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## **Introduction: Maps in Libraries. Trends in Enabling Spatial Information Retrieval**

*Keywords:* map collection, map cataloguing, subject indexing, authority files, georeferencing, Leibniz Institute for East and Southeast European Studies, library, GeoPortOst.

*Summary:* This paper describes the development of a geoportal of ‘hidden’ thematic maps. Particular importance is attached to the production of high-quality metadata for maps. Based on the experiences of the library of the Leibniz Institute for East and Southeast European Studies (IOS) in constructing the GeoPortOst portal, the workshop *Maps in Libraries* was conducted in March 2019 at the IOS. In its context, the papers, published in this and the following e-Perimtron issue, were presented.

### **The Birth of a Geoportal: From Bibliographic Control to Spatial Browsing**

In 1952, the library of a German research institute started indexing special material for its catalogue. At the beginning of the Cold War, the Eastern European Institute (Osteuropa-Institut, OEI)<sup>1</sup> in Munich operated as an institution, which played an important role in observing activities behind the Iron Curtain. For this purpose, the OEI set itself the target to collect all information about East European countries. Besides monographs, journals and newspapers, the library was seeking to supply the researchers with additional material like “hidden” components from these media. Among this material were so-called hidden maps, which were printed in books or journals and were not edited as independent items. They were indexed in a special catalogue to support the research of the scientific community.

In 2013, this catalogue was the starting point of a project idea, created at the Leibniz Institute for East and Southeast European Studies (IOS) in Regensburg. The IOS, the successor institution of the OEI, runs a library that counts 340,000 independent media items, searchable in an online catalogue. The lack of electronic records of hidden material has led to the desire for retro-conversion of the special catalogues. So the IOS applied for funding the retro-conversion of the hidden maps catalogue from the German Research Foundation (DFG). As the prospect of a successful application for a pure conversation was extremely low, the project design included the digitisation of the copyright-free maps including their georeferencing. The latter generated geographical data of the maps.

With the approval by the DFG, the project GeoPortOst (Tegeler 2016) started in 2014. In its course it became obvious that thematic maps make up the majority of the digital map collection. Thematic maps often refer to a context to be found outside the map (Bauer 2018) and require recourse to media and discourses outside the map image in order to decode it (Renz 2014), they are marked by their significance as an argument for the narrative in which they are embedded. So for

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<sup>1</sup> For the history of the OEI, see <https://www.ios-regensburg.de/en/institute/history/the-history-of-the-eastern-european-institute-in-munich-and-regensburg-oei.html>

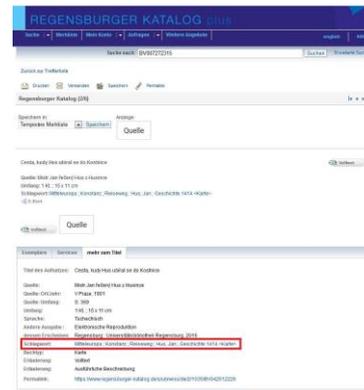
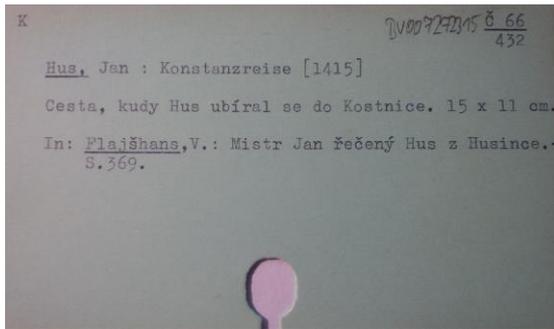
the second phase of the project, it was decided to implement an annotation tool that enables the linking of the text or the data, on which a map is based – and thereby open the ‘black box of the cartographer’ (Harley 1989). After the end of funding, the IOS provides a geoportal that offers a geographical and a verbal search of 3,000 digital maps. Moreover, browsing by facets like collection, map type, place, or subject is possible. Now, the metadata and images are downloadable; the maps can be opened in different viewers; and the data can be exported in a GeoTIFF format.

*Doing the Meta-Step Right: How to Describe Maps in Library Catalogues*

The road to this result – an intuitive retrieval and analysis instrument for thematic maps – was marked from the beginning of the project by consistent development of its metadata. As information objects with specific geographical components, maps also make ‘specific’ demands on their description. However, we have to note that in libraries the classical system of reference, the catalogue, has deficits and often does not represent this ‘specific’ character. Verbal indexing dominates the methods of bibliographic control and this is not sufficient to provide orientation in the map world (Šolar 2016). The indexing in the librarian framework RDA initially makes use of the bibliographic information contained in the medium (in the formal cataloguing, for example, title, author, year of publication, scale, etc.). In general, however, RDA also provides the recording of coordinates as centre coordinates, boundary coordinates or polygons (Andrew, Moore & Larsgaard 2015). But in practice the recommendation to determine coordinates for cartographic resources requires effort and seems not to be implemented comprehensively. An example of this may be that the catalogue data field 034 of the internal MAB format, which is designated for coordinates, till now is not actively used in the Bavarian Library Network. When describing maps using title data, there are considerable ambiguities. Map titles are often not very meaningful. Single sheets of map series are partly only numbered consecutively or provided with names of the main places, in the case of older title entries only the higher-level map series is recorded (Scheven 2016). In addition, place names change in the course of time or are given different names in different languages, and toponyms given in the title do not cover the entire space covered by the map. All the more importance is attached in the catalogue to subject indexing using notations and authority files. Authority files for geographic entities (such as the Integrated Authority File of the German National Library – GND)<sup>2</sup> not only contain name variants and other-language labels, they also refer to parent geographical entities. They increasingly rely on the acquisition of coordinates, which can support the search in space, and thus move functionally strongly towards fully developed gazetteers. Since authority files are made available as Linked Open Data and also play an important role in Wikipedia or Wikidata, for example, in unambiguously linking information, they open a window far beyond the catalogue. A window that could be further extended by the indexer proposing new geographic entities for authority files when indexing maps – and uses them as a kind of reverse-gazetteer.

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<sup>2</sup> [https://www.dnb.de/EN/Professionell/Standardisierung/GND/gnd\\_node.html](https://www.dnb.de/EN/Professionell/Standardisierung/GND/gnd_node.html)



Geogr. Koord.	934	—	A	899	<ul style="list-style-type: none"> <li>d 8.59072851560351</li> <li>e 14.7881373433528</li> <li>f 30.16167881372827</li> <li>g 47.5117287105825</li> <li>v Georeferenzierung</li> </ul>
Sprachcode	037	b	a	C28	
Materialcode	050	—	a	a	
Code Monogr.R.	051	—	a		
Inhaltstyp	056	—	c	cri	
Medientyp	061	—	b	n	
Datenträgertyp	062	—	b	ab	
Ang. Inhalt	064	a	—	Karte	
ID Bearb. Inst.	070	b	a	DE-He13	
Anwendercodes	078	a	—	digit	
Anwendercodes	078	q	a	IOSVK	
Stufe	080	—	a	05	
Haupttitel	331	—	a	Cesta, kudy Hus ubiral se do Kostnice	
Umfang	433	—	a	1 Kt. ; 15 x 11 cm	
Standard.	580	a	—	IOS-V808252	
Titel d. Quelle	590	—	a	Mistr Jan fečený Hus z Husince	
Ort Quelle	594	—	a	V Praze	
Jahr Quelle	595	—	a	1901	
Fundstelle zung	596	—	a	S. 349	
Stand.nr. Quelle	599	—	a	BV08722215	
Repr.versuch	649	d	—	Elektronische Reproduktion	
				Regensburg	
				Universitätsbibliothek Regensburg	
				2016	
URL (o.ä.)	655	e	—	urn:nbn:de:hbz:355-ubr16048-0390-8	
				https://nbn-resolving.org/urn:nbn:de:hbz:355-ubr16048-0390-8	
				Resolving-System	
				kostenfrei	
				Volltext	
URL (o.ä.)	655	e	—	http://geoportost.ios-regensburg.de/map/BV042512226	
				Digitalisierung	
				kostenfrei	
				Anschließliche Beschreibung	
				1	
Eng. Bemerkung	659	—	a	kostenfrei	
Notation	700	a	—	6-die 8-ge 2:24	
DDC	705	a	c	900	
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				43	
SW/Knoten	710	—	a	Hus, Jan : Konstanzreise [1415]	
Schlagwort 1	902	—	g	Mittelalter	
				(DE-588)4039677-0	
Schlagwort 1	902	—	g	Konstanz	
				(DE-588)4032215-4	
Schlagwort 1	902	—	g	Reiseweg	
				(DE-588)4233933-9	
Schlagwort 1	902	—	p	Hus, Jan	
				1369-1415	
				(DE-588)118554948	
Schlagwort 1	902	—	z	Geschichte 1414	
				f Karte	

Figure 1: Three stages of map metadata: index card, OPAC with linked subject headings, cataloguing system with (hidden) coordinates.

### Completing Map Metadata via Georeferencing

Quality of metadata is defined by three criteria: accuracy, consistency and completeness (Kužma & Mosicka 2018). In order to represent the records of the documents in GeoPortOst comprehensively, they had to be supplemented by their specific geographical component, by coordinates. Coordinates can be used in bibliographic records to compensate for the deficit of verbal indexing. It is no longer the linguistically variable concept of place that is referenced, but geographical space as a physical constant. This also significantly increases the accessibility and searchability of map or geographical collections (Bidney 2010). For this purpose a geo application for georeferencing was implemented.<sup>3</sup> Georeferencing has become part of the standard repertoire for the organisation of digital map collections. The georeferencer from Klokan Technologies<sup>4</sup> was chosen, which has proven itself as a web tool especially for libraries and – from London to Leiden and Darmstadt to Brno – has been used by numerous institutions (Storms 2017, Christoph et al. 2016, Kowal & Přidal 2012). The convincing advantage of the Georeferencer is based on its intuitive operation, which, understandable for laymen, is designed for crowdsourcing. The concept of

<sup>3</sup> <http://geoportost.ios-regensburg.de/georeferencer/>

<sup>4</sup> <http://www.georeferencer.com/>

crowd or community sourcing is to split the processing of large amounts of data into manageable work steps that can be handled by volunteers (Macdonald & Osborne 2013). More than 40 volunteers participated in the georeferencing worldwide after a call in social media and processed almost all 3,028 cards in a period of two and a half months until August 2018 (distributed over two project phases), setting more than 60,000 control points. The contribution of the volunteers was spread out roughly according to a Pareto distribution: a few super-contributors with 2,000 up to 30,000 control points are faced with many occasional users.



Figure 2: Compare and combine features of the georeferencer: georeferenced maps from the directory *Ves' Peterburg* 1910, <https://nbn-resolving.org/urn:nbn:de:bvb:355-ubr16557-7>.

### *Indexing + Georeferencing = Datafication*

Of course, the results from the georeferencing should hardly satisfy strict geographical criteria (see Crom 2019 in this issue): the handling of different projections, scales, but also the authenticity of the map material proves to be difficult (Fleet 2008). Nevertheless, the library benefits from the bounding box coordinates, which can be downloaded in MARC21 format for ingest into the catalogue and serve as the basis for cross-collection discovery systems with geographical search features, while the user benefits from data for free re-use in formats such as GeoTIFF, WMTS for geo information systems (ArcGIS, QGIS) or JSON. In order to finally merge the complex relationships between formal description (provenance, map image), content (authority files) and geographical framework (coordinates), a geodata portal was set up for GeoPortOst as a central aggregator, which is realised with the open source system GeoBlacklight<sup>5</sup> (in detail Hardy & Durante 2014). Geospatial data portals solve the critical points in the search for geographic resources by using interactive areal search interfaces and a data management that is able to manage different geographic documents – from raster images to vector data to geographically tagged text (Müller & Schmunk 2019). The geodata portal is not a closed container, but can be connected to existing services such as the library catalogue or other (meta)data collections. Thus GeoPortOst takes the decisive step from a static map collection to an interface for geoinformation (cf. Stäcker 2019). Using GeoPortOst as an interface, cartographic documents can not only be viewed, they can be linked with post-processing (e.g. from GIS applications), with contexts from their source works and enhanced using external tools (e.g. an annotation tool<sup>6</sup>). This development is based on high-quality metadata. The top layer of viewers, tools and interactive applications may change rapidly with new techniques and new user expectations. The metadata, on the other hand, as long as they were created in interoperable formats and as Linked Open Data, remain re-usable.

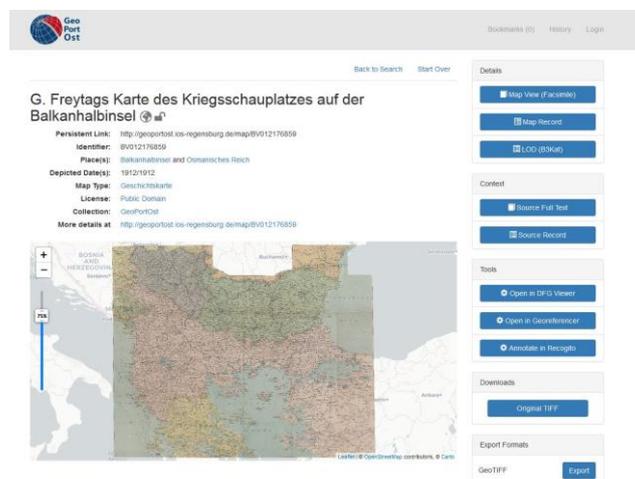


Figure 3: The fully developed GeoPortOst geoportal. Overlay of *G. Freytags Karte des Kriegsschauplatzes auf der Balkanhalbinsel*, 1912, <http://geoportal.ios-regensburg.de/catalog/BV012176859>.

### **Networking with Maps in Libraries**

What has started with a classical librarian's work – the description of bibliographical units – led to an infrastructure that provides digital maps for researchers and the interested public. This shows

<sup>5</sup> <https://geoblacklight.org/>

<sup>6</sup> <https://recogito.pelagios.org/>, <http://annotation.ios-regensburg.de/>

that map collection of libraries not necessarily contain only independent maps or map series, but also smaller units like hidden maps. Furthermore, in libraries the metadata of maps go beyond verbal indexing; today, users expected a geographical search. So, the framework for libraries, which hold maps, has changed in the past years. Like libraries in general, map collections have to compete with the internet and the customs of users in the digital age. For these reasons, the IOS library has conducted a workshop within the GeoPortOst project to discuss the requirements for maps in libraries.

On the workshop contributors from all over Europe and North America presented their papers.<sup>7</sup> Besides librarians, digital humanities researchers dealing with maps applied for participation. This enabled the organisers to compile a program that entangled the needs of researchers with the requirements of map libraries.

In this and the following issue of e-perimtron a selection of contributions to the workshop will be published. These range in this issue ('Linking Maps to Geospace: georeferencing and semantic annotation') from the fundamental reflection of the evaluation of georeferenced collections (Crom) to overview presentations of the transformation of map libraries by georeferencing (Fleet, Van Egmond) to innovative tools for increasing the information value of maps by annotation (Simon et al.).

In the upcoming e-perimtron, entitled 'Libraries, Collections, Archives: processing and use of their contents', the practice of creating metadata for maps at Polish libraries, the British Library and the Russian Presidential Library, but also in the archive sector, will be discussed. Finally, a case study from the analysis of hand-drawn old maps from Russia opens a view of the need for maps from the perspective of research.

The diversity of themes and challenges addressed in these two issues reflects the common concern to be able to reference, organise and share maps across institutional and national borders. Thus, the exchange of infrastructure institutions is just as essential as the active contact to user communities from the academia and the interested public.

## References

Andrew, P. G., S. M. Moore and M. L. Larsgaard (2015). *RDA and Cartographic Resources*. London: Facet publ.

Bauer, H. (2018). Karte mit Kontext. Erschließung und Verortung thematischer Karten im Portal GeoPortOst. *Zeitschrift für Bibliothekswesen und Bibliographie* 65 (5-6): 300-307. In digital form, <https://doi.org/10.3196/1864295018655671>.

Bidney, M. (2010). Can Geographic Coordinates in the Catalog Record Be Useful? *Journal of Map and Geography Libraries* 6: 140-150. In digital form, <https://doi.org/10.1080/15420353.2010.492304>.

Christoph, A. et al. (2016). Digitalisierung-Verortung-Recherche. Neue Perspektiven für historische Karten. *Kartographische Nachrichten* 3: 115-122.

Fleet, Ch. (2008). Putting old maps in their place? Practicalities of geo-referencing and delivering historical maps online. In digital form, [http://help.oldmapsonline.org/georeference/2008\\_BCS\\_Fleet.doc?attredirects=0](http://help.oldmapsonline.org/georeference/2008_BCS_Fleet.doc?attredirects=0).

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<sup>7</sup> <http://geoportost.ios-regensburg.de/mapsinlibraries2019/>

- Hardy, D. and K. Durante (2014). A Metadata Schema for Geospatial Resource Discovery Use Cases. *The Code4Lib Journal* 25. In digital form, <http://journal.code4lib.org/articles/9710>.
- Harley, J. B. (1989). Deconstructing the Map. *Cartographica: The International Journal for Geographic Information and Geovisualization* 26 (2): 1-20.
- Kowal, K. and P. Přidal (2012). Online Georeferencing for Libraries: The British Library Implementation of Georeferencer for Spatial Metadata Enhancement and Public Engagement. *Journal of Map and Geography Libraries* 8 (3): 276-289. In digital form, <https://doi.org/10.1080/15420353.2012.700914>.
- Kuźma, M. and A. Mosicka (2018). Evaluation of the accessibility of archival cartographic documents in digital libraries. *The Electronic Library* 36 (6): 1062-1081. In digital form, <https://doi.org/10.1108/EL-06-2017-0130>.
- Macdonald, S. and N. Osborne (2013). AddressingHistory - Crowdsourcing a Nation's Past. *Journal of Map and Geography Libraries* 9 (1-2): 194-214. In digital form, <https://doi.org/10.1080/15420353.2013.768191>.
- Müller, F. and St. Schmunk (2019). Bedeutung und Potenzial von Geoinformationen und deren Anwendungen im Kontext von Bibliotheken und digitalen Sammlungen. *Bibliothek Forschung und Praxis* 43 (1): 21–34. In digital form, <https://doi.org/10.1515/bfp-2018-0049>.
- Renz, M. (2014). *Kartierte Kolonialgeschichte. Der Kolonialismus in raumbezogenen Medien historischen Lernens - ein Vergleich aktueller europäischer Geschichtsatlantiken*. Göttingen: Vandenhoeck & Ruprecht.
- Scheven, E. (2016). Geografische Koordinaten und Bibliotheksdaten - Regelwerke und Anwendungen. *Dialog mit Bibliotheken* 28 (1): 30-38. In digital form, <https://d-nb.info/1118655923/34>.
- Šolar, R. (2016). Map Libraries - Challenges for the future. *e-perimetron* 11 (2): 90-98. In digital form, [http://www.e-perimetron.org/Vol\\_11\\_2/Solar.pdf](http://www.e-perimetron.org/Vol_11_2/Solar.pdf).
- Stäcker, Th. (2019). Die Sammlung ist tot, es lebe die Sammlung! Die digitale Sammlung als Paradigma moderner Bibliotheksarbeit. *Bibliothek Forschung und Praxis* 43 (2): 304–310. In digital form, <https://doi.org/10.1515/bfp-2019-2066>.
- Storms, M. (2017). Maps in the crowd: results of a map georeferencing crowdsourcing pilot project. *e-perimetron* 12 (3): 109-118. In digital form, [http://www.e-perimetron.org/Vol\\_12\\_3/Storms.pdf](http://www.e-perimetron.org/Vol_12_3/Storms.pdf).
- Tegeler, T. (2016). Discovering Hidden Maps: Cartographic Representations as Arguments for Historical Narratives. In M. Altić, I. J. Demhardt and S. Vervust (eds.), *Dissemination of Cartographic Knowledge. 6th International Symposium of the ICA Commission on the History of Cartography, 2016*. Cham: Springer. In digital form, [https://doi.org/10.1007/978-3-319-61515-8\\_18](https://doi.org/10.1007/978-3-319-61515-8_18).