map Co., 1993.
Description	Scale 1:633,600. 1 map ; 56 x 79 cm.
Language	English
Notes	Panel title. Includes insets of Szczecin, Czestochowa, Grudziadz, and 8 diagrams of narrow-gauge district railways. On verso: index, index map, and maps of 14 urban areas.
Subjects	Railroads -- Poland -- Maps. >
Author / Creator	Quail Map Company. >
Identifier	ISBN : 0900609893
Creation Date	1993
HOLLIS number	990091409900203941
Permalink	http://id.lib.harvard.edu/alma/990091409900203941/catalog
Source	HVD - Core
Other search terms	Communication and traffic > Concessions > Public utilities > Transportation > Trusts, Industrial >

a

b

Title	Propozycja przebiegu granic w Okręgu Wileńskim
Author	Kopeć, Witold; Prezes Rady Opiekuńczej Okręgu Wileńskiego
Type	Map
Places	westlimit=26.8475; southlimit=54.0449; eastlimit=27.9581; northlimit=55.006;
Dates	1920-09
Languages	pl
Date of the item	1920-09

SCANS OF DOCUMENTS



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Fig. 1. Examples of the structure and presentation of metadata: a) Harvard Geospatial Library (n.d.); b) the repository of the Józef Piłsudski Institute in America (n.d.) (author's compilation)

KRONIK@ System (Cyfryzacja KPRM, 2020).

Development of metadata for maps should be based on the characteristics of searches for this type of sources. Depending on their preferences, Internet users search for historical sources from a spatial (spatial reference) or temporal (chronological reference to the source content) perspective or focus their attention on the content of the sources (Goodchild & Janelle, 2010). Hence, the definition of the metadata structure and scope requires addition of information in a form of the spatial extent of data in the source material to the classic descriptive elements (Bidney, 2010). This is particularly important for the access to cartographic historical sources due to the nature of these data. Currently, the standard for description of a geographic dataset is defined by the ISO 19115 standard (International Organization for Standardization, 2014). The ISO 19100 series of standards is used to define, describe, and manage geographic information. Additionally, it is used for definition of profiles that facilitate interoperability of geographic information systems (GIS) with application systems in the search for resources (Kuźma & Mościcka, 2020; Mościcka & Zwirowicz-Rutkowska, 2020).

The creation and access to metadata on the Web is supported by mechanisms that help to the search for these metadata. This process is based on the Semantic Web improving communication and information processing by machines and applications, i.e. creating links between data referred to as *Linked Open Data* (LOD) (Roszkowski, 2010; Linked Data, 2015). The use of LOD to describe cartographic resources has been analyzed by e.g. B. Yoose and J. Perkins (2013) as well as M. McGee, K. Durante, K. Weimer (2017). Spatial and descriptive data collected in the designed database of sources will also be available as Linked Data. The RDF (Resource Description Framework) standard will be used to represent the data in this model to solve the problem of a large amount of data: text documents, images (scans), graphic files, etc. The RDF standard facilitates description of the content of individual resources in a short and concise XML file containing structured information about the resource. This solution will be implemented more widely in the further stages of the project, and the description thereof goes beyond the scope of this article.

3. Metadata in the project database structure

The basic element of the digital architecture of the source database constituting the central repository of the project is the relational temporal-spatial database. Its functionality includes dedicated solutions for the storage of digital copies of sources and metadata. It primarily contains high-resolution digital copies of handwritten and printed maps and cartographic sketches as well as documentary and text sources. The database architecture combines two approaches to designing IT solutions: a relational model for grouping data into schemas and relationships (HDataset schema) and a geodatabase representing the layers of geographic information systems (Geography schema) (fig. 2).

The relational model is mainly responsible for storing descriptive information obtained via the analysis of the content of historical cartographic sources and related descriptive historical sources. In addition to the basic information describing the collection, scientific descriptions of the sources are stored. The geodatabase schema stores a vector representation of information associated with the descriptive data. The *Extents* table, which includes extents – vector surface objects playing a role of metadata for spatial (rasters) and non-spatial information, connects the two schemas. Data from various sources collected and generated in different formats have been combined into one coherent model facilitating creation of queries to search for selected historical data in an appropriate geographic context. Information about the sources (metadata) is stored in relational tables. Selected elements of the HDataset schema are described below:

- *MapMetaData* – a table storing basic raster map metadata. It is relationally linked with the *People*, *Collections*, *DocumentType*, *Document*, and *KeyWords* tables, which contain additional normalized metadata. It is also relationally linked with the *Maps* table storing raster maps;
- *People* – a table storing information about the authors of the maps, addressees of the sources, decision-makers, etc.;
- *Collections* – contains information about the data collection;
- *Documents* – a table storing all scanned documents that are not spatial information;

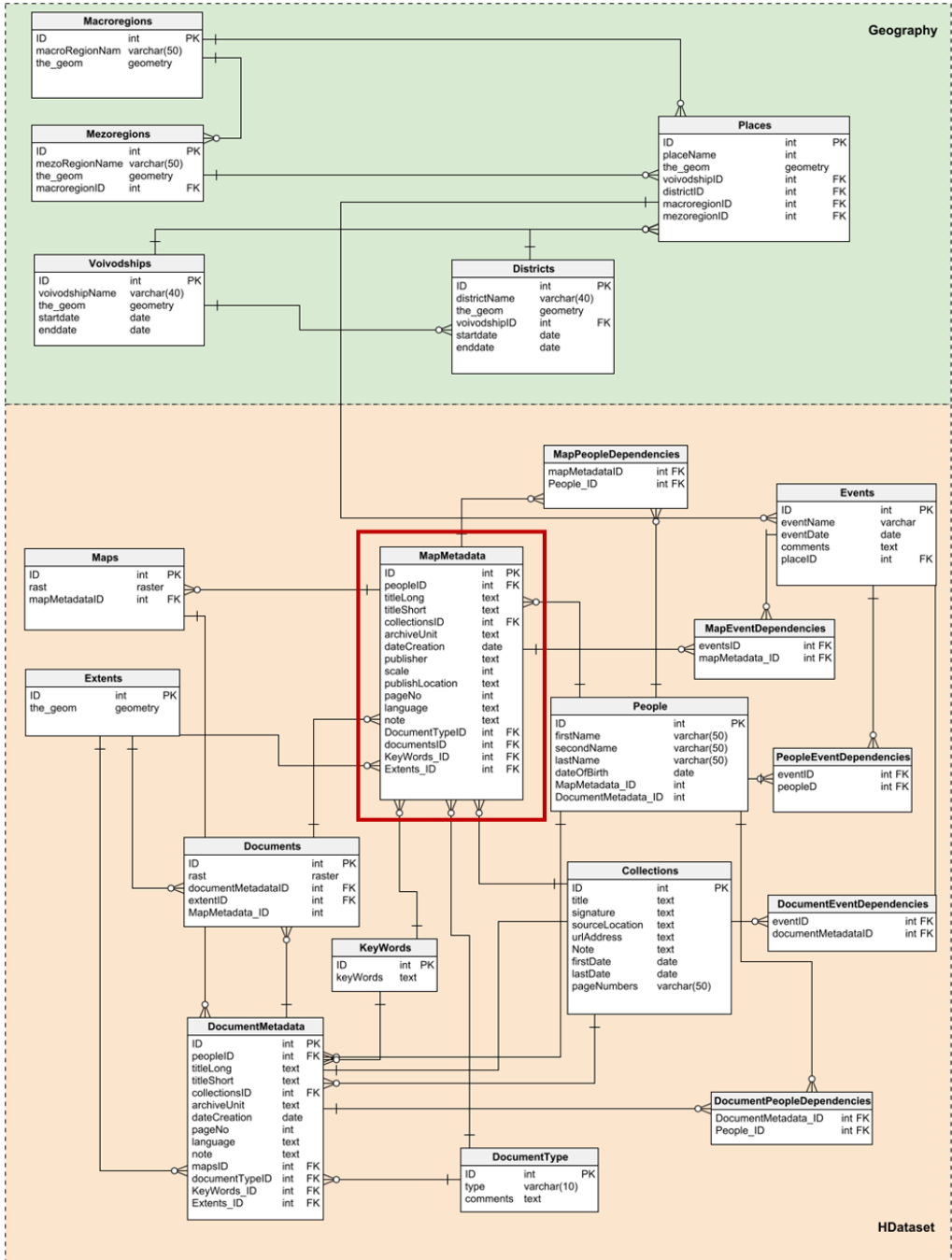


Fig. 2. Metadata for cartographic sources in a logical database model – HDataset and Geography schemas (author’s compilation)

- *DocumentType* – a normalized table storing information about the types of stored documents;
- *DocumentMetaData* – a table storing basic metadata about documents – non-spatial data;
- *KeyWords* – a table storing keyword sequences;
- *Extents* – a table storing vector metadata extents of data. It extends the metadata with spatial information.

4. Metadata structure

The starting point for the development of the metadata structure was the general Dublin Core standard, which uses 15 main metadata elements to describe web resources (Dublin Core, n.d.). The creators of this standard adopted four assumptions that contributed to its widespread use. These include: 1) ease of

creation of a description and management of resources, 2) commonly understood vocabulary, 3) international scope, and 4) flexibility of the structure (Filipek, 2006). Despite its simplicity, the Dublin Core (n.d.) standard generates a number of problems in its application to the description of cartographic sources. They were described by D.Y. Allen (2001), who proposed the best solutions to address these problems.

4.1. Descriptive metadata

The historical context is represented by the extensive metadata of the resource composed of the 15 main metadata elements in the Dublin Core (n.d.) standard with the following additional elements: short title, scale, and keywords. The metadata structure is presented and explained in table 1.

Table 1. Elements of metadata compliant with the Dublin Core standard and their characteristics (author's compilation)

Element	Content
Identifier <dc:identifier>	Uniform Resource Identifier (URI)
Full title <dc:title>	Full name of the map
Short title <dc:shorttitle>	Abbreviated name of the map
Author <dc:creator>	Author(s) of the map
Map editor <dc:contributor>	Contributor to the map
Publisher address <dc:publisher>	Full address of the map publisher
Publisher location <dc:publisherLocation>	Place of publishing with indication of the country and city
Date <dc:date>	Year of map publication
Scale <dc:scale>	Map scale - denominator value
Subject <dc:subject>	Brief description of the main content of the map
Type of map acc. to the method of preparation and subject matter <dc:type>	Identification of the form of a map, e.g. handwritten maps, printed map, handwritten maps with annotations, printed map with handwritten annotations; Identification of the type of the map content, e.g. social, economic, general geographic, political, and administrative maps
Language <dc:language>	Dominant language on the map
Description <dc:description>	Detailed characterization of the map including its historical value
Source <dc:source>	Place of storage of the original map
Relation <dc:relation>	Relation to other sources
Coverage <dc:coverage>	Map coverage expressed in coordinates (EPSG: 4326) of the bounding quadrilateral
Keywords <dc:keywords>	Object keywords, name keywords, geographic keywords

Keywords are an important element of metadata, playing a role in the operation of web browsers. This type of meta tag helps to find information and retrieve the correct result. The keyword value is a commonly used word, a formalized word, or a phrase used to describe a topic. Keywords help to refine the search for full texts or objects (Jones, 2011).

In terms of the specificity of the sources and the nature of the database, keywords can be grouped into three thematic categories:

1) object keywords (e.g. elections; Polish National Committee),

2) name keywords (e.g. Paderewski Ignacy Jan; Dmowski Roman),

3) geographic keywords (e.g. Polish-Slovak border; Silesia).

In the case of object and name keywords, the Virtual International Authority File (n.d.) database, which is an international register of model entries, will be used. The use of geographic keywords is associated with the need to specify the spatial reference scope of the map content. In the case of some maps, spatial metadata expressed as a map frame may suggest that the entire extent has relevant content (fig. 3).

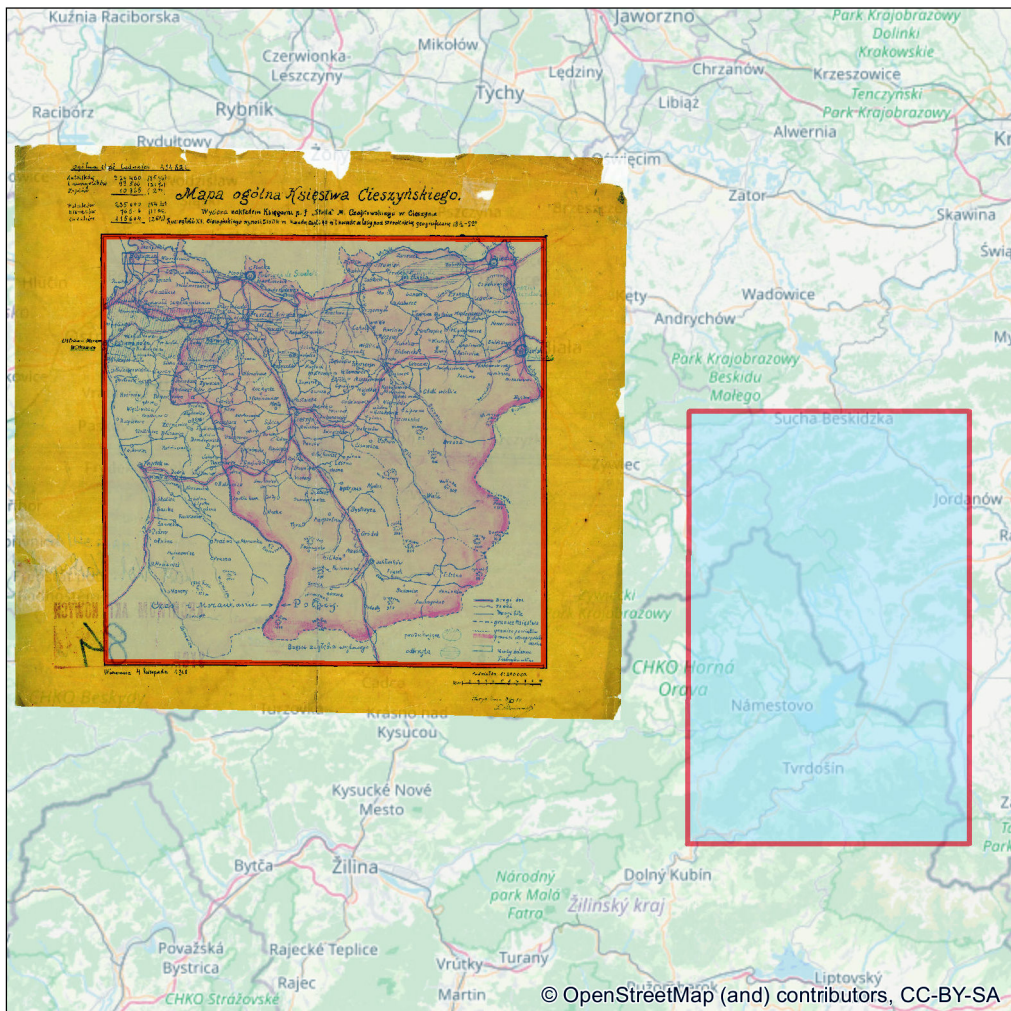


Fig. 3. Example of spatial metadata – extents of selected maps (author's compilation)

4.2. Spatial metadata

In addition to the aforementioned verbal form of communication (metadata elements indicating specific locations, e.g. keywords) and the entry of coordinates in the <dc:coverage> element, the spatial extent of the information contained in the source is presented in graphical and mathematical terms. Following the good practices in the development of metadata, the spatial presentation was realized as resource extents in the geographical space expressed by a bounding quadrilateral. The current practice is based on the use of a bounding rectangle expressed by the meridians of the western and eastern border of the area and parallels of the southern and northern borders (EUR-Lex, 2008). In the analysis of the spatial metadata, irregular quadrilaterals were used, which was related to the map calibration and the resulting extents of the map content (fig. 3).

5. Stages of metadata development

The technical guidelines for the development of metadata (Baranowski et al., 2008) indicate three stages: 1) collection of information on the data of all entities related to the data resources (owners, distributors, creators, publishers of data resources), 2) collection of information describing all data resources, 3) creation of metadata. Following these recommendations, a procedure was developed, where the main stage consisted in preparation of descriptions to be added to the target database (fig. 4).

The first stage involved a query and acquisition of digital copies of the cartographic sources. In this stage, resources associated with the Paris Peace Conference were found and analyzed. This query included resources available in archives, museums, and libraries in Poland and abroad (Konopska, 2016). Depending on the availability of the sources, two types of their digital copies were obtained: 1) high-resolution scans of the sources (in the case of inaccessibility of the online resource), 2) links (hyperlinks) to the resources in publicly available source repositories.

The creation of the metadata for the historical cartographic sources (due to their large numbers) determined the preparation of an intuitive environment, which facilitated:

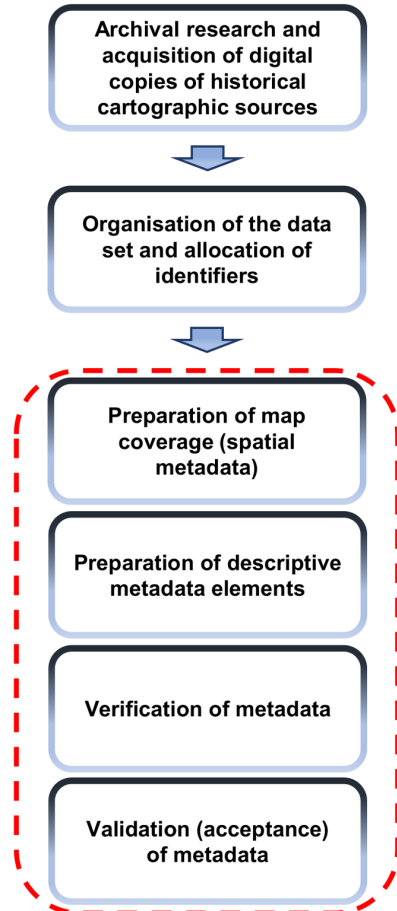


Fig. 4. Procedure for creation of metadata in the project (author's compilation)

- storing and access to digital copies of sources and simultaneous editing by several users,
- control of developed metadata versions,
- generating results in a tabular form (possibility of exporting to the result database).

After the analysis of the available solutions, the solution in the Google Workspace cloud computing environment was used. Based on this service, tools and a procedure for the creation of metadata for three interrelated environments were prepared:

- 1) structured digital copies of sources with hyperlinks (providing access to the source copy),
- 2) tabular list of cartographic sources,
- 3) a metadata creation application.

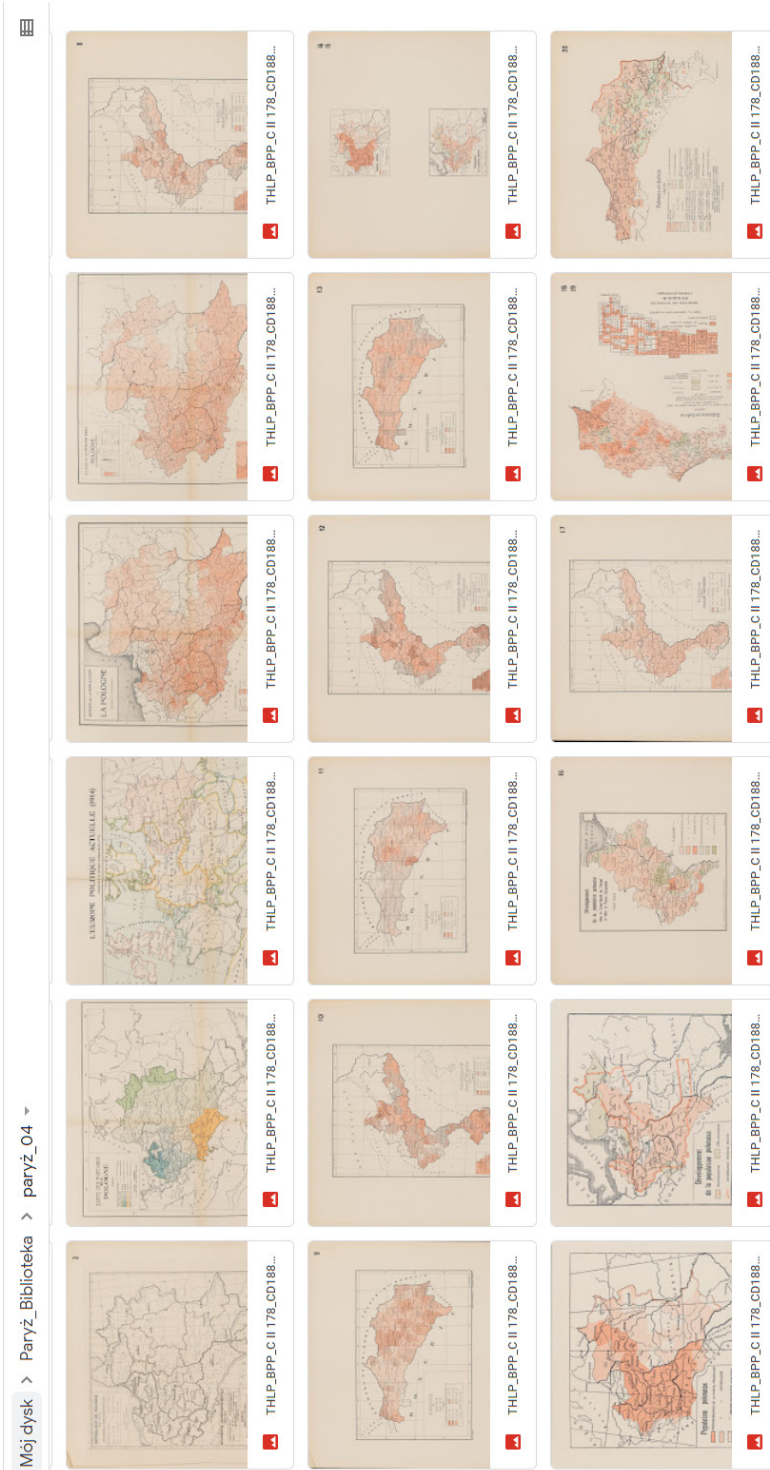


Fig. 5. Structured cartographic sources with assigned internal identifiers (author's compilation)

The second stage consisted in structuring and depositing the scans of the sources in the virtual disk space (fig. 5). The layout and hierarchy of the folders corresponded to the origin of the digital copies (archive name, files, volumes). The map scans were assigned unique internal identifiers (creation of unique URIs, Universal Resource Identifiers; this will be implemented in a later stage of the project), and a hyperlink was generated for each document for direct access to the files without the need to search the entire resource. Next, a table was prepared for the copies of the sources to support the work on the descriptions conducted by the research team.

The next stage of metadata creation was the generation of spatial metadata in the form of map extents. This task was a three-stage process: 1) calibration (spatial reference) of cartographic sources, 2) determination of the extents of old maps, and 3) assessment of the cartometricity of the maps. The detailed technical aspects of this task and the discussion of research problems were presented by M. Kuźma (2020).

The last stage consisted in work on the descriptive elements of the metadata and a specialized description of the source. This task was accomplished by a team of historians, geographers, and cartographers. A web application enabling the entire team to enter the metadata into the database was used to optimize the work. The application was created as a cloud computing and crowdsourcing solution. Such detailed settings as required fields, dropdown lists of predefined items, etc. ensured control over the completeness of the entered metadata.

5.1. Problems with metadata creation

The emerging difficulties with the creation of metadata elements were associated with the specificity and diversity of the historical cartographic sources. The sources collected through the query had been dispersed in non-affiliated American, English, Austrian, Czech, French, Lithuanian, German, Polish, and Ukrainian libraries, archives, and museums. To acquire the sources, the activities of diplomats and experts who were part of the Polish delegation to peace conferences had to be analyzed. The maps were focused on Polish affairs and were

prepared for the negotiations of the establishment of Poland's borders during the Paris Peace Conference. They were prepared by both cartographers (e.g. Eugeniusz Romer) and diplomats (e.g. Roman Dmowski). Hence, the collection contains very detailed cartographic drawings with all map components (e.g. legends, which are an important source of information for completion of metadata), printed maps with handwritten annotations (many unsigned comments handwritten directly on the maps), and cartographic sketches. The link between the available resources and historical sources had a substantial impact on the preparation of the metadata elements. The analysis covered maps and cartographic sketches from 1916–1923 along with documentation, i.e. comments and working materials, which are essential for understanding thereof.

The retrieved maps constitute a resource that can be organized in many ways for creation of metadata, e.g. according to the scale: small-scale, medium-scale, large-scale maps, according to the generation technique: handwritten, black and white printed, multicolored printed, printed with handwritten comments, printed with handwritten thematic content, according to the degree of accuracy: cartometric maps, cartographic sketches, imaginary maps, and according to themes: administrative/political, nationality, linguistic, religion, and economic maps (Konopska & Barwiński, 2019).

The presented diversity of maps resulted in the following difficulties:

1. Identification of the map creator.

This problem was encountered especially in the case of the handwritten maps and maps separated from the textual documentation. The author of the map was identified through the analysis of files where the map or its content (e.g. the annotations, fig. 6) were part of the documents. When the task was unsuccessful, the name of the author of the map was not provided or an annotation “probable author” was used.

2. Determination of the map scale (conversion of linear scales or lack of scales and the linear scale).

The problem of the lack of the map scale was solved by implementation of a GIS solution analyzing the cartometry of the maps and identifying their scale. This issue was described in greater detail by M. Kuźma (2020).

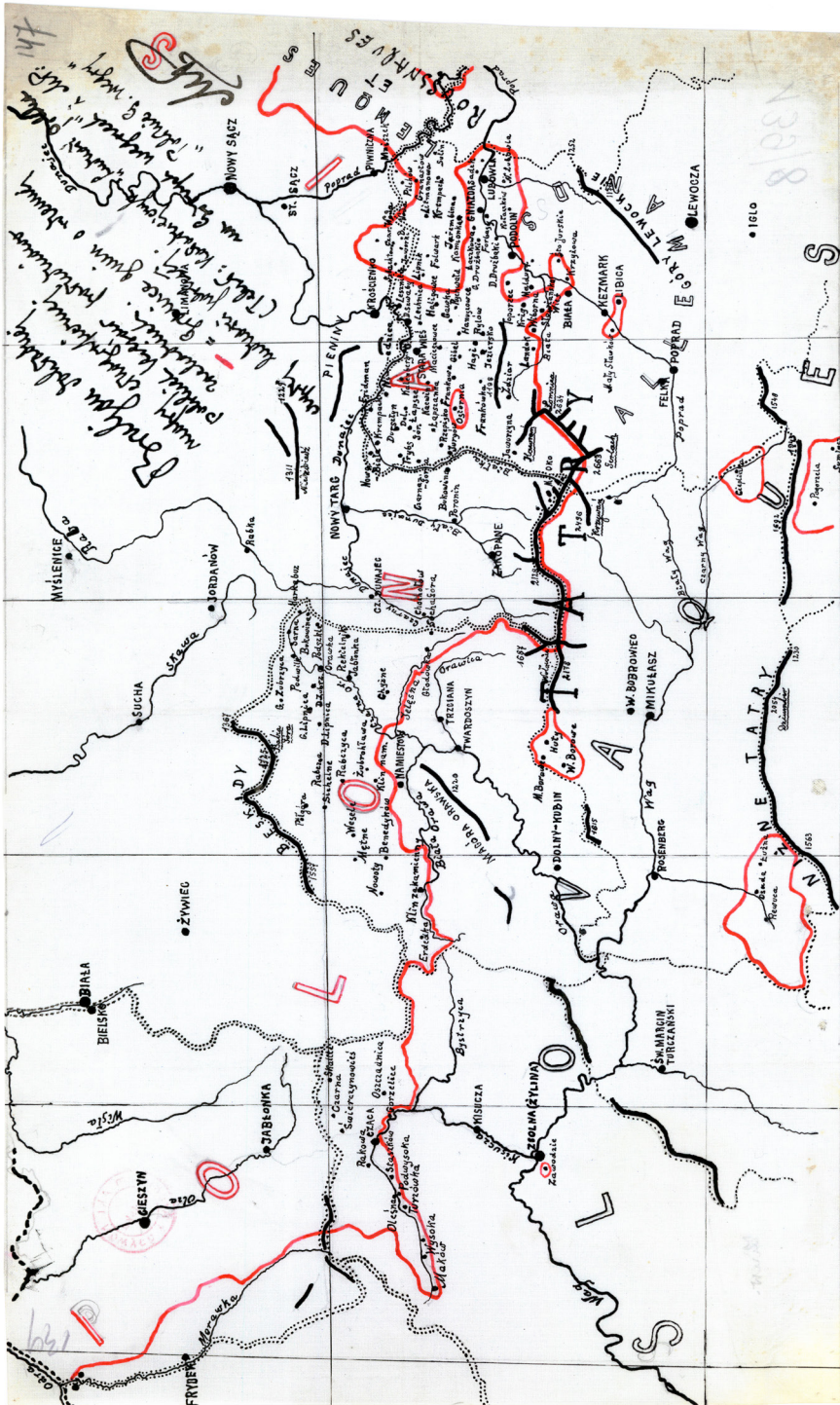


Fig. 6. Example of a handwritten map

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<?xml version="1.0"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:dc="http://purl.org/dc/elements/1.1/">
  <rdf:Description rdf:about="">
    <dc:title> Pologne Prussienne. La nationalité des enfants dans les écoles primaires d'après la statistique du
gouvernement Prussien de 1911 </dc:title>
    <dc:creator>M. Biske</dc:creator>
    <dc:subject>Polish western border, Polish National Committee, Prussia, children of Polish nationality in
schools, nationality statistics, Prussian school census 1911, Polish-German border, Prussia, Prussian partition
borders </dc:subject>
    <dc:description> The map shows with a red line the proposed course of the Polish-German border,
according to the position of the Polish National Committee. A map issued by the Cartographic Office of the Central
Polish Agency in Lausanne, showing the percentage of children of Polish nationality among pupils in elementary
schools in the districts of East Prussia, according to official statistics of the Prussian government from the school
census of 1911, was used as a background...
    </dc:description>
    <dc:publisher> Bureau Cartographique "l'Agence Polonaise Centrale" a Lausanne </dc:publisher>
    <dc:date> 1917-1919 </dc:date>
    <dc:type> Printed map with handwritten annotations </dc:type>
    <dc:format> image/tiff </dc:format>
    <dc:source> Central Archives of Modern Records/260 Cartographic collection/429 </dc:source>
    <dc:language> pl </dc:language>
    <dc:coverage> North 55.448, South 49.480, East 23.338, West 14.644. POLAND </dc:coverage>
    <dc:rights> General Public License </dc:rights>
  </rdf:Description>
</rdf:RDF>

```

Fig. 7. Example of metadata saved in the RDF format (author's compilation)

3. Lack of information about the date of creation of the map.

As in 1., when the date of the map creation was unknown, the content and the source documentation associated with the map were analyzed. In the case of difficulties in determination of the exact date, a wider time range was provided.

4. Preparation of coherent map descriptions.

The variations in the content, method of creation, and authorship of the maps posed difficulties in their uniform characterization. The <dc: description> element is an important part of metadata used for determination of the suitability of the map for further use.

5. Determination of the typology of the maps.

In terms of the method of creation, content, and purpose, the historical cartographic sources fit into several typological classes. During the creation of the metadata, another division was adopted according to the method of creation (a handwritten map, a printed map, a handwritten map with additional annotations, a printed map with handwritten annotations) and the

content (social, economic, general, political, administrative maps).

6. Preparation of the keywords.

The name and object keywords were prepared with the use of the Virtual International Authority File (n.d.) database. In the case of the geographic keywords, a catalog of keywords defining in detail the spatial scope of the data was designed.

6. Summary

The created metadata fulfill two tasks. Primarily, they are an element of the map service infrastructure facilitating not only the search for resources based on localization but also exploration and analysis of data (Kuźma & Bauer, 2020). Secondly, the identification information is part of a critical overview of sources (see fig. 7). The descriptive and spatial metadata elements are the outcome of the ongoing research project aimed at critical analysis and dissemination of unique and dispersed cartographic sources associated with the Paris

Peace Conference. The maps were important during the negotiations of borders as a means of conveying ideas and a tool for persuasion and mnemonics based on visual associations. The preparation of the maps indicates that the time and the strong need to convey the idea in a clear way were the main determinants of their final cartographic form. The available resource is dominated by linguistic, nationality, and religion maps as well as maps of proposed borders (Konopska & Barwiński, 2019).

The creation of metadata is the most time-consuming stage of dissemination of digital copies of sources, as it is necessary to describe the resource appropriately to help the reader to find the information of interest. This process requires not only selection of an appropriate scheme of storing data but also correct complementation of data.

The database of the digital copies of the historical cartographic sources was created based on the Dublin Core (n.d.) standard as the input metadata structure due to the possibility of modification of the content scope. After the design of the initial structure (assuming modifications associated with the development nature of the project), a procedure for metadata creation was proposed. Taking into account the specificity and diversity of the sources, this task required the involvement of an interdisciplinary team of researchers in the field of cartography, socio-economic geogra-

phy, political and economic history, and geoinformatics. The difficulties in identification of the authors of the maps, the map scales, the links between the sources, and the development of consistent and complete descriptions of the maps were diagnosed as the main problems.

Dissemination of the metadata-enriched sources in open access will be a starting point for further interdisciplinary research on the political thought at the turn of the 19th and 20th centuries and the Polish thought in the 20th century. It will especially support research on geopolitical concepts, socio-economic history, ethnography, historical geography, and social anthropology. The detailed descriptions of the maps and their links with other sources, which distinguishes the proposed database of digital source copies, will provide data for not only scientists but also a wide audience.

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Literature

- Allen, D.Y. (2001). Using the Dublin Core with CORC to Catalog Digital Images of Maps. *Journal of Internet Cataloging*, 4(1-2), 163-176. https://doi.org/10.1300/J141v04n01_15
- Baranowski, M., Bielecka, E., Gotlib, D., Pachót, P. & Soczewski, P. (2008). *Wytyczne techniczne. Zasady tworzenia metadanych w zakresie geoinformacji. Wersja 1.03*.
- Biblioteka Narodowa, (n.d.). *Przepisy Katalogowania. Mapy*. Retrieved 7 November 2021, from <https://przepisy.bn.org.pl/przepisy-katalogowania/mapy#mapy>
- Bidney, M. (2010). Can Geographic Coordinates in the Catalog Record Be Useful? *Journal of Map & Geography Libraries*, 6(2), 140-150. <https://doi.org/10.1080/15420353.2010.492304>
- Bomba, R. (2013). Narzędzia cyfrowe jako wyznacznik nowego paradygmatu badań humanistycznych. In A. Radomski & R. Bomba (Eds.), *Zwrot cyfrowy w humanistyce* (pp. 57-71). E-naukowiec.
- Brahaj, A., Razum, M. & Hoxha, J. (2013). Defining Digital Library. In T. Aalberg, C. Papatheodorou, M. Dobрева, G. Tsakonas & J. Farrugia (Eds.), *Research and Advanced Technology for Digital Libraries. TPDL 2013. Lecture Notes in Computer Science*, 8092. Springer. https://doi.org/10.1007/978-3-642-40501-3_3
- Carpó, M. (2017). *The Second Digital Turn. Design Beyond Intelligence*. The MIT Press.
- Chan, L.M. & Zeng, M.L. (2006). Metadata Interoperability and Standardization – A Study of Methodology, Part I. *D-Lib Magazine*, 12(6). <https://doi.org/10.1045/june2006-chan>
- Cyfrizacja KPRM, (2020). *Standard metadanych dla Systemu KRONiK@*. Retrieved 16 November 2021,

- from <https://www.gov.pl/web/cyfrzacja/standard-metadanych-dla-systemu-kronik>
- David Rumsey Collection, (n.d.). Retrieved 16 November 2021, from <https://www.davidrumsey.com>
- Dublin Core, (n.d.). Retrieved 16 November 2021, from <http://dublincore.org>
- EUR-Lex, (2008). *Rozporządzenie Komisji (WE) NR 1205/2008 z dnia 3 grudnia 2008 r. w sprawie wykonania dyrektywy 2007/2/WE Parlamentu Europejskiego i Rady w zakresie metadanych*. Retrieved 16 November 2021, from <https://eur-lex.europa.eu/legal-content/PL/TXT/HTML/?uri=CELEX:32008R1205&from=ES>
- Europeana Collections, (n.d.). Retrieved 7 December 2021, from <https://www.europeana.eu/pl>
- Federacja Bibliotek Cyfrowych, (2016). Retrieved 8 November 2021, from <https://fbc.pionier.net.pl/pro/tworzyc-repozytoria-cyfrowe/opisywanie-obiektow-cyfrowych>
- Filipek, A. (2006). Dublin Core, czyli metadane w nowej formie. *Zagadnienia Informacji Naukowej*, (2), 50-58.
- Goodchild, M.F. & Janelle D.G. (2010). Toward critical spatial thinking in the social sciences and humanities. *GeoJournal*, 75(1), 3-13. <https://doi.org/10.1007/s10708-010-9340-3>
- Gregory, I.N. & Healey, R.G. (2007). Historical GIS: Structuring, mapping and analysing geographies of the past. *Progress in Human Geography*, 31(5), 638-653. <https://doi.org/10.1177/0309132507081495>
- Harvard Geospatial Library, (n.d.). Retrieved 18 November 2021, from <https://library.harvard.edu>
- International Organization for Standardization. (2014). *Geographic information — Metadata — Part 1: Fundamentals (ISO Standard No. ISO 19115-1:2014)*. Retrieved 5 December 2021, from <https://www.iso.org/standard/53798.html>
- Jones, R. (2011). *Keyword intelligence: Keyword research for search, social and beyond*. Sybex.
- Józef Piłsudski Institute of America, (n.d.). Retrieved 18 November 2021, from <https://www.pilsudski.org>
- Konopska, B. & Barwiński, M. (2019). *Przegląd odnalezionych źródeł kartograficznych i tekstowych. Część pierwsza – mapy Polski* [Paper presentation]. Kształtowanie granic niepodległej Polski w świetle dokumentów kartograficznych – problemy metodyczne korzystania z historycznych źródeł kartograficznych i tekstowych, Warsaw.
- Konopska, B. (2016). The cartographic materials auxiliary in the determination of the borders of Poland during the Paris Peace Conference (1919–1920) in the light of archival records. *Polish Cartographical Review*, 48(2), 67-75. <https://doi.org/10.1515/pcr-2016-0006>
- Kuźma, M. & Bauer, H. (2020). Map Metadata: the Basis of the Retrieval System of Digital Collections. *ISPRS International Journal of Geo-Information*, 9(7), 444. <https://doi.org/10.3390/ijgi9070444>
- Kuźma, M. & Mościcka, A. (2020). Evaluation of metadata describing topographic maps in a National Library. *Heritage Science*, 8(113), 1-16. <https://doi.org/10.1186/s40494-020-00455-3>
- Kuźma, M. (2020). The use of GIS tools in the automation of examining the cartometry of old maps. *Polish Cartographical Review*, 52(4), 152-161. <https://doi.org/10.2478/pcr-2020-0013>
- Library of Congress, (n.d.). *MARC Standards Office. MARC21 Standards*. Retrieved 7 December 2021, from <https://www.loc.gov/marc/>
- Linked Data, (2015). Retrieved 10 November 2021, from <https://www.w3.org/standards/semanticweb/data>
- McGee, M., Durante, K. & Weimer, K.H. (2017). Toward a Linked Data Model for Describing Cartographic Resources. *Journal of Map & Geography Libraries*, 13(1), 133-144. <https://doi.org/10.1080/15420353.2017.1308291>
- Mościcka, A. & Ziwirowicz-Rutkowska, A. (2020). Description of old maps in the Europeana Data Model. *Journal of Cultural Heritage*, 45, 315-326. <https://doi.org/10.1016/j.culher.2020.05.009>
- Mościcka, A. & Ziwirowicz-Rutkowska, A. (2018). On the use of geographic information in humanities research infrastructure: A case study on cultural heritage. *ISPRS International Journal of Geo-Information*, 7(3), 106. <https://doi.org/10.3390/ijgi7030106>
- Old Maps Online, (n.d.). Retrieved 10 November 2020, from <https://www.oldmapsonline.org/>
- Open Education Database, (2021). Retrieved 10 November 2021, from <https://oedb.org>
- Polona, (n.d.). Retrieved 10 November 2020, from <https://polona.pl>
- Registry of Open Access Repositories, (n.d.). Retrieved 10 November 2021, from <http://roar.eprints.org>
- Roszkowski, M. (2010). *Linked Data – model danych powiązanych w Semantic Web*. *Zagadnienia Informacji Naukowej*, (2), 52-68.
- Shepard, E. (2014). A Digital Collection Collaboration in an Academic Repository: A Case Study. *Journal of Archival Organization*, 11(3-4), 205-220. <https://doi.org/10.1080/15332748.2013.948739>
- USGS Historical Topographic Map Explorer, (n.d.). Retrieved 8 December 2021, from <https://livingatlas.arcgis.com/topoexplorer/>
- Virtual International Authority File, (n.d.). Retrieved 5 December 2021, from <http://viaf.org>
- Yoose, B. & Perkins, J. (2013). The Linked Open Data Landscape in Libraries and Beyond. *Journal of Library Metadata*, 13(2-3), 197-211. <https://doi.org/10.1080/19386389.2013.826075>
- Youngblood, D. (2006). Map use across the disciplines. *Journal of Map and Geography Libraries*, 2(2), 33-66. https://doi.org/10.1300/J230v02n02_04
- Ziwirowicz-Rutkowska, A. & Mościcka, A. (2015). Standaryzacja w obszarze dziedzictwa kulturowego – przegląd wybranych podstaw metodycznych. *Roczniki Geomatyki*, 13(3,69), 277-287.