


Spatial Humanities

Book of Abstracts

International Conference
25.–27. September 2024
Universität Bamberg

This PDF compiles the abstracts of all talks and posters presented at the Spatial Humanities Conference in Bamberg,

For further information see
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 UrbanMetaMapping


Centre for Heritage
Conservation Studies
and Technologies



Spatial Humanities 2024

Book of Conference Abstracts

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Introduction

Dear Researchers,

We were happy to host the [Spatial Humanities 2024](#) in Bamberg with more than one hundred participants from 26 countries. A big thank you to all who contributed with presentations, posters, with reviewing proposals or chairing sessions, to the Spatial Humanities Executive Committee and to all the helpers during the conference.

The conference covered classic spatial humanities topics such as gazetteers and georeferencing, open spatial data, demography and historical GIS approaches, deep mapping, and network analysis. As a result of the special focus on heritage studies, several sessions dealt with urban heritage, the urban environment, deep mapping for heritage and culture, and mapping sensory experiences.

This book of abstracts compiles the (extended) abstracts of all presentations and posters that were presented at the conference. The talks are grouped by session title as you can see in the [table of contents](#).

Klaus Stein, Anastasia Bauch, Carmen M. Enss

Please note that this collection presents the abstracts as is (including formatting). If no updated version was provided the original version submitted for review was used.

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Call for Papers

This is the Call for Papers for the conference, issued in December 2023.

Spatial Humanities 2024 welcomes submissions on all aspects of using geospatial technologies in humanities research, methodological innovations, and applied research that develops our understanding of the geographies of the past. We welcome contributions from anyone working on computational approaches to spatial questions in the humanities and arts. These disciplines include, but are not limited to, history (including fields from social history such as historical demography and environmental history), archaeology, heritage and conservation studies, literary studies, classics, linguistics, art history, anthropology and religious studies, as well as from interdisciplinary and/or technical fields including GIS, digital humanities, computational linguistics and computer science. Abstracts should be between 750–1000 words for full papers and 500–750 words for posters.

This year the conference will take place in Bamberg, Germany, a UNESCO World Heritage Site. Accordingly, the conference will feature a special session with a focus on *Spatial Humanities and Heritage*. Heritage has spatial dimensions and heritage processes are linked to place: architecture and urban conservation, the listing of historic buildings, sites, cultural landscapes or heritage districts. Maps of heritage ‘assets’ and archaeological sites shape the way we perceive and understand places, as well as their cultural identity. How can these be studied to reveal cultural boundaries and exclusivity in heritage discourses? How can innovative multi-layered maps show alternative and diverse aspects of heritage?

We are delighted to announce that this year’s keynote speakers will be Francesca Ammon (University of Pennsylvania) and Ross Purves (University of Zurich).

Themes

Proposals are welcomed on, but not limited to, the following themes:

- Gazetteers, e.g. urban, regional, national and international
- Artificial intelligence, e.g. computer vision, NLP, deep learning, etc.
- Spatial explorations of narratives, literary and imaginary places
- GIS and spatial analysis including 3D modeling and spatial statistics
- Deep mapping, experiences of places
- Territorial representations, transgressions, subalternity and boundaries
- Mapping mobility, spatial connections and networks
- Linking the map and the text: mixed-method approaches
- Geospatial ‘collections as data’, enrichment and annotation
- Historical maps and georeferencing
- Environmental humanities: landscapes, waterscapes and the blue humanities

-
- Linked Open (Geo)Data
 - IIF applications for maps and spatial data
 - Labs notebooks, workflows and infrastructure
 - Data mining, visualisation and the challenges of geolocation
 - Building, mapping and spatially analysing heritage inventories

1 Keynotes

1.1 Approaching landscape through language

Ross Purves

The importance of understanding diverse ways of valuing “natural” landscapes has been thrown into sharp focus by the development of new typologies of nature’s values (Pascual et al. 2023). Despite the acknowledged importance of diverse values, little work has explored these issues through the explicit lens of language. In my talk I will set out a series of different conceptual models through which landscape can be explored, including framings such as Landscape Character Assessment, Cultural Ecosystem Services and Nature’s Contribution’s to People. I will explore different ways in which language can be used to explore elements of these conceptualisations, presenting the results of both corpus-based and empirical studies in a range of European languages and settings. Using these studies and framings I will discuss the strengths and weaknesses of different methodological approaches to operationalising landscape values, and link these to work in spatial humanities.

1.2 Telling Histories of Neighborhood Change via Historic Preservation

Francesca Ammon

By 1965, nearly 800 American cities sought to spur revitalization through the federal policy of urban renewal. Typically this took the form of large-scale demolition, destroying countless buildings and displacing over a million residents and 100,000 businesses in the process. The city of Philadelphia, Pennsylvania, was at the forefront of a more conservationist approach to renewal that incorporated rehabilitation and restoration as well. In its landmark Society Hill project, for example, the city married relatively selective clearance with the restoration of existing colonial-era rowhouses and the in-fill construction of new, contemporary designs. As in the case of clearance, however, these planning and preservation interventions of the 1950s–70s still dramatically transformed both the physical and social character of the built environment. In the process, they also helped define the myriad meanings of preservation itself. This talk will examine the urban renewal process in a series of site-based examples throughout the Society Hill neighborhood. The medium for this examination will be Preserving Society Hill (<https://preservingsocietyhill.org>), an ongoing public history project that leverages the data aggregation, organization, and mapping capacities of the digital humanities to illuminate the stories of individual residents and properties.

2 Talks

Spatial Humanities 2024
Bamberg University, Germany, 25th–27th Sept 2024

Title (Paper Type):

The Geography of Emotions in the Holocaust Survivor's Testimonies (Full Paper)

Authors and Affiliations:

Ignatius Ezeani¹, Tim Cole², Zephyr Frank³, Ian Gregory⁴, Paul Rayson¹ and Erik Steiner³

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Abstract:

In World War 2, the Nazi regime systematically persecuted and murdered millions of Jews and other targeted groups – an event commonly referred to as the Holocaust. While a previous literature has explored what – drawing on Agnew and Duncan – the locations and locales of the Holocaust, less has been written on sense of place.¹ One key source for understanding victims' sense of place are post-war interviews with survivors. These provide valuable sources of historical and cultural knowledge, as well as emotional and psychological insight into the human condition under extreme circumstances. Of particular interest to us, given the focus on sense of place, survivors' narratives contain references to the emotions experienced when describing memories of people, places, and events.

One aspect that can be explored in Holocaust survivors' testimonies is the spatial and temporal dimensions of the emotions expressed about people, places, and events, otherwise known as the geography of emotion. As Guy Miron² signals in the case of German Jews, individuals experienced Nazi spatial control "both as a feeling and as a physical reality". Just as spatial experiences had an emotional dimension, so too did emotions have a spatiality or geography. Emotional geography³ is a concept that helps us understand how people feel about and react to, their environment, and how their environment influences their identity and memory. It also allows us to examine the interplay of different emotional experiences, e.g. *fear, anger, surprise, sadness, disgust*, and even *joy* which were originally proposed by Ekman and Friesen⁴. We hypothesise that the analysis of these combinations of emotions expressed by multiple individuals at different places and times and in different situations during the Holocaust provide a much richer understanding of the geography and physicality of these emotions.

With this work, we aim at developing a computational framework for understanding the emotional landscapes of a textual narrative in a more nuanced form beyond the classification into positive and negative sentiments. We applied our method to a sample of Holocaust survivors' testimonies with a focus on Ekman and Friesen's 6 emotion classes⁴. We approached this study by posing the following fundamental research questions:

¹ J. Agnew & J. Duncan (eds.), *The Power of Place: Bringing Together Geographical and Sociological Imaginations*. Boston: Unwin Hayman, 1989. On the nascent literature on Holocaust geographies see in particular A.K. Knowles, T. Cole & A. Giordano (eds.), *Geographies of the Holocaust*. Bloomington: Indiana University Press, 2014.

² G. Miron, "Lately, Almost Constantly, Everything Seems Small to Me": The Lived Space of German Jews under the Nazi Regime, *Jewish Social Studies: History, Culture, Society* 20 (2013) 121–149.

³ J. Davidson, C. Milligan, *Embodying Emotion Sensing Space: Introducing Emotional Geographies*, *Social & Cultural Geography* 5 (2004) 523–532.

⁴ Ekman, P. & Friesen, W. V. Constants across cultures in the face and emotion., *Journal of Personality and Social Psychology* 17 (1971) 124.

- Can we use natural language processing techniques - possibly leveraging large language models - to effectively extract and analyse expressions of emotions in Holocaust testimonies?
- If so, how can we quantitatively and qualitatively represent the interplay of different emotions in a survivor's testimony?
- How does the expression of each of the emotions change across the narrative sequence of each testimony?
- Do different spatio-temporal elements (toponyms, geographical features, events, date and time etc.) particularly relate or interact with specific emotions in any way?

For this work, we will adapt an extraction pipeline that is a version of the framework originally proposed by Ezeani *et al.*^{5,6} for extracting place names, geographical feature nouns from text through named entity recognition for the Lake District corpora in the United Kingdom. The framework includes processes for fine-tuning an off-the-shelf named-entity recogniser. The fine-tuned model is subsequently applied to similar texts to perform surface-level extraction of spatial elements and even sentiment-bearing words for basic sentiment analysis. This pipeline will be improved by leveraging large language models for the emotion classification as well as modifications appropriate to Holocaust testimonies.

⁵ I. Ezeani, P. Rayson, I. Gregory, E. Haris, A. Cohn, J. Stell, T. Cole, J. Taylor, D. Bodenhamer, N. Devadasan, et al., Towards an extensible framework for understanding spatial narratives, in: Proceedings of the 7th ACM SIGSPATIAL International Workshop on Geospatial Humanities, 2023, pp. 1–10

⁶ I. Ezeani, P. Rayson, I. N. Gregory, Extracting imprecise geographical and temporal references from journey narratives., in: Text2Story@ ECIR, 2023, pp. 113–118.

2.2 Elevating public voice in heritage discourse through the integration of public engagement and deep mapping methodologies

James Aron Juip

A large body of scholarship in the spatial humanities and social sciences has illustrated the many benefits of engaging public stakeholders in mapping projects. An aim of many public participatory mapping projects is the integration of quantitative data of 'official' sources with community values and perceptions (Fagerholm et al. 2021; Kahila-Tani et al. 2016; Kahila-Tani, Kytta, and Geertman 2019). Public participatory projects have been shown to be valuable tools for the representation of knowledge co-produced between community stakeholders and institutional authorities (Elwood 2008). These projects also actively engage community stakeholders in social processes, such as policy decision making, mapping, and heritage work (Brown and Kytta 2014; Lafreniere et al. 2019; Tulloch 2008).

Public participatory mapping research has many benefits for both the public and academic researchers. Benefits include empowering public stakeholders in the process of decision making and planning on projects directly impact them (Kahila and Kytta 2006; Brown and Kytta 2014b; Kahila-Tani et al. 2016), the ability to contextualize quantitative data with community perceptions (Verplanke et al. 2016; McCall 2021) and the creation of community – researcher partnerships that work to address academic and community problems (Robinson, Block, and Rees 2017; Robinson and Hawthorne 2018).

However, challenges come with these benefits. One major challenge is the need to maintain relationships with public stakeholders. These relationships take time and resources to build, sustain, and grow. Engaging stakeholders in mapping projects has been a continual challenge for the field. It has been thought that the novelty of digital mapping would increase participation in public participatory mapping projects, but Brown and Kytta (2014) argue that engagement with these projects has been low (averaging 13% response rates in the 5 studies they review) and has continued to stay low. The authors argue that theories of social engagement could increase participation in these projects but have yet to be put into practice. For public participatory projects to reach their full potential they must work to create and grow relationships with a diverse and large volume of stakeholders, creating a need for successful public outreach activities.

Although the need has been recognized, to date, no one has developed a model of engagement that guides researchers on how to create and sustain public engagement in spatial humanities projects. By integrating best practices from the fields of citizen science, public relations and communications, spatial humanities, and public history and interpretation we have created the nested pyramid model of engagement (NPME), a deep mapping public engagement framework that aims to meet this gap. This model offers a clear opportunity to both measure and help design outreach programming that fosters growth in a community-project relationship.

In this paper we move beyond the theoretical and apply this model to a well-established public participatory historical GIS project, the Keweenaw Time Traveler (KeTT), to systemat-

ically implement and subsequently analyze the effectiveness of public engagement programs for KeTT.

The Keweenaw Time Traveler (KeTT) is an online historical atlas that encourages and supports public engagement in its robust spatial representation of Michigan's Copper Country, one of the first major industrial mining landscapes in United States History. The impacts of rapid industrialization and deindustrialization, attributed to the growth and decline of the region's copper mining industry that took place between the mid-19th century and 20th centuries, has had a major effect on the cultural, social and environmental fabric of the Copper Country landscape (Lankton 1993, 2010; Lafreniere et al. 2019). KeTT was built to empower community stakeholders, public officials, and academic researchers with the ability to gain and share knowledge about how the industrial past of the region impacts the present and to develop discourse about how to leverage this past to create a healthier and more prosperous future.

From its beginning in 2015, KeTT has been seen as a collaborative project focused on the co-production of knowledge between researchers and community stakeholders. The mission of the Keweenaw Time Traveler is '...to start conversations about how this region's industrial past continues to affect our lives and identities today. We work to engage residents, descendent groups, researchers, municipal governments, and visitors in the conversation about how to leverage the Keweenaw's past to create a healthier and more prosperous future.' Aligning with this mission, community stakeholders were included in the design process of KeTT's digital interface through many iterations of design charrettes (Scarlett et al. 2018). Stakeholders were also able to contribute directly to the initial building of the historical geospatial datasets contained within KeTT through three PPHGIS applications that helped document historic building use, building material, and transcribe unique notations written on digitized historic maps (Lafreniere et al. 2019). Members of the public have been able to continue to add to the data contained within KeTT through the use of Story Points. Using Story Points, individuals can work to preserve and share their own memories and stories by uploading text, audio, video, images and other multimedia onto the KeTT interface. Their stories are linked to other historical data about the people and places of the Copper Country creating a much more robust and complicated representation of the Copper Country than with just researcher contributed data. Sustained and active in-person programming, at local heritage organization sites, and festivals, along with blog and social media posts have worked to keep stakeholders engaged with the project as it continues to develop. KeTT's well-established public-project partnership model makes this project an ideal candidate to use to investigate the value of the NPME model as a tool for evaluating and creating outreach programming for public participatory projects.

2.3 Mapping Deeper and Wider: Fostering a Next-Generation of Public Participatory Spatial Humanities Scholars and Professionals

Don Lafreniere

In this paper we outline and recruit new fellows for our forthcoming NEH Community Deep Mapping Institute. The NEH Community Deep Mapping institute is a hybrid 12-month virtual and in-person institute running from January 2025 through December 2025.

Deep maps integrate information and representations about space, time, architecture, material culture, environment, and community knowledge into a spatially and temporally scaled digital platform that affords open-ended exploration of a particular time and place (Bodenhamer, Corrigan, Harris 2013; Ridge, Lafreniere, Nesbit 2013). Deep maps are discursive resources that can be designed to visualize changes in human-environmental relationships over time and to accommodate multiple voices in the creation of community-based narratives. Over the past decade, alongside the growth of digital and spatial humanities scholarship, researchers from a range of humanities fields have succeeded in developing disciplinary-specific theoretical approaches to deep maps. However, the potential of deep mapping and recognition of its broader intellectual impacts in the humanities have not yet been fully realized because of the lack of transdisciplinary and public collaboration. This institute, will, for the first time, bring together an otherwise disparate group of scholars and professionals to expand the scope and refine the practices of doing deep mapping together.

The Institute will focus on expanding the scope and practice of deep mapping by integrating public-facing and transdisciplinary scholarship into the spatial humanities. Our aim is to move from the established theories and concepts of deep mapping towards developing a foundation of practice with a specific emphasis on supporting community histories. Institute Fellows will receive instruction from leading experts in the digital and spatial humanities and a wide-range of heritage fields on the use of advanced spatial and digital technologies and visualization/interpretive techniques. Working individually or in teams, Fellows will apply their new skills towards the creation of a prototype deep map using data drawn from their own active research programs.

The NEH Community Deep Mapping Institute is drawing together a group of participants who have shared interests in the digital and spatial humanities, as well as individual expertise in archaeology, geography, history, heritage, interpretation, public history, and community-based research. The institute has four central objectives 1) Train new and established scholars and professionals in the use and integration of advanced geospatial tools to advance approaches to doing deep mapping. 2) Establish best practices for creating public-facing deep maps through community-based research, design, and evaluation processes. 3) Determine methods for, and approaches to, applying augmented and mobile technologies that create immersive experiences built upon the robust historical spatial data infrastructures that form the basis of many current deep mapping projects such as the Keweenaw Time Traveler and Hamtramck Spatial Archaeology Project. 4) Demonstrate how transdisciplinary collaborations will

contribute to building more inclusive communities of practice across academic fields and between academic-based scholars and non-academic heritage practitioners.

This institute's key focus is the 'doing of deep mapping'. As an expected outcome, all institute participants will build a prototype (or more advanced) community-centered, public-facing deep map in an area of their interest. Fellows will leave with the tools, resources, and a network of experts that will support continued development of their deep map.

2.4 Pauliceia 2.0: an open and collaborative historical mapping project in Brazil

Luis Ferla

The digital humanities are becoming a growing and unavoidable reality for those working with historical knowledge. They have gained intellectual and institutional footing among scholars across disciplines, who have proceeded from arguing for their potential to discussing their practice and implications. Such discussions include the question of defining an epistemological identity for the field, along with the theoretical and practical implications for scholarship and within the institutional structures that evaluate a scholar's work.

On the other hand, the most recent developments in knowledge production regimes allow it to be developed in an increasingly collaborative and more easily shared manner. That this is so can certainly be understood by some characteristics of the technologies involved, related to the establishment of horizontal networks and the facilitation of traffic and electronic exchange of information. The role of the global computer network, in this aspect, mainly from the affirmation of the so-called web 2.0, characterized not only by the wide availability of studies and investigations, but also by the widely favored opportunity for their collaborative production, increasingly allows the realization of practice of those theoretical values. Thus, the ethics of defending the free circulation of knowledge has strongly conditioned the development of digital humanities, as they are easily articulated with what remains of it in the academic and scientific environment.

Framed by public history, open science and digital humanities, this project aims to design and build a computational platform for collaborative spatial historical research. The principal goal is to develop state-of-the-art software tools, such as a web portal and Geographical Information System (GIS) plugins, that allow humanities researchers to create, organize, store, integrate, process and publish urban history data sets. The proposed platform integrates all these tools.

The project foresees the development and release in the worldwide web of a digital historical cartographic database of São Paulo city covering the period of its urban and industrial modernization (1870-1940). The space-time focus of this project has historical and methodological justifications. On the one hand, the conviction that the city during this period experienced a dramatic process of urbanization, almost unique in terms of history, is well established in historiography. On the other hand, and precisely because it is a scenario and a period of great historiographical appeal and with a great density of academic production, the objective of raising awareness of potential collaborators is significantly facilitated.

The platform will provide access to this database and allow interaction among researchers, who will be able to contribute to the database events that can be spatially and temporally represented. In doing so, scholars will be able to produce maps and visualizations of their own research and at the same time contribute to the data within the system. This project will enrich understanding of the history of São Paulo during the above-mentioned period in addition to offering an innovative model of research for the digital humanities that recognizes the immense opportunities of open science.

The first phase of the project, focusing on a pilot area corresponding to São Paulo's city center, was carried out from February 2017 to January 2021. The beta version of the platform is available on the internet for testing (www.pauliceia.unifesp.br). The actual second phase will expand the spatial coverage, the platform functionalities, and community engagement. It will also create a guide to allow other researchers to replicate the approaches in other cities.

The communication aims to present the state of the art of the platform and its main functionalities, the path taken to achieve this and the methodological reflections it provided, and a perspective for the continuity of the project. As the version of the platform currently available is undergoing a testing phase by researchers who volunteer to do so, special attention should be paid to the possibilities for engagement and acceptance of criticism and suggestions. In this way, in addition to seeking to disseminate a project in which free collaboration is decisive for its success, the aim is to provide support for reflections on the relationships between technology, historical knowledge and the open science movement.

The project has a multidisciplinary team of around 30 people, and is a partnership between the Federal University of São Paulo (Guarulhos and São José dos Campos campuses), the Aeronautics Technological Institute, the National Institute for Space Research, Emory University and the Public Archive from the State of São Paulo, and is funded by CNPq and the Fapesp eScience Program.

The project should enrich the approaches concerning the spatial history of São Paulo during the above-mentioned period within the most recent and interesting digital humanities unfolding, which fosters collaborative work and free knowledge flow.

2.5 The HisGIS 1832 Project. Digitising, Vectorising, and Modelling the Napoleonic Cadastral Maps and Tables for the Netherlands (and Beyond?)

Rombert Stapel

HisGIS.nl provides a national digital infrastructure for research, policy development, and the creation and promotion of interest in the historic landscape and related built environment of the Netherlands. The project is based on the digitised and vectorised maps and tables of the oldest, so-called Napoleonic cadastre from around 1832, which was introduced in large parts of Europe following French instructions. The purpose of this cadastre was to introduce a new and fair system of taxing land and buildings. It consisted of three pillars that formed an indivisible whole: the measurement of parcels (shown on maps), the registration of ownership and land use (in tables), and a complex system of valuation of types of parcels (documented in a series of municipal reports). The HisGIS.nl project is aimed at national and international (historical, economic, archaeological, sociological, geographical, and ecological) researchers, volunteers, interested citizens, (local) governments and third parties developing (commercial) services for any of the above-mentioned groups.

The development of the HisGIS.nl platform has taken place over several decades and has been significantly expanded, especially in recent years, through the commitment and funding of (regional) governments, volunteers, researchers, and other parties. In 2019, the project was officially handed over from the Fryske Akademy in Leeuwarden to the Humanities Cluster of the Royal Netherlands Academy of Arts and Sciences (KNAW) in Amsterdam. However, years of fragmented investment have had a profound impact on the project's underlying infrastructure. Data access is cumbersome by today's standards, older files need quality improvement, and resources for large-scale infrastructure improvements are lacking. These challenges are being addressed head-on by a new and substantial round of national investment in HisGIS.nl for the years 2023-2025, which will allow us to make the data and platform consistent, sustainable and well-functioning, and to provide a fully national infrastructure environment. At the end of this investment round, we will have georeferenced all 16,000 cadastral maps of the Netherlands, both urban and rural, and provide a central access point for all vectorised parcels (estimated at around 60% of 3,000,000 by the end of 2025) and related registers.

Here we would like to present the full scope of the HisGIS.nl project, which in its current state is a fully functional and widely used research infrastructure project, as well as our plans for the coming years. We will focus on five key components of the project: The georeferencing of the cadastral maps (Figure 1) using a new IIF-based georeferencing tool from AllMaps which will be specially adapted to the specific difficulties associated with cadastral maps; the vectorisation of the parcels drawn on these maps using a custom-built OpenStreetMap environment (Figure 2); digitising the full registers, the Oorspronkelijk Aanwijzende Tafels or Original Designating Tables (Figure 3), as well as the reports and tables associated with the valuation of the parcel categories; providing a data output pipeline that allows the data to be interoperable with other datasets and a wide range of file formats (from shapefiles to CSV and RDF); and managing a unique and bespoke citizen science platform that we have devel-

oped to work with our pool of volunteers. We will also discuss why we have decided against using (semi)automatic feature extraction and transcription methods, at least so far, and have instead chosen to invest in better data entry tools.

As the French-style cadastre has been implemented in a virtually uniform manner across Europe, our project infrastructure and data models can be applied to non-Dutch contexts with very little additional investment. However, our integral approach of combining all three pillars of the French cadastre (maps, tables and valuation documentation) in one system and data model sets HisGIS.nl apart from most other European projects using the 19th century Napoleonic cadastre (e.g., Michelin and Chadeyron 2020; Département Vaucluse 2017; Hauts-de-Seine le Département 2020; Uhrmacher and Kass 2016–2024). The over-focus on only one pillar - usually only the maps, or only the summary assembly maps (Michelin and Chadeyron 2020) - is most evident in the digitisation efforts of the Napoleonic cadastre outside the Netherlands. The archival scans of the Napoleonic cadastre focus almost exclusively on the maps ('Cartesius', n.d.; FranceArchives 2024; 'Le Géoportail National Du Grand-Duché de Luxembourg', n.d.; 'Feuilles Cadastrales Historiques: Urplaeng' 2022). Ignoring the cadastral tables and the wealth of related documents, however, deprives us of essential knowledge for fully understanding and using the cadastre and, we would argue, for efficiently digitising cadastral data. It also drastically limits the potential uses of the data. In our presentation we will briefly address these use cases in the Netherlands, which are much broader than academic use and range from commercial archaeology to policy making, based on our experience so far.

Figure 1. Cadastral map of the municipality Stad Almelo

Figure 2. The digitised Napoleonic cadastre for the region around Amsterdam (ca. 1832).

Figure 3. Original Designating Table of the municipality Zijpe.

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2.6 Beyond the Line: Mapping Early Twentieth Century St. Augustine through Letters of an FEC Trainman's Wife

Jeanette Vigliotti, Jolene DuBray

The city of St. Augustine is the oldest continuously occupied European settlement in the continental United States and, at the end of the nineteenth century, it was the birthplace of modern tourism in Florida. At the end of the nineteenth century Henry Flagler, who was an industrialist, and co-founder of Standard Oil, launched his robust hotel and railroad empire from St. Augustine. His businesses fundamentally altered the demographics of the former Spanish colonial city, attracting the wealthy elite of the Northeast. Scholarly contributions about the Gilded Age in St. Augustine focus heavily on the creation of the Hotel Ponce de Leon and the Florida East Coast (FEC) Railroad and the influx of wealthy visitors. However, there is a notable silence in the scholarship. In recent years there has been a growing interest in the people whose blood, sweat, and tears went into making Flagler's vision come to fruition. What was the daily experience of the individuals who built their lives around Flagler's vision?

Our digital mapping project *Beyond the Line: Mapping Early Twentieth Century St. Augustine through Letters of an FEC Trainman's Wife* makes a significant contribution to the historical narrative of St. Augustine's residents who witnessed and contributed to the rise of the FEC Hotel and Railway empire. We significantly reconfigure early twentieth-century conceptions of St. Augustine by layering insights from working-class residents alongside the more familiar narratives of tourism and industrialization.

Beyond the Line will provide a better understanding of the connections and tensions of gender and class in the early twentieth-century boom in St. Augustine. A collection of correspondence recently uncovered in the Flagler College Archives gives insight into what life was like for a family living in St. Augustine and working for the Florida East Coast Railway during this boom. Most of the letters are written by a young newlywed schoolgirl named Susan Pollock, who goes by the nickname "Chubby." Her husband, George Pollock, was a trainman whose career kept him away from home.

Chubby's letters not only allow a re-mapping of St. Augustine's early twentieth-century tourist boom but also conjure other locations connected by Flagler's rail empire. Her letters followed George throughout the eastern seaboard. Through her intimate contact, our digital map collapses geographies to demonstrate the lived realities of this trainman's work—including the danger. Some of the details in this collection include a first-hand account of the anxiety of having a loved one who lived the unpredictable and sometimes dangerous life of a trainman. This trade included long hours in a hazardous environment. Several of the letters go into detail about an employee who was killed in an accident, and it brings to light the significance of such perils. In 1909, Chubby writes to her husband in multiple locations around the country and is sometimes unsure of his location or well-being, which causes her much anxiety.

Our map highlights the gendered experience of Chubby's life in St. Augustine and George's life on the railway. Her 1909 letters provide granular details about what life was like for this family: daily activities such as cleaning and sewing; the social network of other women in working-class families; the shortage of money to make ends meet, and how women relied

on their husbands to provide income. Chubby's letters provide insight into the social spaces of St. Augustine for women of working-class families and the domestic tensions of Chubby's intergenerational household. Our map draws from these letters to detail a tight-knit community of neighbors and other employees of the FEC railway and community social events such as the 1909 Ponce de Leon Celebration and baseball games featuring teams of FEC trainmen.

Once the data has been collected from these letters, and more information is gathered from other local heritage collections, the data will be analyzed and digitally mapped to visualize this family's daily experience living and working in St. Augustine and for the FEC Railway during the progressive era. This collection is the jumping-off point to continue to tell a more complete story from the perspective of the working class of the early twentieth century boom in St. Augustine.

Using archival materials from the breadth of Chubby and George's life, *Beyond the Line* effectively captures important social and demographic changes in St. Augustine. In our digital map, we will combine Chubby's personal letters with other materials from the collection such as a series of receipts that show George Pollock membership of the Brotherhood of Railroad Trainmen from 1918 until 1947. Though in its infancy, our project provides the starting point to tell more diverse histories of twentieth century St. Augustine that weave class, race, and gender together beginning from the perspective of an ordinary girl.

2.7 Bird's-Eye Views of the Venetian Lagoon: Mapping Animal-Human-Technology Interactions

Noemi Quagliati

The Venetian Lagoon is renowned worldwide, yet most visitors are primarily familiar with its architecture—"The Stones of Venice," as John Ruskin famously described. In contrast, the lagoon's rich more-than-human presence often remains overlooked. Positioned between land and sea, the Venetian Lagoon sustains an extraordinary diversity of plant and wildlife species. As Italy's largest wetland, it is a protected habitat recognized as a "priority for conservation" under the EU Habitats Directive, part of the Natura 2000 network and the LIFE program. Additionally, the lagoon is an "action site" in the EU Horizon 2020 Green Deal project WaterLANDS and is designated a wildlife sanctuary under the Ramsar Convention due to its significance for coastal wintering, migratory, and breeding waterbirds.

My contribution to the 5th Spatial Humanities Conference explores the Venetian Lagoon ecosystem through "bird's-eye views." These are not limited to aerial recordings or satellite images used for environmental monitoring. Instead, they encompass ecological and creative approaches to understanding the lagoon's more-than-human geographies, with a focus on its avifauna. This paper challenges the anthropocentric history of the aerial perspective by showcasing examples from citizen science, deep mapping, and art projects that reinterpret the literal meaning of "bird's-eye view." Finally, it highlights the role of birds as environmental sentinels, raising broader questions about non-human ways of perceiving and mapping the world.

2.8 Deep Mapping Middletown: Designing Immersive Experiences for Spatialized Historical Data

James Connolly, John Fillwalk

Deep Mapping Middletown seeks to represent in spatial terms the substantial archive produced by research on Muncie, Indiana, USA, the site of Robert and Helen Lynds' seminal community studies, *Middletown (1929)* and *Middletown in Transition (1937)*. The success of the Lynds' work, which is considered to be among the most influential interpretations of twentieth-century American life, inaugurated a tradition of using this small midwestern city as a barometer for assessing broader social and cultural trends in the United States. Researchers, journalists, and filmmakers have repeatedly returned to the city over the past century to document social and cultural change, generating an extraordinarily rich multimedia archive documenting local experience. Most, though not all, of this material is accessible in digital form.

We have begun to build a multi-tiered platform that mobilizes this archive for “deep mapping” the city. By deep mapping, we mean the process of generating user-driven, multimedia depictions of a place. Drawing on postmodern theory, scholars engaged in deep mapping have employed digital technologies to create complex representations of spaces and empower users to explore them from a variety of perspectives. Deep mapping aims to destabilize depictions of place, conveying the multiple meanings that different groups of people have assigned to specific settings and their evolution over time. Our deep mapping platform integrates GIS and immersive 3D simulation technology to provide access to this material and facilitate investigations of spatial-historical experience, including the evolution of racial geographies and the civic and social consequences of deindustrialization.

Part of our aim in this project is to reframe Middletown Studies for scholars, students, and public audiences. While there is an extraordinarily rich collection of Middletown research materials, including extensive published scholarship, hundreds of recorded interviews, thousands of photographs, hundreds of hours of films, survey results and unpublished research reports, much of the work that produced this archive rests on a problematic premise. The Lynds' initial investigations neglected Black and other minority experiences, an oversight that many follow-up studies failed to remedy. Only since the 1970s has Middletown research become more inclusive, incorporating the experiences of racial and ethnic minorities that the Lynds and their immediate successors ignored. Recent work has also jettisoned the anthropological gaze in favor of more collaborative approaches that share authority between researchers and community members. A key goal of Deep Mapping Middletown is to elevate this later body of work, using the multivocality inherent in deep mapping to repurpose the Middletown archive as a resource for investigating and empowering the marginalized, not just the mainstream.

In its current, prototyping stage, our project aims to overcome several technical and design challenges. These include:

1. The development and refinement of a Historical Spatial Data Infrastructure (HSDI) that include geolocated historical data from various sources and in various formats (text,

image, audio, and video) ingested into a GIS, as well as tools, features, and procedures to manage and facilitate use of the data. A key part of this work is establishing lat-long coordinates for photographs and audio-visual material as well as for passages extracted from textual sources such as oral history transcripts or ethnographic writing.

2. Application of manual and computational techniques developed by various scholars for capturing and representing vague or subjective spatial information in both 2D and 3D. The Middletown archive includes a substantial body of purposely obscured evidence in ethnographic writing, as well as spatial data contained in oral histories, and anonymized survey data. While researchers have employed a range of visualization techniques that extend beyond traditional coordinate-based cartographic methods to represent these kinds of data, we are especially interested in approaches that link vague and subjective experiential evidence to coordinate locations.
3. Development of the interface between a Unity-based virtual environment and a GIS-based HSDI that enables users to engage with the spatial data we are assembling.
4. Development of a virtual environment that includes in-world visual cues modeled on game analytics, such as heat maps and dwell times, that visualize spatial data, including affective and sensory experiences, documented in Middletown research.

We propose to present a paper documenting our progress to date in meeting these challenges and explain the potential of 3D immersion for deep mapping. Working with a team of scholarly advisors, librarians, designers and developers, we have produced an initial GIS that includes geolocated sample data for a single neighborhood drawn from collections of photographs, oral histories, and ethnographies. We have also developed a 3D immersive space using the Unity game engine, employing the ArcGIS SDK for Unity to integrate our GIS and 3D model, giving users access to spatial data within our immersive environment. We are also currently creating role-playing experiences that limit access to spaces and information depending on the role adopted by the user and the period selected. These experiences are derived from spatial data in the Middletown archive. We will also follow best practices for heritage visualization as described in the London Charter by making paradata that documents our interpretive choices available to users.

Our presentation will also include a demonstration of our prototyping work to date, including a sample walk-through of our immersive test environment and a review of the HSDI.

2.9 Geographical-Talmudic Orientation: Integration of a Digital Map in a Scholarly-Digital Edition for tractate Yerushalmi Rosh Hashanah.

Yaron Silverstein

In recent decades, scholars in Jewish studies have devoted themselves to crafting critical editions of various compositions within Sage literature, driven by the premise that an “accurate book” serves as the fundamental bedrock for all textual inquiries. Within the burgeoning field of digital humanities, aimed at leveraging programming tools for humanistic research, the potential to incorporate scholarly-digital editions of both ancient and contemporary texts has emerged. At the 18th World Congress of Jewish Studies in the summer of 2015, I unveiled a scholarly-digital edition of the Jerusalem Rosh Hashanah Talmud tractate available at www.yerushalmi-criticaledition.com. This edition encompasses textual sections, afra, parallels to sage literature, and a comprehensive commentary on the entire treatise based on extensive research (www.yerushalmi-criticaledition.com).

A key advantage of a scholarly-digital edition lies in its capacity to augment the commentary section with a digital compendium featuring images, videos, sound clips, and maps (Google Maps link). The integration of a digital map in the scholarly-digital edition for Rosh Hashanah Jerusalemites as a representation of knowledge poses multifaceted challenges. The process of map preparation prompts inquiries into site identifications, dual identifications of the same site, differentiation between tangible and conceptual sites, determining the optimal number of layers on the map, and more. On the part of students engaging with this edition, questions arise regarding the map’s utility in identifying mentioned sites and comprehending the spatial context within which the sages operated during the Talmudic period.

In this presentation, I aim to briefly outline the challenges encountered by the map’s editor and present initial findings from an ongoing study I am conducting on how students of oral Torah, both as learners and educators, utilize the map within this edition.

2.10 London's Strand: From Pedestrianisation to Humanisation

Cristina A. G. Kiminami, Stuart Dunn

There are many studies of pedestrian behaviour which are geared to specific utilitarian purposes. These include the analysis of footfall for the purposes of urban traffic planning, investigating similar phenomena to establish the viability of commercial districts or advertising sites, the positioning of amenities; and – especially in recent years – the investigation of pedestrian behaviour to ensure the safe deployment of driverless vehicles, and of the physical security of pedestrian spaces. A considerable body of scientific literature has thus accumulated on these topics as they relate to the narrow policy implications of pedestrianising public spaces. What is lacking however is studies of pedestrianisation as a means of promoting social and cultural good for its own sake. We argue that the idea of “deep mapping”, as articulated by Bodenhamer et al (2010) can address this lack. To illustrate this, this paper will explore a present-day example of the pedestrianisation of a high-traffic volume area in the context of its deeper spatial history, and argue that a “deep mapping” methodology can promote pedestrianisation as an agent of social and cultural good, as well as economic and functional, benefit. We share the preliminary findings of the Unmapped Strands project, and discuss the potential and projections for future research. Unmapped Strands, which is supported by the Centre for Attention Studies and the Digital Futures Institute at King's College London, enhances our comprehension of the pedestrian walking experience in a car-free area, and its interrelation with both physical and virtual information. Additionally, it seeks to contribute to the understanding of how geospatial technologies can be utilised in humanities research. Our goal is to demonstrate how deep mapping can be utilised to support spatial analysis by combining digital and ethnographical methods; and to develop a participatory research and design strategy for the Strand.

The Strand/Aldwych area is one of the major thoroughfares in London, connecting the historic political heart of the city at Westminster in the west, and its economic heart in the City in the east. It is thus a deeply symbolic space of connection and communication; yet for much of the twentieth century it was fully dominated by vehicular traffic. In December 2022, its eastern section (the southern part of which is the frontage of KCL's Strand Building) was fully pedestrianised as a result of a major project overseen by Westminster City Council. This programme has the aim of creating “a wealth of benefits to the local area, including a more people-friendly experience for pedestrians and cyclists and enhanced connections to significant central locations of London (Covent Garden, the City, Holborn and the West End). The collective flow of footfall in the space is now unconstrained by traffic, resulting in far more social and cultural interaction possibilities. As well as the removal of traffic, the pedestrianisation programme has introduced a range of street furniture, art installations, walkways and planted gardens, all of which encourage interaction between people and the environment, as well as social interaction.

The project undertook an experimental research investigation in May and June 2023, interviewing a self-selecting sample of pedestrian users of the space to understand the benefits that its move to pedestrianization, the introduction of the street features, and the emergence of the space to dwell in as well as to traverse, has brought to their daily lives. First, GPS traces

were collected from regular users – research participants- of the Strand area to provide a visual snapshot of how walking trajectories now respond to the space. A total of 48 GPS traces were captured from the participants. These were overlaid using Quantum GIS and waypoints extracted at 1-meter intervals. These were collated to identify “hotspots” and popular trajectories.

In the second phase, open-ended interviews were conducted with the same user group to complement the visual snapshot with a more qualitative verbal one, gaining an insight into non-tangible responses to the space. Overall, from the two sets of activities, we are able to discern three high-level categories of factor which impact pedestrian uses of the space: factors which cause people to stop, factors which draw them through the space, and extrinsic sensual stimuli.

As well as outlining the methods used for this initial study and spatial analysis, this paper will outline the potential of our initial small dataset to constitute a “deep map” of this profoundly historic and symbolically important area. How might we articulate the sensory, transitory, ephemeral and emotional traces of the space, now it has become a space for passage of people and not of vehicles? In what ways have these aspects become clearer and more traceable as a result of the pedestrianisation?

These are all questions that we will address with reference to the idea of deep mapping, as articulated by Bodenhamer et al (2010) etc. In the context of the Strand/Aldwych pedestrianisation, we will illustrate how deep mapping can enable a shift beyond the paradigm of understanding pedestrianisation as utilitarian, economic and practical activity, to one in which space becomes “humanised”.

Causes of ethnic segregation in a nineteenth century city: The case of Vyborg

Keywords: ethnic segregation, spatial regression analysis, spatial humanities, urban historical GIS

Spatial differentiation of social groups within urban space is a classic theme of urban ecology and sociology. Segregation is a phenomenon that has major implications for social cohesion of societies and the wellbeing of individuals. Consequently, many models of segregation and assimilation have been proposed, both for the modern and the pre-industrial urban societies. In this paper, the spatial segregation of a minority in an industrialising city is studied using empirical data concerning the Russian population of Vyborg in 1880. Socioeconomic segregation is also studied, but only as a possible cause of ethnic segregation.

Vyborg (Viipuri, Viborg), originally a medieval trading post and stronghold founded by the Swedes, was conquered by Russians in the Great Northern War. Under Swedish rule, the city had an elite that spoke Swedish and German and commoners who spoke Finnish, just like the peasants in the surrounding area. After the Russian conquest, a large garrison was established. The military units also brought civilians with them, not only families of soldiers and other camp followers, but also higher status persons, such as retired officers or wealthier merchants and artisans. Russians remained a large and distinctive minority in Vyborg until the upheavals during and after World War One.

The spatial data are derived from historical maps and tax records. Digitised cadastral maps provide accurate location information. The religion of the inhabitants was recorded in the poll tax registers from 1880 onward. Since every household is tied to a cadastral plot, the density of populations can be tracked in high resolution, unlike censuses. In Vyborg, the Orthodox denomination can be used as a proxy for Russian speakers. The income level can be determined based on total income tax paid. This data is provided by municipal income tax records from 1880.

Several hypotheses for explaining segregation are considered, based on earlier research: policies of segregation, guild-based differentiation, discrimination from above, prejudice between groups, income-based differentiation between groups, differences in preferences, and differences of housing-market information. The main drivers of spatial segregation seem to have been the decrees enforced by both the Russian military administration and the town's civilian administration. At one time, when the administrations intended to separate Finnish and Russian lower classes on separate suburbs on the opposite sides of the city. Many of the poorer inhabitants were also *de facto* driven out from within the walls after fires. There are still concentrations of the Russian minority in areas which were inhabited by Russians in the eighteenth century. Segregation based on membership of guilds was not significant based on previous research and distribution of masters. Most guilds in Vyborg were tiny, only having a few masters and journeymen as members. The remaining three potential causes of segregation, namely discrimination, prejudice, and differences in housing market information cannot be studied with the data available.

To test the impact of income on the location of the Russians, a spatial regression analysis is performed. The predicted variable is the proportion of the Russians in a location (N=540), and the predictors are the natural logarithm of the average local income and distance to the nearest Orthodox church. The form of the model is a Bayesian multilevel linear regression model with spatial correlation between observations. The coefficients of the linear regression are different for each of the three areas of Vyborg. These are the western suburb, the centre within the walls, and the eastern suburbs. This means that the effects of predictors on Russian population density can vary. There is also hyperparameter that acts as a restraint on

the regression coefficients of the areas. In other words, the observations are partially pooled, which combines the flexibility of treating areas as separate (unpooled observations) with the robustness of using all observations (pooled observations).

The results indicate that neither the different preferences of Russians and others nor the income differences between areas explain the distribution of Russians. The posterior distributions of regression coefficients are relatively wide, but they tend to be around zero. In other words, predictors have little effect on the proportion of Russian population.

According to the classic models of segregation, segregation gradually diminishes due to social diffusion. However, segregation-driving policy decisions of the eighteenth and early nineteenth centuries were still visible in the data from 1880. Interestingly, while the segregation of Russians decreases during *fin de siècle*, it begins increasing around 1900. One explanation for this may be the political battle between Finnish nationalists and the Imperial regime, which intensified after 1899. The disappearance of old segregation patterns may be related to the changes in the build environment, since the new concentrations of Russians were different than those in 19th century.

To conclude, segregation in Vyborg cannot be explained by any single cause. The explanations behind segregation are most likely a complex system of causal links that are hard to untangle with empirical research. However, the use of high-quality spatial data allows the rejection of overly simplistic explanations.

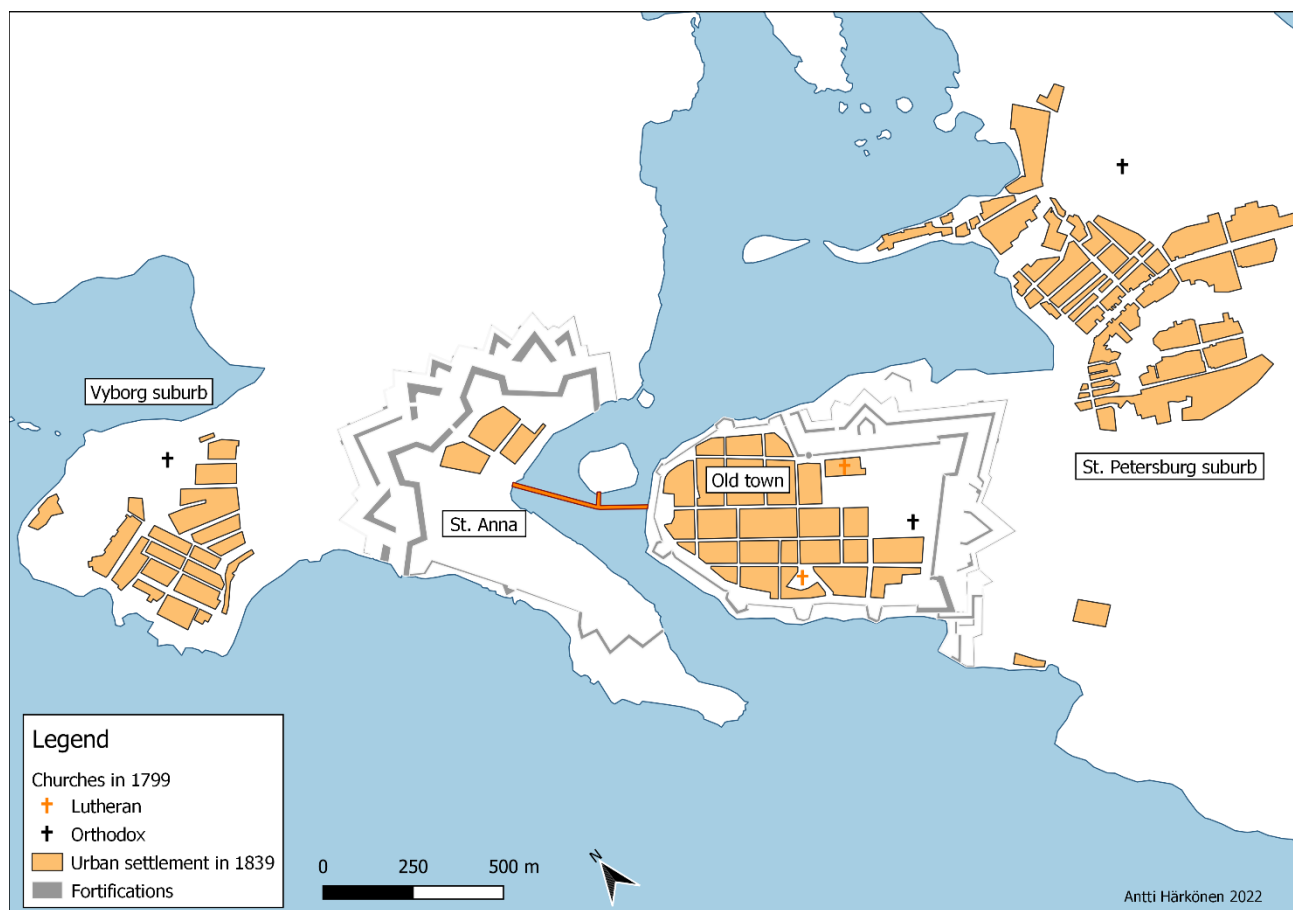


Figure 1. Map of Vyborg and its major suburbs in 1839

2.12 Child abandonment in 19th century Lisbon: foundlings' distribution, life course and movement through the lens of spatial analysis methods and tools

Joana Vieira Paulino

In Portugal, until the 1860s, child abandonment was an anonymous, legal, and generalized practice. Children were left in foundling wheels, hollow wooden cylinders which rotated on an axis with a single opening, situated in the window of buildings or, more commonly, of Foundling Houses. After placing the child inside, the person abandoning the infant would ring a bell located on the wall to inform the wheel attendant of the arrival of a new ward. The latter, inside the Foundling House, would turn the cylinder, collect the minor and provide him/her with initial healthcare, before being sent to be raised by an external wet nurse. The proliferation of these type of institutions and the wheel mechanism wasn't exclusive of Portugal. It was common in the European Catholic states such as Spain, France, and Italy.

However, the legality of the anonymous child abandonment led to the abuse of such practice. In Lisbon, the Portuguese capital and biggest city, the Santa Casa da Misericórdia de Lisboa (literally, the Holy House of Mercy, henceforth the SCML) was the institution responsible for raising the abandoned children. From the mid-19th century until the end of the 1860's between 2.000 to almost 3.000 children were abandoned on its wheel. The goal, was to send them to be raised by external wet nurses, particularly, the ones living in the countryside, believing their houses would have better conditions and the children would be integrated among their families (when compared to wet nurses living in the big city). From the moment of the abandonment, the life course of these children was marked by mobility in space, not only from the institution to the wet nurses' houses, but also among the latter, considering that the decrease in their salaries as children got older frequently led to a new institutionalization and to being sent again to another wet nurse.

From the second half of the 19th century, a debate took place regarding the viability of the admission model in force. State and institutional authorities, as well as doctors, intellectuals, and politicians, started to consider discontinuing the use of the foundling wheel and adopting a new reception system. What was at stake wasn't the end of the welcoming institution, the Foundling House, but rather the wheel as a mechanism for anonymous exposure. The height of this public debate in Portugal was marked by a decree in 1867 which closed the wheels in the Kingdom. Instead, controlled admissions were imposed, and breastfeeding allowances were generalized. Despite the decree being revoked, in 1870 the SCML closed its foundling wheel and adopted the new admission model (in which the exposures, mostly mothers, had to identify themselves, the reason for the abandonment, and their provenance).

Despite the plurality of regional studies on child abandonment, on a national and international level, no in-depth researches have been carried out concerning this practice in Lisbon and the transition to the new admission model. Additionally, no study has focused on the movement and life course analysis of the abandoned children through a spatial perspective, applying spatial analysis methods and tools.

This paper seeks to fill this gap focusing on a spatial analysis and the use of a Geographic Informatic System to approach child abandonment in 19th century Lisbon, its evolution, characteristics and the life course of foundlings. It allows us not only to integrate child abandonment in space and time, since from 1870 it was mandatory for parents to identify themselves and we have information about the ones who exposed their sons or daughters and their provenance (municipality and parish), enabling to relate it to Lisbon's growth; but also to spatially follow foundlings' life course and mobility across time.

Having as a starting point the contemporary argument that it was preferable to send these children to be raised by countryside wet nurses, with effects on their integration, we will use a Geographic Information System to: 1) pursue a macro analysis on the spatial distribution of foundlings in the Kingdom when raised by external wet nurses; 2) develop a micro analysis of particular life courses, mainly, of two groups of children – ones raised by countryside wet nurses from a parish in Tomar; and another group raised by workers from a parish in Lisbon. How did the spatial distribution of foundlings affect their integration? And how can we track their movement and their path? Was there a different mobility degree from the ones raised by countryside wet nurses when compared to the ones raised by Lisbon ones?

This paper will have a triple approach: qualitative, quantitative, and spatial. The qualitative analysis will be based on the study and problematization of the sources on the evolution of the welfare towards foundlings, which are rich and very well preserved - the ones issued by the Ministry of the Realm, the Royal Academy of Sciences, Lisbon's Municipal Council, legislation, writings from doctors and intellectuals, but also the institutional minutes of the SCML Board of Administration and its reports. The latter, produced since 1850, contain statistics about the SCML services, which will also allow to pursue a visual quantitative perspective, focusing on the spatial dimension of foundlings distribution throughout the Kingdom. Additionally, the SCML produced individual records for each children, enabling us to develop a life course analysis. Since the path of some children is hard to follow and the institution lost their track, this sources need to be crossed with religious ones – marriage, birth and death records, and, particularly, Róis de Confessados, a list of people living in the same house which was collected during Easter season. This combination enables to apply a spatial approach, “designing” those children mobility and building a spatial narrative to answer: how can Geographic Information Systems contribute to study the life course of foundlings in 19th century Lisbon?

2.13 The lure of the waterfront. Mapping economic inequality in Rotterdam from the sixteenth until the nineteenth century

Maarten F. Van Dijck, Paul van de Laar

At the end of the Middle Ages, Rotterdam was a relatively modest town. However, with the separation of the Northern Netherlands and the emergence of the Dutch Republic, urban development along the Maas River experienced a significant upsurge. Rotterdam benefited from the blockade of the Scheldt during the civil war in the Netherlands. As emerging Amsterdam joined the northern capitalism scene later, Rotterdam had the opportunity to develop into an intriguing port city, playing a significant role in expanding the global commercial network of the Dutch Republic. In 1400, Rotterdam housed a mere 2,500 inhabitants; by the early seventeenth century, this figure had surged to 20,000, and by the late eighteenth century, it exceeded 50,000. This rapid growth inevitably resulted in strains on the housing market. This paper aims to chart this process using spatial data, comparing it with similar phenomena in other cities of the Netherlands, such as Antwerp and Amsterdam, where such developments have already been extensively studied using taxation data based on property rental values, available across various periods.

While these sources have previously been utilized by other historians to delineate the spatial dimensions of inequality, they also carry inherent limitations. It is commonly assumed that they provide a reasonably accurate reflection of the income levels of property owners or tenants. However, these sources tend to underestimate the true extent of inequality within the urban landscape. This is because poorer households are compelled to allocate a more substantial portion of their income towards rental expenses compared to their wealthier counterparts. Poor families indeed required a minimum number of rooms, while there was a limit on the percentage that extremely wealthy families could spend on their accommodation in the city. Moreover, the precision of spatial data presents a challenge. During the early modern period, such data were only accessible at the street level, with the number of streets documented increasing over time. For instance, while tax registers from 1553 list a mere 16 streets, by 1665, this figure had soared to 82, and by 1731, there were records of 155 distinct streets. This escalation underscores the difficulty in accurately gauging urban spatial dynamics solely through historical records.

The examination of social inequality in Rotterdam during the early modern era holds significant interest for two primary reasons. Firstly, the remarkable growth of Rotterdam has been somewhat overshadowed in the historiography of the Dutch Republic, particularly in comparison to the well-documented developments in Amsterdam. Nonetheless, Rotterdam would eventually evolve into one of the world's foremost ports. Thus, this study seeks to address this scholarly gap. Secondly, the spatial patterns observed in Rotterdam diverge from conventional narratives. On a micro level, the Rotterdam pattern shows similarities with other cities in the early modern period, where the wealthy resided along the main roads, while the poor settled in their vicinity in the smaller alleys. However, we also observe a pattern on a macro level. Contrary to prevailing assumptions, affluent households in Rotterdam have been situated near the waterfront since the sixteenth century. This challenges long-standing notions of urban segregation patterns and warrants a reevaluation of existing frameworks.

For a considerable period, historians have predominantly relied upon Sjoberg's model, which posits a stratified urban structure with a small elite occupying central positions, while the less affluent reside on the outskirts. This is referred to as a center-periphery model. However, Lesger and van Leeuwen argue that Vance's model, delineating the transition to capitalist cities in the sixteenth century, offers contradictory results. According to Vance, capitalist dynamics drove spatial segregation processes during the early modern period, with property values primarily dictated by commercial desirability. This model provides a more apt framework for interpreting Rotterdam's urban evolution. Interesting commercial locations in the harbour and along major streets had the highest values.

Comparative analyses with the results for other port cities, such as sixteenth-century Antwerp and seventeenth-century Amsterdam, suggest that Rotterdam's urban dynamics may be less exceptional than previously assumed. In these cities as well, historical evidence suggests a similar phenomenon, with affluent households gravitating towards the old harbors. This was often considered in line with the models of Sjoberg and Vance, but we might need to stress the importance of living in harbour districts during the early modern period. This is remarkable because, in the nineteenth century, waterfront residences became less desirable, prompting the elite to seek housing away from the water's edge. However, during the early modern period, living by the water was considered a mark of privilege.

In conclusion, the study of Rotterdam's urban development during the early modern era offers valuable insights into broader historical trends and challenges conventional narratives of urban segregation. By employing spatial data and revisiting theoretical frameworks, historians can achieve a more nuanced understanding of the complex dynamics shaping urban landscapes throughout history.

There are no unknown places

1 Introduction

Identifying places that are referred to in historical sources is an important part of analysing such sources and understanding better the spatial structures they express (Cooper et al. 2016). It is also an interesting area of research in itself, based on a number of assumption that are often not made explicit. In this abstract some of these assumptions are discussed, giving the background for and discussing its possibly counter-intuitive title. We will then go on to discuss some methods for practical place identification, including a small experiment which is under development. The proposed paper will discuss the results of the experiment connected to the issues raised in this abstract.

2 Definitions

- A **place reference** is any sign (semiotically speaking) referring to what by the creator and/or users of the sign is assumed to be a physical place.
- A **place** is defined in line with E53 Place in CIDOC CRM (Bekiari et al. 2024), that is, a physical location on a reference object, for instance, an area on the face of a planet.
- All places discussed here are on Earth, that is, they are **geographical places**.
- A **declarative place** is a place which is defined by a human made description, for instance, coordinates establishing a polygon, in line with the definition in CIDOC CRMgeo (Hiebel et al. 2015). Declarative places approximate places, but are never identical to them.

Mapping a place reference onto a map is based on the following procedure, in which some of the assumptions (most notably the one in item 4) are not always made explicit:

1. A string of letters₁ is a place reference assumed to refer to a place₂.
2. A declarative place₃ is identified, typically expressed in geographical coordinates, which is assumed to approximate the location of place₂.
3. A map symbol₄ is put on some map at the location of the declarative place₃.
4. The mapping procedure expresses the assumption that the map symbol₄ co-refers¹ with the string of letters₁.

Places referred to from texts are rarely points in a strict geometrical sense. They usually refer to areas such as countries, cities, the place where a person stands at a certain time, or an area referred to as “the corner of the room”. The places are, however, often expressed as points on maps. The points are then assumed to be within (ideally at the center of) the area of the real place.

3 ‘Unknown places’

Places referred to by place references are never unknown in the sense that we have no idea whatsoever where they are. If they are assumed to be real places, they are also assumed to be somewhere. While assumptions such as “somewhere in this galaxy” or “somewhere in the universe” pose interesting philosophical questions,² they will not be discussed further. We will focus on geographical places only, that is, places which are assumed to be somewhere on Earth. This information alone is of course not very helpful. Even the assumption that all places referred to in *Il Milione* (Marco Polo’s travels), insofar they are assumed to be real places, are located in Eurasia is not very helpful in improving our understanding of this textual tradition and its historical and intellectual aspects—but it is a starting point which can be applied to references to ‘known’ as well as ‘unknown’ places.

¹Co-reference is concept primarily known from linguistics, e.g., as a basis for anaphora resolution. It is here used in a generalised sense in which a co-reference is expressing the assumption that two signs both refer to the same thing (Eide 2009).

²Cf. ‘place’ and ‘space’ in (Casey 1998).

4 Place identification

In the methodology suggested here, places referred to by place references are identified through a process of reducing the polygon of the phenomenological place we know the real place to be within as much as possible—but not too much. This reduction is based on the context of the place reference: narrow textual context, wider textual context, other texts, maps, knowledge of landscapes, general world knowledge, etc. and can be implemented partly or fully in computer programs. It is inspired by previous work in the identification of unknown places and borders, most notably on Seydi Gheranghiyeh (2022). The aim is not to identify the exact location of places—in a strict sense this is not possible. The goal is to reduce the room of possibility for the declarative place referred to by the co-reference connection to the place reference as much as possible. The basis for this work is a tool for creating rooms of possibilities for unknown places developed by Frederik Zimmer as part of his BA thesis.³

The textual basis for the experiment is a table of place names with distances taken from Schnitler (1962, 35), a text originally written in the 1740s. The places listed in the table show a standard route from the border mountains in what is today Sweden to the city of Trondheim in Norway, with distances between each of the places. The experimental mapping procedure implemented is the following:

1. Create a place record in a mapping system for each place name in the table.
2. Establish coordinates for each place using the study of modern map, based on the gazetteer in Schnitler (1962).⁴
3. Set parameter values for distance and direction for the span of possible locations of the previous and next place based on interpretation of the length unit used in the source ('miile') and the contextual direction information which can be read out of the intended meaning of the text.
4. For each place:
 - (a) Generate rooms of possibilities from the place before and after.

³*Unknown Places: Automatisierte Identifikation unbekannter Orte aus Kontextinformationen*. Unpublished BA thesis in Medieninformatik, University of Cologne, 2023. The thesis was based on ideas expressed in Eide (2015, 177–180) and Eide (2014).

⁴On the use of gazetteers, see Berman et al. (2016).

- (b) See if the place identified through coordinates in step 2 above falls within the intersection of the two rooms of possibility based on the parameter values used.

In the paper, we will demonstrate running a series of these procedures in which we vary the parameter values for distance, span, and direction. For instance, the length of the danish ‘miile’ (mile) can vary from around 6 to 11,3 km, based on the context of use (Eide 2015, 79), cf Eide (2012, 136–138). We will show how this leads to possible assumptions of how these concepts in an 18th text can be interpreted. This can then be used to reduce the possible geographical room we can assume place references to refer to. Based on the results from this experiment, some suggestions for further research towards a more general solution to the place identification problem will be suggested.

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Administrative Dimensions of National Gazetteers (3rd-12th Century): A Comparative Perspective of Medieval China and the Roman Empire

This paper provides an analysis of a specific genre of national gazetteers in medieval China, and discusses how it was created for bureaucratic purposes during the third to twelfth centuries. It explores a structural transformation of those national gazetteers from official archives primarily recorded in the third year of Taikang (282) to public publications that reached their peak but faded away soon with the collapse of the Northern Song dynasty in 1127. While there are obvious differences in geographical documents between Medieval China and the Roman Empire, the goal is to underscore the shared characteristics that appear to be universal within a comparative analytical framework. Despite originating from different cultural traditions, both sets of gazetteers were dedicated to serve similar political formations characterized by centralized bureaucracies controlling vast territories and populations.

Since the Qin and Han dynasties, governors have required counties and states to submit regular statistical documents containing geographical information. This practice led to the inclusion of a specific chapter on geography in *History of Han* (汉书). A wide range of genres concerning places emerged in the subsequent dynasties, the specific genre under examination in this paper stands out from others in its initiatives, compilers, thematic inclinations, and writing style. Unlike those contemporaneous privately compiled national gazetteers, which spanned hundreds or even thousands of volumes and meticulously detailed regional geographical records of customs, miracles, landscapes, relics, local worthies, and folk religions, the genre of interest here constituted a government-sponsored endeavor, typically encompassing fewer than 20 volumes and motivated by central power and authority. Constrained by its limited scale, the records of regions were curated with the primary objective of facilitating governance over the entirety of the territories, rather than prioritizing local concerns. Notably, its clarity and conciseness set it apart from the *Uniform National Gazetteers* (一统志) of the following Yuan, Ming, and Qing dynasties.

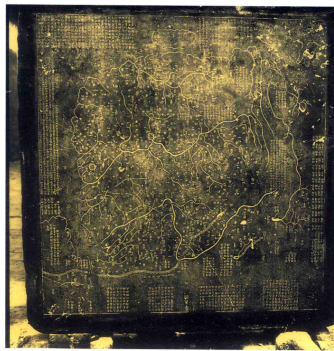
The transformation of this enduring genre can be divided into two distinct stages. During the early Pre-Sui period (280-589), geographical records were typically titled after the reigning year, such as the *Geographical Record of Taikang* (太康地志). Although none of these national gazetteers survived into later centuries, fragments can be found in works such as the *History of Song* (宋书) and the *History of Southern Qi* (南齐书). Subsequently, these gazetteers gradually developed into standardization, regularization, and institutionalization. They were supplemented and rewritten constantly from the Tang to Song dynasties, known respectively as the *Geographical Records of Ten Districts* (十道图) during the Tang, Five Dynasties and early Song periods, and the *Geographical Records of Nine Regions* (九域图) in the middle and late Northern Song Dynasty, also identified by reign titles as their precedents. In the late Song period, the central court appointed professional officials and established a specialized institute to complete frequent compilation tasks. However, the institute was unable to achieve anything due to a devastating war. Two lengthy excerpts from the Tang dynasty have been brought back to life through Dunhuang manuscripts, respectively from the period of Tianbao (天宝 742-756) and Zhenyuan (贞元 785-805). The most well-preserved national gazetteer is the one completed in the third year of Yuanfeng (1080), which serves as a model for what the specific genre of national gazetteers should be like. The survival of

these three documents is not simply due to their relatively later period, but their circulation as public writings rather than in archives in the period before the Sui dynasty. Encyclopedias witnessed the transmission of geographical knowledge from the court to the public, providing insight into lost writings through citations.

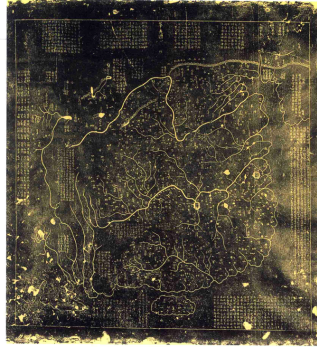


五 法 PeLechin.2522 貞元十道錄

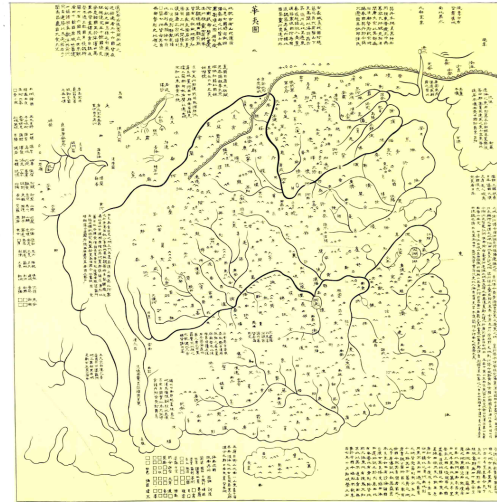
While the aforementioned genre is typically brief, it is more than a mere gazetteer of places. All the contents were selected from original documents, edited, and rearranged to fulfill the needs of the emperor and officials. From the Western Jin dynasty to the Northern Song dynasty, the way of disseminating and preserving national gazetteers changed, yet their fundamental purpose persisted, and the categories of content remained consistent. According to historical records of compilations, national gazetteers underwent several revisions due to changes in the establishment and abolition of prefectures, alterations in the rank of regions, and fluctuations in population. In general, they demonstrated the administrative division system and regional hierarchy patterns of their dynasties. According to their name 'tu' (maps), they were likely not only textual documents but provided attached maps as well. Key data and information, such as population, geographical directions, administrative ranks, financial resources, taxation, tribute, and especially, the measured distances to capitals, served to visualize central power and order within spatial descriptions. With the recording of basic regional information, they contributed to the coordination between local prefectures and the central government, including selection and appointment of local officials, determination of official salaries and staffing levels, and allocation of national administrative resources.



60 华美图原石 (原图石摹刻)
Stone tablet of *Hua Yi Tu* (Map of China and the Barbarian Countries)



61 华美图拓片
Rubbing of *Hua Yi Tu*



62 华美图墨线图
Ink-line sketch of *Hua Yi Tu*

This paper doesn't aim to compare every detail of geographical documents from Medieval China and the Roman Empire. Instead, it focuses on their administrative aspects. Both societies produced similar geographical documents to support bureaucracy, like *Notitia Dignitatum* and *Itineraries* in the Roman Empire. The former included bureaucratic maps showing officials and the latter described distances, stages, road standards, and geographical features, presented in the form of written itineraries or itinerary maps. Strabo's *Geography* is another example, where he gathered information from various sources to explain the present world with historical events and link places to the center, catering to politicians and military leaders. As discussed, both societies' textual records and maps related to administration, routes, and historic events exhibit striking similarities in form and principle, which were primarily crafted for administrative and military purposes. For centralized authoritarian governments, the utilization of textual geographical documents and maps represents a widespread and effective administrative technique. By discussing the similar roles of geographical documents, we may better understand the different interactions of central authority and local communities in each context.

2.16 Digital gazetteers: benefits and challenges of the harvesting tool gazetteers.net

Dariusz Gierczak

In recent times, the media coverages of the Russian invasion of Ukraine clearly shows the importance - and the challenges - of management of data related to geographical names. Ukrainian place names appeared in an inconsistent spelling which sometimes looks like Russian and Ukrainian mixed together. The recipients can hardly distinguish whether a city or a much larger administrative unit is meant. Several levels of the challenges concerning the place names become apparent here: the correct assignment of the relevant language, the periodicity or actuality of the place names, especially since several place names have been changed in Ukraine since 2020, and the location in the respective administrative system.

In the course of history, place names within a language have changed, as an expression of power relations or as a result of a debate about the importance of local dialects among others. Similar reasons can also play a role in the official assignment of a place name in another language. Homonymity also causes confusion because not only are numerous administrative units named after their headquarters, but various places in different countries and in different languages also have the same name.

For centuries, various printed gazetteers have tried to provide orientation, but the large number of such gazetteers and their diverse structures did not make it easy. Some gazetteers cover the whole world and many languages. However, the coverage of separate regions varies. In addition, global gazetteers barely cover small regional languages which in turn become the focus of small, especially digital, initiatives.

Digital gazetteers usually do not reflect administrative changes. As a result, many incorporated towns are often not represented. Recent name changes are also ignored or updated with a delay of several years. Since there is no standard definition of place as a geographical unit (human settlement), the scope of places that are mentioned in the individual gazetteers include individual farms, mills and municipalities. State sovereignty in the course of history and thus also language authority in the respective areas is also mostly not reflected in the digital gazetteers.

The current development in digital humanities creates new possibilities for the use of gazetteers, which also enable a simultaneous comparison of different sources. Still, the sheer number, different geographical coverage and metadata schemes of digital gazetteers make it difficult to compare existing gazetteer entries systematically and to use existing data in other applications. At the same time, current digital gazetteers show how geographical orders of knowledge are transformed from analogue structures (for example, printed indexes) into digital structures.

The research project of the Herder Institute for Historical Research on East Central Europe (Marburg), the Institute for Regional Geography (Leipzig) and the Justus Liebig University Gießen, developed a publicly operational web application, gazetteers.net, which allows exploring content and metadata structure of several gazetteers simultaneously. The gazetteers.net web application enables users to search several place name-related databases in a unified manner and to view and compare data from different gazetteers. The application

supports also the identification of items in different databases that refer to the same geographical entity, regardless of the definition of geographical place in the individual gazetteers or its administrative status. By linking corresponding items across gazetteers, the application facilitates data aggregation and comparison. In addition to the major and well-known web gazetteers, the official gazetteers and some small local gazetteers for a selected country (Poland) have been connected in order to be able to cover regional languages and historical names. A comparison of these specific and general gazetteers has also facilitated, among other things, the identification of differences regarding languages, spelling and administrative changes throughout history.

The project team examined existing digital gazetteers for their structure (semantics, description of metadata) and content (reliability of assignment between place names and coordinates). The project team also discussed geographical discourses inherent in existing gazetteers and examined strategies to reveal specific power-knowledge relationships within existing gazetteers. Having examined the results of this testing, project participants revised and refined the metadata structure and web application interface. The recent version of the harvesting tool was launched online after a positive evaluation by the expert communities. Despite the current regional focus of the project, searches can also be conducted at the global level. Current work on the tool is aimed at finding a way to incorporate more gazetteers, for example, of other countries or regions, without sacrificing clarity and responsiveness. Since the application is designed to support searches in the existing gazetteers, the quality of the results depends directly on the quality of each connected source.

2.17 EMEW: Building a Gazetteer of Early Modern England & Wales

Stephen Gadd

This paper describes the ongoing creation from historical primary sources of “EMEW”, an online Gazetteer of Early Modern England & Wales. The speaker is Technical Director of the World Historical Gazetteer, and was (as an early modern historian) co-leader of a public history project, “Viae Regiae”, which crowd-sourced the transcription and geolocation of various early modern maps and texts. EMEW is intended as both a qualitative and a quantitative resource for economic and transport historians interested in the spatial development and decline of commercial networks over time. The paper gives a detailed account of the diverse computational processes and tools employed in the preparation of the various Linked Open (Geo)Datasets which will constitute EMEW.

At the core of EMEW will be a digital rendition of “Index Villaris”, a list of some 24,000 place names first published by John Adams in 1680, and the first gazetteer of England and Wales to attempt the inclusion of geo-coordinates. The AI-based transcription tool “Transkribus” was first trained to recognise the idiosyncrasies and symbology of the published source. The resulting transcript was then corrected manually, and GIS techniques were used to transform Adams’ coordinate reference system (CRS), aligning the place names more closely with their known modern locations. The entire dataset was then processed using “Locolligo”, a tool developed by the speaker for a project based at the British Library, which facilitates the geospatial linking of datasets. Index Villaris place names were thereby linked as far as possible to Wikidata, to Open Street Map (OSM) road nodes, and to place names from the GB1900 Gazetteer. The GB1900 Gazetteer is itself a crowd-sourced dataset comprising all of the textual content of the Ordnance Survey six-inch to the mile maps of England, Scotland and Wales, dating from 1888-1913, and amounting to some 2.5 million names.

Supplementing Index Villaris, EMEW will include datasets derived by *Viae Regiae* volunteers from Christopher Saxton’s county maps (published in the 1570s) and from records of John Leland’s travels in the 1530s. These were prepared online collaboratively using “Recognito”, a geolocation and transcription tool that employs IIF for serving both maps and texts.

EMEW is to be bolstered further by the inclusion of a dataset which geolocates all of the monasteries closed during the English Reformation, adding temporo-spatial dimensions to any study of this period of especially-significant economic upheaval. A dataset of markets and fairs in England and Wales, originally covering the period to 1516, is being extended to 1900 through traditional archival research, exploring Crown patents and court records held at the UK National Archives. Yet another dataset originating in a War Office survey of accommodation and stabling made in 1686 will add a qualitative proxy-dimension to the market towns recorded in Index Villaris six years earlier. Together, these datasets will help with charting the changing economic status of both localities and regions.

The paper will also describe the speaker’s work on “desCartes”, a computational workflow which employs AI, computer vision technologies, and Python notebooks to attempt the extraction of road vectors from historical maps. Using a combination of random forest and convolutional neural networks for pixel classification, the initial aim is to produce a vector

road map from the same set of Ordnance Survey maps as was used to produce the textual data of GB1900, which were surveyed before the commencement of major road-building programmes. Through further research identifying roads built following the legally-authorized compulsory purchase of land or those created by the documented process of enclosure, this vector road map will form the basis for historical regression. Ultimately, it is hoped that a digital map will be produced representing speculatively the development of the road network of England and Wales since 1540, as both a driver and indicator of historical economic development.

World Historical Gazetteer (WHG) provides a collection of content and services that permit world historians, their students, and the general public to perform spatial and temporal reasoning and visualisation in a data rich environment, at local, national, global and trans-regional scales. Among the array of WHG services is the “Dataset Collection”, which allows users to group together datasets which share a common theme. This paper concludes with an account of how this feature is being used to create EMEW.

Many of the key themes of the 5th Spatial Humanities Conference are addressed by this paper. In particular, it highlights the use of gazetteers, artificial intelligence (computer vision and deep learning), spatial explorations of narratives, GIS and spatial statistical analysis, spatial connections and networks, linking maps and texts, geospatial data enrichment and annotation, historical maps and georeferencing, Linked Open (Geo)Data, IIIF applications, labs notebooks, workflows and infrastructure, data mining, visualisation, and the challenges of geolocation.

The Lure and Limits of Linked Data: the case of World Historical Gazetteer

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Introduction

Spatial humanists and others have long recognized the enormous integrative potential of using places as common points of reference for heterogeneous information. To realize that potential, collections of named places must be *abundant*, *diverse*, *collectively assembled*, and *historically deep*. In 2017, the World Historical Gazetteer (WHG) project based at the University of Pittsburgh undertook to build a freely available web platform¹ that would facilitate the collaborative development of such a collection, and to provide multiple ways of accessing its continuously growing results. Version 1 of the WHG platform was initially launched in 2019, and in 2021 voted “Best DH Tool or Suite of Tools” in the annual Digital Humanities Awards. Version 2 followed in April 2022, and a Version 3 is due in mid-2024.

The approach taken by the WHG project for assembling, linking, and publishing diverse place data as a free web resource utilizes the technological and social elements of the Linked Data paradigm (LD), as its characteristics match the requirements of a comprehensive digital historical gazetteer well (Bol 2011, Grossner, Keßler, and Janowicz 2014). These include (i) *extensibility*, due to its underlying graph-based conceptual model; (ii) *multivocality*, by accommodating multiple possibly conflicting statements about the same phenomena; (iii) *integration* and (iv) *sustainability*--both facilitated by an expressive standard interchange format expressed in RDF².

The union index has grown to well over 2 million "clusters" of place attestations, i.e. sets of attestations for the same (or closely matched) place from multiple sources. Many additional datasets are published in the WHG and not yet added to the union index, and many more are at some earlier stage of accessioning. The WHG is in fact *collectively assembled*, and is well on its way to being *abundant*, *diverse*, and *historically deep*.

A different kind of gazetteer

The WHG is not so much a gazetteer as it is a collection of gazetteers, generically termed *place datasets* in the platform. The records from datasets published in the WHG are to a large extent internally linked by their creators in a "union index," and accessed via faceted search and an application programming Interface (API). Individual datasets are also presented as publications within the system and can be browsed and queried as such. The WHG platform provides features for performing the linking of data and disseminating the results as truly "linked open *usable* data" as advocated and described by Sanderson (2020).

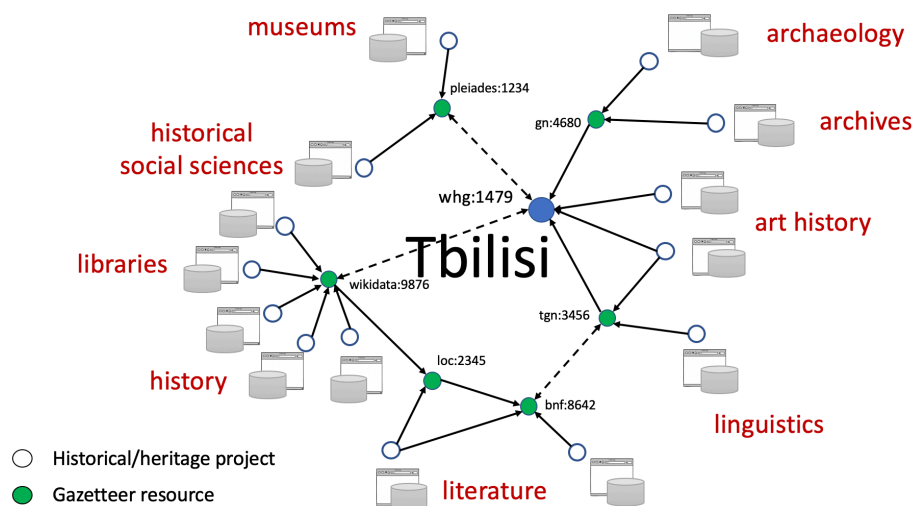
The lure and the promise

Knowledge about the past derived from research outputs, archives, and library holdings can be brought together indirectly with Linked Data methodology by common references to places. In Figure 1, each project (clear circle) has some information pertaining to Tbilisi, concerning perhaps museum holdings or historical events. Each project has within its research output a listing of all the places its work references--including Tbilisi. For each place they have identified one or more identifiers from an

¹ World Historical Gazetteer, <http://whgazetteer.org>

² RDF (Resource Description Framework) is the core *subject-predicate-object* data model underlying Semantic Web and Linked Data methodologies

"authority" resource such as Getty Thesaurus of Geographic Names (TGN), Bibliothèque Nationale de France (BnF), GeoNames, or Wikidata (green circle). By publishing their place records in the WHG, projects are in effect announcing "we have information about {x} and Tbilisi." A search for "Tbilisi" -- or any of the 70 name variants gathered from linked records -- will currently return a set of 7 attestations, each from a different source.



linking knowledge about the past via place

Figure 1 - Linking projects and disciplines with place

Multivocality. Linked Data methodologies facilitate the surfacing of suppressed place names and difficult histories by supporting peoples' discoveries about past places. It can allow genealogists and others to discover common historical connections to places, even if ancestors had different experiences at them and may have called them by different names. A visitor to the WHG who searches for *Ayers Rock* finds information about *Uluru*. A search for *Tenochtitlan* returns *Mexico City* and *Ciudad de México* (and vice versa), and a search for *Batavia* links to *Jakarta* as well.

Teaching. An index of linked gazetteers is a powerful teaching tool. By exploring how the same name recurs across the globe, students can trace contours of immigration, conquest, and political power. The WHG *Place Collection* and *Collection Group* features support classroom exercises for creating and annotating collections of thematically linked places.

The limits

Sparse temporal information. Relatively few historical place attestations include timespans indicating a period of existence; publication year of the source is often all that is available. For this reason, it is not possible to get comprehensive results when filtering on a year, timespan, or period, or to make clear the distinction.

LD is not (necessarily) curated. A stated premise of the original RDF model design was that "anyone can say anything about anything" (W3C 2002). This is a blessing and a curse: it affords essential multivocality, but the quality of an information resource can suffer, and contributors to an LD graph have no control over who says what about their statements.

Disambiguation and conflation. The requirement for one record per place is a burden for many potential collaborators. Places can have multiple names, types, extents/locations and relationships over time. Aggregating these attributes within a single record can be difficult.

Semantics. There is little agreement as to some essential categorizations, e.g. of place type. The WHG allows any term to be added for type, but because contributors resist mapping their terms to the common vocabulary we offer, reconciliation results and filtering of search results by place type are somewhat hampered.

Looking Forward

Historian Jo Guldi recently asked how to take a digital, quantitative approach to history that still maintains the complexity of past human experience and the heterogenous, ambiguous, and ideologically embedded sources in which it is represented (Guldi 2023). Geographer Ruth Wilson Gilmore argues that struggles for racial justice are always also struggles for place (Gilmore 2022). Linking multiple digital humanities projects together is on its face a worthwhile goal, but there is still work to be done to determine how best and most ethically to do that while honoring the fact that each project has its own unique and organic relationship with a data-sharing community, one that may be vulnerable and may have a history of exploitation (Smith 1999). This is a complex practical and epistemological challenge, one that linked data makes both easier and more complex in various ways, and with which the WHG continues to wrestle.

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2.19 A Geospatial Approach to Modelling Social, Religious and Political Shifts in History

Mária Vargha, Stefan Eichert

From the 10th c. onwards, new polities emerged on the periphery of the Holy Roman Empire (HRE), the new centre of Christendom. Endowing Christianity as an institutional system was integral to the emperor's power, expanding his influence and securing his rule in the new kingdoms. Previous narratives have been generally constructed on the basis of limited written accounts, which mainly concern the higher echelons of society, emphasising the role of secular and ecclesiastical elites. However, the ecclesiastical and secular administrative organisation of the rural population could not be reconstructed satisfactorily from these sources, despite their importance for the stability of both State and Church.

The present poster introduces the ERC StG RELIC (Modelling Religiopolitics. The Imperium Christianum via its Commoners), which proposes a complex, comparative analysis and contextualisation of archaeological and historical remains of the rural population living on the eastern fringes of the later HRE during the Ottonian and Salian periods (10th -12th c.), exploring the influences of centres and networks of secular and ecclesiastical lords, of the natural environment, and of the economic infrastructure. Investigating this often-overlooked segment of the population, its hitherto unexplored or neglected role allows us to study how (top-level) changes in political and ecclesiastical organisations can be reflected in the evidence concerning the lower levels of society and of the local church network; how different strategies worked in different political settings, and what role local initiatives/agencies could have played in religious and political shifts. The archaeology of Christianisation frequently focuses on one crucial aspect i.e. the division of pagan and Christian elements, based predominantly on cemetery types and some aspects of the material culture. The spatial contextualisation of the burial customs and material remains, especially their comparative and large-scale analysis, could potentially bring new narratives about the pagan-Christian transition and the phenomenon of transitional cemeteries.

The project uses the OpenAtlas (<https://openatlas.eu>) framework to conduct this analysis, with respect to particular characteristics of object types and burial customs that are relevant to Christianisation (<https://openatlas.eu>, <https://thanados.net>). In the OpenAtlas framework, the data entry is directly mapped into predefined networks following the International Council of Museums' Conceptual Reference Model (CIDOC CRM). The model allows compatibility with different large datasets and easy dissemination to the public, also providing built-in features for fundamental statistical analysis. The system also allows the exportation of data, which can be further analysed in already existing systems that provide more possibilities for sophisticated analysis, such as diverse GIS programmes or R framework. Proximity, network, and catchment analysis will be conducted on the site level. Based on the results of the proof of concept research, the relation of the early church network to the landscape and to the early centres and power structures will be investigated by reconstructing 'areas of influence' of the early church network, based on factors (environmental, political, social) influencing their site selection. The spatial contextualisation of the – primarily archaeological – results creates a unique narrative concerning

spatial dynamics characterising the religious organisation of commoners, which can be compared to existing historical and archaeological theories concerning the role of central power and the circumstances the rural population and the local church network played a part in the stabilisation of Christianity.

RELIC's innovation is supplementing large-scale spatial-quantitative analysis of site level historical, art historical and archaeological data with in-depth qualitative comparative analysis of thoroughly-researched and published churchyard cemeteries. The spatial-comparative approach will identify the spatial configuration of social and religious networks of institutionalised Christianisation, and this spatiality will be interpreted also as a proxy to the chronology of the process – of adaptation and expansion, beyond the point of view of the elites exposed in the chronicle tradition. Different regional patterns will point to different dynamics, hinting at the respective causes, for example, different levels of influence of the Church and the secular state, the problems of centralised coordination, of gradual or rapid expansions, how this process potentially influenced the later reorganisation of social structures, of settlement networks and their nucleation processes. The comparative model of archaeological and historical data will contribute to a better understanding of rural society and its adaptation to the new social and religious systems and offer a 'view from below' on major political and religious processes.

The present paper proposes to introduce RELIC as a methodological model that can be applied to other areas of historical studies with thematic questions, especially fields where traditional historical evidence is lacking. The project is developing a digital database of features connected to Christianisation, and the present paper showcases the upsides and challenges of the extensive, digital, geospatial database.

2.20 Layering Sources in GIS as a Method of Historical Deconstruction and Source Criticism

Julius Wilm

Abstract

This paper explores the potential of Geographic Information Systems (GIS) as a method for historical deconstruction and source criticism that can address the limitations of quantitative approaches in contemporary historical research. While quantitative methods in history have lost prominence, especially in light of the New Cultural History's emphasis on power dynamics and the shift towards centering marginalized populations, this paper proposes a novel approach using GIS to analyze quantitative sources in a more critical manner. The method involves layering different sources to reveal and transcend biases inherent in historical data and its creators, thereby offering a nuanced understanding of complex historical formations. The discussion draws on the web map "Land Acquisition and Dispossession: Mapping the Homestead Act, 1863-1912," published by the author together with Robert K. Nelson and Justin Madron in the online historical atlas American Panorama in 2021 as well as the author's Post-doc project on the same theme at Leipzig University's SFB 1199.

Introduction

Historical research has witnessed a shift away from quantitative approaches, once considered pivotal for representing historical reality on a large scale. The data positivism associated with historical statistics has been criticized for reflecting the perspectives of the entities generating them, such as governments and businesses. The rise of the New Cultural History, with its emphasis on power dynamics and marginalized populations, further challenges the utility of quantitative history. In response, this paper introduces GIS as a method that can transcend the limitations of earlier quantitative approaches by employing a layered approach to historical data.

Background and Rationale

While the digital humanities and digital history have contributed to a modest revival of statistical methods in history, they still need to fully address the reservations raised against their quantitative predecessors. Also, many digital projects focus on visualizing sources rather than developing new arguments. Quantitative methods, therefore, remain rare in historical studies. This paper advocates for the use of GIS and georeferencing as a means to break with the data positivism of earlier quantitative approaches, providing a framework for historical deconstruction and source criticism.

Methodology

The paper discusses the application of GIS, specifically using open-source software like QGIS, to layer different historical sources. This method allows researchers to acknowledge and navigate the one-sidedness of certain source groups, providing a historical representation from multiple perspectives. The layering process enables the integration of diverse data sources while recognizing and accounting for inherent biases. The paper emphasizes that, despite the digital nature of GIS, the used data should be approached with the same level of source criticism as traditional historical research.

Case Study

The primary case study draws on a Postdoc project at Leipzig University's SFB 1199, which investigates the impact of the U.S. Homestead Act of 1862 on Indigenous nations. As with many studies on colonial history, the project encounters an uneven source situation, with limited statistical or other uniform source sets from Indigenous actors. The paper demonstrates how GIS layering can help to address the one-sided source situation. Layering sources such as statistics on homestead land claims, maps of Indigenous land cessions and reservations, and data on frontier clashes between Indigenous nations, U.S. Army personnel, and civilians can help us deconstruct and contextualize these historical data layers. We gain a more critical understanding of the source datasets and their biases while maintaining the source datasets' grand scope and explanatory potential. The methodology promises to combine the critical edge more common to small historical case studies with the large scale and long duration of macro-historical approaches.

Conclusion

The paper presents examples from the author's research on the intertwining of homesteading and Indigenous dispossession between the 1860s and the 1910s. It shows that many legal assumptions regarding the nature and timing of the historical process by which Indigenous lands became U.S. government property and only later were opened to white settlement bore little relation to reality. The real process was messier and more violent than a focus on statute books, land statistics, or even a singular focus on frontier violence would suggest. While alone, the different datasets would tell very one-sided stories, their combination creates a framework for a nuanced history on a grand scale. In telling this history, the paper proposes GIS layering as a valuable method for historical deconstruction and source criticism, especially in contexts with limited or biased data. By acknowledging and addressing the one-sidedness of historical sources, GIS potentially allows for a more nuanced understanding of complex historical processes. As the discipline moves away from quantitative approaches, GIS provides a digital method that aligns with the principles of historical source criticism, fostering a more comprehensive and inclusive historical scholarship.

Towards a spatial history of Cold War operational planning

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This paper reports on the first step towards developing a GIS-based methodology for analysing military operational plans from the Cold War. During the Cold War, the military of both NATO and the Warsaw Pact carried out a comprehensive military planning for the potential military confrontation between the two alliances.

Military planning documents is complicated historical source due to combination of both text, diagrams and cartographic representations used to convey the complex spatial relationship between the operational environment, the objective (intentions) of own forces and information about the capability and deployment of own and enemy forces. An important component of the plan complexes are the cartographic representations of the operational plan, typically drawn directly on topographic maps or on different types of overlays. In the NATO planning system, these cartographic representations are supplementary to text documents, while in the Soviet / Warsaw Pact system, the map is the central planning document with the text and diagram being second.

However, these maps are difficult to analyse due to a number of reasons. First, the number of maps as well as the amount of information on the maps makes it difficult to analyse the plan. In many cases, information is distributed on several maps at different scales covering vast geographic area include a spatio-temporal dynamics. Second, some difficulties are related to the specific cartographic technique used by Cold War militaries. Maps prepared in relation to NATO operational planning are often made on overlays, which needs to be viewed on top of a topographic map in order to provide a spatial reference. Such topographic maps for reference are typically not available at the reading room at the archive. Maps made by the Warsaw Pact armies are typically drawn directly on composite topographic map sheets, which cover the entire operational area. Depending on unite size and reference scale, such an operational area can be as much as whole of Western Europe. This means that the maps can be as lager as up to almost 18 square meters, which is almost impossible to view physically in detail. The physical size also means that digitization is difficult and that the output often comes as several parts, which is difficult to read without further processing. The complicated nature of the source material are probably also one of the reason behind the limited application of the cartographic content of the plans in Cold War research. Current research often ignores the spatial component of the plans in favour of the text, thus reducing the cartographic representation and spatial diagrams to illustrations.

Based on comprehensive archives from the Danish military for the NATO commands COMLANDZEALAND and COMLANDJUT as well as the Polish General Staff during the Cold War, we propose the first steps towards a GIS-based methodology for analysing the history of cartography of Cold War operational planning. The proposed method consists of two parts.

First, we aim to develop standard protocols for the georeferencing of plans from NATO as well as Warsaw Pact. For NATO plans, we propose to use the UTM-grid and coordinates as the main geographic reference and persistent geographic features from a reference maps as secondary in cases, where it is not possible to use the UTM grid or coordinates. For Warsaw Pact plans, we use the grid and coordinates related to the Soviet SK42 system and persistent geographic features as secondary.

Second, we aim to develop a GIS-ontology, which can accommodate the cartographic content of the plans within the standard geometry in vector-GIS. This is not a simple task, because the Cold War plans in most cases were drawn by hand applying different symbols and colours to show the content of the plan visually on a paper map. In some cases, such as with deployment areas, these are represented as area, which can easily be digitized as polygons in GIS. However, in other cases large arrows are drawn on the map to show axis of advance. These could be digitized as either a line or a polygon. In addition to these two, examples additional complexity can be added in relation to time and scale of the different plans, as well as the need for combining information from different maps within the operational plan complexes.

Despite these methodological difficulties, our results from our initial development has shown, that such GIS-data and visualizations can add significantly analytical power to the analysis of the Cold War operational plans. In addition, digital vector layers from the historical Cold War operational plans could also provide the source basis for a new historical geography of Cold War operational planning.



Extracts show examples of NATO and Warsaw Pact operational planning for an operation on the Island of Zealand, Denmark in the 1970s.

2.22 An End-to-End Open-Source Methodology For Spatial Humanities: From Textual Annotation to Spatial Analysis of Infrastructure in Late Imperial China

Sunkyu Lee, Taylor Zaneri, Sander Molenaar, Meret Elisabeth Meister

This paper will present the open-source methodology developed as part of the In-fraLives/RegInfra projects. This combined team, based at the International Institute for Social History in Amsterdam and KU Leuven, is examining how the construction and maintenance of major infrastructures such as roads, walls, and bridges shaped relationships between state power and regional entities in late imperial China (1000-1900). The creation of infrastructure involved the intentions and actions of many different actors at local, regional, and state levels, which were mitigated by factors such as economic realities, environmental events, and conflicts. Untangling these factors requires the ability to handle large datasets from a variety of different sources in a spatiotemporal framework. This paper will demonstrate the methodology developed to address such needs, both within our specific project and spatial humanities projects in general.

We will first explain the workflow of our project. The workflow involves 1) the annotation of infrastructural events (including spatial references) in historical gazetteers and visual images, 2) organizing and structuring the data into an event schema, and 3) analyzing data in a spatial and network analysis platform. We will demonstrate and discuss the processes involved in each of these steps, and the programs which were developed for this work.

Subsequently, we will present three case studies focused on city walls and bridges in late imperial Shanxi, Fujian, and Hebei provinces, which use this methodology to address the following questions: 1) what kinds of actors were involved in the creation, maintenance, and destruction of infrastructure, 2) what were the driving forces (environmental, political etc.) behind the construction of these objects, and 3) what were the physical materials and processes that were involved and how was labor organized?

The first case study, focused on Shanxi, will examine the material transformation of walls in the sixteenth and seventeenth centuries. During this time, walls were newly built or rebuilt using more solid materials such as bricks or stones to strengthen their defense capacities against foreign incursions and internal disturbances. The subjects of this transformation include both the extensive wall structures built on Ming-Mongol boundaries (known as the Ming Great Walls) and the enclosed wall structures, including military forts and cities under the civilian administration. Based on the textual inscriptions and city maps in gazetteers, this work visualizes the evolution of masonry walls in Ming northern frontiers of Shanxi, and analyses who drove this transformation. Local magistrates and elites led this transformation despite famines and local food crises in the challenging time of the Little Ice Age. This case study investigates the contribution of local actors, and how their interests were reflected in the physicality of city wall compounds in terms of the choices of building materials, dimensions, and attached facilities to the main wall body, such as barbicans, towers, and platforms.

The second case, focused on Fujian, examines the spatial distribution of Buddhist involvement in bridge and city wall constructions and overlaps the results with a spatial visualization

of Buddhist institutions to explore relationships between state power and regional entities. Inscriptions in late imperial Chinese gazetteers give the impression that infrastructure construction was primarily a joint undertaking between local magistrates and elites, which is not surprising considering the importance of both in the compilation of gazetteers. However, frequent references to Buddhist monks hint at an important role for religious groups in the construction of infrastructure. The comparison between city walls and bridges, which differ significantly in terms of scale, cost, and strategic value, helps to visualize the extent of Buddhist involvement in infrastructure construction. In addition, while inscriptions often mention individual Buddhist monks involved in construction projects, the spatial visualization of Buddhist institutions shows the extent to which these individuals were embedded in broader Buddhist infrastructures. This case study uses infrastructure events to highlight the role of Buddhists in local society and their relationship with local magistrates and elites.

The final case study, focused on Hebei, examines the representations of bodies of water and infrastructures such as city walls. It makes use of a comparative analysis of textual inscriptions preserved in gazetteers and visual materials such as sketches of maps found in these same gazetteers. Hebei exhibits vastly different geographical conditions. By locating counties in their geographic reality, we can identify patterns of vulnerability regarding water-related issues that counties in specific locations faced. Comparison to events mentioned in inscriptions that directly impacted walls and bridges at these locations shows how this vulnerability was understood and managed. After collecting relevant information on destruction and construction events through text annotation the visual representation of the counties in question within the gazetteers is annotated and analyzed by looking at the image in detail, utilizing an iconographical approach. Here the divergence of the images depicting the county landscape from other maps and the topographical reality comes into focus and reveals the attitudes of the producers toward the environment and their perceived place within it.

The methodology discussed here is generalizable and open source and therefore can be adapted by scholars working in spatial humanities. We will conclude our paper by discussing how other researchers can take advantage of this workflow for their projects.

2.23 Inventories for Eternity? A History of Science in the Inventorying of Monuments during Times of Transformation

Franziska Klemstein

Monument inventories have existed in Europe since the 19th century, but only a few are still available digitally today. The following article discusses how relevant data on the monument inventory of the German Democratic Republic (GDR) and the Federal Republic of Germany (FRG) can be found in (digital) archives/repositories and why it makes sense to transfer information from analog sources into digital formats. Furthermore, the data quality of current digital data on monument inventories in Germany is examined, followed by the derivation of further steps for the visualization of various monument inventories. Three different approaches will be evaluated: 1. the use of Python, 2. the use of FactGrid and 3. the use of WissKi in combination with a Flask framework. These approaches will be demonstrated using the case study of the Berlin monument inventory at the time of the merging of monument lists from the GDR and the FRG.

Inventories and Maps of Monument Inventories in Germany

Digital maps depicting the current inventory of monuments exist in great numbers; however, thus far, they have always been limited to individual federal states or monument regions and only rarely designed to be interoperable or reusable.

Furthermore, they all lack a temporal component, creating the impression that monument registries are an immutable product. The project outlined here contributes to the creation of an interactive platform aimed at highlighting historical changes in the monument inventory, strengthening awareness of cultural heritage in Germany, and promoting dialogue on monument conservation and inventory processes.

The focus of the project lies in the development of an innovative, map-based web application that allows for the visualization of temporal and spatial relationships and changes. This not only fosters understanding of the history of the monument inventory but also facilitates the identification of trends in societal and political engagement with it.

Due to the multitude of lists, inventories, and other data and source collections, this will be exemplified within the scope of the presentation using the federal state of Berlin.

Data Quality and Methodology

When examining the data and sources, three problems immediately become apparent:

1. Outdated street and object designations that hinder clear assignment,
2. General lack of geodata/georeferencing, and
3. The challenge of capturing analog information as well as transparency regarding the provincial nature of the data.

Furthermore, questions arise regarding how geodata is modeled and processed. This includes the standardization or transformation of coordinates. In the case described here, the decision was made for the decimal degree system. In the absence of coordinate data, spatial reference information was assigned through geocoding using Python. Regarding GIS data

quality, efforts were made to adhere to the appropriate ISO 19157. Additional information on objects that could be extracted from the topographies was also stored in an OpenDocument database at first hand.

Three different approaches are presented in this study with the aim of evaluating possible ways for creating an application that is as sustainable and lightweight as possible and that can be connected to other projects and initiatives, such as the National Research Data Infrastructure.

1. Inventories of Monuments in a Python Environment

In terms of the methodological approach, it may be surprising that established GIS software is not used. However, this decision was consciously made because working in a Python environment does not require software installation, thus being resource-efficient and flexible (also regarding different operating systems). Moreover, the focus of the project study presented here lies on the visualization and analysis of geodata representation rather than the capture and management of extensive datasets. Working with Python also allows for easy export options for visualizations, enabling straightforward embedding into web applications. Additionally, various forms of visualization can be quickly implemented and easily adjusted and re-visualized depending on the question at hand. The folium library builds on the strengths of the Python ecosystem in data processing and the strengths of the Leaflet.js library in mapping, making it easy to manipulate data in a Leaflet map. In addition to representing data in the form of points (markers), polygons can also be created.

1. Inventories of Monuments in FactGrid

Using FactGrid to store and analyze information about heritage inventories offers several compelling advantages. FactGrid provides a structured and collaborative platform specifically designed for storing and organizing historical data. This structured approach ensures that information related to heritage inventories can be systematically cataloged and easily retrieved, facilitating efficient research and analysis. Furthermore FactGrid supports the creation of interconnected datasets, allowing researchers to explore complex relationships between different elements of heritage inventories. By linking related data points within the FactGrid framework, users can uncover hidden patterns, trends, and connections that may not be immediately apparent through traditional methods of analysis.

1. Inventories of Monuments in WissKI in combination with a Flask-Framework

Combining WissKI with a Flask framework presents a compelling approach for analyzing monument inventories in space and time due to several key advantages. WissKI provides a structured environment specifically designed for managing and analyzing complex historical data, including monument inventories. Its flexible data model allows for the organization of spatial and temporal information in a coherent manner, enabling researchers to capture

the nuanced relationships between monuments, locations, and historical contexts. By integrating Flask with WissKI, researchers can create interactive visualization tools and analytical interfaces that leverage the structured data stored within WissKI, enabling dynamic exploration of monument inventories across different spatial and temporal dimensions. Moreover, the combination of WissKI and Flask enables scalability and interoperability, allowing researchers to seamlessly integrate additional data sources and analytical tools as needed.

MEHDIE - Data Integration Tools for Spatial Humanities in the Middle East

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Ancient civilizations in the Middle East overlapped in time and space with others. Many of their writings are originally unstructured text in ancient languages or ancient dialects of modern languages. Thus, humanities scholars studying these civilizations are required to specialize in one or a few of these languages, causing them to be siloed from other researchers and limited to these sources. Recent efforts in extracting information from historical scripts into place names (toponym) and people names databases (prosopographies) have followed this pattern, focusing on one civilization or even one scholar. For example, the Syriaca project (Gibson et al. 2017) presents a comprehensive gazetteer extracted from sources in the Syriac language. If we wish to allow scholars to interact with the works of others and integrate it with their own, we need a common database. A prominent example of such an initiative to create a common database is the World Historical Gazetteer (WHG, Grossner and Mostern, 2021), which allows researchers to upload their toponyms to a common repository. However, beyond being able to link their data to wikidata, the WHG does not provide a means to link one scholar's work to another.

The Middle East Heritage Data Integration Endeavor (MEHDIE, Rusinek et al., 2023) is a project aiming to create language-aware spatial data integration tools for the alignment and matching of datasets created from different historical sources and for different purposes. We use several approaches to perform the matching. A syntactic approach augments known name variants with transliterated variants to other semitic languages to perform syntactic comparison between variant pairs in the same script type. A phonetic approach converts the toponym titles to their International Phonetic alphabet representation. A machine-learning approach utilizes a shared embedding space created for the languages and scripts in the Middle East allowing a semantic comparison between the meanings of the names. Finally, a graph-based approach utilizes related places to assess similarity. Related places are those whose distance or hierarchical relation to a place is known. We perform graph-learning over the created place-relations graph to calculate similarity between the sub-graphs.

The tool itself is publicly available to humanities scholars to use and attempt to match their own data with that of other scholars. We can extend the tool to handle other language families and hope to pursue such extensions in the near future. Figure 1 shows an example of the tool's interface that allows the user to see a place (Dendara, in modern day Egypt) on the map and a navigable related-place graph for all the places that have been found to be related to this place by our matching tool and through external referencing.

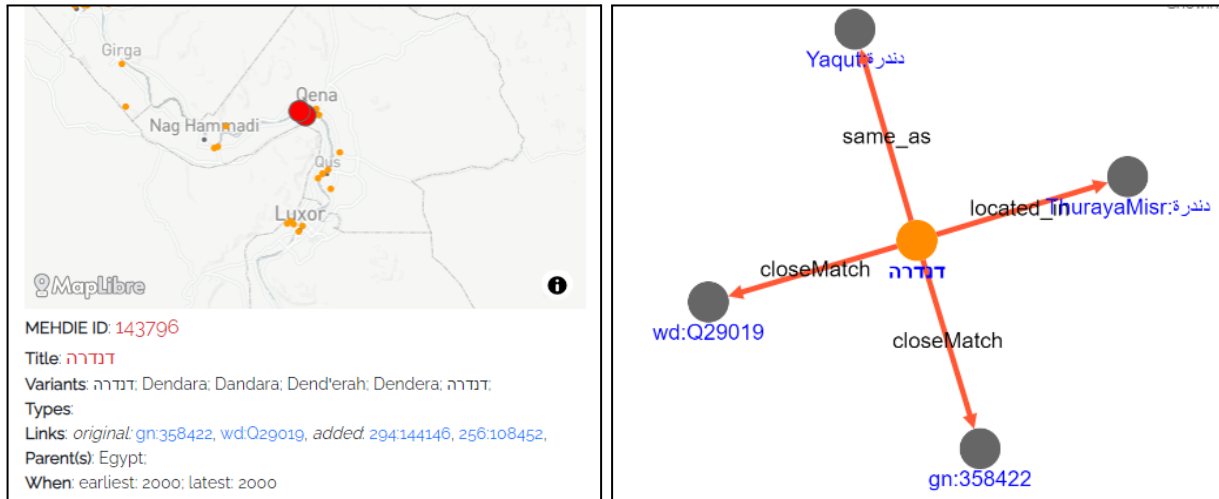


Figure 1: an example from the MEHDIE tool: Dendara in the Kima dataset matched to places from other datasets.

Using the MEHDIE tool and hopping between the map and the linked place identities, historians and other humanities researchers can enrich their knowledge with related information. For example (Figure 2), a historian who studies the history of the coast of Arabia in the Persian Gulf can now enrich the military and cultural information she receives from reading Yaqut Al-Hamawi (A Muslim geographer) about the Qatif oasis, with new information about the pearl industry there, provided by Benjamin of Tudela (a medieval Jewish traveler). The scholar of Jewish history, on the other hand, may follow the graph from Qatif to its geographic parent, and learn from Yaqut about the history of Jews in the Caliphate country of Bahrain.

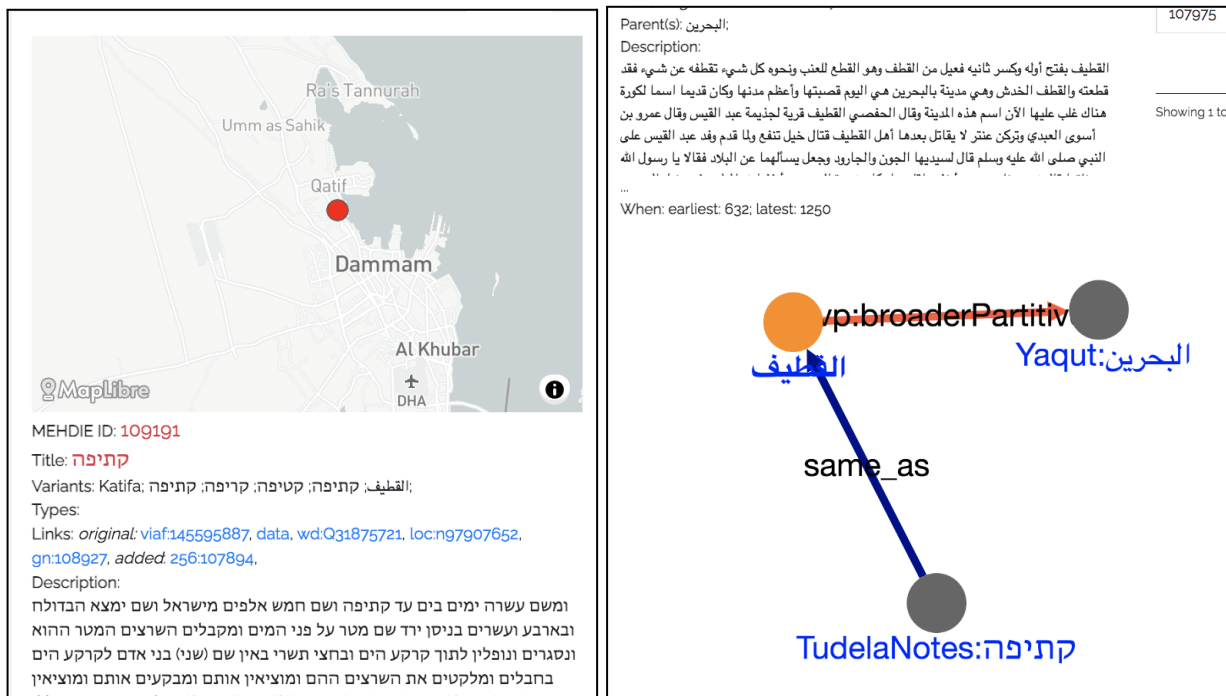


Figure 2: an example from the MEHDIE tool: ‘Katifa’ in Benjamin of Tudela on the left, matched with ‘Al-Qatif’ from Yaqut Al-Hamawi, on the right, with a graph visualizing their match and the relation of Qatif to Bahrain.

Keywords: Data Integration, Multi-lingual, Toponym matching, Middle East

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Applying Digital Humanities Methods to Historic Damage Maps

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Despite war being such a major catalyst for urban change, postwar planning and reconstruction still remains an important field for further investigation. The existing literature has investigated this topic through several lens': architecture, urban archaeology, heritage, urban design, city planning, critical cartography, and social geography. Existing accounts have documented the number/type of bomb attacks on selected cities (e.g. Hohn, 1991; 1993) and the subsequent damage caused (e.g. Durth and Gutschow, 1993; Diefendorf, 1993), examined reconstruction efforts, alternative planning visions and designs and to an extent, their legacies (Pendlebury et al. 2015; Alvanides and Ludwig, 2023), and more recently shifted the focus to the maps of war themselves, critically delineating and "reading" their production, purpose, and the information they represent and communicate (e.g. Corner, 2011; Oswalt, 2019; Enss & Knauer, 2022). Few studies, however, have attempted to quantitatively analyse the impact of war on city transformation via the application of digital humanities methods. Our paper addresses this research gap. It contributes to and expands on the existing body of knowledge, advancing understanding of post-war transformation and the way in which such transformation can be explored through the application of various digital humanities methods.

This presentation showcases the findings of the BMBF-funded project, 'Sozialkartographie', demonstrating the multiple data science methods employed, using a Geographical Information System (GIS), to explore specific forms of postwar urban and social transformation in Nuremberg, Cologne and Essen (Germany). Research questions included: How can the use of GIS inform new questions and advance understanding of postwar transformation? To what extent has the level of destruction in postwar cities influenced the subsequent land use mix, urban morphology, spatial concentration of heritage and later socioeconomic profile of the cities explored? The case study cities chosen are ideal examples for the development and testing of such exploratory research methods, as shall be summarised below.

With a population of around 520,000 individuals, Nuremberg is the second-largest city in Bavaria and one of the 15 largest cities in Germany. Nuremberg suffered heavy bombing during the Second World War with the main destruction taking place on January 2, 1945. In 1939, according to the official census, there were 125,074 normal dwellings in Nuremberg and a population of 423,838 inhabitants. In May 1945 only 63,753 dwellings were left (52.5% of the pre-war housing stock). Of these, 7,238 were completely uninhabitable because of severe damage. Only 14,517 had been spared from the destruction of the war (Durth & Gutschow, 1993). The remaining dwellings were either severely, moderately, or slightly damaged.

While several key textbooks provide a detailed account of the destruction of German cities during the Second World War (Diefendorf 1993; Durth & Gutschow 1993; Hohn 1991; Beseler & Gutschow 2000), very few authors have focused specifically on the industrial city of Essen, exploring its architecture (Boucsein 2010) or the historical role of the Krupp steel works (Heistermann 2004). Essen was one of 10 cities in the new Federal Republic of Germany with the largest amount of rubble during the Second World War (almost 15 million cubic metres), in fifth place behind Berlin, Hamburg, Cologne and Dortmund (Diefendorf 1993: 15). Essen suffered severe bomb damage, primarily because it was a target of Allied strategic (precision) bombing. This war strategy led to accurate

attacks on carefully chosen industrial targets, with the goal to destroy the enemy's military capacity. Following this policy, the British Royal Air Force (RAF) reportedly dropped 36,429 tons of bombs on Essen during the war. March 5, 1943, saw the first major bombing raid on Essen and as part of the campaign known as the 'Battle of the Ruhr' Essen was a repeated target, experiencing a total of 272 air raids (Beseler & Gutschow 2000: 468).

As a target of 262 Allied air raids since the spring of 1940, Cologne, Germany, is reported to have suffered 70 per cent destruction during the Second World War (Wiktorin, 2005). This figure, however, included great differences between the city's districts, with the southern part of the old town suffering an estimated 93 per cent destruction, the northern part an estimated 87 per cent, while districts further out were comparatively little destroyed.

Building on existing post-war planning research, we sought to develop alternative methods to improve understanding of various forms of city transformation following the war. By using historic damage maps as a foundation, we applied urban analytic approaches to investigate the varying impact of war on the cities studied. To do so, we brought together under-researched archival material (damage maps and documentation), landuse maps, heritage maps and socioeconomic data sets into a Geographical Information System (GIS). Converting urban features depicted in historic maps into geospatial data we mapped the spatial distribution of bomb damage at the district level, allocating a quantifiable bomb damage index (BDI) score to each district. Secondly, we assessed the BDI alongside other spatial data to investigate the relationship between the level of bomb destruction and the transformation of the cities as observed today.

We considered these findings in relation to the post-war reconstruction of the cities concerned and the subsequent planning decisions implemented across them. In doing so, we provide: 1) a digital representation of the level and spatial distribution of bomb damage across the cities, and 2) an assessment of the relationship between bombed areas and their present-day urban form (morphological change as observed through changes in block typologies), landuse, heritage profile and socioeconomic status. Together, this innovative research offers insights into the geographies of the bombed cities' pasts, and provides a richer understanding of the cities' destruction, reconstruction, and postwar legacies. The results are of interest to planners/policymakers seeking to improve future cities, as well as to researchers seeking to apply alternative, digital humanities methodologies to the study of historic maps.

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Digital Stone Witnesses: a multi-modal survey of Jewish graveyards across Germany

SZD: “Steinerne Zeugen digital” (Digital Stone Witnesses) is a 24 year project to document, preserve and disseminate information from Jewish Cemeteries across Germany.

There are more than 2000 surviving Jewish cemeteries in Germany, some dating as far back as the eleventh century. Despite great losses, no other European country possesses a comparably old, rich and multi-layered Jewish tradition. These cemeteries are among the oldest testimonies to sepulchral culture in Germany, and therefore their preservation, documentation, development and dissemination is a task of great importance both to the Jewish community and society as a whole. Nevertheless, they have not yet received the attention they deserve as places of remembrance with both religious and cultural significance, as expressions of individual and corporate Jewish identity, and as historical, literary and material sources.

This is where the Digital Stone Witnesses project comes in: By selecting, collecting and editing Hebrew and Hebrew-German tomb inscriptions from across the German-speaking countries; and by recording and analysing the form, structure, construction, material and preservation of the gravestones, a representative digital text and image corpus will be created, documented and sustainably archived. This data will be combined with the digital recording of spatial and structural characteristics and detailed topographical relationships. As a result, a representative, interdisciplinary, multimodal data set will be created and preserved in perpetuity. On this basis, for the first time the grave inscriptions, gravestone designs and spatial relationships within the cemeteries can be systematically analysed both diachronically and synchronously. The results will be made accessible to the public and for further scientific research.

In this presentation we will present the results and activity from the first year of the project in one specific graveyard. The Walsdorf cemetery is located in Upper Franconia in the district of Bamberg, and contains over 1100 gravestones dating as far back as the 17th century. The majority of the older stones are made of **frangible** sandstone, and are thus susceptible to weathering and environmental damage, a process potentially accelerating due to climate change. Subsequently, many of the inscriptions are very hard, if not impossible, to read, and more are disappearing every year - taking with them invaluable and irreplaceable historical, genealogical and sociological data.

Bamberg’s DTHC Research Group (Digital Technologies in Heritage) has recorded the cemetery with a variety of digital technologies, including mobile-mapping, terrestrial laser scanning (with the Leica BLK) and GIS mapping to capture topological and structural data. The data is used to create an accurate, geo-referenced plans of the cemeteries in their current state, with each surviving gravestone individually recorded and identified. As part of the project, methodologies and workflows for automating the conversion of laser scan data to CAD models are being developed and evaluated. These plans will be used for monitoring, to map changes and damage from the past and into the future, and to create interactive maps that can link together heterogeneous data from multiple sources.

In addition to a digital photography campaign, colleagues from the Jewish studies department in Bamberg and the Steinheim institute are conducting digital epigraphy to record and interpret the surviving inscriptions. The epigraphic information will be recorded using the Epidoc TEI/XML (Text Encoding Initiative) compliant format ensuring maximum interoperability and sustainability.

In addition, stones with particularly hard to read inscriptions, due to weathering, damage or vegetation have been further recorded in 3D using Structure from Motion techniques. The 3D models, both with and without texture, are made available online to aid in the interpretation, and have already revealed hitherto illegible information.

All information, including the transcribed inscriptions, typological, geospatial and structural data, the interactive geo-referenced plan of the cemetery, 2D photographs and 3D models will be entered into MonArch, an information system and research platform specifically developed for spatial digital documentation which allows the aggregation of a wide variety of heterogeneous data. Information will be encoded using a custom ontology and stored as linked open data using various standard vocabularies including the Bamberg Vocabulary for Historic Architecture.

The combined data including all the multi-modal components will be made available for epigraphical, building, and monument research and will be made available to the public as an open access semantic web service.

This presentation will present the results so far achieved, and the lessons learned in the first year of this ongoing 24 year project. We will explore the intersection of geospatial science with the humanities and how GIS data intersects with and supports traditional disciplines such as epigraphy, history and genealogical studies.

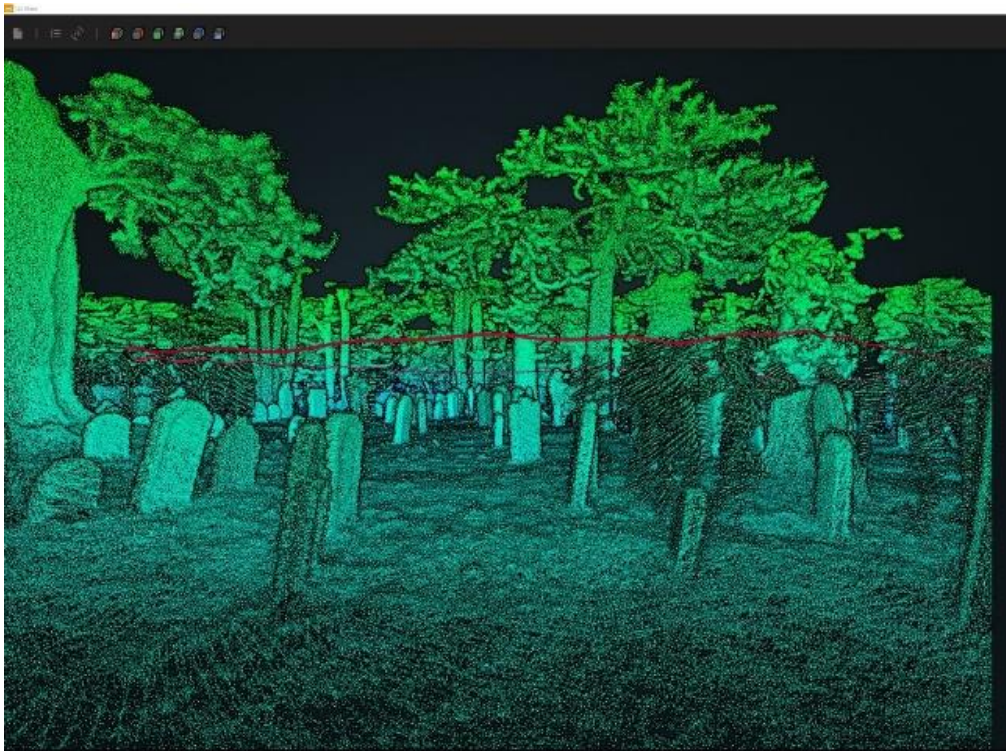


Figure 1: Laser scan data from Geoslam mobile-mapping system

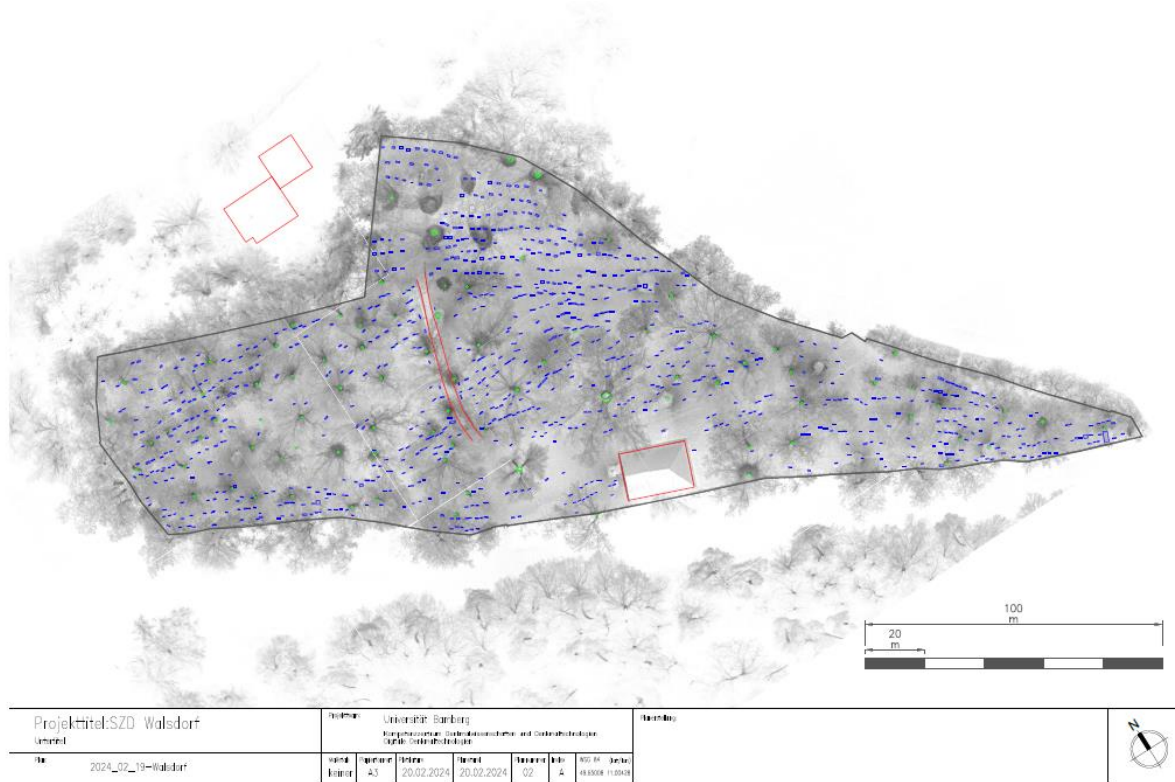


Figure 2: Preparation of plan (Walsdorf cemetery) using laser scan data



Figure 3: Use of SfM models to improve readability of inscription

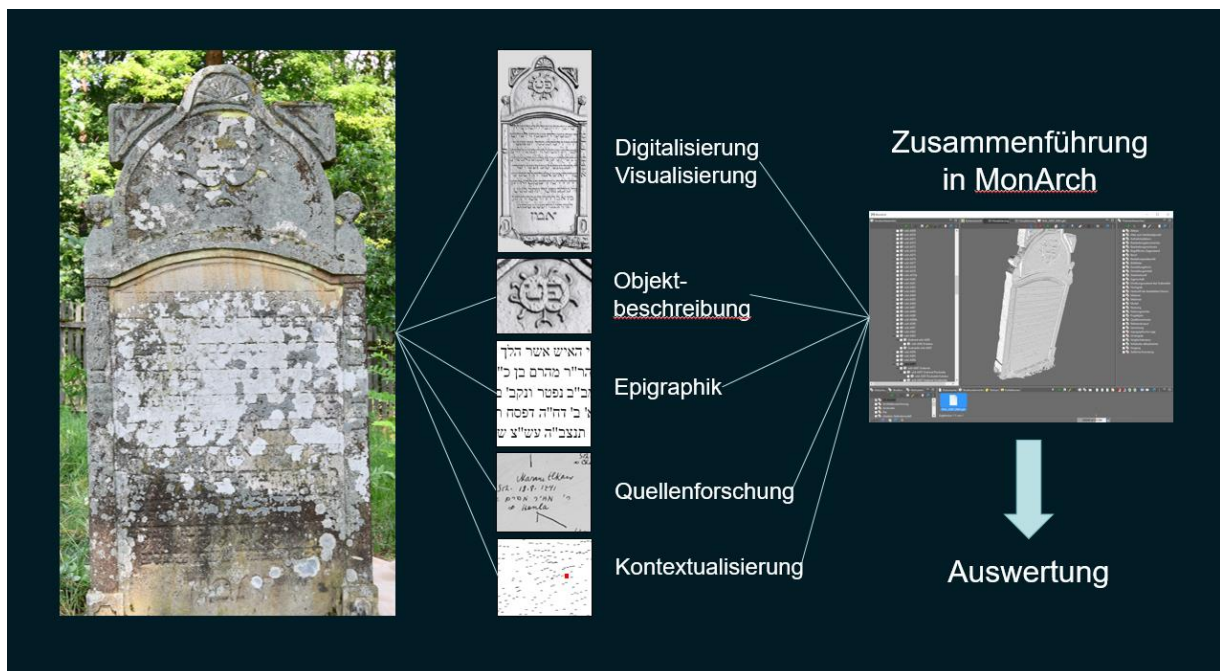


Figure 4: Multi-modal data aggregation in MonArch

2.27 The Horn of My Salvation, My Refuge: A Geospatial Study of Fortified Churches

Liam Downs-Tepper

“Space is something abstract, without any substantial meaning. While place refers to how people are aware of/attracted to a certain piece of space. A place can be seen as space that has a meaning.”

Anything designed for a single purpose brings with it a purity and clarity of function. A meat grinder does one thing and does it with aplomb. A mousetrap is the ideal tool to have on hand if the goal is the trapping of mice. The moment multiple purposes are introduced, however, the situation becomes more complex - and even more so if those purposes are at odds with each other. What purpose is a priority? Are design choices a question of compromise? Or do they in fact compromise each other?

Fortified Churches are just such a study in contradictions. A house of worship is intended to be a place of peace; a fortress is a place of conflict. A sanctuary should be open to all who wish to enter, yet a fortress requires robust walls, bastions, structures of exclusion. These buildings are the physical embodiment of conflicting ideals: inclusion and exclusion, peace and war, prosperity and fear. Their mere existence suggests a story; for a fortified church is built for one group and is intended as protection against another.

This project examines the extent of church fortifications throughout Europe, using comparative digital humanities based geospatial analysis of large-scale data as well as more intensive individual case studies. Through the use of methods that have yet to be applied to this field, this project aims to determine how the intersection of culture and topography impacts the placement of different styles of fortified church throughout Europe. Given the geographic, temporal, and cultural diversity of fortified churches, this research would look to find both commonalities and differentiating characteristics between different “clusters” of fortified churches. In its most reduced form, then, the research question for this dissertation is: What factors determine the locations of fortified churches, and how consistent are these factors between different regions?

Given the moderate volume of scholarship on the subject thus far, this research approaches the subject in two novel ways. First, by identifying and collecting assorted theories on Fortified Church placement, and then rigorously testing each for veracity. Second, by scaling up the area and volume of sites under examination, taking advantage of GIS to showcase trends without getting mired in exceptions and individual case studies.

Examinations of current literature on the topic find a wide variety of different explanations for fortress church locations, among them:

As a direct response to the Mongol Invasion of 1241-1242 and external threats.

Fear of Ottoman incursions.

Fear of Pagan pushback.

As a continuation of the legacy of the Teutonic Knights, crusader orders, Saxons, or other specific groups.

As a demonstration of “peasant fortifications” - intended for use by common people.

There are also a number of theories which explicitly address geographic placement:

Placement on hills.

Placement in foothills.

The desire to use church towers as watchtowers.

Strategic placement to create a barrier/chain against incursion.

Other work aims to show these structures as inheritors of different legacies: sometimes an evolution of Roman fortification concepts, sometimes as a twist on monastic protection and isolation.

This research brings together an array of different methods and offers further insights into both similarities and differences across Europe's fortified churches. This work builds upon a significant amount of mapping and research done by historians in the 1800s, whose interest in the medieval era led to the creation of some of the most detailed material available. There is therefore naturally a massive amount of georeferencing involved, as well as other approaches to pinpointing (sometimes no longer extant) locations via satellite imagery. Viewshed analysis, least cost path, and intervisibility analysis all come into play as well.

Research thus far has demonstrated that many of these theories capture only small aspects of larger issues or are downright false, often mired in nationalistic ideology. Testing of them provides initial results indicating that the prevailing narratives on fortified church placement are deeply flawed. In Transylvania, for example, fortified churches do not tend to appear on either hills or in foothills; they are more commonly found in areas which lack natural protection. They also do not tend to have any form of interconnected intervisibility, or at least no more so than non-fortified churches: there is nothing that indicates that they were placed with the intent to create some form of barrier or fence. They do not, in general, have any greater view area than non-fortified churches, indicating that they were not designed to be dedicated watchtowers.

Other forms of fortified churches demonstrate very different placement logic. Irish round towers do seem to have more expansive views than other comparable churches, indicating that they were indeed intended to survey the area.

This is a methodologically and spatially diverse endeavor. It also shines a light on the spread of different contexts in which they were developed: whether it is internal strife, coastal protection, or militarizing borders, there are rather different outcomes. This work necessarily combines a number of different approaches - both digital and textual - to offer a more complete view of fortified churches in context.

The Mapping of Nürnberg in WWII: An Example of GIS-Based Analysis of Historical Urban Maps

Historical urban studies frequently study the city as a palimpsest. This is a speaking metaphor in the case of wartime destruction and rebuilding. During the bombing and subsequent rebuilding processes, buildings were damaged, destroyed and partly rebuild.

The UrbanMetaMapping research consortium examines war damage maps from the Second World War and other thematic urban maps covering Central and Central Eastern Europe, investigating urban mapping as a cultural practice of transformation, the social and spatial development, and how heritage was mapped and historical consciousness formed.

The city of Nürnberg, Germany, was heavily damaged in successive air raids during WWII. This especially included the inner city with its many historically significant buildings. From 1942 onwards, the Nürnberg administration concentrated its disaster control efforts on the historic centre. This is evidenced by a newly created cadastral map, covering the area of the walled city, with a granularity that identifies each building, including side buildings. This map served as a basis map for war damage maps from air raids as well as for thematic maps, e.g. stated historic values (“Nürnberg” 2023).

By comparing written sources and maps from the Nuremberg archives, we study the processes of disaster prevention, disaster relief and reconstruction directed by the city administration between 1942 and 1952. During this period, Nürnberg underwent a transformation from a centre of National Socialism (“Stadt der Reichsparteitage”) through the Nuremberg Military Tribunals (1946–1949) to democratic regional centre. Throughout this period, the regulations for demolition, reconstruction and dismantling of damaged buildings organised by the city administration show considerable continuity, including the urban planning for reconstruction dating back to 1943. Until recently these complex and intertwined processes of planning, rubble clearance and rebuilding against the background of political change have been studied separately from each other.

Using traditional art historical comparative methods, we analysed the reconstruction strategies for selected town squares, streets and the urban landscapes in general and specifically the preservation of damaged historical buildings in particular (Enss 2022, Knauer 2023, Knauer and Enss 2022). For a comprehensive study of the walled city of Nürnberg, especially the investigation of traces of the intertwined processes, we now resort to a GIS-based approach. We also use this as a case study for the question of how GIS can support studies of historical maps and which methods are most promising.

The various maps of air raids, historical values, reconstruction plans, etc., superimposed on the cadastral base map, constitute a multi-layered paper database, that holds all kinds of thematic information, but is tedious to analyse manually, especially in terms of cross-comparison between maps. Georeferencing and vectorising the maps into a GIS database allows for attainable access and quantitative analysis, from the temporal sequences of damage on one hand



Crop of a multilayered GIS map showing the relation between the degree of destruction and historic value as taken from the Damage Map 1952 (StadtAN_A4_X_265) and the Map of Historic Value, no date (StadtAN_A4_X_210).

to the relationships between different thematic data, such as the declared historic value of buildings.

With GIS we create our own multi-thematic maps. The data from the different paper maps is attributed to the geo-objects (buildings), which allows the selection and visualisation of complex queries such as: show all buildings mapped as destroyed and as historically valuable. Due to our exploratory approach, visualising these cross-references between different data points is crucial, for our own research as well as for dissemination. Additionally, the publication of maps created from GIS is possible without navigating the complex copyright situation of the original maps. A quantitative evaluation of these queries, e.g. how many buildings or what percentage of the total area have features X and Y, provides a tangible measure of these findings.

Having all the data from the different maps combined allows us to check for internal consistency: on the one hand we can check whether the data from successive maps are coherent, and on the other hand we can test for hidden interdependencies. In the Nürnberg air raid maps, we found that buildings shown as destroyed on one map were shown as intact on a later map, which is an example of internal inconsistency. Comparing the degree of destruction with additional information like the historical value of a building can reveal hidden biases.

We plan to integrate additional data sources, such as georeferenced statistical data from the period, as well as results from GIS-based research at other scales (Ludwig and Alvanides 2023).

GIS gives us a view of the data from the paper maps that was not easily accessible before, as it allows us to reveal, query, and visualise unexpected relationships. We therefore encourage the application of building level GIS to other historical city maps.

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The Map Never Replaces the Story - Story Mapping Principles & Practices from the Atlascine Project

Sébastien Caquard et Emory Shaw

Atlascine is a free, open-source and online platform dedicated to annotating, visualizing and exploring stories with maps¹. This application was developed to address theoretical and ethical issues raised in oral history, post-representational cartography, feminist data visualization and deep mapping, and today occupies a unique niche at the intersection of story mapping platforms like ESRI StoryMaps, Nunalit and StoryMap JS, and oral history tools such as Oral History Metadata Synchronizer and Recogito. It combines the spatial visualization tools and techniques of the former with the indexing and annotating features of the latter to produce maps and atlases that open up and mobilize archives of recorded media to the research communities and to the educational benefit of wider publics.

The latest version of Atlascine presented in this paper is organized as three modules: A Data Management Module for uploading, modifying and browsing the data displayed in an atlas; A Stories Module in which stories on an atlas are tagged and mapped individually; and a Themes Module in which all the stories of an atlas are connected and overlaid based on common themes and places. This structure and associated features have been designed to address key principles in the mapping of stories that pertain to a range of cartographic projects, the first and most fundamental of which being that (1) the map does not replace the story. Given all the transformations that cartographic processes can impose on source data, this key guiding principle is especially relevant for sensitive story data whose multidimensionality is still beyond what a map can represent. As such, the mapmakers' and storytellers' voices remain clearly differentiated. (2) The integrity and completeness of each mapped story (i.e. dataset) must also be preserved. While mapping stories is usually associated with a selection and curation of segments and materials that are of particular interest to the mapmaker, Atlascine makes no such fragmentation, preserving necessary context and meaning amid any cartographic transformation. (3) The mapping process is also exposed and made to be transparent. As a core principle in contemporary cartography, such transparency acknowledges the impact that cartographic decisions and processes have on their mapping outcomes and opens them up to critique, contestation and discussion. Three additional principles help to outline a practice of mapping for story collections put forward by Atlascine: (4) The narrative pathways of the story are exposed as a visualized spatial trajectory, revealing the spatial complexity of its narrative structure. These narrative pathways are (5) connected through places, which emerge as plural and collective in that they assemble multiple mapped stories, allowing us to explore the collective knowledge and experiences embedded in story collections to reveal similarities and differences among and between them. Finally, (6) the map acts as an interface, or as a "portal" into these narratives. The map services itself to the stories and acts as an invitation to explore them both analytically and affectively.

¹ <https://atascine.org/>

These different functions and features have made Atlascine appealing to a range of mapping projects. At the time of writing this paper, about 150 stories have been mapped in different atlases. The Atlas of Rwandan Life Stories² contains 20 oral history interviews from members of the Rwandan community living in Montréal, including many from survivors of persecution and genocide. Mapping these life stories raised challenging ethical, methodological, and technological questions that shaped the early stages of the platform's redesign. The *La Ville Extraordinaire*³ atlas presents over 70 oral history interviews of elderly Montrealers from multiple origins and backgrounds that provide a community-based perspective on its cityscape and history. Meanwhile, the atlas of Intangible heritage of Parc-Extension⁴, a multicultural neighborhood in Montreal facing intense gentrification, includes 14 interviews of residents who share their memories in the context of urban change. Finally, the Raconte-moi Riopelle⁵ atlas is part of an oral history project intended to deepen our understanding of the life and career of visual artist Jean Paul Riopelle through the mapping of 17 interviews about their work and vision.

Atlascine is a unique platform that addresses ethical issues raised by the mapping of stories of violence and genocide, methodological issues raised by the mapping of stories more generally, technological issues raised by the navigation between and within stories and maps, and theoretical issues raised in contemporary cartography. Atlascine's unique combination of textual, visual and cartographic elements, coupled with the immersive power of the stories themselves make it a valuable tool for recording and communicating nuance and emotion about events, people and places.

² <https://rs-atlascine.concordia.ca/rwanda>

³ <https://rs-atlascine.concordia.ca/la-ville-extraordinaire>

⁴ <https://rs-atlascine.concordia.ca/parcextension>

⁵ <https://rs-atlascine.concordia.ca/riopelle>

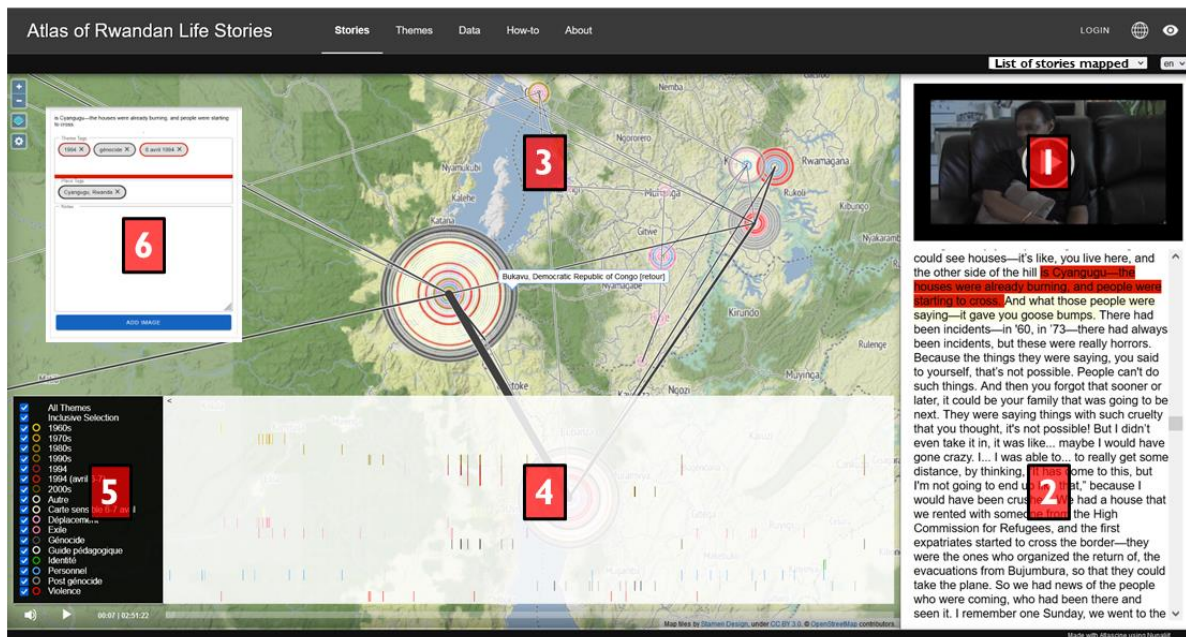


Figure 1 – The Atlascine “Stories” module - Six interconnected windows: (1) the audio-visual window; (2) the text window; (3) the map window; (4) the interactive graph timeline; (5) the interactive legend and (6) the tagging popup window.

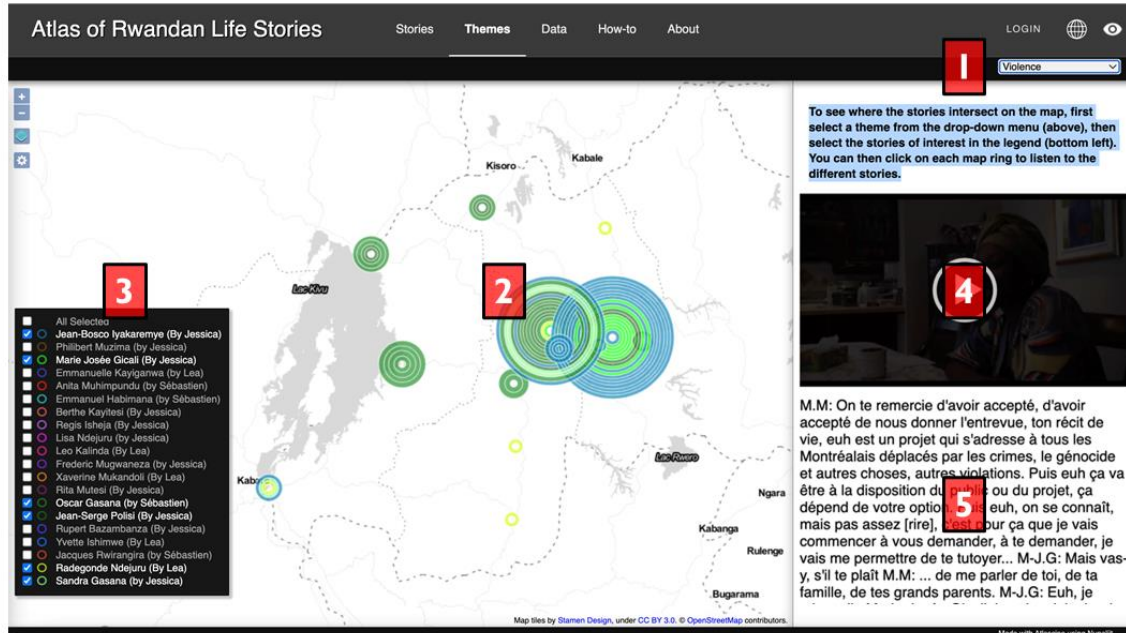


Figure 2 – Atlascine Themes Module: (1) in the dropdown menu the user selects the theme they want to see mapped (among all the ones previously generated in the Stories Module); (2) on the map each color represents one particular story; (3) each story can be activated-deactivated in the interactive legend; and when the user double clicks on a particular ring on the map, the associated segment starts in both (4) the audio visual and (5) the text windows.

2.30 The Peculiar World of Spatial Smellscapes in Travel History from the late Middle Ages to the late Eighteenth century

Olena Morenets

Nosenography, toposmia and sensory geography are new directions that consider smells, an often-ignored sensory feature, in constructing spaces. The dominance of visual perspective on the perception of the world results in sensory asymmetry, which is still in place today. However, despite the difference in their subjects of study, both “sensory” and “spatial” turns, addressed the sensorial disbalance and allowed scholars to combine geographical study with sensory dimensions of the physical world. That interconnection examines how individuals engage with their surroundings through multiple senses and how these sensory experiences are situated within specific spatial contexts. As a result, the role of senses, smell, in particular, has been revised. Tracing and describing variations of smell in places will reveal previously overlooked qualities of spaces, such as their affective characteristics, emotional powers, olfactory artefacts and “spirit of a place” (Norberg-Schulz 1980). However, there has been relatively little effort to explore connections between smells and particular qualities of spaces that are more than an analysis of the pleasantness of smells in certain places or parts of cities.

Recently, literature in geography, cultural history, sociology, architecture, urban studies, and literary criticism has defined spaces as complex, rhythmic assemblages of multiple histories and constituents which travel over physical and visual barriers. The evidence that geographical knowledge is no longer limited only to the visual realm of cartographic and topographic reflections of soil types and streamlines is the advancement of nosenography, toposmia and sensory geography. Firstly, these fields study places as emitters of sensory data and holders of smell artefacts. Secondly, the concept of “smellscape” serves as a unifying framework across these disciplines, emphasising the interconnections between smells and their sources, human perceptions, physical environments, and the context of places. Porteous (1985) introduced the concept of “smellscape” to describe the fragmented, discontinued, space-time interrelated human perception of spaces through smells. The significance of smell in shaping human experiences of places has led to the expansion of essential components of smellscapes. Henshaw (2013) and Classen (2002) suggested that smellscape should involve smell sources, physical environmental settings, built forms, materials, time, weather, memory associations, thought processes, social and cultural contexts, to name but a few. Therefore, smellscape has become a multi-layered notion encompassing perceptions of smell, specific places and environments.

Multimodality is not the only connection between spaces and smells. The emotionality of smells is another decisive factor in triggering reminiscences about specific places. First, smell was designed to immediately send an emotional signal even when any emotional context is lacking. It happens due to the link between olfactory receptors and the limbic system which plays a major role in controlling mood, memory, behaviour and emotion. Therefore, every breath with smelly molecules activates limbic areas associated with emotions and memory retrieval. Second, smells lack proper vocabulary and names. It is difficult to talk about smells without mentioning situations of smell experience or without tracing parallels to other smells

or objects. As a result, smells are described through emotional associations to the context that speakers link to that specific smell.

Given all that has been mentioned, smellscapes have increasingly attracted attention across disciplines. This paper extends analyses of spaces from the past times to dimensions of sensuous geographies and toposmia through travel narratives. These fields of research help to recreate spatial smells from the late Middle Ages to the late Eighteenth century. Smell is a sense that travellers are frequently exposed to firsthand, consciously and unconsciously. As a result, travel narratives represent an abundant source of smellscapes as smell provides an entry point into newness and difference. Smellscapes provoked affective responses that bridged emotionality and spaciality together and contributed to the authentic smell-saturated place descriptions, including information on flora and fauna, climatic conditions, level of industrialisation, and forms of habitations.

Drawing on travel narratives, I will comment on how sensuous geographies help to study the smelly places of the past. I am going to discuss how smell features in spatial assemblages of travellers, locations and experiences. Then, I will raise such questions as whether temples and markets were the smelliest places back in the day and why smells of certain places were mentioned more often than others. The travellers' descriptions of smells and how new smells impacted the geographical experience of travellers will also be taken into consideration.

LitSpatz-App: An Offer of Virtual Literary Walks for Primary Students

Nora Heyne, Maximilian Pfof & Peter Kuntner

Keywords (5): walk-through story, text comprehension, spatial perspective taking, reading and listening literacy

The teaching of listening and reading, including abilities to take on spatial perspectives and critical reflection in relation to one's own world, are central goals of primary school education (KMK, 2022). As studies showed, listening (Stanat et al., 2022) and reading literacy (McElvany et al., 2023) of many primary students in Germany do not meet minimum standards. However, few findings are available to date on skills in the other areas, in particular for spatial perspective-taking. Against this background, the pilot study presented addresses students need for support as well as unanswered questions about the status of skills that have so far been little investigated. Hence, one objective of the project is to provide children with a digital offer for taking part in virtual literary walks to promote their listening and reading literacy. In this app, a story is presented auditorily and the locations of the story are visualized – via illustrations or a guided walk to the authentic locations – which is accompanied by cognitively activating questions. In addition, the study examines previously little-researched competences of children, e.g., their spatial perspective-taking in illustrated vs. visited places of action.

Concerning spatial imagination, from the age of 7, children are able to form flexible mental representations if they are given the opportunity to walk around places and view them from different perspectives (Liben & Downs, 1993). This corresponds to earlier assumptions and results about the concrete-operational thinking of children of primary school age (Piaget, 1978) as well as to results on embodied cognition (Glenberg & Galese, 2012). According to current knowledge, it can be assumed that children find it easier to understand texts if they relate to directly perceptible objects. With respect to literary text comprehension, children's spatial perspective-taking has rarely been studied. Current assumptions on text and image comprehension suggest that illustrations support children in developing situation models (Mayer, 2021). Referring to findings and assumptions above, it can be assumed that children are supported by visible places of action, which they see in the sense of "backdrops" of the story.

Moreover, viewing of a story's locations is also expected to enhance children's involvement in a story which is described in the concept of transportation (Gerrig 1993). Accordingly, people immerse themselves in stories with their feelings, their attention and, through vivid mental images, with their imagination (Appel et al. 2015; Gerrig 1993). According to previous assumptions, transportation is strongly related for developing reading motivation, and hence, for further improvement of reading literacy.

Against this background, the project developed an app for primary students that takes into account the aforementioned aspects of (promoting) comprehension processes. Specifically, the app makes it possible to listen to a walk-through story whose spatial constellations are illustrated by means of illustrations vs. directly accessible authentic locations. In addition, the children are asked various cognitively activating questions between the scenes, e.g., to critically reflect on the story as well

as to take on spatial perspectives of the characters portrayed. This visualization of the spatial scenery is expected to support children to understand the entire plot of the story and to reflect (critically) on it in relation to their own environment. Moreover, it is expected that the visualization of the spatial constellations can also promote the occurrence of transportation as well as processes of spatial perspective-taking with regard to the characters shown, which are ultimately experienced as positive and motivating.

The study focuses on questions about children's different abilities in text comprehension when the spatial setting of the story is illustrated by illustrations vs. directly accessible places. The children's abilities examined are transportation, abilities to take on spatial perspectives with regard to the characters portrayed, as well as reading motivation, for which differences are assumed in the various conditions: In particular, it is expected that children listening to walk-in stories at the respective play locations – compared to reception with illustrations – will show stronger performances in investigated abilities. In addition, the study examines how adult app users rate the usability of the app.

To implement the project, an app was developed for participation in virtual literary walks to a walk-in story, which can be used on PCs or cell phones. The screen successively shows a) maps of the respective locations, b) bars for playing the audio files, accompanied by illustrations or maps for finding the authentic locations, and c) cognitively activating questions for processing the text. In this way, the story is presented in six scenes at a total of six locations. To be able to use the app, the children receive an access code after prior registration by their parents.

When the app is started, users can choose whether they want to use the app a) on site in Bamberg, or b) online with illustrations. Thereafter, the following screens either show only the site plans (version a) or illustrations of the locations (version b). In the course of using the app, users' log data and answers to the questions presented are recorded. These questions relate to the children's entry requirements, the conditions of their use of the app, and their answers to the various cognitively activating questions, including on spatial perspective-taking.

The sample of the study includes children in learning groups in support facilities and schools who use the app as part of the respective support program. In addition, adult users and people accompanying children who use the app are asked about the usability of the app by means of a questionnaire.

It is expected that the results of the study reveal which abilities children show in text comprehension when the spatial scenery of the story is visualized by illustrations vs. directly accessible places using the app. Particularly, they show the extent to which children – under both conditions – show abilities for spatial perspective-taking with regard to the characters depicted, transportation and reading motivation. Finally, results are discussed with regard to the expectations and possibilities for future implementations, including the use of geospatial technologies.

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2.32 Mapping the historicity of a place through its name – spatial information on 15th century manuscript maps

Anna Vuolanto

This is a presentation of a set of spatial data which was created during a digitisation project conducted in 2022-2023 in the National Library of Finland. It is a corpus consisting of place names from the 15th century manuscript work of Ptolemaic maps, some 5000 in total, recorded in the library database. My aim is to invite scholars to develop and make use of the data and suggest some ways of georeferencing the places in the maps.

The maps can be browsed and the place names can be searched in the library's search service kansalliskirjasto.finna.fi. The digitised maps are available on the digi.kansalliskirjasto.fi platform. Both services, Finna and digi.kansalliskirjasto.fi, provide an API that enables processing of the data.

The work in question is titled at some point *Cosmographia* and it consists of 27 maps drawn after *Geographia Hyphegesis* by Claudius Ptolemy. The manuscript was most probably produced by the workshop of Nicolaus Germanus (ca. 1420-ca. 1490) in Florence during the late 15th century. The maps are bound together with a work *La sfera* by a Florentine merchant and humanist Gregorio Dati. Both works in this manuscript, *Cosmographia* and *La sfera*, are products of the same hand and the same workshop. The work including the maps has raised only minimal scholarly attention. In 2014, Chet Van Duzer published an article focusing on the non-Ptolemaic legends added to the maps. He makes comparisons with other copies from the same period in other collections. Before him, there were no studies which would have been focused on the maps of the manuscript. The work of Dati has been an interest of only a few as well.

According to van Duzer, the maps in this manuscript belong to the first group of the three of Ptolemies produced in Florence by Nicolaus Germanus and his workshop. These maps are less luxurious copies than the other known copies in other public collections. However, in the maps in question here, there is an unusually high amount of added information on the maps: legends and place names. This feature seems to be almost unique. There are both Ptolemaic and non-Ptolemaic place names, indicating that they derive from the Ptolemy's text and from other sources. In addition to the place names, there are short mentions and longer explanations about exotic animals, mythical monsters and peoples, among other subjects, which are not mentioned by Ptolemy at all.

Therefore, the corpus of the place names was created among the digitisation project mentioned above. While the metadata of each map was created by cataloguing them in MARC21 format in the library database, all the place names and legends were extracted from maps as well. This resulted 27 bibliographic records of the category map, with a large amount of the field 522, a note on geographical coverage. The highest amount of place names, over 600, was recorded in the map of Asia minor (<https://digi.kansalliskirjasto.fi/teos/binding/2767605?page=37>). Also, the maps of Hispania, Greece, Italy, and another one of Asia minor, are dense with spatial information. Not surprisingly, the smallest number of place names, 80 in total, was recorded on the map of Tabrobana insula (<https://digi.kansalliskirjasto.fi/teos/binding/2767605?page=59>). Around 100 place names were also recorded on two

maps depicting Sarmatia, the regions today around and north from the Black Sea, Azov Sea, and Caspian Sea (<https://digi.kansalliskirjasto.fi/teos/binding/2767605?page=39> and <https://digi.kansalliskirjasto.fi/teos/binding/2767605?page=39>).

The additional information on maps, which Van Duzer discusses in his article - the legends on e.g. animals, peoples, or natural resources - were also saved on the bibliographical records of the maps, in the field 500, a general note. The number of these supplementary legends increases on maps depicting the African continent and India; the highest number of the legends are in the map of North Africa, 25 in total, with an average number of toponyms, 310 (<https://digi.kansalliskirjasto.fi/teos/binding/2767605?page=35>). As van Duzer has noticed, this follows both the ancient and medieval traditions, in where these areas are seen as sources for miracles and wonders. Generally, those maps rich with toponyms often lack the legends. This is not surprising. The regions were considered important during the Ptolemy's time and they were well known also to the 15th century reader.

These maps have not been georeferenced to correspond modern digital map bases, but an effective way of studying the maps and their spatial information would be an ontology which would preserve the historical dimension of named places. Enriching the vocabulary with coordinates, languages, time periods, and other linked information, such as Wikidata and other thesauri would allow studies not limited only to spatial humanities but also for instance language studies or onomastics.

Today, the manuscript belongs to the Nordenskiöld Collection, which was collected by scholar and explorer Adolf Erik Nordenskiöld in late 19th century. The collection consists of early cartography and maps, and literature on geography, history, and travel. This collection provides plenty of opportunities for spatial humanities as well.

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Links:

Manuscript on the library's search service:

<https://kansalliskirjasto.finna.fi/Record/fikka.5621944>

Digital copy: <http://urn.fi/URN:NBN:fi-fd2023-00032457>

Digital Ptolemy Atlases collection: digi.kansalliskirjasto.fi/ptolemaios

Details for the APIs, see:

https://api.finna.fi/swagger-ui/?url=%2Fapi%2Fv1%3Fswagger#/Record/get_record

<https://wiki.helsinki.fi/xwiki/bin/view/Comhis/Comhis/Interfaces%20of%20digi.kansalliskirjasto.fi/>

Spatial Humanities 2024

Seminar Proposal

Professor Carrie Beneš, New College of Florida

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The Analysis and Presentation of Global Knowledge in the Manuscript Tradition of Dati's Sfera

Of all misconceptions about the Middle Ages, one of the most persistent and erroneous is the idea that people before Columbus thought the world was flat—a myth invented wholesale in 1828 by American novelist Washington Irving. Even medieval schoolchildren began their study of cosmology and natural philosophy with the round earth, as we see in *La sfera* (*The Globe*), a curious vernacular textbook written circa 1425 in *ottava rima* by the Florentine merchant Gregorio Dati. The present obscurity of Dati's treatise belies its bestseller status in its own time, as demonstrated by its survival in approximately 165 manuscripts and 18 printed editions all predating the year 1500.

Dati's treatise provides a concise introduction to medieval cosmology, science, geography, and navigation: all the basic information a young Florentine merchant-in-training would need to understand the natural phenomena affecting travel and trade around the turn of the fifteenth century. Yet labeling *La sfera* a "school text" does not explain the enormous number of surviving manuscripts, nor the vast diversity in their appearance and production values. While some are utilitarian owner-produced manuscripts, many *Sfera* manuscripts contain luxuriously illustrated sets of cosmological diagrams and maps—particularly in book 4 of the treatise, which provides a port-by-port itinerary of the Mediterranean coastline from West Africa to the Black Sea. Dati's poem discusses the voyage along the Canary Islands and the coast of west Africa, the cold waters of the north pole, the rivers of Central Asia, and the dangerous fauna of the African desert. *La sfera's* global perspective is also a powerful witness to the eastward orientation of most European ventures of the time—an attitude grounded in the commerce as well as the theology of the period. In this way *La sfera* crystallizes a crucial transitional moment of the European worldview somewhere between the invention of the dry magnetic compass around 1300 and the traditional "Age of Exploration" beginning at the end of the fifteenth century. Dati's treatise is unique in how it spans the practical world of cartography and the more impressionistic world of travel literature (such as the works of

Marco Polo or Ibn Battutah). Further, its integration of medieval navigational charts or portolans with the more classicizing tradition of Claudius Ptolemy's *Cosmographia* (translated in Florence, during Dati's lifetime) gives Dati's work a major and hitherto unappreciated role in the history of cartography.

Dati's *Sfera* is therefore long overdue for a modern critical edition that will make it accessible to scholars of the Mediterranean world, the history of cartography, and the history of Italy at the threshold between the Middle Ages and the Renaissance. Yet before the online cataloging and manuscript digitization efforts of the last twenty years, it would have been impossible to establish a good picture of the size and diversity of the large *Sfera* corpus. While about half of the extant manuscripts are still in Florentine libraries, the rest are dispersed across the globe. As a result, most of the modern scholarship on *La sfera* has tended to rely on one or only a few manuscripts at a time, and until the creation of the *Sfera Project* (<http://www.sferaproject.org>) no one has tried to assess the size and scope of the full corpus.

The *Sfera Project* is a collaborative effort to transcribe, translate, and create a digital edition for Dati's *Sfera*. The digital medium can support and showcase the multimodality of Dati's original treatise—which combines texts, images, and maps—in ways that a traditional print edition cannot. Along with the Italian text and English translation, our edition will incorporate an editorial introduction, hyperlinked explanatory notes, annotated IIIF manuscript images from a variety of sources, and a georeferenced ArcGIS gazetteer locating the toponyms in Dati's work. True to the project's crowd-sourced roots (the 2020 #lasferachallenge), our digital edition is also designed to be extensible, in order to incorporate additional manuscript transcriptions as they are produced either by our pre-existing community of *Sfera* scholars or by new users who join the scholarly effort.

The *La Sfera Project* will therefore create a multifunction, multimedia interface that will present Dati's integrated world of cosmology, geography, and cartography using visual, textual, and spatial data. While researchers are increasingly interested in understanding how geographical knowledge and cartography developed in and around the Mediterranean in the 14th and 15th centuries, few reference resources exist which summarize that knowledge or help scholars identify toponym variants. The large *Sfera* manuscript corpus provides a rich body of evidence for spatial analysis but also presents numerous challenges. This paper will explain the *Sfera Project* team's analysis and choices with regard to such questions as: the use of GIS and linked open data to locate and identify medieval places in modern terms; digital techniques for documenting vague, anachronistic, or imaginary places; and efforts to balance usability with respect for each manuscript's idiosyncrasies of labeling, orthography, and visual representation; and database and interface design, as we attempt to reproduce and make legible *La sfera's* complex combination of text, maps, and images.

Initial image: Map of the Middle East in Goro Dati's *La sfera* (Florence, Biblioteca Nazionale Centrale MS II.II.83, f. 205v-206r).

2.34 The changes in the fortifications of the city of Trogir from 220 BCE until 1500 CE. Enhancing new hypotheses on medieval urban fabric using GIS model

Ana Plosnić Škarić

Studying changes in medieval urban fabric comprises collecting all the available data on preserved and unpreserved parts and using them to reconstruct what was lost while understanding the processes of changes that occurred over centuries.

This paper presents a model for structuring and interpreting information on a medieval city and its changes. Its purpose is to support future hypotheses, and the final result aims to serve as a prototype for similar urban studies.

The city that has been studied is Trogir, located on a small island on the eastern Adriatic coast. The urban fabric, built in stone, covers the whole surface of the island and testifies to more than two thousand years of continuous urban life. Due to the excellently preserved medieval and early modern buildings, Trogir was declared a UNESCO World Heritage Site in 1997. On its edge, the buildings that stand out are two High Medieval and one Renaissance tower, the Late Medieval castle and a portion of the city walls, which are only a lesser part of the former fortifications that protected the city.

The time scope of the model covers seventeen centuries – from the foundation of the ancient Greek colony around 220 BCE until 1500 CE. A Hellenistic tower has protected Trogir's SE part for over two thousand years. From 220 BCE until 1420 CE, the city expanded several times. Afterwards, only modernisation of the defence system occurred. Little is known about the Hellenistic, Late Antiquity and Early Medieval fortifications. Information on the fortifications protecting the city from the High Medieval and Renaissance periods is also fragmented. The author believes the model would make it easier to understand how fortifications from these earliest periods were first incorporated and then disintegrated within the urban fabric as the city expanded. The model consists of a base map, seven layers, each for a different source type, and a layer for the hypotheses.

This study's principal source is the urban fabric, comprising fortifications preserved at full height or only in parts above the street level. All known information is collected and presented in the first layer using georeferenced architectural drawings and plans. The second layer offers all information on remains unearthed in archaeological campaigns. They are mapped using the same method as in the first. A critical analysis of historical maps and blueprints, based on the precision by which they were made and the information they provide, led to a selection of just a few. They provide information on buildings that are not preserved in the urban fabric. This information is presented in the third layer after georectification. Information on the form of dismantled parts of the fortifications, provided in old photographs, is delivered in the third layer. The next, similarly, offers those from critically analysed vedute (historical cityscapes). Information from these visual sources, presented in the third, fourth and fifth layers, provide only quality information on the no longer extant buildings. The last two layers contain information from written sources: late medieval archival documents, consisting predominantly of notarial acts (preserved in fragments from 1263 until 1500), and local

historiographical text. These textual sources provide information on the former existence of different parts of the fortifications, on construction, builders and commissioners of both extant and no-extant parts of the fortifications, and on their owners and tenants and the way they used it, revealing thus details on their former forms and changes.

In the first three layers, polygons are used to reveal the perimeters of the buildings or the width and length of the parts of the walls. In the following two layers, the facades of the fortifications, visible in sources, are presented in lines as projections. Texts are presented with points; each document or information from a historiography book is a separate entry. The colours represent periods during which a portion of the fortifications had been constructed, and they are applied to all inserted symbols. The periods are Hellenistic (around 220 BCE), Late Antiquity (4th to 7th century CE), High Medieval (before 1200, predominantly the 12th century CE), Late Medieval (between 1200 and 1470 CE), and Renaissance (after 1470 CE).

Each inserted symbol is provided with an annotation. First, there is metadata: ID number, name of the building, state of preservation, period (which resembles the periods presented with colours), date of the construction, when available, and reference to a publication. Second, there is a short description of each source and an explanation of the data it provides. In cases of ambiguities, a method of dealing with it is explained. It differs from source to source and data to data, offering interpretation within the limits of argumentation. Third, each annotation is provided with an illustration of a source and the caption. Archival documents are supplied with photos, transcription of the relevant part and a regesta (summary). In the seventh layer are illustrations of the historical book pages. They are written in Latin or a local idiom of Italian, so summaries are added.

The layers overlap and are transparent, and they are laid over a base map representing contemporary urban built fabric in 2024. Together, they demonstrate the existing information on the fortifications and the limits of our knowledge.

This methodology of using all the available data from all kinds of sources already led the author to hypothesise on the former site of a portion of the High Medieval city walls and a tower. The hypothesis was published in 2007 and has been accepted by other scholars studying Trogir. This hypothesis is presented in a separate layer, using dashed lines to distinguish it from the different symbols. The dashed line's width resembles the width of the High Medieval walls, which are known from the preserved remains. The author expects the model to lead to new hypotheses about the locations of the fortifications that decayed over centuries (especially the Hellenistic, Late Antiquity and High Medieval ones) and to formulate principles of their changes and integration into the urban fabric.

2.35 Mapping the cultural borderland. Artistic network of the Basilian order in Eighteenth-Century Poland-Lithuania

Melchior Jakubowski, Tomasz Panecki

The division between Western (Latin) and Eastern (Greek) Christianity has profoundly influenced the cultural landscapes of Europe, giving rise to two distinct trajectories of religious and secular evolution. Among various initiatives aimed at bridging the Western-Eastern gap, the Union of Brest (1596) holds particular significance. This event established the Uniate (Greek Catholic) Church within the Commonwealth of Poland and Lithuania, combining Eastern rites and traditions with Catholic dogmas and the supremacy of the pope. The Basilians, the sole Uniate order and the ecclesiastical elite, played a pivotal role in facilitating cultural exchanges between Western and Eastern influences. By the eighteenth century, they constituted one of the largest monastic communities in Poland-Lithuania, boasting a network of over 150 monasteries (their number was changing) and over one thousand monks. They took care of the most important sanctuaries, provided pastoral and educational care, established modern printing houses, and served as a recruitment pool for Uniate bishops. Consequently, alterations in Basilian monastic complexes aptly reflect the modernising aspirations and social roles of influential Uniate figures.

The project titled “Jesuits of the East? Artistic Network of the Basilian Order in Eighteenth-Century Poland-Lithuania” utilises GIS (Geographic Information System) and SNA (Social Network Analysis) to uncover the interconnections within and around the Basilian order, encompassing individuals, events, objects, and locations. Research inquiries revolve around the artistic pursuits of the order, the uniformity and specificity (in the context of art), and the influence of patronage.

The project relies on diverse historical sources, including written, iconographic, cartographic, and material evidence (objects of art in situ). Written sources comprise acts of visitations, inventories, chronicles, building documentation (agreements with artists or artisans, payment records, artistic designs), correspondence, and Basilian prints. These sources are complemented by historical and contemporary images of Basilian objects and their representations on maps. To gather, analyse, and visualise the data and address the research questions, a digital humanities toolset, consisting of Nodegoat, QGIS, and Gephi, is employed. Nodegoat is used for data model preparation and data collection, while QGIS and Gephi are employed for geographical and social visualisations, respectively.

The data model includes distinct feature types for human actors (Basilian order members, patrons, artists, etc.), places and tangible objects (monasteries, settlements, artefacts), and events (actions). Controlled vocabularies ensure data consistency, with “action” being a pivotal concept that links human actors, places, and objects. For example, the action of constructing a new church occurs in a specific monastery and involves various individuals with particular roles (monastery superior, patron, architect, contractors, etc.). The database encompasses approximately 1500 actions, 600 human actors, 181 monasteries, and 1800 artistic objects, enabling further analysis through filtering, querying, spatial operations, and graph metrics.

A fundamental aspect of the project involves mapping the formal solutions employed in objects of art and the arrangement patterns of monastic complexes. Basilians amalgamated Tri-

dentine Catholicism with the spiritual and material heritage of Eastern monasticism. Tracking specific objects in particular monasteries illustrates the spatial dispersion of “Latin” and “Orthodox” elements, as well as the synthesis of various influences (e.g. introducing side altars or organs, reducing and creatively remodelling of the iconostasis). Similarly, the preferred localisation and spatial organisation of monasteries evolved with Basilians’ increased involvement in pastoral and educational services. Older outposts were situated in remote places away from settlements, while new ones were established in urban contexts. The shift from a loose composition of wooden buildings to regular axial ensembles of brick edifices in Late Baroque, Rococo, or Neoclassical styles is evident throughout the order’s outposts. On the other hand, significant disparities between the Polish and Lithuanian provinces of the order are observed, both in terms of actor activities and formal solutions employed in artworks.

The described approach integrates data from historical sources of various kinds and the contemporary appearance of preserved heritage into a single database. This integration enables the tracking of spatial distribution of artistic and sociocultural phenomena across the Eastern-Western borderland area comprising the territories of present-day Poland, Ukraine, Belarus, Lithuania, Latvia, and even part of Russia. Moreover, the project’s challenges and significance are heightened by the current political situation. Monuments in Belarus are inaccessible to Western scholars, while Basilian complexes in Ukraine should be considered endangered heritage. Furthermore, the Greek Catholic Church holds immense importance for Ukrainian national identity that has made it a target of Russian persecutions, both tsarist and Soviet. Consequently, the study of the artistic network of the Basilian order transcends academic boundaries, resonating with broader questions of identity and Eastern-Western tensions in the expansive region between Central Europe and Russia.

Realms of rule: Exploring 'hidden geographies' in medieval corpora through spatial humanities

Ian Gregory, Keith Lilley, Paul Rayson and John Vidler

There is a tendency in the spatial humanities to focus more on the modern era where sources, both textual and cartographic, are comparatively rich. Recent studies, such as the *Map of Early Modern London* project (<https://mapoflondon.uvic.ca/>), and *Pelagios* project (<https://pelagios.org/>), also show the potential for spatial humanities techniques in the Early Modern and Classical periods respectively. However, as yet, comparatively few similar studies have focused on the medieval period. Reasons for this might in part be due to the unevenness of textual sources from the Middle Ages, and also their variety and heterogeneity. This paper aims to address this by exploring the potential of using natural language processing (NLP) techniques to explore an English medieval corpus.

The paper starts by describing the creation of a suitable corpus for analysis. This consists of a collection of digitised state and administrative records in the form of Calendars of Charter and Patent Rolls, originally printed in the 19th century but now accessible digitally via British History Online. Under the Plantagenet kings of England (12th-15th centuries CE), these records were the main written instruments through which the royal administration and its officials ruled the realm. They provide documentation on legal and bureaucratic decisions concerning a wide range of governance issues, including information on property, people and places. Thanks to a grant from the Joy Welch Fund, the authors have been engaged with using the Calendars as a basis for an exploratory study to 'excavate' hidden geographies of the Plantagenet realm, and in particular to determine (1) what places were of interest to English government in the 13th and 14th centuries, and (2) what do contemporaries have to say about these places in the Calendars?

To answer these questions we begin with a multi-pronged approach to simplifying the textual sources for machine processing. As with many NLP pipelines, we began by downloading and converting the corpus data to use consistent UTF-8 formatting and a simple XML schema in order to represent the document structure. Inspired by existing approaches applied for modern texts by the Spatial Narratives project (<https://spacetime narratives.github.io/>), we adapted a pipeline of NLP tools to lemmatise the input (match terms to their dictionary headwords), part-of-speech tag (assign major word classes such as noun, verb, adjective and adverb), and semantically tag the text with semantic fields from the PyMUSAS system (<https://pypi.org/project/pymusas/>) to group words and phrases together into major topic areas. We also cross referenced locations in the text using the Survey of English Place Names (<https://epns.nottingham.ac.uk>) combining the modern and historic geographic names to create a geographic lemma.

The resulting network of text, associated annotations and alternate forms was stored in a graph database (Neo4J) for subsequent explorative analysis via collocation and other relationships. This enables us to take a very source-led approach to understanding the corpora and the geographies that they contain as well as helping to support more hypothesis-driven approaches. Taking one example, that of medieval town formation, searching in the graph-space starting from a list of manually selected seed terms relevant to town formation enabled

us to refer to the locations in any of their forms. In Figure 1 we present a fragment of the much larger graph showing a subset of the full annotations available within our data as the density of data even in a relatively small corpus precludes representing the entire graph.

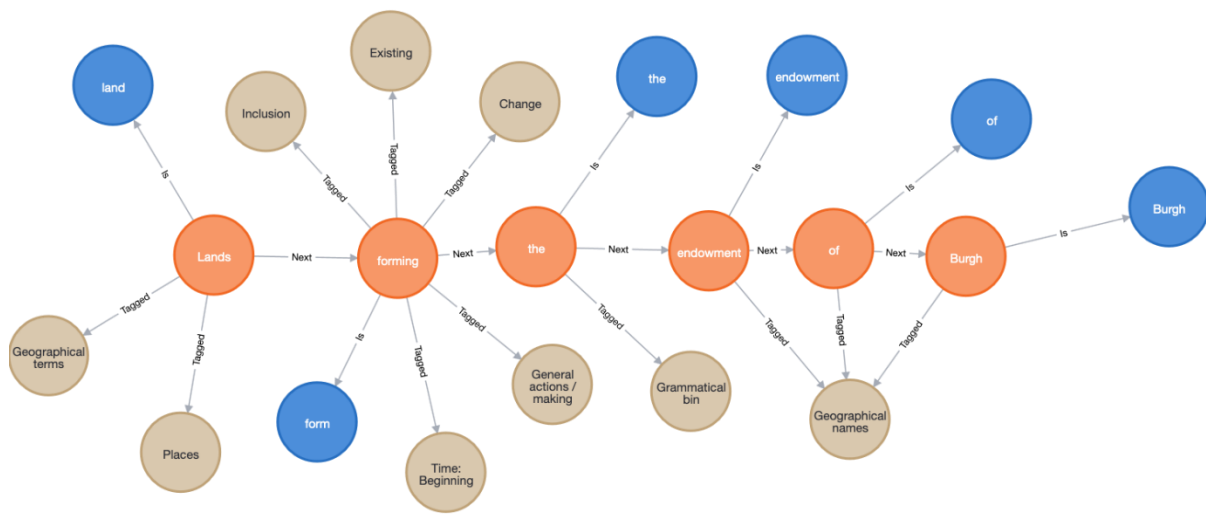


Figure 1: A subgraph of a larger corpus-graph demonstrating the associated tags and their relations.

Using these techniques we can extract paths through the data connecting individual concepts, places, people, or other entities along either corpus tokens (the source texts) or conceptual relationships (links between times, places, normal forms and others). The next stage of work is to define graphlet or fragment templates and evaluate their relative accuracy for extracting the information. This paper reports on these findings and their significance, as well as the next steps for visualisations of social networks of the Plantagenet realm, as we seek to understand and demonstrate the potential digital tools have for exploring how geographically dispersed people and places across medieval Britain and Ireland were governed through spatial connections that linked them to the centralised rule of the monarch. In so doing we will also present a paper that illustrates the potential for spatial humanities approaches in helping to understand medieval geographies.

Click, See, Explore

A Multimodal Approach to Better Understand the Early Modern Colonial World through Old Maps

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Abstract

Unlocking archives demands more than words alone. In the case of the paper archives of the Dutch East India Company (VOC), localizing toponyms through (historical) maps facilitates the interpretation of the giant collection of letters, reports, and ledgers. These maps can act as interpreters, bridging the gap between past and present place names (often changed by succeeding colonial regimes, independence, or other historical events) and revealing how cartographers and their commissioners perceived and exploited bodies of land and water. By taking information from maps into account, one might gain a richer understanding of the spatial context in written archives, moving beyond the mere textual representation of people, places and what happened to them.

At the GLOBALISE project,¹ funded by the Dutch Research Council (NWO), we aim to make textual archives of the VOC (covering the period 1605-1799) searchable and *researchable* by recognizing handwritten text on almost 5M scans, and by annotating and identifying entities such as persons, places, and polities, including the events they were part of. This big textual corpus is the starting point for computer-assisted research into the history of Dutch colonization as seen from the perspective of the VOC.

To improve our understanding of the colonial context, we have complemented our textual corpus by interlinking it with a visual counterpart: a corpus of colonial maps. In our presentation, we will present a pilot that involves a three-layered enrichment of maps sourced from two collections (1584-1813) of the Dutch National Archives, and that we intend to develop further with more maps from other collections and archives, such as the Royal Netherlands Institute of Southeast Asian and Caribbean Studies (Leiden) and the Allard Pierson Museum (Amsterdam).²

Ahead of the enrichment steps, we convert each of the collection's Encoded Archival Description (EAD) files to a IIIF Collection (with subcollections and manifests, cf. the IIIF Presentation API³) to replicate their archival hierarchy and context. Next, we supplement these IIIF Collections with different kinds of (web) annotations, grouped by purpose in separate layers.

In our first enrichment layer, we try to link the early modern map view of colonies and other territories to a modern map through the Allmaps tool (<https://allmaps.org/>), which adds IIIF

¹ Petram and Van Rossum (2022), see also: <https://www.globalise.huygens.knaw.nl/>

² The Leupe collection of foreign maps (1584-1813, 4.VEL & 4.VELH). See <https://www.nationaalarchief.nl/onderzoeken/archief/4.VEL> & <https://www.nationaalarchief.nl/onderzoeken/archief/4.VELH> respectively.

³ <https://iiif.io/api/presentation/3.0/>

Georeference Extension⁴ annotations. This layer helps to bridge the historical representation of a place with its contemporary one, and illustrates how the area was seen through the colonial lens: a high level of detail on a large scale likely means that the area was considered of great importance, and that there was considerable colonial influence.

The second layer is about named places. By applying a text spotter model, we automatically extract labels from the maps,⁵ allowing us to run these through a handwritten-text recognition model to transcribe the labels,⁶ and connect the labels to the places in our written corpus by linking them to our knowledge graph, external thesauri, and other gazetteers.

Finally, the third layer deals with geographic iconography. We have prepared a sample training set for usage in a segmentation model to annotate and classify icons and symbols on the maps, such as a Dutch flag representing a Dutch settlement, or trees to signify plantations and colonial exploitation. This layer is crucial for both comprehending the Dutch colonial worldview and tracing its evolution in the early modern era.

Each of these layers brings in a specific type of interpretation that can be viewed independently, or can be analyzed in combination with other enrichments. For instance, toponyms on maps can be linked to their corresponding icons. For convenience and maximum interoperability, we aggregate a pointer to the image itself, its metadata, and our enrichments in a single IIIF Manifest, which exposes all enrichments (ours and potentially those of others), creating a unified container for this layered information. It is this container that can potentially be called upon in the project's research environment to make it easier for a researcher to get a grip on the historical material as it provides additional aid for interpretation: analyzing the textual materials and these three layers together, and through time, paints a multifaceted picture of the colonizer's world perception. From commissioned maps to embedded references, this combined analysis unlocks crucial context for interpreting the early modern world through the colonizer's lens.

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⁴ <https://iiif.io/api/extension/georef/>

⁵ We use the model created by Li et al. (2020) and a slightly modified version of their pipeline. See: <https://github.com/machines-reading-maps/map-kurator>

⁶ An open-source HTR pipeline has been developed by the KNAW Humanities Cluster, Amsterdam: <https://github.com/knaw-huc/loghi>

Reconstructing and editing historical geodata. An open-source implementation of a conceptual framework

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The proposed paper deals with the challenges encountered and workflows needed for reconstructing and editing historical geodata. It describes the results of an effort to reconstruct territorial changes in Hessen since the first half of the 19th century. The paper focuses on the implementation of an existing conceptual data modeling framework using a custom plugin for [QGIS](https://qgis.org/) (<https://qgis.org/>). This plugin aims at facilitating the error prone process of editing historical vector data and is published under an open-source license. Due to its generic design, it can easily be reused by other projects.

Introduction

Over the past years, researchers interested in the domain of historical cartography have been blessed with an ever growing number of digitized maps available on the internet, provided by private and public institutions alike. Some of them have been georeferenced and hence are available for desktop and web-based Geographic Information Systems (GIS) to be compared to historical and modern geodata. However, the vast majority of these maps are still mere images, a grid of raster cells with associated numerical values. They still need to be consulted by means of critical scholarly research to derive vector data. This kind of geospatial data can be used for the purpose of visualization and geospatial analysis. The features extracted from the map may range from topographical features, human settlement footprint and logistical infrastructure, e.g. canals, roads and railways. During the course of historical geographical data modeling, a special emphasis has been put upon the reconstruction of historical borders. While the late 1990s and early 2000s mark the heyday of the creation of national Historical GIS projects in Europe, little advances have been made in this domain since. With the exception of a recent project aiming at reconstructing the administrative boundaries of modern France. As a result, scholars dependent on such data for their research are confronted with a highly varying degree both in quality and quantity of historical vector data.

Data Modeling

With the advent of GIS in the 1980s and 1990s, several mental frameworks have been developed to cope with the central challenge in creating historical vector data: how to model the change in space and time in a manner that is both manageable by existing software solutions and researchers while limiting the amount of duplicated data. The most prevailing concepts have been the *snapshot*, *time-variant* and – as a variation of the latter – the *Least Common Geometry* (LCG) approach.

The snapshot model aims at reconstructing one or more points in time. Geometries are copied, hence features that have not changed their borders are nonetheless included multiple times within the same data set. While this method is easily applied and allows for economic and fast initial results, it does come with significant costs in the long run: databases created this way tend to be virtually non editable, as ex post border changes will have to be added to several or all existing snapshots. Despite its obvious drawbacks this approach is still applied in recent projects.

A more complex approach is to encode the validity by setting start and end points on the geometric features. This concept can be extended by reconstructing the smallest extends of territorial boundaries (called *Least Common Geometries* (LCG), typically boroughs or parishes). Using those features as puzzle pieces one can generate larger administrative units by means of GIS based union operations in an automatized fashion. Contrary to the snapshot model, border changes between features are only recorded once and can be edited as soon as new evidence comes to light. This is especially important in cases where there is no single written source registering all the territorial changes within a region. Indeed, our project has been significantly occupied with identifying the points in time specific border changes occurred and thus needs to be flexible enough to incorporate new findings. While it is highly beneficial regarding the maintainability of the data product new challenges arise with regard to data management. Researchers need to ensure that a) features do not overlap one another at any given point in time (spatial topology) and b) a continuous succession of features for an area (temporal topology) exists. While a limited number of edits can be managed with standard GIS software, an increasing number of border changes rapidly leads to an increasing amount of time spent on quality assurance.

QGIS Time Editor

To facilitate the process of editing time-variant features we developed the Time Editor ([source-code: https://github.com/hil-mr/time-editor](https://github.com/hil-mr/time-editor)) plugin for the well-known and established open-source GIS **QGIS**. The plugin does provide several checks that address the challenges associated with the practical applications of the conceptual framework. The most important ones being the *Temporal Integrity* and *Spatial Integrity* checks. The *Temporal Integrity* check ensures that all features associated with an administrative unit do not overlap temporarily. As historical administrative units might dissolve and be reestablished, users can define exceptions for all existing integrity checks. The *Spatial Integrity* check ensures that for any point in time there are no intersections between adjacent features. All checks can be limited by the use of filter expressions and / or prior feature selections. The plugin was designed to be as generic as possible and has been extensively tested in different project contexts. In addition to integrity checks the plugin provides functions to facilitate the creation of new features.

Summary

With the methods described in this paper we aim at facilitating the edition of historical vector datasets. We hope that the workflows and software solutions developed are beneficial to other projects in this domain. Besides, special emphasis is laid on openness – be it in the software development process or regarding the licensing of the resulting data products.

2.39 Extracting Geographic Information from Social Media Data, an approach using NER with Colombian spanish

Brayan Oviedo

In the past decade, there has been a growth of interest in exploring the large amount of data present on social media, generated by users around the world. Some calculations aim to confirm that are around 4.95 billion of users of social networks, and they are generating huge quantities of information that can be used for research in geography and spatial humanities. Multiple investigations about data contained in social networks as Twitter, Flickr, Reddit, TripAdvisor and other popular social networks could be found in general academic research, especially with in subjects like Natural Language Processing (NLP) that also has been growing exponentially in the past few years. With such a big source of information, there are a lot of work possibilities in different topics in which geography and spatial humanities must not be unconnected, because as the available information is generated by people, we can found a lot of different topics to study this kind of information.

Trying to understand geographic data from social media information is one important goal for researchers in recent years. But how can we obtain that geographic information from sources that are principally texts and pictures? In this research we try to answer that question, in that context, the main goal of this research is to make social media data a source from geographic information that could be used for several researching and decision making.

There has been some approaches to the main question by using social media data, for example, some researches tried to use geotagged pictures to find some spatial patterns of sentiments with photos from Instagram and Flickr. Another approach is using Named Entity Recognition (NER) to process TripAdvisor comments reviews using the text contents. In the case of twitter data, there has been 3 principal approaches to the matter: 1) Use the metadata of the information (as they call geo-tagged tweets); 2) Inferring the geographic location of the tweet using a combination of metadata, profile data and making predictions based on the language of the texts available in the content being able to summarize a location of the origin of the tweet, and finally, 3) one of the most common approach by using techniques as NER.

Except for a few cases of work with data from Indonesia, China and India and focused to the local languages, most of the work in this task has been in the English language or has used another approach like taking the words from the original language and translating it to English with automated translation methods. Is in this context than a necessity of working with models that can be trained to use NER approaches in Spanish language specifically for Spanish in Colombia has reached, and to make the testing task with twitter data of Spanish tweets of Colombia could be useful to contribute growing the NER tasks focused on identifying location in short texts as tweets. Furthermore, NER tasks are too general to named entities, so they are useful to find names, location, roles and organization, in this case, the main focus of this process is to use it focused in Locations.

To achieve that goal, the exploration of NER methods has been taking place by exploring some supervised trained models for this task, first, testing some of the available as Stanford NER and Spacy library NER and comparing it with the results of a trained supervised NER

model using Colombian Spanish and Colombian toponyms. In this way we can see the improvements of the NER tasks in the recognition of locations for this specific case. By comparing the methodological approaches, and by generating the corresponding models we could say this approach of a Colombian Language NER is a big contribution in several fields: 1) the researching in NER tasks of the scientific community interested in NLP process and 2) the spatial humanities, geography community and institutions that can take another huge geographic information resource to further researching and decision making towards the geo-spatial understanding on the world.

As this work is part of a bigger effort to understand the geographical space in Colombia with the use of data presented in texts (short texts in the case of twitter) processed with NLP, testing NER tasks with Colombian Spanish to extract geographic locations is one of the first steps of the work, so that is why the future work will be related to use different approaches of unsupervised training as topic modeling and finally, trying to summarize that extraction with some topic and sentiment analysis in the tweets, all of this in an effort to contribute to the spatial humanities and digital humanities approaches.

Geolinguual Studies: Combining linguistics, remote sensing, and digital humanities to assess the interrelation of physical and social spaces

Johannes Mast, Richard Lemoine-Rodríguez, Ninja Schulz, Hannes Taubenböck, Carolin Biewer

The last decades have seen an enormous increase of digital text data from Internet sources such as social media platforms, blogs, web forums, and web news. These data contain rich information about people's perceptions, emotions, and opinions, as well as their activities and relationships. They are used in a large variety of fields, for instance, to assess human perception of their environment or gain situational awareness in disaster response (Z. Wang et al., 2019; Zhu et al., 2022). Some of these data also contain information on the geolocation of the messages, either in an explicit form (e.g., by using geotags) or in an implicit form (i.e., by mentioning locations in the texts), so that these messages can be located via geoparsing methods (Middleton et al., 2018). Therefore, the texts can be analyzed spatially e.g., by means of geostatistics or point-pattern analyses (Cressie, 2015). Additionally, timestamps included in these data allow to assess temporal trends, which can be combined with the geolocation to assess human mobility (Gonzalez et al., 2008). Using geographic location as a link, the content of the messages can be related to a wealth of geodata from other sources, such as volunteered geographic information (Goodchild, 2007), the internet of things (Kamilaris & Ostermann, 2018), or remote sensing imagery (H. Wang et al., 2018; Taubenböck et al., 2018). Combining such heterogeneous datasets offers new insights into how physical space and socially constructed space, i.e. place, interact. We call this new approach 'Geolinguual Studies' (GLS), which integrates methods from digital humanities with those from remote sensing and linguistics, especially sociolinguistics, corpus-linguistics and (critical) discourse analysis, to investigate the relationship between physical space and place.

Here we present two studies to illustrate the opportunities and challenges of the GLS framework: Firstly, we show how social media data and remote sensing data can be combined and contrasted to assess digital imbalances between new and old urban spaces. For 135 settlements across Africa, we used satellite imagery to map the growth of each settlement's built-up area over time. This enabled us to compare the Tweet density between older and younger parts of the settlements. Results confirm the existence of a digital disparity between older and newer settlement areas that we found to be related, in complex ways, to settlement structure and the geographic setting. The other case study features an additional layer of analysis by integrating a linguistic analysis of the textual data in an application in a humanitarian crisis setting, i.e. the war in Ukraine. We included mobility information at user-level which enabled us to identify migrant flows and the main needs and interests of migrants across space and migration stages, based on geotagged Twitter data (Lemoine-Rodríguez et al., 2024). In this example, we show how topics can be identified across languages and characterized regarding the expressed opinions using a combination of natural language processing and qualitative analysis. The results show that the topics discussed by migrants on social media shifted depending on their migration stage (i.e., before leaving, after leaving, or

after returning to Ukraine), and that the language used to communicate varied depending on the topic and the targeted audience.

Challenges lie in the comparatively small proportion of text content which can be reliably geolocated (Zhu et al., 2022), the representativeness of the userbase (Lemoine-Rodriguez et al., 2024), the protection of users' (geo-)privacy (Kounadi & Resch, 2018), and questions of ethics in this domain (Kochupillai et al., 2022). Additionally, as the example of Twitter demonstrates, the stability of data sources cannot be taken for granted (Davidson et al., 2023). However, many of the challenges associated with social media data can be effectively mitigated through technical methods. Furthermore, the comparison of results derived from social media with other datasets (e.g., official statistics) allows to confirm the plausibility of the insights derived from such data (Lemoine-Rodriguez et al., 2024). The benefits of social media data for research are substantial, since it represents a rich data source for research as well as for decision-makers e.g., in crisis response situations, providing first-hand information in real-time of various facets of human behavior, including needs, opinions, interests, sentiments, and in some cases, mobility (Hübl et al., 2017; Mast et al., 2024; Zhu et al., 2022). In this sense, the combination of insights derived from text data and traditional data sources has great potential to improve our understanding of society. Thus, the combination of geographic and linguistic approaches can help to assess social behavior in a more holistic manner than any of these disciplines alone. These insights can be useful for psychologists, urban planners, or sociologists, and contribute meaningfully to several research disciplines, including the Spatial Humanities.

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2.41 Mapping the prospects of Nature-based Climate Change Adaptation Strategies (NbS) for restoration of Heritage in Nigeria

Olufemi Adetunji

Protection of heritage against damage and loss due to continuous changes in temperature, rainfall and other climate parameters is becoming more challenging due to limited resources and poor understanding of the distribution and severity of climate risks. The changes are devastating to tangible and intangible heritage, particularly in terms of archaeological site, historical buildings, cultural landscapes, parks and gardens, museums and artefacts. For instance, average temperatures across Nigeria increased by 1.5°C since 1980 with projection of 5°C by 2080. The impacts of climate change evident across the region include reduction in rainfall, rising sea levels causing damages to historical buildings, archaeological sites and cultural landscapes and more frequent extreme weather events. Future projections revealed continuous increase in temperature, sea level and more variable rainfall indicating urgent need for implementation of actions to adapt and improve resilience of heritage sites. However, Nigeria government, as a matter of priority, established an unconditional contribution target of reducing greenhouse gas emissions by 20% below the business-as-usual emissions scenario by 2030 with primary focus on agriculture, power, transportation and water resources sectors.

Relevant studies suggest implementation of nature-based adaptation strategies to protect heritage against climate change and restoration of natural ecosystems surrounding cultural and natural heritage sites. Nature-based strategies, in the context of this study, refer to actions that address community challenges through protection, management and restoration of natural ecosystems of heritage sites, not only to address climate change impacts, but also improve human wellbeing and biodiversity.

The current paper, therefore, investigates the potentials of nature-based adaptation strategies such as planting of trees, restoration of wetlands and sustainable land management practices to safeguard heritage for future generations. Geographic Information Systems (GIS) maps were collected to understand the exposure and vulnerability of the heritage sites to climate risks and develop pathways to implementing nature-based adaptation strategies. Stakeholder dialogue was implemented to understand critical issues relating to policy and governance, institutional capacity and community engagement influencing conservation and management of the heritage sites. Also, four case studies were selected based on the climatic zones in Nigeria to understand the trend of changes in climate parameters and illustrate the influence of climate change on heritage sites.

Findings revealed that heritage sites ranging from historic buildings to natural conservation areas are impacted by climate risks resulting into rapid deterioration of the values and loss of connection to the community. 42% of heritage sites in southern Nigeria are threatened by flood and other coastal risks while 59% of the heritage sites in northern Nigeria are impacted by droughts, increasing temperature and sandstorms. Findings also established that there is limited understanding of the significance of nature-based adaptation strategies in

protecting heritage sites due to inadequate awareness, policy instability, weak political will and limited involvement of local communities and non-government stakeholders. Local communities where heritage sites were located also have limited access to climate information and knowledge resulting into environmental inequalities and marginalisation. Although, the government have enacted different climate policies (such as Climate Change Act) and targets (such as Net Zero Emissions 2050 and Energy Transition Plan), but the implementation of the policies is impeded largely due to weak organisational capacity and policy misalignment between federal, state and local governments. It was also observed that heritage principles were not integrated into the planning and development of the climate policies and targets. The findings further highlights implementing nature-based adaptation strategies needs to include managing and increasing green cover, improve soil quality and biodiversity and manage freshwaters and wetlands around the heritage sites.

The study further finds that adopting nature-based adaptation strategies enabled protection of traditional knowledge and inclusion of indigenous communities, who can provide valuable insights and strategies for adapting heritage sites to climate change impacts. The study, therefore, recommend i.) establishment of protected areas around heritage sites to serve as barriers to climate change impacts and provide refuge for biodiversity and safeguard heritage values, ii.) development of responsive urban development framework using GIS and other advanced spatial tools that recognises the protected areas and heritage sites to avoid intrusion, deforestation and uncontrolled urbanisation, iii.) promotion of low-impact tourism activities, iv.) implement guidelines for visitor management, and v.) encourage cultural and environmental education programs. Community members also agreed that incorporating nature-based adaptation strategies helped them to reconnect with the values, beliefs and history of the past generations, rediscover their identify and reignite sense of responsibility and care for the heritage sites. In conclusion, implementing nature-based adaptation strategies will improve protection of heritage sites as well as contribute to significant reduction of greenhouse gas emissions while starving off worst impacts of increasing temperatures.

2.42 Over the Horizon

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Over the Horizon

Abstract

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Over the Horizon considers spatial dimensions of intersections between contemporary art and security space in Nevada, a strategically important state in the Western US. Beyond being the home of the internationally known Las Vegas Strip and its hospitality industry, Nevada is the center of two crucial government programs: experimental weapons development and testing, and nuclear waste storage. In a state where over 80% of territory is public, the majority of Nevada's terrain is nonetheless sequestered from public oversight in restricted space stretching from ground to air. This paper addresses how a work of video art, Omer Fast's 2011 5,000' Is the Best, and a work of land art, Michael Heizer's City (1970-2022) have both mediated and utilized Nevada's special relation to national security infrastructure to shed light on the influence of place on cultural identity, and on how cultural heritage is itself strategically employed to protect and limit the exploitation of national resources. In so doing, it maps the politics of spatial use across art, architecture, and planning in an unexpected and often overlooked corner of the United States.

Israeli-American artist Omer Fast (b. 1972 Jerusalem, lives and works in Berlin) debuted 5,000' Is the Best at the 2011 Venice Biennale, the premiere global stage for contemporary art. The 30-minute, multi-channel video work uses oral testimony and staged recreations of US military drone pilots' experiences in the Afghan and Iraq wars to lay bare issues of complicity in participating in and witnessing military engagement. Its title refers to an optimal altitude from which to successfully strike a ground target in unmanned aerial combat. First regarded as a sharp critique of its engagement in the so-called "forever wars," 5,000 haunts the conclusion of US ground operations in those wars while previewing the remote-controlled present of spectacular conflict. Less well understood is the video's relationship to Southern Nevada, where it was not only filmed but explicitly set, both in the shadow of the Las Vegas Strip and of two local Air Force Bases serving as central command for US overseas drone operations. Read through this lens, 5,000' explores how Fast's video articulates such hauntings in the geography of the homefront, its focus on the quotidian nature of surveillance states predicting its future.

American artist Michael Heizer, (b. 1944 Berkeley, CA, lives and works in New York) is a pioneer of monumental sculpture engaging environmental settings. Since 1970, he has been at work on City, a 1.25-mile-long complex of rammed earth structures in the desert basins north of Las Vegas. Kept secret during its construction, City opened to a (limited) public audience in 2022, admission available through a lengthy wait list administered by the artist's non-profit foundation. It sits cheek-by-jowl with two notorious US national security sites on Nevada public land: Area 51, a highly classified Air Force training and testing facility officially

acknowledged by the US government in 2013, and Yucca Mountain, a long-proposed storage site for US nuclear waste controversial on many levels. Curiously, *City*, a then-hidden work of contemporary art, became a linchpin in a mid-2000s campaign to prevent Yucca Mountain from being further developed and protecting additional lands around Area 51. Its federal designation in 2015 as federally protected cultural heritage under the 1906 US Antiquities Act effectively blocked transit of nuclear waste to the Yucca Mountain site, and brought an additional 700,000 acres of land bordering classified security sites under government regulation and control.

Over the Horizon examines how these two works' settings and execution create an opportunity to map contemporary art's political impact over strategic, and secretive, geography. It also proposes a new methodology for understanding spatial humanities as a process of mapping discrete cultural works to the complex physical and cultural landscapes that produced them. Going a step beyond articulating context dependency, the paper argues that such works of art actively shape the physical, juridical, and geostrategic space they depict, modify, and mediate in the shadow of public scrutiny.

2.43 Deep, Thick oder Fuzzy Mapping of the Spree in the 19. and 20. Century - Approaches to the Digital Environmental History of a River

Rita Gudermann

Although it flows through the centre of the German capital, the Spree is a river that has so far attracted little interest from historians. Yet this almost 400 kilometre-long tributary of the Havel in eastern Germany was and is not only central to ship transport and the supply of drinking water and wastewater disposal for the city of Berlin. It is also at the centre of the far-reaching changes to the landscape around the open-cast lignite mine in Lower Lusatia, of which it is the most important water drain. At the same time, it irrigates the tourist attraction, the Spreewald near Berlin, and its lakes are an important recreational area for the Berlin population. During the period of German-German division, the Spree played an important role both as a barrier and as an escape route as a river that did not respect political borders. Like many other rivers, the Spree was straightened and dammed, equipped with sluices and tunnelled under, its banks fortified with walls and built on, its natural course altered, especially in urban areas, and its water polluted with filth and chemicals of all kinds.

How could one write an environmental history of the Spree that takes all these aspects into account and that at the same time makes the many facets of human perception of this 'lifeline' tangible? One that consults not only traditional maps, but also serial sources of all kinds that deal with the state of the river? That takes into account very personal experiences with the river and also honours literary sources? Which represents the various forces acting on the river - be they natural or man-made? So much for the epistemological questions. But such a complex and colourful topic also deserves appropriate visualisation, not least in the form of maps. How can the spatial aspects of the river's history be visualised in a compelling way? Are there cartographic methods that make it possible to depict not only the multidimensionality of the history of a river, but also the diversity of experiences of its neighbours and users over the course of history?

Some more recent approaches to the integration of different levels in map visualisation are the concepts of 'deep', 'thick' or 'fuzzy mapping' developed mostly in the Anglo-American world. They transcend the classic two-dimensional maps and depict historical processes in multi-dimensional views, linking a wide variety of layers, some of which are also intended to depict virtual realities. They are not limited to the representation of present and past realities, but also include unrealised spatial arrangements or future plans of a space or place.

While 'deep' and 'thick mapping' have already been tested on a few historical regions and locations, fuzzy mapping, which originated in the field of IT and neurology, has not yet been used to answer historical questions. The method seeks to capture and depict causal knowledge and represent cognitive landscapes in the manner of neural networks and has been used to model decision-making processes in social and political systems. For the representation of structured knowledge and the modelling of complex systems, the method is attracting increasing research interest in various scientific disciplines. With this task and the tools devel-

oped so far, it should also be possible to visualise environmental historical processes in the form of maps, perhaps even better than is possible with existing methods.

Using the history of the Spree in the 19th and 20th centuries as an example, a variety of different source and data resources (such as water levels, leisure traffic, pollution, fishing results, etc.) or even quotations from serial sources such as postcards, inspection reports, etc. will be interlinked in the sense of 'deep' or 'thick mapping' in order to create a multidimensional picture of the environmental history of the river, its space and its inhabitants. Finally, fuzzy mapping will be used to visualise development and decision-making processes with their causalities and drivers and unrealised alternatives. The paper presents initial research results and raises further methodological questions and problems.

2.44 Mapping historical blue-green infrastructures of interwar German housing estates

Aleksandra Gierko

The presentation concerns the landscape of multifamily housing estates designed and built before 1945 as part of the modernist trend in Berlin, Frankfurt am Main, and Breslau (present-day Wrocław, Poland). Research investigates the original land development state, compares the original and contemporary development states, and identifies historical solutions, which could be currently perceived as blue-green infrastructures. The starting point of the investigation was the observation that the interwar German housing estates were planned in a functional way, with the pivotal role of greenery and water in shaping urban spaces. Consequently, this pre-war development approach aligns with current calls for sustainable development and the creation of resilient cities. Natural elements were not only an aesthetic consideration, but an integral part of the urban fabric. However, especially in Wrocław, subsequent post-war transformations led to the degradation of these planned spaces, highlighting the need for a comprehensive understanding of historical urban planning to inform contemporary approaches.

The pre-war state of development is illegible to a large extent and could be reconstructed through archival materials employing the comparative cartographic analysis method. This type of analysis is commonly used in landscape studies to trace landscape changes using mainly cartographic data. The comparison was carried out, juxtaposing current open spatial data and historical topographic maps, aerial photos, topographic maps, and original manually drafted plans and projects. The analysis was carried out in the GIS environment. Field observations of the housing estates under study, carried out using the method of direct observation combined with photographic documentation, were complementary to the analysis. The subject of the observation was the land development of the housing estates, with particular emphasis on green-blue infrastructures, such as street greenery, climbing plants on buildings, retention basins, and water reservoirs. The effects of the study were mapped and compared quantitatively.

As part of the study, comparative research of housing estates from the same period in Wrocław, Berlin, and Frankfurt am Main was conducted. The research questions explore whether blue and green infrastructure solutions are local or exhibit repetitive patterns of land development. This comparative approach broadens the scope of the study and enriches the understanding of how these solutions manifested in diverse urban landscapes.

In conclusion, this research contributes to understanding the historical land development of housing estates. While existing research has focused primarily on the architectural aspects of these estates, this study complements the literature by offering insights into the broader context of balance between functional planning and the use of greenery and water, and the subsequent landscape transformations these spaces underwent.

The birth and life of buildings: High-Resolution Analysis of Historical Building Trends through the Digitised Municipal Archive of Tel Aviv-Yafo

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Keywords: Building age prediction, Building documentation, Building information databases, Architectural historiography, Spatial humanities, Tel Aviv-Yafo

The built environment constantly changes as buildings are constructed, repaired, renovated, remodelled, refurbished, reconstructed, and demolished. But while we know from everyday experience that building existence is a temporal phenomenon, systematically defining what actions amount to the construction of a new building or its demise is not as straightforward as one could expect. This blurriness in definitions was acknowledged in recent studies on building age prediction and heritage discourse in spatial humanities (Ferreira-Lopes & Pinto-Puerto, 2018; Li et al., 2018; Sun et al., 2022; Zeppelzauer et al., 2018), including a study that noted that “[w]hile it is one of the key building attributes [...], the year of construction of a building has not been given much attention in practice and research” (Biljecki & Sindram, 2017, p. 22). When attempting to investigate large databases of building information to explore the historical transformations of a city's physical development, this conceptual blurriness becomes a genuine impediment to extracting meaningful and reliable quantitative insights. Without clearly and consistently defining the moments of “birth” and “change” of most buildings in such databases, analysing the historical trends embodied in them stands on shaky grounds.

In this study, we explored the theoretical ambiguities, blurry definitions, and technical challenges that complicate the seemingly straightforward definition of major moments in a building's life, both within academic discourse and across professional and regulatory domains. We then attempted to distil coherent definitions of a building's moment of inception that may serve as a strong indicator for significant construction activity concentrated on a single building plot. In defining this moment, the proposed system considers a building's visual appearance, impact on the built landscape, and structural integrity as the most important spatial variables that indicate significant construction activity. Consequently, we suggest determining a building's moment of “birth” based on the type of certification documents contained in municipal building files, highlighting the significance of carefully studying the local properties of building certification systems in large-scale and high-resolution analyses of building stock trends.

This study presents a reproducible ontological formulation defining a building's moments of “birth” to support large-scale, high-resolution historical analysis of construction trends and cycles. The study also aims to rectify a critical gap in the methodological foundations of architectural historiography that has direct implications within the broader domain of the spatial humanities. This gap impedes different types of diachronic analysis of the evolution of the built environment, especially when studying how the ups and downs in the economy affect the building stock. To explore the coherence, practicality, and challenges of the suggested methodology, we applied it to the historical analysis of a large dataset of planning and construction documents archived and digitised by the Tel Aviv-Yafo Municipality's Engineering Administration. Based on the documents' classifications, we automatically extracted years of increased building activities on each plot to recreate the city's timeline of construction and expansion (Figure 1).

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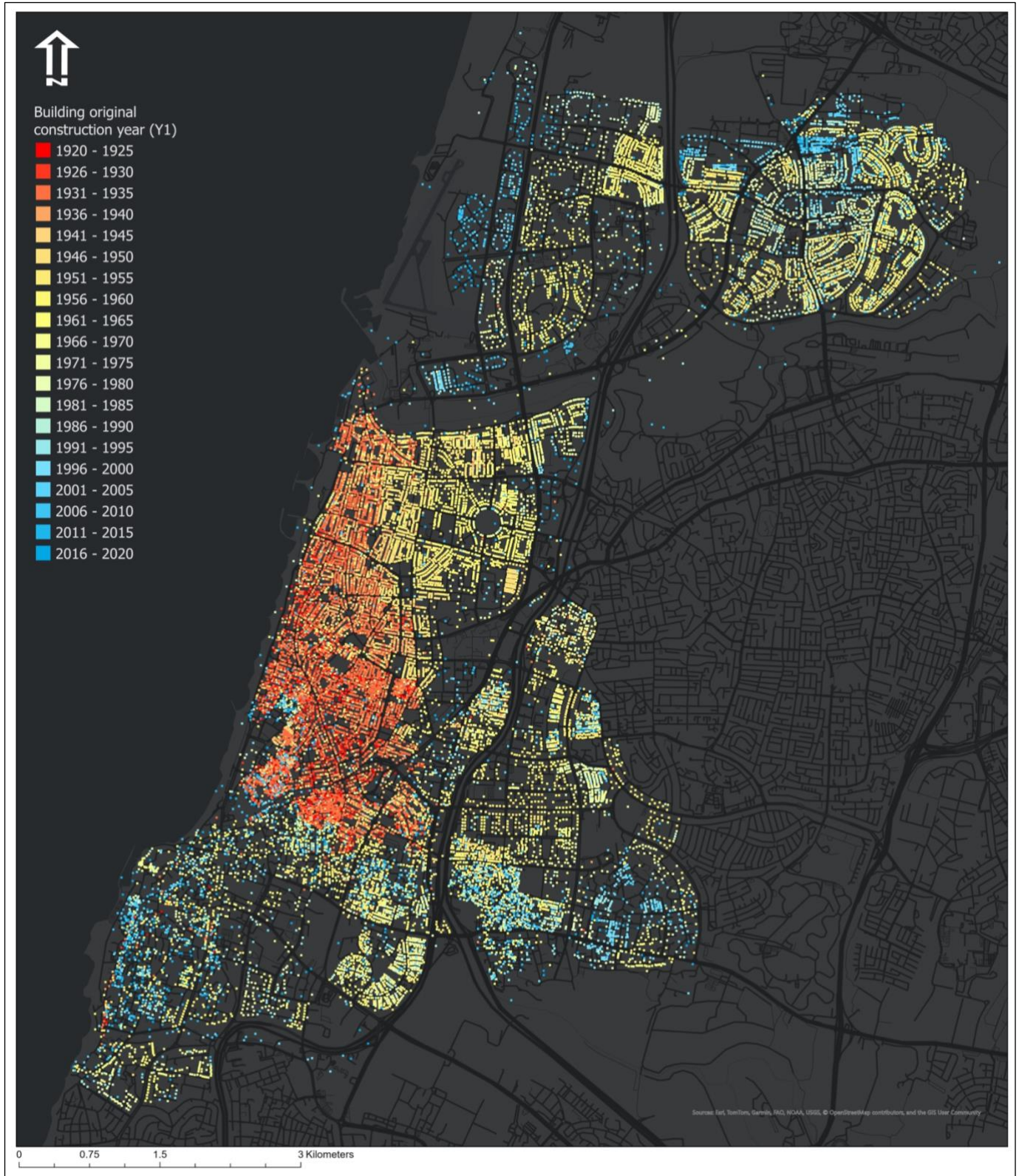


Figure 1. Construction chronology in Tel Aviv-Yafo, 1920-2020: (Y1) building birth years.

Using Counter-Modellings analysing narratives about places of unsafety in Recife, Brazil

Dominik Kremer

In the context of crisis discourses, corpus linguistic analysis of language use patterns are worthwhile in order to understand how crises are linguistically bound (Bubenhofner, 2009). This concerns acute crises such as diseases (Semino et al., 2004) or pandemics (Kremer and Felgenhauer, 2022), but also everyday experiences of unsafety in urban spaces (Moura de Souza et al., 2022). Metaphors of fighting the crisis (Semino, 2021) imply a search for places of the crisis (Brinks and Ibert, 2020) in order to identify, control and combat effects and causes (Chapman and Miller, 2020). When it comes to the question of experienced unsafety in everyday life, it is known from conceptual social sciences that they are modelled best as fluid spaces (Redepenning et al., 2010), which reflect forms of mobility as well as constantly changing situations (Moura de Souza et al., 2022). Even when the virus had already penetrated the population during the COVID-19 pandemic, the question of a spatial origin, the "hotspots", still played a decisive role in the search for causes (Kremer and Felgenhauer, 2022). Interestingly, however, media repertoires have developed in everyday discourses on unsafety that address this need non-cartographically in a mixture of social media and classic unidirectional TV broadcasts (Moura de Souza et al., 2022) and thus may represent a more suitable data basis for the analysis of unsafety than their mere visualization bound to map-based data.

In the search for shared "imaginaries" (Taylor, 2004), the dominant guiding metaphors (Lakoff and Johnson, 2008) and narratives (Viehöver, 2001) of everyday places, focus in Digital Spatial Humanities is directed towards multimodal analysis of imagery (Rose, 2016) and text data (Mayring, 2016). Supported by digital analysis methods, certain structural findings are available for the first time (Moretti, 2013). In the tradition of critical data studies (Dalton and Thatcher, 2014; Kitchin and Lauriault, 2014), however, it has become established to interrogate such research-based digital representations and data collections as apolitical spaces (Iliadis and Russo, 2016), to systematically scrutinize power, surveillance and control in the supposed decision support and, if necessary, to help underrepresented interests gain more visibility through counter-data (Dalton and Thatcher, 2014) (Iliadis and Russo, 2016). Dominant perspectives (Kitchin and Lauriault, 2014) manifest themselves - either unconsciously through the organizational structure of the data or consciously as part of a previously developed information architecture of a project - as data and information modelling. In analogy to `_counter-data_`, we thus see our approach of what we call concept space analysis as an opportunity to systematically examine data modeling and its social production conditions not only ex-post, but complementarily in the sense of counter-modeling (Kremer/Lang 2024) even before their development at the beginning of projects in terms of examining alternative explanatory approaches.

We illustrate our workflow using the example of a study on place-based narratives about perceived safety in different stakeholder groups in the city of Recife, Brazil (Moura de Souza et al., 2022). A general **workflow** can be derived (Kremer/Lang 2024), which can be explored incrementally in order to obtain complementary answers to research questions:

1 Identify theoretical approach: Which different theoretical approaches can be applied to the research question in principle? Which spatial terms are used to refer to the question from a technical point of view? What are the basic assumptions?

2 Analyze conceptual space: Which spatial concepts should be used to make structures visible on the data in an explorative manner?

3 Develop appropriate data modelling: In which data schemas should the spatial data be organized? Which explorative data analyses can be applied to appropriately evaluate the validity of the investigated spatial theory approaches with respect to the given research question?

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Mapping Medieval Trebizond (Trabzon) as an Urban Archaeology Practice

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Türkiye has a rich Byzantine heritage; however, it is generally neglected for several reasons and is constantly threatened by unplanned urban ‘development’ in most places. Medieval Trebizond (modern Trabzon) has an essential place in the Byzantine world since it was the capital of the Empire of Trebizond, ruled by the Grand Komnenoi in the Late Medieval period (1204-1461) until the Ottomans took the city. At this time, Trebizond was a vibrant crossroads of cultural confluence where Byzantine, Latin, Caucasian, and Eastern influences converged. This convergence is reflected in the urban fabric and architectural heritage, which contains invaluable historical and cultural treasures.

Although Trabzon’s Medieval heritage has largely been lost, some of the most important buildings of the period, such as the imperial palace and fortifications, religious buildings, and public open spaces, have survived. Scholars have claimed that the city's historical urban structure may have remained from Antiquity (Bryer, 1986). Also, the city

maintained its dispersed urban character during the Ottoman and Republican periods, even until the 1970s, when rapid and haphazard urbanization began.

Shoreline expansions and constructions against the preservation proposals and decisions by the Municipality of Trabzon's urban development plan (1970) significantly changed the city's topographical characteristics and irreversibly damaged the historic landscape. Some Byzantine buildings were deliberately demolished as late as the second half of the 20th century. In addition, top-down political decisions, alienation of the Byzantine heritage, neglect, lack of maintenance, and the passage of time threaten this unique heritage. Besides, previous research on the Byzantine heritage of Trebizond is minimal; not much has been added to the scholarship after the seminal work of Bryer and Winfield (1985). Within this context, the Byzantine *stratum* of Trabzon requires re-documentation, reinterpretation, and re-presentation to the public to ensure broader awareness and accessibility.

This research is part of an ongoing dissertation aiming to identify, document, and analyze the Medieval Trebizond for a better recognition and preservation of its heritage. This study investigates the medieval layer of the city through an urban archaeological approach. Within this frame, the material and literary evidence are evaluated together to unravel the town's medieval layer and understand the core urban aspects and the cultural, religious, and urban life of that period traced into the urban structure. All components of the historical urban setting are as vital as its architectural heritage; therefore, its identification and mapping are essential for conservation and preventing further damage

(ICOMOS, 1964; ICOMOS, 1987; ICOMOS, 2005; UNESCO, 2011). Charalambos Bouras' (2002) methodological approach to studying a medieval town is embraced in this research. This includes –along with archaeological excavations– i) Unification of all the surveys into a single plan of the present situation; ii) Reconstruction of the urban tissue of different periods; iii) Identification of architectural and urban uses, with the assistance of movable finds related to production; iv) Complementary interpretation of material and literary evidence; v) Research into urban growth and its historical interpretation. Trabzon has never been the subject of planned archaeological excavations until 2021; therefore, this research mainly employs the other methods of this approach.

GIS is an optimal tool to practice this methodology. To document Trabzon's medieval heritage, a geodatabase has been created where all the collected data from the literature, archives, and the site survey about the existing and lost medieval buildings are stored and analyzed. Obviously, to reveal the medieval layer of the city, the locations of the lost heritage places need to be determined, in addition to the existing heritage. We georeference and superimpose historical maps, survey maps created by scholars and professionals, and aerial photographs to pinpoint lost buildings and determine the medieval topography, urban structure, and land use changes over centuries, evaluating the outcome with other collected data. Crosschecking different sources is crucial as they include different information, and GIS makes this procedure easier and more accurate. This methodology also enables us to study Trabzon's urban growth and analyze the topographical, diachronic, and even demographic changes.

With this research, we aim to obtain a comprehensive map of the medieval heritage of Trabzon and analyze the town's urban character within the Late Medieval (Byzantine) context. Dramatic demographic changes in the last century, the eventual and significant loss of the majority of the city's Greek, Armenian, and Latin heritage, continuous negligence of the Byzantine-period heritage, and relentless urbanization seriously altered the city's essential characteristics. Mapping the medieval city will not only help us understand its distinct aspects but also reveal the multicultural essence of the town, which continued to exist until a century ago.

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Representing the dynamics of premodern real estate transactions in space and time. Challenges using the Historical Land Register of Basel

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Premodern urban economy relied massively on annuities as a (mostly) real-estate-based credit instrument, turning houses into an important economic factor. Sources on transactions related to real estate are generally dispersed in the archives – and any finding is hard to localize precisely, which is probably why real estate has played a minor role in research on premodern urban economies. If one could find means to research such transactions on a large scale, we expect to discover a dynamic field of economic activity. The ability to address such questions for Basel is based on the Historical Land Register of Basel, known as “Historisches Grundbuch Basel”, initiated in 1895 and developed over several decades (see <https://dls.staatsarchiv.bs.ch/records/1016781>). The creation of this land register involved a thorough plowing through large parts of Basel’s city archives. Each mention of a house prompted the creation of a file card, which contained an almost verbatim transcription of the source, accompanied by a date and additional details. These cards, approximately 115,000 in total, were organized by house and sequenced chronologically. Due to this arrangement, any discovery within the register can potentially be both localized and dated. The wealth of information within the historical land register is unparalleled for the era since it is not limited to one corpus but contains combined information from a variety of corpora.

For the Spatial Humanities 2024 conference, we’d like to discuss two major challenges: one related to the process of georeferencing data and one to strategies for data analysis in space and time.

Localizing houses

When the Historical Land Register was established, it was decided to base its structure on an 1862 address book of the city of Basel. That was a pragmatic decision that allowed for an easily manageable structure for researchers. However, this structure was faulty for obvious reasons: it could not take into account the changes that occurred during several centuries of building activity and real estate trading. When sources indicated that plots were divided or united, the editors of the Historical Land Register created new house dossiers linked to the same address in 1862. This has the advantage that the dynamics of plots and housing can be retraced at the cost of having multiple dossiers linked to one address. These dossiers were then described as being “part of” plots as they presented themselves in 1862 or having

multiple addresses in 1862 in case of plots that were split later. Based on this metadata and the dates we can extract from the records, we can establish some “plot history” for the whole city. By the way, this plot history is one of ownership rather than one of construction. For example, a person might have bought a neighbouring house at some point and built a new house in place of the two old ones at some other time. This last activity generally cannot be identified in the sources.

To establish a plot history, we used rule-based procedures based on metadata to displace points in probable directions. As a principle, for united plots, the point was shifted to the center of gravity of all address points involved, whereas plots that were part of an 1862 address were moved one-quarter of the distance in the direction of the mentioned neighbor. An algorithm carried out some shifts based on complete information extractable from available metadata, other shifts were done manually. The intention is not to find precise locations for houses that no longer exist but to create plausible approximations and to reduce overlappings that render visualizations difficult to interpret. For the 591 house dossiers that had undergone some change (i.e., plots were split or joined), we could reduce the quota of dossiers sharing a point in space from 60% to just above 10%.

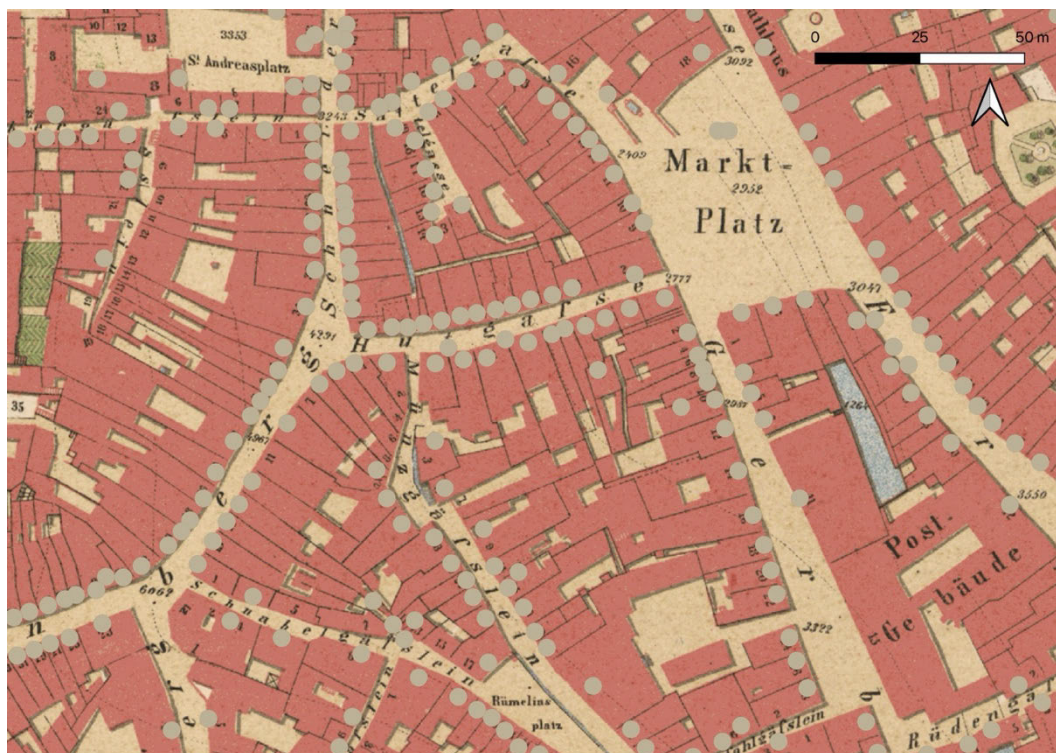


Figure 1: Representation of the house dossiers near the central marketplace, based on the 1862 address book. Each point may represent multiple house dossiers.



Figure 2: Displacement of localizations in the same area, based on metadata on split and united plots. While points shifted by algorithm were spread quite evenly, manual corrections were concentrated mainly in spots that had undergone major constructions works in the 19th century, making the matching of 1862 addresses to no longer existing houses particularly difficult.

Spatial analysis

Having established a usable localization for the houses in Basel, we can start analysing the real estate market. Based on procedures that will not be presented here, we identified the main transaction of each record in the Historical Land Register using machine learning methods. In our data ranging from 1400 to 1700 AD, we identified a total of 19'318 sales contracts, 9742 seizure procedures initiated in the city court, and 4398 contracts establishing annuities where the house served as collateral.

We then explored various strategies of spatial analysis strategies for such data as well as challenges linked to the representation of the results in space and time. In addition to the use of analysis tools and procedures, we would like to focus on two aspects. Firstly, we would like to explore the use of known physical and cultural structures of the city space (such as streets, suburbs, church parishes, etc.) to structure our data or their representation. Secondly, we intend to revert the process, using our data to determine the city's relevant structures and economic hotspots. The following maps illustrate possible strategies of analysis and visualisation, based on a sample of events between 1438 and 1462, where all three types of transactions were frequently recorded.

The following maps are based on different strategies of aggregation. This allows not only a comparison of absolute numbers of cases within a particular area but also the calculation of a relative value. Here, we use the number of house dossiers present within the area at the time in question to calculate the density of events in comparison to the existing houses.



Figure 3: Annuities contracts 1438-1462 by parish, absolute numbers (left) and densities (right). When looking at densities, one sees that houses in the city center close to the only Rhine bridge were quite often used as collateral in annuities – contrary to what one could conclude from looking at absolute numbers only.

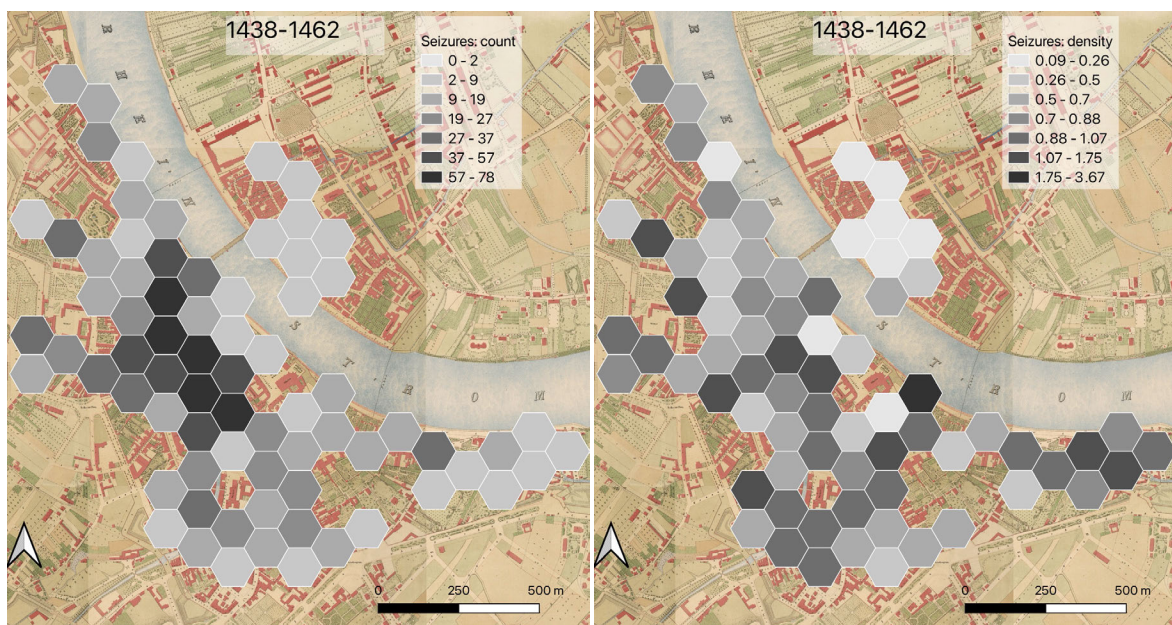


Figure 4: Seizure procedures 1438-1462 by hexagons, absolute numbers (left) and densities (right). The aggregation using hexagons is one way of using an arbitrary division of space for analysis. The size of the hexagons (120 meters)

wide here) is chosen according to the required granularity. A comparison with the parishes shows that a dense zone in terms of absolute numbers overlaps the border area between several parishes in the center, which lets us conclude that parishes are not very useful for spatial aggregation. The Map with densities shows that while seizures were more frequent in the centre in absolute numbers, they were quite evenly distributed over the whole city, with a slight overrepresentation of some suburbs.

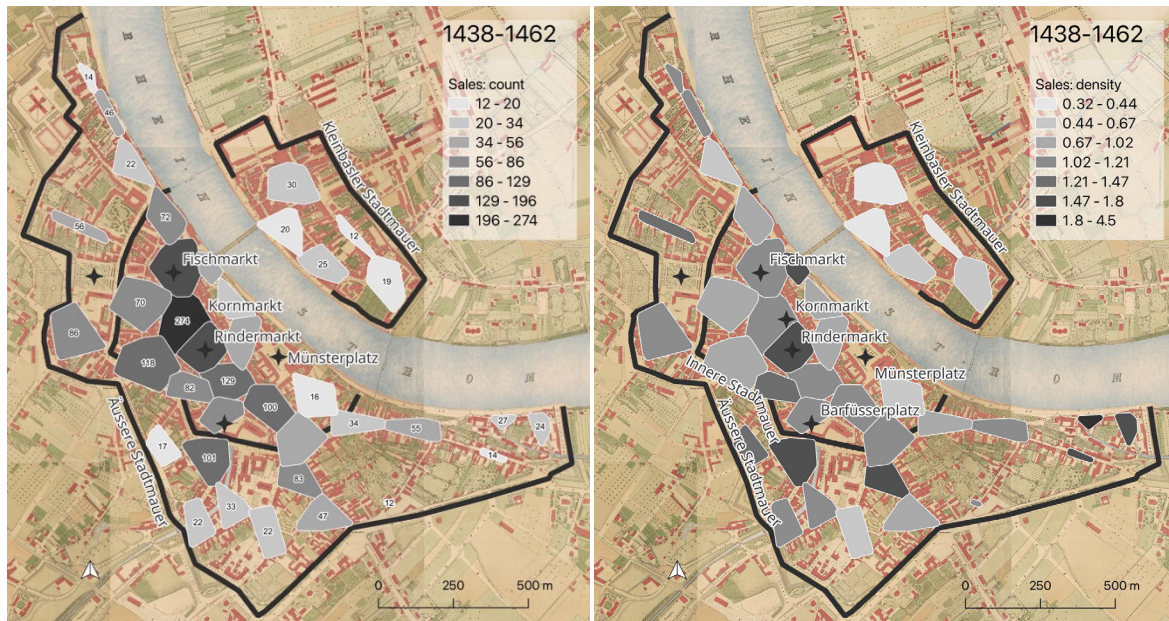


Figure 5: Nearest Neighbour Clustering by QGIS¹ applied to the sales data, 1438-1462, absolute numbers (left) and densities (right). The clustering map represents a completely data-based division of the urban space. As seen above, the look at densities relativizes the high absolute numbers in the city center, showing a dynamic property market in the urban periphery. The clusters mostly respect the boundary represented by the inner-city wall, while three prominent marketplaces (fish, grain, and cattle markets) are forming hubs for their respective clusters.

Copyright Information

All visualisations made in QGIS (www.qgis.org) by Benjamin Hitz

Background map: Situationsplan “Loeffel”, 1862, CC BY

(<https://opendata.swiss/de/dataset/situationsplan-1862>)

¹ For Details see <https://analysecriminelle.org/main/#nearest-neighbours-clusters-map>.

The Role of Geographic Information Systems (GIS) in Participatory Conservation of Heritage Areas

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Abstract

Introduction: In contemporary heritage management, participatory approaches play a crucial role in identifying and safeguarding values for a diverse range of stakeholders. While referring to a wide range of stakeholders in planning historical areas, many world heritage conservation organizations have emphasized the importance of local communities, their traditions, and their way of life. For heritage planning, participation can enable consensus in defining heritage significance and values to promote heritage resources for sustainable conservation and development. Hence, Urban experts have used community-based participatory research for decades, citing benefits such as faster identification of community-relevant research targets, and accelerated transfer of knowledge and findings to the community. Also, researchers from heritage organizations have found that balancing conservation measures with community-based interests will require the participation of people to upgrade their communities to a protected status. On the other hand, the role of GIS technology is pivotal in heritage preservation research, enabling the development of dynamic information management systems and effectively advancing the sustainable conservation and transmission of heritage resources. It can be used to analyze and assess the impacts of natural and anthropogenic threats on heritage, such as geological disasters, Global Change, and urban expansion, to implement appropriate conservation measures.

Purpose: On this basis, this study aims to explore the role of Geographic Information Systems (GIS) in facilitating participatory conservation efforts in heritage areas, Hence, the theoretical foundation of this study will delve into the utilization of GIS in both heritage conservation and public engagement. Subsequently, the article will introduce a theoretical framework that highlights key principles crucial for GIS-based participatory conservation. The following section of the study will focus on evaluating five case studies from Iran, the USA, Finland, Egypt, and Spain based on these fundamental principles. Eventually, the insights gained from the case study evaluations will provide support for the theoretical considerations outlined in the study.

Methodology: This study adopts a qualitative approach, employing logical argumentation to analyze pertinent research content and integrating both qualitative and quantitative data from previous studies. After a thorough examination of the theoretical framework, the paper introduces a conceptual model for a literature review, delineating the fundamental principles that underscore the significance of Geographic Information Systems (GIS) in participatory conservation efforts. Subsequently, the paper investigates five case studies that have utilized GIS in participatory planning processes, spanning various contexts including developed and developing countries. Specifically, the case studies draw from previous research on Participatory GIS (PPGIS) in Iran, the USA, Finland, Egypt, and Spain offering a comprehensive exploration of the applications and implications of GIS in participatory approaches.

Case studies: The article seeks to explicate the effectiveness and potential of Geographic Information Systems (GIS) in fostering inclusive and participatory approaches to heritage areas. In light of this, the research evaluates five case studies from Iran, The USA, Finland, Egypt, and Spain that have utilized GIS in participatory planning processes. The selection of the five case studies for this research is grounded in the need to evaluate a diverse array of contexts that encompass both developed and developing countries, thereby providing a comprehensive understanding of participatory conservation practices. By including various heritage areas—such as urban environments, rural landscapes, industrial landscape, religious complexes, and villages—this study captures the multifaceted nature of heritage conservation across different settings.

Finding: This study contributes to the growing body of literature on the intersection of GIS technology and participatory conservation in heritage areas. The findings of this research demonstrate that Geographic Information Systems (GIS) are essential for enhancing participatory conservation efforts in heritage areas by integrating heritage values, facilitating community engagement, guiding effective conservation strategies, and prioritizing conservation and development measures through participatory mapping and spatial data analysis. In addition to that, the insights gained from the theoretical framework, case study evaluations, and key considerations provide a robust foundation for future research and practical applications of GIS in heritage conservation and urban planning. As heritage conservation continues to evolve in the digital age, the role of GIS in facilitating participatory approaches remains paramount for fostering sustainable and inclusive conservation efforts worldwide.

key words: Geographical Information System (GIS), Public Participation Geographical Information System (PPGIS), Participatory Conservation, Heritage Area

Historical Roofs as a Resource Towards an automated roof cadastre for Lower Saxony's heritage

Dr.-Ing. Christoph Palmen, Yasmin Loeper

Roofs strongly shape the image of our cities and settlements. Historical roofs contribute to the value of numerous buildings as testimonies to our culture and history. However, it can be observed that historical roof coverings and roof structures are subject to considerable change and are often lost during renovations or conversions. Currently, Germany's heritage protection laws are being revised so that solar roofs can largely be approved on listed buildings, and, in addition, cities and municipalities are about to revoke or change their preservation statutes as well. It can be assumed that the use of roofs for energy generation through photovoltaic (PV) and solar thermal systems will be an essential factor in the change of listed buildings in the future. This represents a major challenge for the heritage and requires extensive knowledge of the building's roofing materiality, construction and cultural significance. Therefore, a central database with information about all roofs of listed buildings would be of great interest to assess and oversee future developments. The question arises as to how the roofs can be systematically researched and analysed, especially within large inventories.

The Lower Saxony State Office for Monument Preservation (NLD) is leading an interdisciplinary research project with the Institute for Geodesy and Photogrammetry at the Technical University of Braunschweig (IGP) to develop a monument roof cadastre for Lower Saxony. The suitability of monument roofs for solar systems will be the focus of the project. The goal is to develop an ArcGIS-based tool that analyses and evaluates roofs, not only based on their solar potential but also on their roof material, geometry and visibility.

The application will be used for an expanded solar cadastre, which will include qualified heritage data for the first time. The map will provide information on the impact of PV and solar thermal systems on listed roofs and informs which roof areas are less suitable for solar panels. Finally, the results will be integrated into Lower Saxony's geographic information systems and made publicly accessible through publication in the online monument atlas of Lower Saxony. This roof cadastre will benefit local preservation authorities and those involved in planning. The qualified data allows a better planning of solar systems, since the visibility and optical limitation of the monument value can be clarified in advance. The research also allows for the identification of historical material on non-listed objects. Finally, the roof cadastre provides information about the distribution of roofing materials. This creates insights into the historical development. In addition, the data can provide information about the longevity of certain roofing materials. The results associated with the project shall not only improve the handling of the objects in practice but also contribute to a greater knowledge of the inventory.

Modern geographic information technology is key to the project. Analysis methods of geoinformatics and criteria from monument preservation and construction history are combined. A 5.6 km² study area in the city centre of Hanover was selected for the development of a prototype of the roof cadastre. It contains various building types from different epochs with different roof shapes and materials. The study area is shown in Figure 1. The data basis for the study area was provided by the Lower Saxony State Office for Geoinformation and State Surveying (LGLN). It consists of 3D building models in LoD2,

TrueDOP, DSM, DTM and ALS data. The data basis is described in more detail in Wichmann et al. (2023).

The roof cadastre is the overall result of several analysis processes. The analysis processes are divided into several automated work packages (Figure 2). Each process results in either a new data set or generates the parameter values relating to a roof area. The final process combines all these parameters into the overall result.

As shown in Figure 2, the first step is to calculate and evaluate the solar potential of the listed buildings. For this step, various existing approaches were tested and compared (e.g. Nelson, 2020; Agugiaro, 2012; Fu, 2000). The 3D building models and the DSM were used as input data. The result is a new data set of listed buildings with high solar potential.

The second step, as shown in Figure 2, is a detailed roof analysis. The detailed roof analysis consists of the visibility analysis, the analysis of the construction features and the classification of the roof material. For the visibility analysis, existing approaches such as that of Wassim et al. (2011) are used. Only the roofs selected in the first step are analysed in terms of their visibility from public areas. The public areas were defined by the LGLN and provided as a layer. As a result, each selected roof receives a parameter value for its visibility.

For the classification of roof materials, a deep learning model is trained with labelled image data. The training dataset contains 13 different roof coverings. The approach of Wyard et al. (2023) is also being tested, in which spectral information of the roofing material is used in addition to the image data. For this purpose, the spectral library for building materials in Karlsruhe, Germany, named KLUM is used (Ilehag, 2019).

So the project deals with georeferenced representation, analysis of material, geometry and visibility of monument roofs. This leads to interdisciplinary collaboration between geoinformatics and heritage preservation. Through this approach the information inherent in aerial photographs, laser scan data and 3-D models can be analysed with regard to the values of listed buildings and converted into maps helpful to the requirements of heritage preservation.

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Figure 1: study area

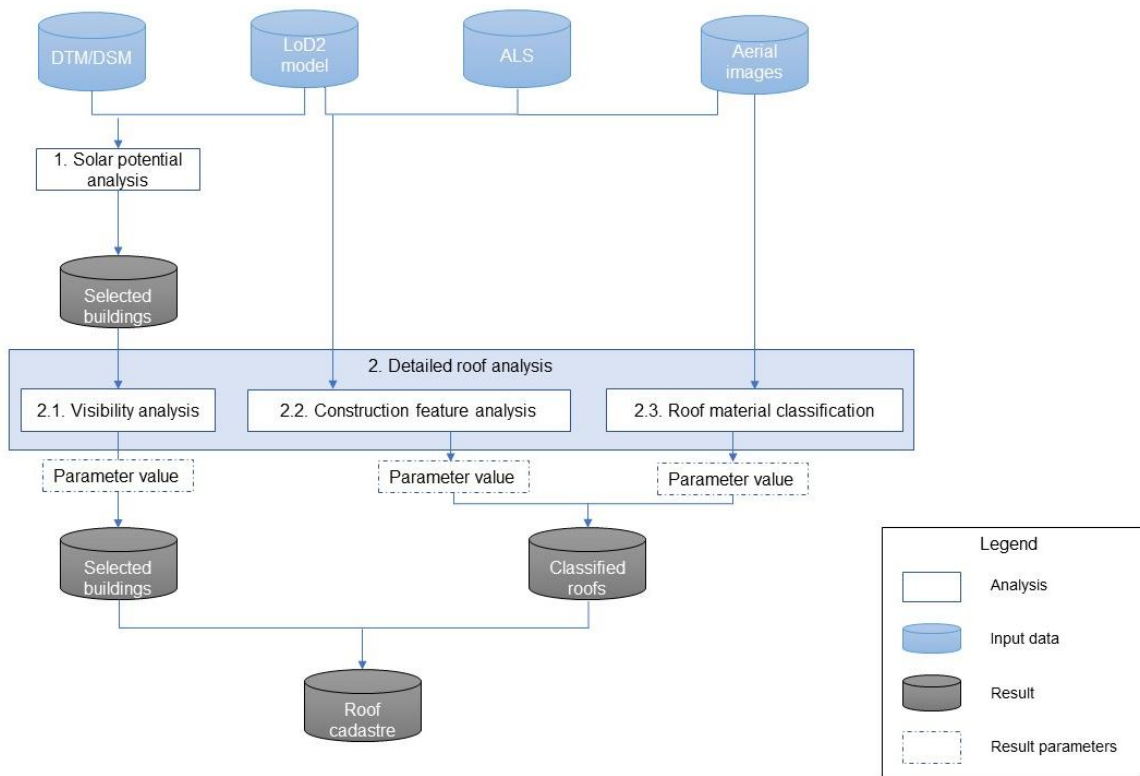


Figure 2: workflow

How Far Did War Damage in Germany's Cities in the 1940s Affect Their Reconstruction Plans?

Dr. Carmen M. Enss

The period of reconstruction after the Second World War is the period that has a vast impact on the urban landscape of Germany today. Due to the chaotic circumstances at the end of the war, it is very difficult to calculate the exact percentage of destruction for specific cities at the end of the war (Hohn 1993). Architectural historians have studied the fate of surviving historic buildings, such as the Berlin Palace, during and after the war. However, little attention has been paid to the distribution of war damage in the urban area and the consideration of extensive destruction in urban planning. The main reason for this is the difficulty in obtaining reliable sources on the distribution of damage and its percentage. Urban damage maps are scattered in local archives and often follow local guidelines for legends and damage categories (for a map collection see Enss and Knauer 2023).

Architects who were part of the Nazi regime prepared large parts of the reconstruction plans as early as 1943 (Durth and Gutschow 1988). Specifically, the Working Group for the Reconstruction Planning of Destroyed Cities formed a network of planners from different cities. Leading figures such as Konstanty Gutschow focused more on technical ideas for modernization than on the creation of representative urban spaces for Hitler (Diefendorf 1985). Many of the plans from the network were pursued under this pretext after the war.

In the spring of 1944, the Working Group commissioned damage mapping for war-damaged cities in the German Reich. This mapping campaign resulted in a collection of war damage maps for 43 cities, standardised in scale, map design and method of data collection. The map design divided the damage continuum into three groups of damage shown on a map with red hatching: damage below 50% (no hatching), 50-70% of damage, and more than 70% of damage (see figure). Although these maps from 1944 do not show the maximum damage of 1945, they formed the basis for planning by the working group.

The renewal and clearance work that began in 1943-44 and continued into the 1970s has often been described as a 'second destruction' of the cities. Planning historians studied reconstruction plans and related written documentation, damage maps and statistics from the archives (Durth and Gutschow 1988). More recent research resulted in city reconstruction biographies for Hamburg, Kassel and Nürnberg. Although examples of surviving buildings demolished after the war are well known, the extent of the phenomenon "second destruction" has not yet been estimated.

The paper analyses whether the modernisation and regeneration plans of the members of the working group in the cities of Hamburg, Kassel and Nuremberg are related to the

location and distribution of the destroyed areas in these cities. An overlay of the 1944 damage maps and the urban reconstruction plans of the same period is a first possibility to estimate which parts of the surviving buildings the planners wanted to sacrifice to modernisation.

First, the 1944 damage maps for Hamburg, Kassel and Nuremberg are digitised and georeferenced. Through historical research, the maps have been linked to printed guidelines for damage mapping issued by the working group (reprinted in Enss and Knauer 2023, 236-247). These guidelines guide damage surveys according to criteria of stability of surviving structural elements such as roofs, perimeter walls, etc. Reconstruction plans (1944-45) are selected from books and articles that collectively form city reconstruction biographies of Hamburg, Kassel and Nuremberg for comparison with damage maps. They are scanned for comparison and superimposition.

One feature that is often described in terms of modernisation during post-war reconstruction is the introduction of motor traffic arteries into the dense urban fabric (Diefendorf 1989). A first visual comparison between damage and street layout has been made for Nuremberg (Knauer and Enss 2022). New proposed traffic arteries are mapped as a layer on top of the damage map in GIS. The proportion of the route of new arterials that passes through destroyed areas is compared to the total damage percentage of the building stock (for the calculation of a bomb damage index see Alvanides and Ludwig 2023).

Another typical planning tool for modernisation is to plan the renewal of an entire neighbourhood. In some cases, inner city neighbourhoods have been redesigned from scratch, requiring the demolition of the area. Such redevelopment areas are mapped on top of the damage maps to check if these areas coincide with the "total" damage.

The correlation between the damage and urban renewal plans is discussed qualitatively and, where possible, quantitatively. Finally, a comparison of aerial photographs taken by the Allied Forces in the spring of 1945 will show the extent to which the damage situation changed by the end of the war.

The juxtaposition of war damage and planned bulldozing for modernisation helps to unravel the sequential and intertwined intentions and developments of destruction and reconstruction in cities during and after the Second World War.

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2.52 Spatialising historical sources of urban heritage: understanding the scaling-up of urban heritage in Budapest through historical-geographical sources (1930-1990)

Gábor Oláh

As historical sources of urban heritage, the monument registers, the building regulations or the general master plans contain a wealth of historical and geographical information on the changing scale of urban heritage protection of Budapest. These sources were the outcome of a process of condensing conflicts and compromises. They were created through a series of aggregating, grouping and structuring operations, which were primarily intended for legal and administrative purposes. However, until the 1960s, these were partly or wholly stuck at some stage of enactment or were created only for professional purposes. Analysis of documents not legally/administratively validated reveal ad hoc urban heritage spatial categories which, on the one hand, represent varying degrees of conceptual sophistication and, on the other, are indicators of needs which are not yet or only partially expressed at the legislative level. These sources of urban heritage can also be used as evidence of the success or inadequacy of the current conceptual apparatus, in terms of whether changes in the perception of urban space can be effectively incorporated into the available terminology.

As a complement to the legislation of monument protection, the primary operational function of the monument registers was to enable the various administrative authorities to find out quickly and easily about the exceptional procedures required for protected buildings. The first official list was published in 1960. Previous attempts to officialise the list were stopped at various stages before official publication or appeared exclusively in a professional context. The lists issued in manuscript form before 1960 are considered to be useful sources of information about professional intentions and requirements for protection.

The building code is a regulatory document, mostly with geographically defined concepts. This is a set of provisions and, more broadly, of policy ideas for the construction of buildings in the city. Its main function, in general terms, is to provide a framework for organising the city of the present and the future, thus becoming one of the tools for implementing urban planning. It therefore also contains references and provisions relating to urban heritage. The building codes were adapted to the requirements and needs of the current urban policy and to local specificities, and have therefore had to be constantly updated.

During the period under review, general master plans of Budapest combined a strategic and technical approach, containing maps and textual information. Since the 1930s, professional and political debates have often focused on the need for a general master plan to solve many of the problems facing the capital. Yet Budapest's first official document was adopted much later, in 1960. The analysis does not begin with the 1960 plan but includes those that remained at the approval stage (before coming into force) and those that defined strategic orientations for the plan as the Urban Development Programme.

To analyse the spatial concentration and geographic data contained in these sources, I have created a database of monument registers using geographic information system (QGIS software), thus integrated the object identifiers and descriptive data into a single system and pro-

jected them onto maps, coupled with the spatial information contained in the urban planning documents.

The definition and content of protected spatial categories depend on the type of documents, a priori on the scale of observation. These sources can be understood as levels of historical information, the product of the intellectual activities and interactions/conflicts of many actors and institutions. These regulatory and planning documents drew multifaceted 'layers' of content on urban areas, operationalised urban conservation objectives in different spatial categories, and encoded in their concepts the temporality of their operations, the specific ways of managing change in urban space. We can trace the typological and spatial expansion of urban heritage, which did not develop in a linear manner.

The co-existing protected spatial concepts and areas in these documents can also be considered as different urban readings. When applied to the studied area, they become systematisable, above all in terms of scale. The spatial categories of monument protection were mostly conceived of as groups of buildings, the urban zones of the building regulations expressed a territoriality, and urban master plans created objects from the townscape to the neighbourhood according to the territorial unit they approached. Their graphic representation also bears witness to their different approaches, whether it is a continuous line running along facades or a zone with specific boundaries. In essence, the line and the zone are value imprints of urban heritage, whose variations indicate the typological, spatial and abstract expansion of heritage. In addition, spatial concepts have emerged that have blurred boundaries or made them secondary: categories that protect the distant view and landscape relations have appeared in some conceptualisations.

This paper analyses the change in the spatial scale of Budapest's urban heritage through historical and geographical information gathered from the monument registers, building codes and general master plans between 1930 and 1990.

Layering Public Park Histories: Using GIS to Uncover Socio-Spatial Inclusion and Exclusion in Post-war Germany and the U.S.

Laura Brannan Fretwell, PhD candidate, George Mason University, Roy Rosenzweig Center for History and New Media (RRCHNM)

Eliane Schmid, PhD candidate at the Luxembourg Centre for Contemporary and Digital History (C2DH)

Session type: Talk (30 minutes)

Abstract: Text

Modern warfare destroys urban landscapes and tears apart the social fabrics of society. Post-war societies are tasked with rebuilding not only the physical landscape of their cities, but also the social aspects of their communities, usually while adapting to new political changes. This co-written paper uses historical GIS to examine how local urban planners in modern post-war societies used public parks to physically rebuild their cities, bolster their tourism economies, and contend with unwanted social and political changes. The paper compares the development and use of public parks specifically in post-American Civil War Richmond (US) and post-World War II Hamburg (DE). Both researchers use historical GIS combined with other spatial humanities methods, such as georeferencing historical maps and gazetteers, utilizing artificial intelligence to help with creating maps in Python, and creating deep layered maps. These methods help illustrate the modern development of parks in post-war Western societies and visualize parks as spaces where urban planners and city leaders projected their desires about ideal citizens and thus included and excluded different groups. Each author's doctoral project conducts an individual case study of each city and thus the session is a trans-continental and trans-urban comparison of the construction of these postwar "public" spaces. Although each case varies in scale, chronological scope, and GIS methods, altogether the paper frames public parks as effective vehicles for spatial analysis of social and political change over time, especially public parks that originated during post-war periods.

This co-written paper informs conversations at the intersections of spatial methods and heritage. The digital maps created by both authors illustrate the histories of modern park constructions, largely unknown today by community members in both Richmond and Hamburg. Fretwell's research centers a park that today hosts a Confederate museum managed by the United States' National Parks Service in Richmond, a city notorious for commemorating pro-Confederate legacies with its many museums and monuments, while Schmid's research focuses on century-old parks in Hamburg that give the city its long established reputation as one of the greenest cities in Germany. The paper examines how issues of heritage, cultural belonging, and political activism were and continue to be regulated and reinforced throughout these city's public spaces over time. As both cases focus on public parks that exist today, the authors can educate non-academic audiences who are either unaware of the histories of the parks they regularly inhabit or assume them as neutral spaces. Fretwell examines how after the Civil War, local and national "Lost Cause" supporters retained White Confederate heritage through rewriting and commemorating historic landscapes such as Richmond's Chimborazo Park and the Confederate Medical Museum later placed on-site. Civil War enthusiasts still visit the museum and park today alongside local residents who are not aware of this history or the Black displacement that occurred on site. Meanwhile, Schmid asks whose heritage is preserved and celebrated in Hamburg's public parks and how past and current usership affects this heritage. Specifically, Schmid analyzes how the histories of transformations of former private estates owned by the

elite and newly built public green spaces in the war-torn city center, along with exclusive usership, is today forgotten by the popularity of these parks favored by tourists and locals alike.

The paper examines how local urban planners in post-war societies idealized certain types of people as potential park users. In both cases, people who would have most benefited from parks—such as African American residents in Richmond and dock workers seeking a leisure space free of charge in Hamburg—were often excluded from using them. Specifically, Chimborazo Park in Richmond was created in the 1870s at the request of White residents to displace a post-war Black neighborhood. Many formerly enslaved Black residents of this neighborhood who could have used the park during their walking commutes to work were intentionally excluded from doing so. Fretwell overlays diverse sources to visualize the complex layers of the site's history: before it became Chimborazo Park, the site also once hosted a hospital for the Confederate Army during the Civil War and then a postwar settlement for newly emancipated African Americans who lived near aggrieved White residents. Fretwell georeferenced historical atlases overlaid with demographic population U.S. census data to visualize how the Black neighborhood was razed to make way for construction of the White-only Chimborazo Park. Schmid's research focuses on the port area of Hamburg during the European post-WWII urban restructuring and rebuilding phase and continues up to the 1973 First Oil Shock when greening policies halted due to financial cuts. The city of Hamburg's green spaces have driven much of its tourist economy since the eighteenth century. Today, Hamburg is regarded as one of the greenest urbanscapes in Germany, especially in comparison to other megacities, but the initial design and intent of these parks is largely forgotten. Schmid applies GIS methods (coding with Python and aided by ChatGPT) to map the development of public parks over time to visualize when Hamburg's public parks came into being, which ones were (re-)built after WWII, where they were located, and how park designs proved inaccessible to users deemed non-ideal by planners, including dock workers, migrants, and mothers with strollers.

Overall, the paper analyzes the significance of park development in Richmond and Hamburg during salient post-war eras and asks how park use changed over time in the wake of many social, political, and economic changes. This comparative study contributes to conversations in urban history, spatial history, city planning, and heritage studies. Comparing the spatial development and social use of modern parks in post-war societies demonstrate that different aspects of these parks emit traces of the past that linger in the present.

Keywords:

Public Parks, GIS, trans-urban history, post-war, heritage

Speakers:

Laura Brannan Fretwell is a fifth year PhD candidate in the History and Art History Department at George Mason University. She received a Master's in Women's, Gender, and Sexuality Studies from Georgia State University in 2019. Her dissertation research focuses on issues over race, commemoration, and public space in the nineteenth century American South through a case study of a municipal park developed in the Reconstruction era and today managed by the National Park Service's Richmond National Battlefield Park in a historically African American neighborhood. She has received fellowships at both George Mason University's Roy Rosenzweig Center for History and New Media and the Center for Humanities Research, the University of Luxembourg's Centre for Contemporary and Digital History, the HASTAC Scholars Program, and the Cosmos Scholars Program. Laura is

interested in spatial history, digital public history, community engaged methods, and memory studies.

Eliane Schmid studied history, philosophy, and English literature at the University of Zurich and ETH Zurich. She is now a PhD candidate at the Luxembourg Centre for Contemporary and Digital History (C2DH), researching the development of public urban green spaces in the port cities of Hamburg and Marseille post-World War II. Eliane's interests focus on urban (re-)building and planning as well as migration in the decolonization and postcolonial period. She consults theories from spatial, port-city and (trans-)urban history, as well as human geography while applying GIS (Geographic Information Systems) as a tool for analysis and visualization.

2.54 Mapping and Spatially Analysing the Heritage Inventory of a Historical Cemetery Complex in Singapore

Yew-Foong HUI

About 5,000 graves from the historical Bukit Brown and Seh Ong cemeteries (hereafter cemetery complex) in Singapore were exhumed in 2013 to make way for an eight-lane carriageway. Prior to the exhumations, grave inscriptions and features were documented digitally and geotagged using GPS, and during the exhumations, burial items were recorded comprehensively. The data collected through this extensive documentation work produced a heritage inventory that could be dated (based on the inscriptions), mapped and spatially analysed. This paper seeks to reflect the socio-economic and cultural patterns associated with the graves, and how they intersect with the spatial-temporal development of the cemetery, and to some extent, the social history of Singapore.

The data for the heritage inventory were collected under the auspices of the Bukit Brown Documentation Project (BBDP) in 2011-2014 within a Geographic Information System (GIS) framework. At that time, the Principal Investigator of the BBDP (also the first author of this paper) focused on completing comprehensive documentation of the graves and burial items that were unearthed through the exhumation process. This massive amount of geotagged data underwent systematic post-processing to facilitate rigorous analysis within a GIS framework. The post-processing and analysis included: (i) inscriptions, and the structural and material cultural features of graves; and (ii) burial items. In addition, historical context was supplemented through archival research and oral history interviews.

For (i) and (ii), post-processing involved further coding of the data for meaningful analysis, following two major lines of inquiry, namely, the investigation of patterns among graves based on socio-economic status and Chinese sub-ethnic cultural categories. Where socio-economic status is concerned, grave features and burial items were further coded to determine socio-economic status. In terms of Chinese sub-ethnic cultural categories, inscriptions, grave features and burial items were coded to reveal the sub-ethnic origins of the deceased (i.e. Hokkien, Teochew, Cantonese, Hakka, Hainanese and others). Furthermore, spatial analysis was conducted to determine the relationship between socio-economic status/cultural origins and the distribution of graves in the cemetery complex.

The dataset is of substantial heritage value, not least because the cemetery complex in question consists of both Bukit Brown Cemetery (BBC) and Seh Ong Cemetery (SOC). The former was opened as a municipal Chinese cemetery in 1922 and closed to burial in 1973, although it was almost fully populated by 1944 during World War 2. BBC was divided into five blocks of standard-sized plots organized into grids that faced the same direction, and the blocks were filled sequentially, i.e. from Block 1 to Block 5. The land for SOC was acquired, partly as burial grounds reserved exclusively for Hokkien Ong clansmen, in 1872. Burial in SOC followed the conventions of clan association cemeteries, whereby the size and location of the plot depended on the wealth and social standing of the deceased. The graves that were affected by the road project and thereby documented happened to be distributed across SOC and all five blocks of BBC, thus providing an excellent sample of graves of different cultural and socio-

economic origins from the late Qing dynasty period (late 19th and early 20th centuries) to the early Republican period (after 1911) and World War 2.

Through analysing this unique and extensive dataset, the paper seeks to shed light on the socio-economic patterns and cultural patterns in the landscape of the cemetery complex, incorporating both the spatial and temporal dimensions. The following are the key questions that the paper will address.

1. Socio-economic patterns

- i) In what ways does socio-economic status affect the distribution of graves in the cemetery complex. While it is almost definite that socio-economic status determines the location of the burial plot in SOC, does socio-economic status play a role in BBC? More specifically, would socio-economic status be reflected spatially, given the Chinese penchant for higher burial grounds in association with better fengshui (geomancy)?

- ii) Would socio-economic patterns be temporally significant? That is, would there be certain periods, such as the 1930s Depression and the onset of the World War 2 years, where socio-economic status or wellbeing, as reflected by graves and burial items, would take a general dip?

2. Cultural patterns

- i) Beyond the common sub-ethnic cultural categories, i.e. Hokkien, Teochew, Cantonese, Hakka and Hainanese, are there other cultural categories that salient through the material culture of the cemetery, such as Peranakan?

- ii) Are there spatial patterns in how the cultural groups are distributed in the cemetery complex?

- iii) In what ways do these cultural categories affect inscriptions, grave features and burial items?

The post-processing of the dataset and examination of the above questions propel the study beyond conventional epigraphic analysis to provide sociological and cultural analyses of a deathscape, thus furnishing us with a more holistic understanding of the heritage value of the historical cemetery complex. At the same time, it extends GIS-related mapping and analysis of cemetery data in recent years beyond gravestone morphology to incorporate material culture related to both aboveground features and underground artifacts.

2.55 Unveiling Urban Complexity: Exploring Historic Cinema Buildings in Haifa Through Spatial Humanities

Irit Carmon Popper, Oryan Shachar

This paper investigates the dynamic urban landscape of Haifa, Northern Israel, renowned for its multicultural milieu, as a lens to comprehend the intricate interplay of ethnonational dynamics. Focused on the “Site and the Archive” course at the Faculty of Architecture and Town Planning, it illustrates how geospatial technologies enrich humanities research and methodological innovations, particularly in elucidating historical narratives within contemporary urban settings. Structured around the themes of archive, site, and documentation, the course employs interdisciplinary approaches to investigate various typologies of urban structures, including cinemas, theaters, hospitals, and swimming pools. By integrating archival resources, field observations, and critical analysis, students engage in a holistic exploration of historical geographies, bridging disciplines such as historiography, conservation, and curation.

Furthermore, the paper delineates the evolution from documentation to curatorial practice, exemplified by the “Dinosaurs in the Streets” exhibition held during a social Bauhaus festival in Hadar HaCarmel (2019). Drawing from course documentation, this exhibition showcases the role of curation in presenting diverse urban narratives, underscored by the use of geospatial technologies to enrich spatial representations of heritage sites. Additionally, it examines the intrinsic spatial dimensions of heritage and its impact on local identity, emphasizing the interconnectedness of heritage processes with the architectural fabric and cultural significance of urban landscapes. Through innovative mapping techniques and geospatial technologies, the paper illuminates alternative heritage narratives and marginalized histories embedded within the urban fabric, offering a nuanced understanding of urban heritage.

Aligned with the conference’s thematic emphasis on “Spatial explorations of narratives, literary and imaginary places,” this paper provides practical insights into the application of spatial humanities in documenting and interpreting built heritage. It underscores the importance of interdisciplinary collaboration and innovative spatial analysis in advancing scholarly comprehension of historical geographies and cultural landscapes.

3 Posters

A GPT-Based Approach to Unraveling Spatial Descriptions in the English Lake District Narratives

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Keywords: spatial narratives, digital humanities, natural language processing, spatial relations, pre-trained models, semantic triples network

Abstract:

In recent years, there has been an increasing interest in analyzing historical archives of cultural heritage and landscapes. In this realm, the Corpus of Lake District Writing (CLDW) [1] has emerged as a significant scholarly source, drawing researchers to explore the English Lake District situated in the northwest of England. The Lake District stands as a sought-after tourist destination, known for its sublime beauty, ribbon lakes and majestic mountains. The region is associated with a rich literary heritage that adds to its cultural significance and has been designated as a UNESCO World Heritage ‘cultural site’. This recognition has revitalized efforts to conserve the region and forge stronger connections to its historical legacy [2], which in turn necessitates a deeper understanding of the region's evolution and the interplay of natural and human processes shaping it over the past three centuries [3]. In this context, an inevitable aspect is to comprehend the geographical and spatial intricacies of heritage sources.

This poster presents a study that contributes to a larger research initiative [4] “understanding imprecise space and time in narratives through qualitative representations, reasoning, and visualization” funded by the Economic and Social Research Council (ESRC). The project aims to uncover the intricate spatial and temporal dynamics embedded within narratives and introduce a considerable shift in our computational and analytical approaches to unveiling the geographies outlined in massive historical narratives. One part of the project is dedicated to the research on the CLDW, a compilation of travel writing and tourist literature that vividly describes the English Lake District from 1622 to 1900. Comprising 80 geoparsed texts with over 1.5 million words and encompassing a range of genres, including travel narratives and fiction, the corpus provides valuable accounts from prominent Lake Poets such as Wordsworth and Coleridge and other significant figures, alongside works from lesser-known authors. The descriptions capture the essence of traveling, aiming to describe landscapes and emotional responses.

The proposed work in this poster is part of a spatial exploration of the CLDW. The collection is rich in spatial narratives featuring detailed descriptions of landscapes, locales, and routes.

Nevertheless, the geographical references and spatial descriptions embedded within historical records impose a significant challenge. The writers' experiences of geography are subjective and extend beyond specific place names to encompass vague and imprecise references, such as "the distant hills" or "further down the road", or relative expressions also called spatial relations, such as "near to", "on the left", or "a few hours' journey from". Hence, computational methods surpassing conventional text analysis approaches are needed to interpret and visualize these qualitative aspects of spatial information. To the best of our knowledge, there are no existing studies that aim to address this challenge and unravel the spatial dimensions of the Lake District region.

We present a holistic framework based on generative pre-trained transformer models (GPT) to extract spatial relations between geographic nouns and specific place entities extracted from the CLDW. The apparent motivation to adopt deep learning-based GPT models in studying spatial representations from historical writings is their inherent ability to generalize to unseen data with minimal supervision, which is ideally required when the data at hand is enormous, as is the case with the CLDW. Spatial relations between entities are extracted as semantic triples and arranged as a network to visually illustrate the geographic details. The experiments focus on the geography of "proximity" and elucidate findings on spatial connections for the most frequently occurring toponyms and the geographic nouns associated with them in relations such as "near", "close to", "surrounds", and other key terms conveying the sense of proximity [5].

The study is interdisciplinary in nature and overlaps with various domains, including GIS and NLP in spatial humanities, particularly studies on the CLDW, spatial relation extraction and utilization of deep learning models such as the pre-trained large language models (LLMs) in geographical information science (GISc). Hence, our findings will be encouraging for a diverse readership and aim to contribute a distinctive approach to understanding the spatial tapestry of the English Lake District.

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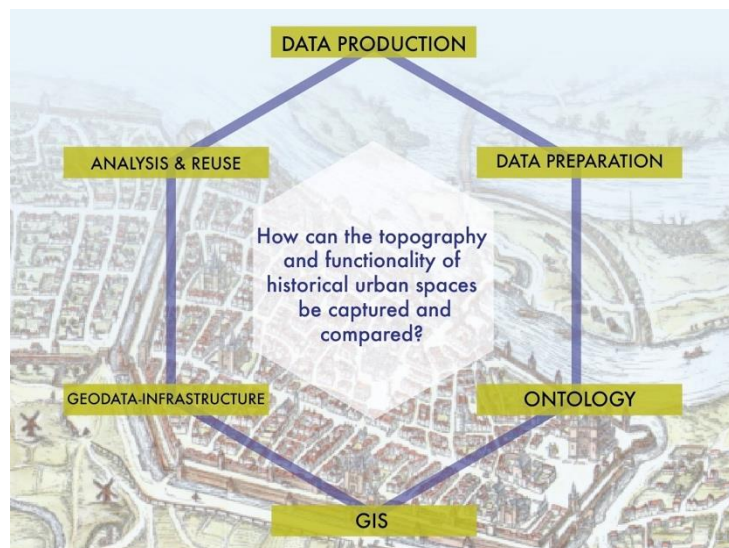
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Contextualising historical place data using GIS and ontologies – The HiSMaComp project

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The HiSMaComp research project (Historical survey maps and the comparative study of the functionality and morphology of urban space. Standardisation – Digital processing – Research) is a collaborative effort between two teams, one at the Institute for Comparative Urban History (IStG) in Münster and the other at Uniwersytet Mikołaja Kopernika in Toruń. It is funded by the DFG and NCN as part of the BEETHOVEN 4 programme since July 2022. In the project, six casestudies of three different town types are being analysed comparatively. These towns are: Warsaw and Magdeburg as 'pre-modern metropolises', Olsztyn and Ochsenfurt as 'medieval collegiate towns', and Inowrocław and Bad Pyrmont as 'spa towns'.

Research data collected by historians and cartographers, based on written and cartographic sources and enriched with authority data, is used for the comparative analysis of the case studies. In digital historical studies, geodata and historical place data have typically been processed using geographic information systems (GIS) for data visualization purposes. The HisMaComp project aims to comparatively analyse the historical and spatial-topographical development of the aforementioned towns using a data-driven approach. The research question underlying this project is: How can we record and analyse the topography, functionality, and morphology of historical urban spaces over the course of time?



(Graphic 1: overview of the HiSMaComp workflow and method model)

We are concerned with common problems when working with historical place data and geodata, such as non-mapability, uncertainty and vagueness. GIS alone are not sufficient to analyse all these aspects together. However, by combining GIS and semantic web technologies, it becomes possible to process complex information and conduct in-depth, multidimensional comparative analyses. To achieve this, an ontology is needed to semanticise and contextualise the data. This geosemantic contextualisation allows for the querying and analysis of geodata and semanticised historical place data together. The 'Historical Ontology of Urban Space' (HOUSE) is partially re-utilised, restructured, and expanded using the modular ontology modelling method.

Although the HOUSE ontology provides a solid foundation, it was originally developed for a different application context. Therefore, its use in our project requires specific adaptations and extensions. In order to determine these, a comprehensive requirements analysis is carried out based on user stories and the formulation of competence questions. On this basis, the individual modules of the ontology are developed iteratively. So far, the following modules have been created

- topographic Types (categorisation of topographic objects into types; e.g. synagogue, park)
- functions (function or use of the entities in the urban space; e.g. leisure function, health function)
- geometries (used to categorise the type of geometry; e.g. polygon, line, etc.)
- land use (categorisation of larger areas according to their use, e.g. fortress, cemetery)
- religious affiliation (assignment of entities to religious denominations)
- legal areas (a spatial approach that allows, for example, the recording of cathedral immunities).

As part of the geosemantic contextualisation mentioned above, the entities modelled in this way are integrated with geometries in the GIS so that they can be analysed together. The project's ontology follows an event-centred approach, which is tied to CIDOC CRM and its associated CRMgeo extension. It also reuses content from other ontologies, controlled vocabularies, and glossaries.

The planned poster will focus on the methods of the integration of ontology and GIS and will present the project's methodological model in detail.

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3.3 Decoding and Encoding Public Space Artfully: Novel forms of Immersion at the Intersection of Technology and Social Engagement.

Mina Zarfsaz

This proposal reimagines spatial storytelling by artful applications of immersion, and mixed realities and investigates the social dimensions of the environment, and eco-philosophical interventions in public spaces that are rooted deeply in the human experience. At its core, this study is dedicated to demystifying technology, considering it not merely a tool but a medium for storytelling, expression, artful design, and experiential transformation within public spaces in order to evoke a renewed sense of sociality and relatability.

The investigation revolves around a multisensory, participatory and interactive project, integrating a guided meditation in Augmented Reality with other algorithmically designed ephemerals that are augmented in the space via projection mapping. This project was conceived to honor 100 years of institutional history at a mid-Atlantic University in the United States. Throughout the experience rich symbolic references to eco-philosophical processes merge with local ethno-histories, unveiling social and subconscious dimensions at the intersections of the individual and institution, nature and culture, space and experience, history and story.

By seamlessly integrating humanities into technological and vice versa, the employed methodologies rhizomatically (Deleuze, 1987) blend historical archives, phenomenology and techne to artfully probe the shape of daily experiences in a public space. This techno-phenomenological approach treats the environment as an active (McLuhan, 1967) interconnected organism, encouraging simultaneous decoding and encoding of sensory information. It is then that the poetics of space (Bachelard, 1957) begins to emerge through meditating, deep-listening, immersing, submerging, and actively discovering (Noë, 2012) oneself as being of/with the world rather than separate from it (Watson, 2020). In this interconnected and activated universe, space transcends containment, objects transcend isolation, mind and body intertwine, and time loses relevance (Latour, 2005).

The study recognises that every individual is entangled in a complex semiotic web tethered to geo-politics, bio-ethics, and ethno-linguistics and finds it imperative to decode these latent complexities that individuals are subconsciously attuned to, and to repeatedly encode conscious and multisensory modalities of experience (Massumi, 2002, Manning, 2014) that challenge perspectives on interconnectedness of all things.

By transforming public space to a living exhibition (Oberender, 2021) and emphasizing the collective over the individual (Haraway, 2016) this study accentuates the holistic understanding of everyday aesthetics of public spaces vital to social cohesion and collective expression.

Lastly, this study offers a unique perspective on the transformative potential of artistic research as an ethos for producing novel processes and outcomes in eco-humanistic research; it outlines a procedural and adaptable recipe/framework for creative problem-solving with deeper insights into how the spatial, social, philosophical and technological can converge through artful inquiry.

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3.4 Eagle Village: A Deep Mapping

Sheila Nadimi

'Eagle Village' is the geo-location of a parcel of land at the southern edge of the small Northern Utah town of Brigham City that housed a vast network of military architecture. Using the same architectural footprint, this infrastructure shifted from a WWII Army Hospital to the largest of the Bureau of Indian Affairs off-reservation Native American boarding schools and, finally, toward a New Urbanist townhome community to be called 'Eagle Village' before the masterplan was abandoned, the buildings demolished, and the land cleared. Using a deep mapping framework, this project reveals the forces that shaped and reimagined this site over time and has generated a spatial archive of place following 25 years of observation, photo-documentation, research, and contemplation. The proposed poster session would highlight both the built environment and the shifting social agendas and priorities that unfolded within. This presentation will offer insight into how this grid of buildings sutured distinct history where contradictions and paradox emerge.

The Eagle Village project was initiated in 1996 and focusses on the ways this parcel of land accommodated some of the key narratives underlying American society including the rehabilitation of the wounded soldier, the assimilation of the American Indian into white settler society, and the building of community. The photographic documentation of the site was concluded in 2021, once the land was cleared and planning decisions consistent with a vernacular of a contemporary American West were predominate on the landscape. Using artistic and scholarly modes of inquiry, this deep mapping project assembles a complex and comprehensive narrative of place. With photographs, the creation of original maps, aerial views from the public record, archival research, and community outreach, this project serves as a contribution to a noted silence in the archive related to the built environments of federal Indian boarding schools and the spatial particularities of individual institutions across the United States. It is through a deeper inquiry into the particularities of these federal boarding schools that the complex ways Indigenous students negotiated with the assimilationist agendas of this colonial project emerge. As such, this deep mapping project serves the dual purpose of clarifying and unsettling this site that is spatially referenced as 'Eagle Village' using a digital device.

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Exploring Violence-Induced Migration: Intersections of Time, Space, and Administrative Governance.

The Second World War's history is marked not only by unprecedented force, extermination policies, and destruction but also by the spatial uprooting of countless individuals.¹ While the National Socialist policy of extermination and the acts of war came to an end with the capitulation of the Axis powers in 1945, the spatial uprooting of millions of people² continued to have a significant impact on global history. In addition to micro-historical perspectives on the fates of the individual displaced persons (DP), interesting perspectives on this complex of issues also emerge from the perspective of national and transnational actors. Apart from central topics such as the care, accommodation and responsibility for the DPs, the question of global remigration in the form of resettlement and repatriation arose.³

By the end of 1946, while many DPs were repatriated, numerous others could not return to their places of origin.⁴ The International Refugee Organization (IRO) managed their fates. Depending on demographic characteristics as well as spatial and temporal circumstances, this process varied for different subgroups.⁵ This group was largely dependent on the IRO and other international actors for their spatial mobility and supplies. From a source-technical perspective, this makes it possible to draw on a rich stock of micro- and macro-historical documents. The registration files of DPs that have applied to the IRO for "Care and Maintenance" (CM/1 files) form the basis of this. They not only allow DPs to be classified demographically based on the data collected but also their migration history from before displacement to resettlement to be traced in spatial and temporal detail.⁶

The research employs a mixed-methods approach, combining exploratory network analysis, Geographic Information Systems (GIS), and event modeling for analysis and modeling. The aim is to analyse the spatial and structural dynamics of the displacement and resettlement process of

¹ Jessica Stroja (2022), *Displaced Persons, Resettlement and the Legacies of War: From War Zones to New Homes*. pages 1-2.

² The figures in the research literature vary greatly depending on the definition and consideration of internally and externally displaced persons. Based on a broad definition of displaced persons, Jessica Reinisch (2013), "Auntie UNRRA at the crossroads", estimates that there are up to 60 million people in Europe alone.

³ Peter Gatrell (2013), *Putting Refugees in Their Place*. In: *New Global Studies* (2013), Vol. 7(1), pages 4-5.

⁴ Ruth Balint (2023), *Destination Elsewhere: Displaced Persons and Their Quest to Leave Postwar Europe*. page 2.

⁵ Michael Marrus (1987), *The Unwanted: European Refugees in the Twentieth Century*. page 345.

⁶ Henning Borggräfe, Lukas Hennies, Christoph Rass (2022), *Geoinformationssysteme in der historischen Forschung. Praxisbeispiele aus der Untersuchung von Flucht, Verfolgung und Migration in den 1930er- bis 1950er-Jahren*, in: *Zeithistorische Forschungen/Studies in Contemporary History, Online-Ausgabe*, Vol. 19 (2022), H. 1.

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the "Last Million" from a temporal longitudinal and cross-sectional demographic perspective.

The research interest is led by the following research questions:

- How does the displacement-resettlement process of the "Last Million" present itself in a spatio-temporal longitudinal, and demographic cross-section?
- To what extent is the heterogeneity of the "Last Million" with regard to the causes of their displacement also reflected in their temporal-spatial profiles of violence-induced migration?
- Which event-based causes, drivers, and influencing factors of violence-induced migration, and its consequences can be identified in a longitudinal temporal section on a macro- and micro-historical level?

The poster presents the research model and initial interim findings, including:

- Modeling people, places, and events: a source-based approach to capture microhistorical data in a relational geodatabase.
- Sample formation: A mixed approach of demographic-stratified, and proportional-spatial sampling.
- Microhistorical case studies: Insight into the range of the spectrum in terms of demographic profiles of DPs as well as causes and course of the process of displacement and resettlement.

In this regard, the project not only aims to contribute to DP- and migration studies from a historical perspective. Rather, through its mixed-methods approach, it contributes to understanding historical forms of mobility, spatial connections, and administrative networks in an intersectional way and their temporal dynamics.

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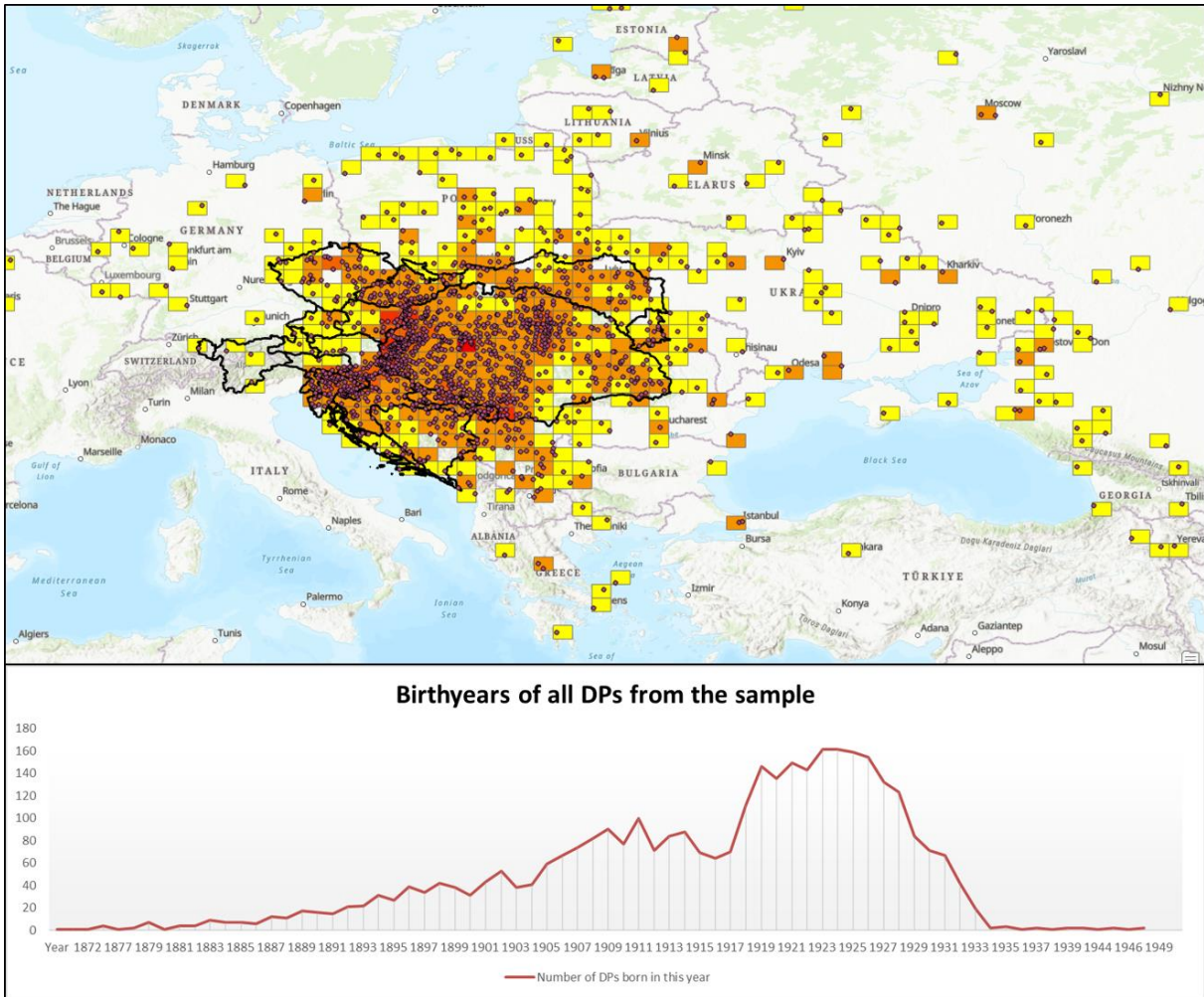


Figure 1: Sketch of the spatial sampling approach based on the birthplaces and age groups of DPs.

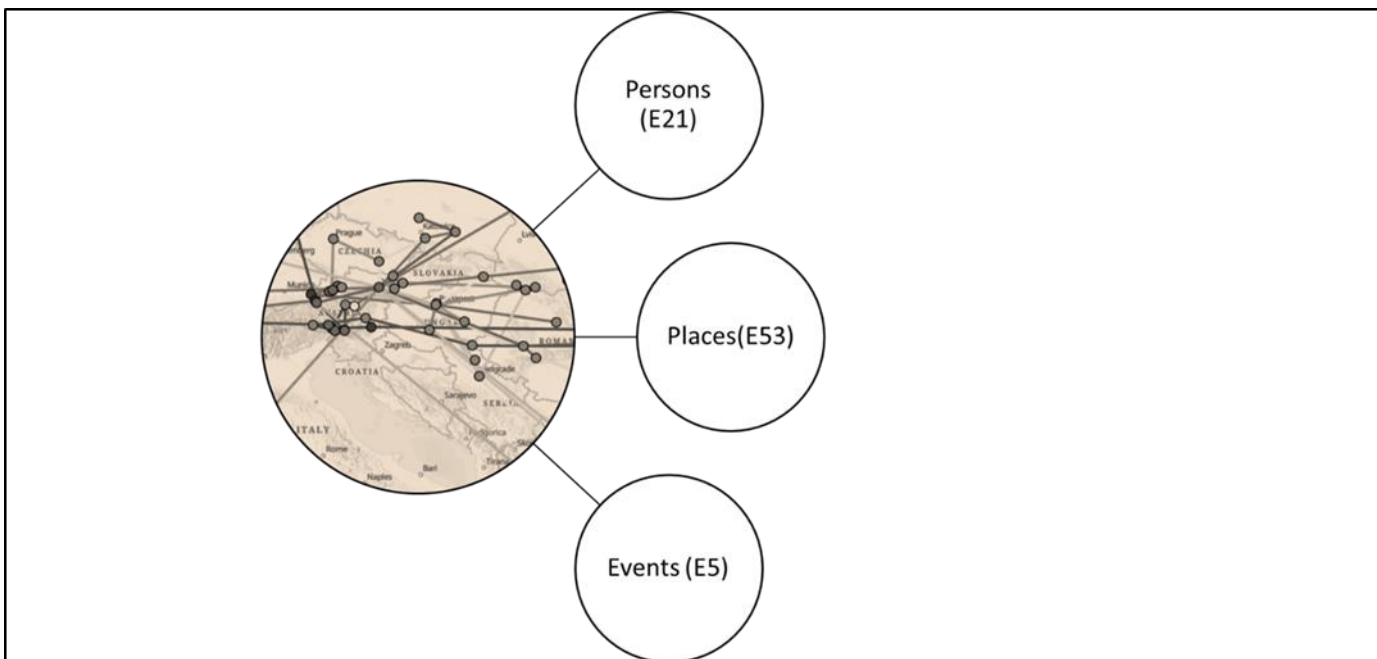


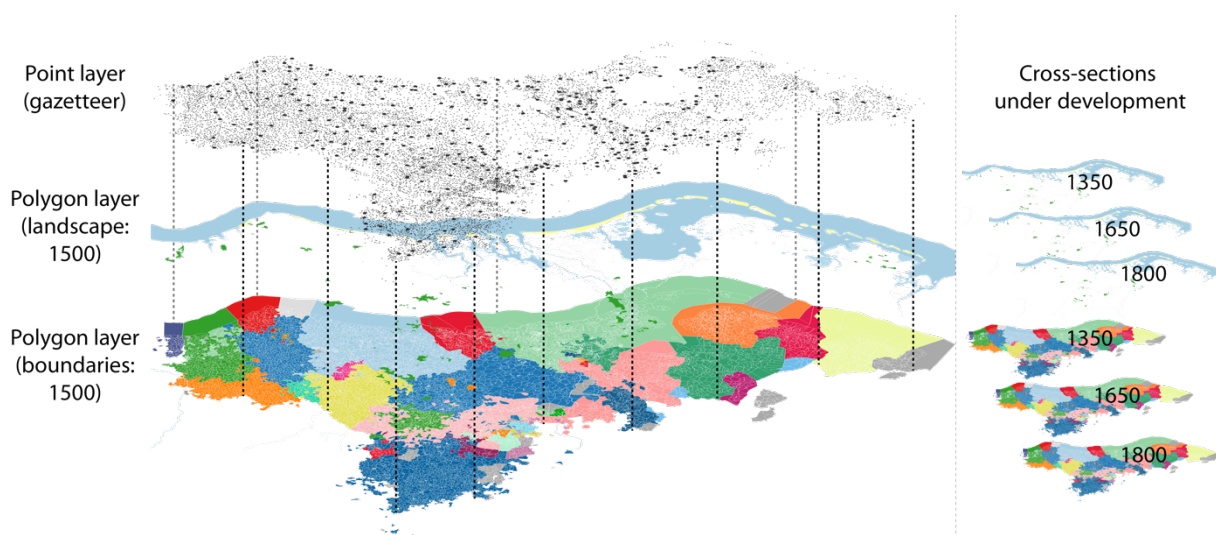
Figure 2: Modeling the complex system of Forced Migration according to the CIDOC-CRM schema.

Historical Atlas of the Low Countries: A GIS Dataset of Locality-Level Boundaries (1350–1800)

This historical GIS provides reconstructions of premodern village-level boundaries in the Low Countries, covering the present-day Netherlands, Belgium, Luxembourg and adjacent parts of France and Germany. While some countries have historical municipal GIS maps for the nineteenth and twentieth centuries, this resource provides a detailed and contiguous historical GIS for the premodern period. It also covers an area spanning several modern states, a rare undertaking. It combines modern and historical sources, including existing GIS data, historical maps, and written records, focusing on the ‘smallest mappable units’ referred to as administrative areas in contemporary documents, such as parishes, lordships, or towns.

This poster presents the results and the rationale behind the project and its database structure, based on a publication that appeared in the *Research Data Journal for the Humanities and Social Sciences* in December 2023 (<https://doi.org/10.1163/24523666-bja10033>). It accompanies the publication of a new and substantial tranche of the dataset, which functions as a complete historical GIS dataset (<https://hdl.handle.net/10622/PGFYTM>). This tranche covers all the core territories of the Low Countries (over 16.000 geographical units) for the first cross-section 1500, which can be used to link statistics for any period between 1350 and 1800. When completed, the GIS dataset will cover four cross-sections: 1350, 1500, 1650, and 1800. Each cross-section will comprise an estimated 18.000 geographical units – typically around 5 to 10 km² each. The dataset consists of one (point-based) gazetteer layer that acts as a conduit for all cross-sections. For each separate cross-section, two additional layers complement the historical GIS: a landscape layer (storing information about cultivable and various types of non-cultivable land such as water bodies) and a polygon-based boundary layer, containing the reconstructed boundaries for that moment in time.

The dataset facilitates cross-temporal analysis of historical statistics while allowing users to consider the wider geographical and territorial micro and macro context of these statistics. The result will be an invaluable resource for historians, archaeologists, geographers, and social scientists alike.



Mapping Migration and Expulsion in the Reichsgau Wartheland

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Dataset and poster: <https://doi.org/10.5281/zenodo.13789643>

In 1939/1940, the propaganda slogan “Heim ins Reich” (en: back home to the Reich) called upon numerous German-speaking population groups from eastern and south-eastern Europe to resettle in areas within the borders of the German Reich. However, the majority of these settlers were not granted land in the heartland but in the annexed territories. This “Germanisation” of the east focused on formerly Polish territories, such as the Reichsgauen Wartheland (“Warthegau”) and Danzig-West Prussia. However, before the settlers were granted any land, they were placed in camps and underwent racial profiling, which (in essence) ascertained their degree of “Germaness”. If deemed insufficient, “inferior” settlers were deployed as cheap workforce in the heartland (Stephan Döring: *Umsiedlung der Wolhyniendeutschen in den Jahren 1939 bis 1940*). Conversely, the settlement of racially acceptable “returnees” was meticulously planned—often there were only a few hours between the expulsion of the former owners and the arrival of the German settlers.

The resettlement campaigns were administered by the “Volksdeutsche Mittelstelle” (VoMi). Coordination and documentation were carried out using so-called “Hofzuweisungslisten” (en: farm allocation lists). These were pre-printed tabular forms containing the date of settlement, the settlement village, the names and family sizes of the settlers and the expelled former inhabitants, the settlers’ place of origin and the camp in which the settlers lived. The columns were filled in on typewriters a few days before a family was to move from the camp to their new homestead.

The poster presents the (geo)dataset derived from approximately 750 scans of such farm allocation lists. The data was collected using Optical Character Recognition (OCR) methods and the toponyms were geocoded using different gazetteers. Due to its exceptional performance with tables and typewriting, Amazon Textract was chosen for the initial OCR analysis. Subsequent curation was instrumented with tools of the open source OCR suite OCR-D. To establish interoperability of the Textract output with OCR-D, a new OCR-D module which converts Amazon Textract outputs into the open PRLmA-Page-XML format was developed (<https://github.com/slub/textract2page>). Finally, the data was converted into a user-friendly, extensively described CSV file. The geocoded toponyms and their detected variants are provided in separate CSV files that adhere to the Linked Places Format (delimited derivative, LP-TSV, <https://github.com/LinkedPasts/linked-places-format>).

The data mostly covers the resettlement campaigns of Volhynian and Galician Germans (originating from regions in today’s western Ukraine, south-western

Belarus and eastern Poland). It breaks down into almost 5000 records, with each record documenting the settlement of one family and the expulsion of another. With a conservative estimate of a mean family size of five people, this would correspond to the documentation of 25,000 resettlements and just as many expulsions. The dataset is made available according to the FAIR principles (<https://doi.org/10.5281/zenodo.13789643>).



Map visualizing the westward migration of the german-speaking settlers.
Review the poster / Zenodo record for detailed information.

3.8 Mapping the epidemiological transition in Copenhagen, 1861-1940

Mads V. Perner

This poster explores the spatial dimension of the epidemiological transition in Copenhagen. The epidemiological transition, as theorized by Omran, describes the shift from a society with high prevalence of infectious disease and high mortality, to one dominated by chronic illnesses and noncommunicable diseases with resulting longer life expectancies. It was a result of advances in medical knowledge and technology, economic development, and improved sanitation and living standards, but for each of those factors the exact timing and extent of their contribution is unclear.

In studies on the transition, historical demographers have tended to focus most of their attention on temporal and social dimensions, but there is a lack of spatially explicit work on specific settings over long time spans. In an industrializing city like Copenhagen, geography could act as a proxy for many of the possible causes: social composition of the population, crowding, sanitary infrastructure and so on. I would argue that in combination with data on socio-economic status and causes of death, a spatial look at the epidemiological transition can help us understand which combination of factors drove the change in mortality during different phases of the process.

My work draws on newly available individual-level records that have been transcribed by the Copenhagen City Archives. In particular the city's burial records, which contain information on name, age, family relations, (parent's) occupation, address and cause(s) of death for almost every burial in Copenhagen from 1861 to 1940. This dataset can be linked to censuses and the so-called police register, a forerunner to Denmark's modern-day population registers, which tracked the addresses of every resident in Copenhagen until 1920. This combination of sources allows me to map the decline (and appearance) of specific causes of death while controlling for a range of factors.

Meta-mapping the Medieval City: Spatial Analysis of the Map of Early 15th Century Prague (1892)

Jitka Močičková – Petra Justová

The development and transformations of the medieval settlement form an important part of European and world cultural heritage. The paper will present the results of the ongoing project *Medieval Settlements - the Core of European Cities. Based on the Example of the Interactive Cartographic Image of Prague* (programme Strategy AV 21: Anatomy of European Society; Cultural heritage as part of European and global discourse, Institute of History, Czech Academy of Sciences), which explores and presents the development and transformation of the medieval urban settlement by analysing historical sources using GIS technologies. The core of the medieval towns of Prague, which have formed a single urban unit since 1784, has undergone a complex development. The situation in the second decade of the 15th century is described in detail in a unique map from 1892 by Václav Vladivoj Tomek (1818-1905):

TOMEK, Václav Vladivoj. *Mappy Staré Prahy k letům 1200, 1348 a 1419*. Praha: Nákladem České Akademie císaře Františka Josefa pro vědy, slowesnost a umění, 1892.

Tomek was a Czech historian, archivist, and leading expert in this field. In the mid-19th century, he began writing a comprehensive 12-volume history of Prague (*Dějepis města Prahy, I-XII*). However, he struggled with topographical data that he was unable to locate and gradually realised how difficult it was to navigate the topography of the city according to written sources. Since no medieval map of Prague has survived (and it is not certain whether one was ever made), he made his reconstruction map to understand the spatial layout of medieval Prague better, using what was probably the most accurate map available at the time, Jüttner's Plan of Prague (JÜTTNER, Josef, *Grundriss der königlichen Hauptstadt Prag*, 1816). Tomek's reconstruction map, based on his long-term research into many historical documents (some of which were irretrievably lost during the Second World War), is a unique achievement even in the European context. It is divided into three parts and offers three different time layers in the urban development of Prague. The basic source for our research is the youngest and most detailed layer, the reconstruction of the situation in 1419 (e.g. before the outbreak of the Hussite revolution).

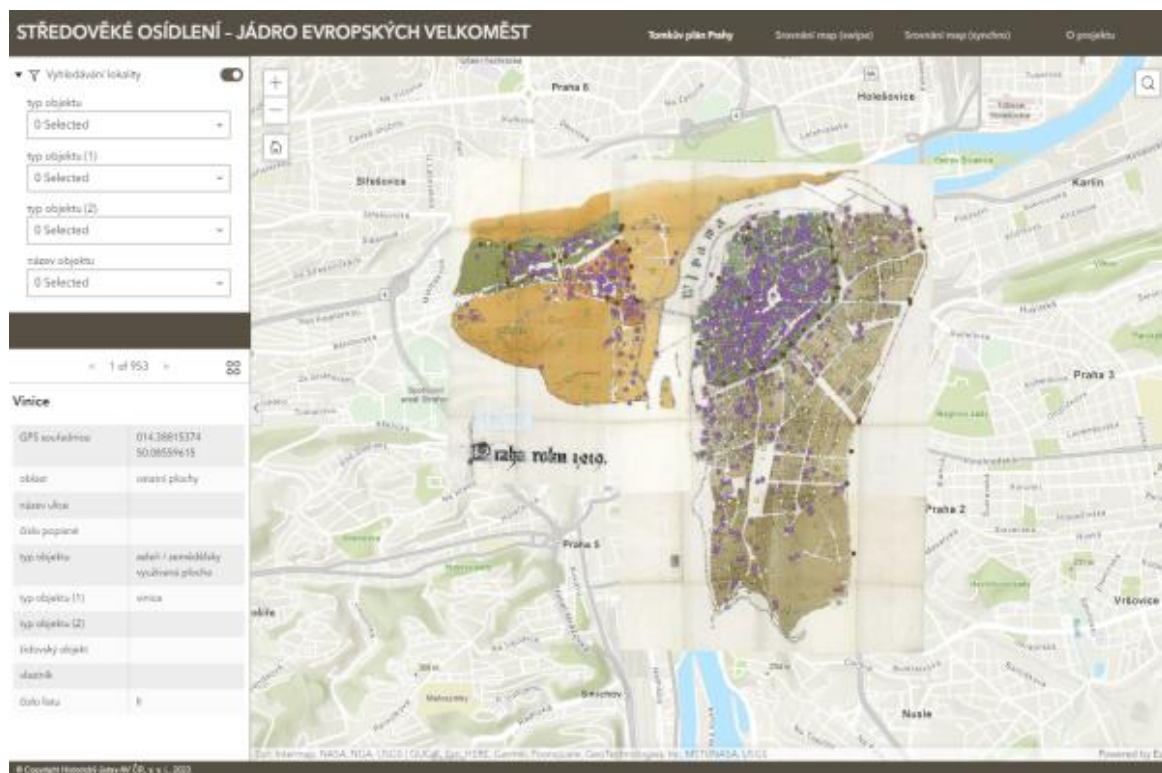
Tomek's cartographic work is still a valuable and in many respects unsurpassed source of knowledge about the medieval topography of Prague, including, for example, the area of the Jewish Town, which, apart from the cemetery and several important buildings, was destroyed at the turn of the 19th and 20th centuries. Based on his map, an extensive specialised database of almost 1,000 entries was created, concentrating and analysing contemporary

natural features, religious and secular buildings and economic areas of the medieval city centre. For further comparative and spatial analysis, the vector data model of georeferenced Tomek's map was created and further enriched with comprehensive attribute data from the database that was collected with up-to-date knowledge from the fields of topography, historical geography and cartography, archaeology, urban planning and art history, using a wide range of historical sources (mainly written, archaeological, architectural, geographical and cartographic sources).

The georeferenced map and the vector database are published in the form of an open-access interactive web map application that enables the comparison of the spatial development of the city from the Middle Ages to the present using other important cartographic sources - detailed manuscript and printed maps of Prague from the 18th to the early 20th centuries (Herget's Map, 1790/1791; Jüttner's Map, 1816; Stable Cadastre, 1842; Orientation map of Prague and neighbouring municipalities, 1910; the most recent orthophoto map, 2023).

Website of the project Medieval Settlements - the Core of European Cities (available in Czech and English): bit.ly/MedievalPrague

Web Map Application of the project (currently available in Czech, hopefully soon also in English, definitely by mid-2024): <https://bit.ly/MedievalPragueMapApp>



More-than-human Mapping: Microbial Heritage in Post-industrial Landscapes

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This project will present the Gowanus Canal, a highly contaminated site in Brooklyn, New York, USA as a “microbial heritage site.” By studying the area in and around the waterway across different temporal scales, we can understand historical impacts, identify spatial patterns, and capture the dynamic interplay between human and more-than-human organisms. (1,2)

Designated by the United States Environmental Protection Agency (EPA) as one of the most contaminated sites in the country (3), the Gowanus Canal stands as a microcosm of human-nature relationships. Located in the heart of Brooklyn, this urban waterway was once an important center for industrial activity in the 19th century. The factories along the canal have since ceased operations and have left traces of past industrialization marked by toxic sediment and polluted waters. The industrial heritage has not only contributed to the classification of the Gowanus Canal as an EPA Superfund site due to significant risks to human health and the environment, but also has fostered thriving microbial assemblages. (4)

A computational analysis of DNA sequences from contaminated sediment samples revealed that these microorganisms are metabolizing toxic compounds they are challenged with, indicating promising bioremediation capabilities. (5) Their metabolic responses serve as indicators of the environment’s history of contamination. As their interactions with their surroundings shape the material composition of the canal, new properties and behaviors emerge, contributing to the ongoing evolution of the waterway, and forming a distinct microbial heritage. (6)

From data collected from fourteen sites along the canal, bacterial species and metabolic functions can be mapped out along the waterway, creating a geospatial genomic map. Using GIS, we will spatially join the genomic map with one depicting chemical concentrations from EPA’s 2011 environmental assessment. Another spatial join of the US Census racial demographic, property value data, and recent zoning changes from industrial to mixed-use can help narrate the ongoing gentrification of this historically working-class neighborhood. (6)

Within our research group, this project employs various methodological approaches to produce multidisciplinary outcomes: deep maps, interactive installations, scientific and humanities manuscripts as well as digital humanities resources. For this conference, we propose a poster which includes the deep mapping approaches and results as well as related outcomes.

To understand geographies of the past, we will create a multi-layered map. Utilizing a mixed-methods approach that integrates data from the EPA, US Census, and Gowanus microbiome DNA sequencing, along with interviews from individuals associated with the canal, our research aims to illuminate how

microbes provide insights into past generations, reveal a history of resource exploitation, highlight cultural shifts of marginalized communities, and present opportunities for sustainable urban development. To accompany this presentation, a website will be created to archive the map layers, allowing conference participants to engage interactively with the material.

This deep mapping endeavor enables us to experience a richer story of the co-creation of the post-industrial heritage at the site. However, we acknowledge not all legacies are depicted in this effort and that the original heritage, that of the Lenape people, is absent in our microbial narrative of the site.

Our hope is to garner awareness of post-industrial landscapes as rich in microbial heritage and in potential more-than-human collaborators for environmental remediation. This work will contribute to the field of environmental humanities, offering a novel perspective by integrating geospatial technologies to a microbial lens. This deep mapping endeavor seeks to render the ubiquitous but invisible life in this environment visible, serving as a road map to include microbes in the conversation of environmental justice and inclusive sustainable urban development.



Visualization by Landscape Metrics

Keywords: Deep mapping, GIS, Post-industrial contamination, Environmental humanities, Microbial heritage, Geospatial technologies, Microbial communities, Genomic mapping, Green gentrification, Bioremediation, Environmental justice.

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Morphologies of Arriving

Showcasing the Design Philosophy of Max Vogt's Railway Stations

Hundreds of thousands of passengers arrive at Zurich main station in thousands of trains every day, watched over by the signal box tower outside the station hall. Many of them passed Altstetten station just minutes before, with a high-rise apartment block next to the rails welcoming them to Switzerland's biggest city. Some may have boarded the train at Stein-Säckingen on the banks of the Rhine, others perhaps in close-by suburban Spreitenbach. All these places were – to some extent – shaped by Max Vogt, who designed over 150 buildings for the Swiss Federal Railways (SBB). Although his buildings characterise many railway station areas in Switzerland until today and are familiar sights to many travellers, Vogt himself is hardly known. With our project, we aim to showcase his work and to carry out morphological analyses, engaging with the ideas about architecture and urban spaces that materialised in his projects.

Vogt's buildings are valuable parts of Switzerland's architectural heritage and considered cornerstones for the current state and future development of urban settings with a high standard of building culture. As individually crafted architectural forms that take requirements of railway engineering into account, the station buildings have a strong visual identity themselves (Nozhova 2022): Over thirty years, Vogt and his team developed an architectural corporate design for SBB (Weidmann/Holenstein 2008: 20) featuring distinct shapes and material choices. Vogt enjoyed far-reaching creative freedom; because he was operating on government-owned land, he did not have to strictly adhere to municipal zoning plans and building regulations. His buildings – infrastructure for passengers such as station buildings and shelters, but also facilities for cargo trains and signal boxes – are therefore referred to as »exterritorial« (Weidmann/Holenstein 2008: 13; Stollenwerk 2006: 9) architecture. Still, he emphasised the role of his designs for station buildings and their surroundings for relating the transport infrastructure to the spatial syntax of the local built environment and for creating counterweights to the linearity of the adjacent railway (Weidmann/Holenstein 2008: 31).

Vogt's aim for morphological connections while working with an exterritorial planning approach raises the question of the extent to which his designs succeeded in creating the relations he was striving for. Key literature (Weidmann/Holenstein 2008) primarily describes architectural features of the station buildings as transit space for travellers. Focusing on their spatial contexts instead, we approach Vogt's oeuvre from a morphological perspective to critically engage with his design vocabulary: Can his station buildings bridge the gap between the railway lines and their surroundings? Does the architecture provide a counterweight to the velocity induced by expanding rail service, as Vogt intended to? Do his designs help to translate the linearity of the railway to the spatial syntax of the places it serves?

In short: We shift the analysis from an architectural focus on form as property of structures and materials to a morphological one, highlighting form as relational feature of urban spaces instead (cf. Marcus 2021: 89). We investigate this by analysing the spatial context around station buildings designed by Vogt. Comparing spatial networks, hierarchies and patterns of relationships enables us to interpret Vogt's designs as interrelated forms within their local context and across cities (Kropf 2017: 14). The analysis is carried out mainly using momepy (Fleischmann 2019). The data set for our analysis is retrieved from OpenStreetMap. Since the built environment has, in many places, evolved since Vogt designed his buildings, we enrich our analysis with an additional layer of historical orthofotos as provided by swisstopo.

The analysis is intended to enhance the existing catalogue of Vogt's work with additional metadata about its morphological properties. The results are being made available online at <https://mtwente.github.io/maxvogt>, linking existing resources from different archives to the catalogue of Vogt's works, and joining them into an online exhibition in one place. We do this, secondly, to showcase CollectionBuilder (Williamson et al. 2019). CollectionBuilder is an open-source framework for creating digital collections with emphasis on low entry barriers and minimal external requirements. Timelines, maps and other browsing features are generated from metadata as starting points for exploring a collection of historic items. At the same time, the website remains easily customizable also for researchers without programming experience.

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Abfahrt Départ – Partenza – Departure mtwente.github.io/maxvogt

Morphologies of Arriving

Showcasing the Design Philosophy of Max Vogt's Stations

Max Vogt

- SBB architect (57–89), key figure for Swiss 20th century built heritage
- Functional designs with exposed concrete
- Strong visual identity, raised either as signposts or landmark designs
- 100+ stations, cargo sheds, signal boxes etc. in Eastern Switzerland
- Online inventory at momepy.github.io/momepy/

The Station Building at Buchs SG was built in 1981, together with the directly neighbouring Service Building/Restaurant.

The architectural basis is a one-storey cuboid connecting the station and service building/restaurant in the southern part of the complex to a much higher cuboid building in the northern part. In between both parts, a passageway opens up, leading passengers from the station square to the platform.

During his employment, Vogt's team engaged in reaching freedom in their work, since federal SBB infrastructure was exempt from building regulations.

At the same time, rail investments diminished due to increasing demand – with simple, yet functional designs, Vogt put forward a distinct SBB style that also was adopted in other parts of Switzerland.

While Vogt's designs vary greatly in size – smaller service buildings, high-rise apartment blocks as well as platform sheds and station hangers – their common denominator is materiality: Exposed concrete. Vogt's preferred construction material is found in almost all projects.

While this choice made his work quite controversial, it allowed for formal and structural freedom leading to creative and confident buildings with e.g. intricate lighting systems, sophisticated positioning of apartments, and consciously placed leisure areas.

Key publications on Vogt also suggest balanced interventions in the spatial context – spatial relations between city and railway created through carefully composed urban settings. As part of this project, we carried out morphological analysis to investigate Vogt's work from this angle and to critically engage with his design vocabulary.

Buchs SG

- Station Building (1981)
- Bahnhofplatz 2–4, 9420 Buchs SG

Zürich Zentraltorwerk

- Signal Box (1963)
- Gustav-Gull-Platz 6, 8004 Zürich

The simple, cuboid shaped building features a characteristic flat roof, overhanging on three sides. Travelers can enter the lavatories directly from the platform. A waiting area under the roof is facing the older station building.

A spatial or architectural connection to the older station is not evident. Instead, the simple design seems nearly counteracting to the pointed roof, the traditional two-story cubature and the detailed window shutters of the historic station. The overhanging roof can be interpreted as an attempt to open up a sheltered space between the two buildings.

Situated in a more rural area, there are fields and meadows around the station and less urban structures to draw from.

Vertical lighting sits, clustered on the northern facade of the nine-storey cuboid, together with a large lighting reading. Zürich make up a focal point to be seen from the train. Remarkable is the overarching viewing platform on the north-western side of the building. Rising above the tracks, height and cubature turn the signal box building into a landmark and city gate.

SBB Buildings

While smaller scale residential buildings are marking up the urban pattern on the western side of the station, the urban pattern to the east consists of larger industrial complexes.

As seen in his other buildings for SBB, Max Vogt adapts some qualities of the surroundings in his design and aims to mediate between urban space and railway, while still creating an outstanding focal point alongside the tracks and a spatial closure for the city scope on the western side.

He achieves this by means of the horizontally oriented, one- and two-story structure in the counterpart of the station, which forms an architectural barrier between city and railway and has a low permeability for users. The vertically oriented office building, over-arching the station building, can be considered a landmark to be seen approaching the railway station from both city and railway tracks.

Feldbach

- Service Building (1966)
- Bahnhofstrasse 16, 8714 Feldbach

This service building, today used as a rest room, is one of many smaller projects by Max Vogt. It was built as an addition to the old station building of Feldbach.

Spatially, the building has to be considered in the context of surrounding structures and a station square on its northern side. To the east, there is an older station building with more traditional features, a newer building part with a flat roof added later, on to its western side, facing the shed.

Max Vogt's building is closing an otherwise open corner of the station square, furthermore opening up a gate-like situation in between two buildings with a restaurant seating area.

Workflow

- Literature Research
- Field Survey
- Building Statistics
- SBB Archives
- YouTube/Flickr/Wikidatas
- OpenStreetMap
- Wikimedia Commons
- momepy Analysis
- CollectionBuilder
- GitHub Repository
- Website and Poster

CollectionBuilder

CollectionBuilder is an open source framework for creating collection and exhibit websites that are driven by metadata. Host digital exhibitions, collections or stories by yourself!

- Create a collection with metadata and media files
- Add to spreadsheet/CSV (e.g. Google Sheets)
- Copy to CollectionBuilder
- Publish with GitHub Pages

CollectionBuilder generates:

- Searchable website
- Interactive maps
- Timelines, tag clouds, etc.

Key Features:

- Open source and static (no database required)
- Simple and straightforward with CSV, Markdown and jekyll
- Long-term archivable

collectionbuilder.github.io

Rheinfelden

- Goods Shed (1968)
- Bahnhofstrasse 2, 4310 Rheinfelden

The Railway Goods Shed in Rheinfelden has a very distinctively shaped flat roof, being the main architectural feature of an otherwise simple cargo facility.

The middle part of the building and roof in particular feature a shape that can be seen in many of Vogt's buildings: an elevation that

Today it has nearly lost its spatial impact. The reasons do not lie in the structure itself but in densification of the surrounding area: ever taller high-rise blocks have been built directly behind the signal box. The changed architectural structures rise far above Max Vogt's architecture and take away from its architectural and spatial effect, which only remains visible for travelers arriving to Zürich by train.

About

Powered by:

- Max Twente
- Luisa Omonsky

Code, Data, Poster: momepy.github.io/momepy/ www.maxvogt.ch/momepy/

Online Collection: collectionbuilder.github.io

Free use

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Spatial Humanities, Bamberg, 09/2024

Poster Resources

The poster is available as PDF at doi.org/10.5281/zenodo.13837394

The online collection of Max Vogt's designs is available at mtwente.github.io/maxvogt/

The data repository, incl. workflow description, is available at mtwente.github.io/maxvogt-analysis/

3.12 The mapping of archaeological sites in Portuguese territorial planning

Gertrudes Branco, Jaquelina Covaneiro, Leonor Rocha

“Better information leads to better decisions”. This is a true premise when applied to the use of geographic information systems in territorial and urban planning, due to their ability to build, analyse and map georeferenced data, which is essential to support decision-making processes.

In Portugal, the general inventory of archaeological sites has always been the responsibility of the public institute responsible for managing archaeological heritage and activity. In the 1980s, they began the first effort to create a national inventory of archaeological sites, called the “Archaeological Charter of Portugal”.

The manual inventory consisted of a set of archaeological site cards with various fields of information, including geographical information, with reference to the military maps of Portugal at a scale of 1:25000. The first attempts to build an information system date back to the mid-1990s and resulted in the creation of a database - Endovélico - associated with a geographic information system, which still supports the information on the “Portal do Arqueólogo” web interface.

The “Portal do Arqueólogo” is an “electronic platform for accessing information on archaeological heritage” that provides information on archaeological sites in mainland Portugal, associated with a GeoPortal that allows you to view their location.

This interface is an indispensable working tool for archaeologists, but also for public and private entities, which are responsible for keeping land-use planning and management models up to date, in which it is essential to characterize and identify cultural values, including the delimitation of areas with a view to safeguarding archaeological information contained in the soil and subsoil.

Our understanding, and our project, which has been tested in a few territorial units, including the municipality of Tavira (Algarve, Portugal), is to turn these territorial planning and management models into knowledge repositories that go beyond the spatial inventory of heritage elements, materialized in maps with points, associated with lists of designations and typologies.

Our specific aim is to create dynamic heritage inventories, combining the tools of geographic information systems with an archaeological recording protocol, which compiles and keeps up-to-date the information known and continuously produced in a given territory and, at the same time, analyses and transforms it into a robust, constantly updated, sufficiently autonomous and transversal information base that can be useful to the actors who administratively manage the territory, to citizens and to archaeologists looking for the basis for building historical and cultural knowledge.

The starting point for this project is the collection of information - documentary, oral, bibliographic, cartographic and archaeological - its processing and compilation into a database, which acts as a container for the distribution of heritage elements, represented in polygons and linear traces, in a geographic information system, which allows us to visualize the heritage content of a given territory at a given time.

What knowledge can we anticipate from analysing the distribution of archaeological sites, of a certain chronology, in relation to the landscape units in which they are located? Are there patterns? trends? preferred locations?

How can we, in planning and management, anticipate the impacts resulting from the implementation of large and small urban development projects? suggest less impacting alternatives in order to safeguard the archaeological heritage, as an added value for territories with low and high urban density?

Inventorying and valuing archaeological sites makes sense as part of a strategy for managing heritage resources and channeling investments towards their enhancement and public dissemination. What criteria should be used?

These, and other, questions are some of those that we have debated in the design and implementation of our project and which we would like to address and discuss with you.

Urbanization & the Geopoetic Memory: Juxtaposing Spatiotemporal Models of Urban Expansion with Geopoetic Inquiry

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This study investigates the relationship between urbanization and place through a dual methodological approach: quantitative spatial modeling and geopoetic inquiry. By combining these perspectives, the research offers an interdisciplinary understanding of place as both a spatial and affective construct shaped by urban transformation.

The quantitative component examines land cover change in Pampanga Province, Philippines, from 2014 to 2022, using Landsat 8 imagery, Google Earth Engine, and QGIS. Future land cover changes from 2022 to 2030 were simulated using the MOLUSCE plugin in QGIS, integrating explanatory spatial variables such as proximity to roads, proximity to airports, and elevation. Results indicate a 5.74% increase in built-up areas (129.15 km²) between 2014 and 2022, with a predicted further increase of 2.70% (60.75 km²) from 2022 to 2030. Overall, an 8.43% increase in built-up areas is projected for the period 2014–2030, reflecting significant urban expansion. These findings illustrate the spatial and temporal dynamics of urban growth, offering insights into its patterns and drivers.

The qualitative component employs geopoetic inquiry to explore the embodied and social experiences of place amidst urbanization. Narratives were gathered through interviews conducted in English, Filipino, and a mix of both, focusing on themes of urban transitions, cultural shifts, food traditions, and religious practices. These narratives were analyzed through lenses of phenomenology, social constructionism, and structuralism to uncover how individuals perceive and adapt to changes in their environments. The narratives were transformed into 13 poems—10 research poems and 3 interpretive poems—that distill participants' affective and sensory experiences. These poems serve as a condensed form of knowledge, offering new ways to understand the interplay between memory, identity, and place.

By juxtaposing spatial modeling with geopoetic inquiry, the study bridges two disciplinary approaches. Land cover maps and simulations provide an empirical projection of future transformations, while poetry captures the lived and historical dimensions of place. This dual perspective reveals how place is simultaneously shaped by physical change and human experience. The findings suggest that these methods are not merely complementary but mutually enriching, enhancing our understanding of the spatial, temporal, and affective dimensions of urbanization.

This research contributes methodologically by advocating for “undisciplined geographies” that integrate quantitative spatial science with qualitative, human-centered approaches. It

underscores the importance of communicating spatial phenomena through interdisciplinary lenses to address the complexity of urban transitions. Ultimately, the study demonstrates the potential of combining geospatial modeling and geopoetic inquiry to create a more comprehensive and nuanced understanding of place, paving the way for innovative approaches to spatial knowledge production.

4 Workshop

4.1 MapReader Workshop: Using Machine Learning to Analyze Large Collections of Digitized Maps

Katherine McDonough, Rosie Wood, Kalle Westerling

MapReader is a software library that was designed for humanities research with big digitised map collections. The winner of the 2023 Roy Rosenzweig Prize for Innovation in Digital History from the American Historical Association, MapReader was developed first within the Living with Machines project, but was created with a wider community of historians in mind as future users. Learn more about MapReader at

<https://github.com/maps-as-data/MapReader>.

MapReader performs two tasks.

1. Patch classification allows users to identify concepts of visual interest on maps, and then to define queries for predicting whether those concepts are present on hundreds or thousands of individual sheets. The power of this approach is its flexibility for any number of spatially-driven research questions.
2. Text spotting makes it possible to create a structured dataset of all text on a map image. MapReader implements models made available during the 2024 MapText competition (Chazalon, Joseph. "ICDAR 2024 Competition on Historical Map Text Detection, Recognition, and Linking". Presented at the International Conference on Document Analysis and Recognition (ICDAR), Athens, Greece, September 4, 2024. <https://doi.org/10.5281/zenodo.13628614>.)

This workshop aims to bring together historians and others with an interest in using digitised historical map collections as primary sources for digitally-inflected research. By bringing together peers working in this space, we aim to learn about and discuss ways to encourage open research in the humanities through skill development and shared digital resources and infrastructure.

During the workshop, participants will:

- Learn about the research and theoretical motivations behind MapReader, and how it fits in a growing ecosystem of computer vision tools for humanities research
- Test a demo of MapReader with sample data

- Learn the basics of computer vision and machine learning as applied to computational maps research
- Discuss how to apply MapReader to your own map collections
- Reflect on the opportunities for using “automatic” methods for analysing maps in humanistic research

About

The conference was organised by the Spatial Humanities Conference Association.

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- Zef Segal (Open University of Israel, Israel)
- Ma Zhaoyi (Nanyang Technological University, Singapore)
- Carol Ludwig (Saarland University, Germany)
- HE, Jie (Architecture, Harbin Institute of Technology (Shenzhen))
- Kai Tan (RWTH Aachen, Germany)

Institutions

- Bamberg University
- Centre for Heritage Conservation Studies and Technologies (KDWT)
- Ghent Centre for Digital Humanities
- Lancaster University Centre for Digital Humanities
- Digital Humanities Lab
- Universidade NOVA de Lisboa
- UrbanMetaMapping consortium
- Federal Ministry of Education and Research (BMBF)

Exhibitions

- Smart City Research Lab (SCRL) Bamberg
- OSGeo / FOSSGIS