Collection Development, Cultural Heritage, and Digital Humanities

DIGITAL SPATIAL INFRASTRUCTURES AND WORLDVIEWS IN PRE-MODERN SOCIETIES

Edited by
ALEXANDRA PETRULEVICH
and **SIMON SKOVGAARD BOECK**

ARC HUMANITIES PRESS

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

DIGITAL SPATIAL INFRASTRUCTURES AND WORLDVIEWS IN PRE-MODERN SOCIETIES

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

COLLECTION DEVELOPMENT, CULTURAL HERITAGE, AND DIGITAL HUMANITIES

Further information and publications:
www.arc-humanities.org/search-results-list/?series=collection-developmentcultural-heritage-and-digital-humanities

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

DIGITAL SPATIAL INFRASTRUCTURES AND WORLDVIEWS IN PRE-MODERN SOCIETIES

Edited by
ALEXANDRA PETRULEVICH and
SIMON SKOVGAARD BOECK

ARC HUMANITIES PRESS

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library.

© 2023, Arc Humanities Press, Leeds

This work is licensed under Creative Commons licence CC-BY-NC-ND 4.0.

The authors assert their moral right to be identified as the authors of this work.

Permission to use brief excerpts from this work in scholarly and educational works is hereby granted provided that the source is acknowledged. Any use of material in this work that is an exception or limitation covered by Article 5 of the European Union's Copyright Directive (2001/29/EC) or would be determined to be "fair use" under Section 107 of the U.S. Copyright Act September 2010 Page 2 or that satisfies the conditions specified in Section 108 of the U.S. Copyright Act (17 USC §108, as revised by P.L. 94–553) does not require the Publisher's permission.

ISBN (HB): 9781641894692
eISBN (PDF): 9781802700794

www.arc-humanities.org
Printed and bound in the UK (by CPI Group [UK] Ltd), USA (by Bookmasters), and elsewhere using print-on-demand technology.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

CONTENTS

List of Illustrations vii

Introduction
ALEXANDRA PETRULEVICH and SIMON SKOVGAARD BOECK 1

PART ONE:
DIGITAL SPATIAL INFRASTRUCTURES IN THE HUMANITIES

Chapter 1. Norse World from Plan to Action: Building a Digital Gazetteer of East Norse Medieval Literature Step by Step
ALEXANDRA PETRULEVICH and SIMON SKOVGAARD BOECK 15

Chapter 2. Mapping Saints: Creating a Digital Spatial Research Infrastructure to Study Medieval Lived Religion
SARA ELLIS NILSSON, TERESE ZACHRISSON, ANDERS FRÖJMARK, LENA LIEPE, and JOHAN ÅHLFELDT 33

Chapter 3. Medieval to Modern: Using Spatial Data from the Digital Projects Icelandic Saga Map and Nafnið.is to Explore the Interaction between Narrative and Place in Iceland
EMILY LETHBRIDGE 59

Chapter 4. TORA: Topographical Register at the Swedish National Archives
OLOF KARSVALL 91

Chapter 5. Toward Digital Spatiality: Rethinking the World's Largest Place-Name Collection
BJÖRN KARLSSON, KRISTINA NEUMÜLLER, and ELIN PIHL 115

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

PART TWO: BUILDING AND SUSTAINING DIGITAL SPATIAL INFRASTRUCTURES: CHALLENGES AND SOLUTIONS

Chapter 6. Place-Name Databases: A Spatio-Temporal Mess
PEDER GAMMELTOFT 137

Chapter 7. Sustainability and Best Practices for Linked Data Heritage Resources: Some Case Studies from Sweden
AGNIESZKA BACKMAN and MARCUS SMITH 159

Chapter 8. Integrating Time and Space in a Digital-Historical Administrative Atlas
PEDER DAM 185

Chapter 9. A Digital Periegesis: Implementing Spatial Research Infrastructures for Classical History and Archaeology
ANNA FOKA, ELTON BARKER, KYRIAKI KONSTANTINIDOU, NASRIN MOSTOFIAN, BRADY KIESLING, LINDA TALATAS, O. CENK DEMIROGLU, and KAJSA PALM 205

PART THREE: THE NORSE PERCEPTION OF THE WORLD: MEDIEVAL SPATIALITY IN THE DIGITAL AGE

Chapter 10. Flores Travels to Babylon: *Flores och Blanzeflor* in Its European Context
SOFIA LODÉN 227

Chapter 11. Place-Name Variation in Medieval Literature in the Digital Age
ALEXANDRA PETRULEVICH 243

Chapter 12. Nameless Places
SIMON SKOVGAARD BOECK 267

Concluding Remarks
STUART DUNN 281

Index 291

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

LIST OF ILLUSTRATIONS

Figures

1.1. The Norse World system overview. 17

2.1. Database model of Mapping Saints (simplified). "PK" denotes primary key and "FK" denotes foreign key. 38

2.2. "PlaceID" 5483, the chapel of the "Holy maid" in Västergötland. 46

2.3. "Cult manifestation" #581, illustrating the votive practice associated with a sculpture of St. Lawrence in Landön chapel. 47

2.4. "Cult manifestation" #2582, a miracle of the Blessed Catherine of Vadstena. 50

3.1. Entity relationship diagram of Icelandic Saga Map backend. 62

3.2 (a) and (b). Screenshots of Landmælingar Íslands maps showing the locations of Kjartanssteinn, Bollalág, and Hafragil according to data in the Landmælingar Íslands database. 64

3.3. Entity relationship diagram of Nafnið.is backend. 69

3.4. Screenshot of Icelandic Saga Map showing geographical places named in *Grettis saga*. 70

3.5. Screenshot of Google MyMaps interface showing geographical places associated with *Grettis saga* manuscripts, organized by manuscript shelfmark. 76

3.6. Screenshot of Google MyMaps interface showing geographical places associated with *Grettis saga* manuscripts, organized by date of manuscript. 76

3.7. Screenshot of Google MyMaps interface showing geographical places associated with *Grettis saga* manuscripts, organized by date of manuscript and showing manuscript locations outside Iceland. 77

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

3.8. Screenshot of Google MyMaps interface showing geographical places associated with *Grettis saga* manuscripts, organized by place of origin (true/false).. 77

3.9. Screenshot of Google MyMaps interface showing geographical places associated with *Grettis saga* manuscripts and geographical places named in *Grettis saga*. 78

3.10 (a) and (b). Screenshots of Nafnið.is interface showing the place-name record for Staðarhraun and location of toponyms in the record (e.g., Grettisoddi) that have been given geographical coordinates. 79

4.1 Östra Älgsjö, Bjälbo parish. The image to the left shows a map by Johan Larsson made around 1635–1637. The map to the right, dated 1638–1639, depicts the same hamlet and is made by the same surveyor. 98

4.2. The extent of large-scale maps in Sweden during the seventeenth century. 100

4.3. Data model or graph in RDF used to describe relations (triples) in TORA. 109

4.4. Architecture and data flows in TORA. 110

5.1. The structure of the Swedish place-name collection in the archive of Isof. 117

5.2. Search results in the old version of the Swedish digital place-name register. 118

5.3. The new Swedish digital place-name register, displaying the results of the simple search for "Uppsala." 121

5.4. System description. 123

5.5. The design of the Swedish digital place-name register. 124

5.6. The simple search entry function in the Swedish digital place-name register. 127

6.1. Schematic overview of indirect location as used in place-name research. The place-name expression is here used as the name attribute for three different locations. 141

6.2. Example of direct location with multiple place-names in different languages. Direct location is here represented by a point location of a named feature. This direct location is known by multiple names, which is typical of multilingual areas. 143

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

6.3. Schematic example of current and previous spellings of a place-name. 146

6.4. Map showing result of not stating a same-origin place-name relationship between localities/feature types.. 147

8.1. Overview map (1:20,000), 1836, based on enclosure maps and cadastral maps (1:4,000), ca. 1792–1816, showing each landowner's plot in the parish of Villersø in eastern Jutland. 188

8.2. Land unit versions per land unit, 1660–2012. 189

8.3. Simplified data model of the DigDag project. Text items such as "Administrative units" stand for tabular data. 191

8.4. Graphical illustration of two administrative units and their four geographical versions, shown with different colours with both precise dating, interval dating (marked with two colour stripes and "?"), and "open-start"/"open-end" dating (marked with "<?" and "?>" respectively). 193

8.5. Dating of administrative units and their versions shown in Figure 8.4. 193

8.6. Percentages of areas affected by interval dating over time for land units (dashed line) and the parishes (solid line), 1660–2012. 194

8.7. Schematic illustration of geographical changes in seven land units, 1682–2012.. 196

8.8. Schematic illustration of geographical changes in seven land units and the mapping method of the DigDag project, 1682–2012.. 197

8.9. Data underlying the DigDag mapping method in Figure 8.8, 1682–2012. 198

8.10. Schematic illustration of geographical changes in seven land units and the mapping method of the DigDag project, 1682–2012. 199

8.11. Data underlying the DigDag mapping method in Figure 8.10 for LUs 3 and 4. 199

8.12. DigDag interface in which the municipalities ("Kommunal") filter has been selected and the date April 13, 1887 chosen. 200

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

8.13. DigDag interface in which two types of administrative units in the Copenhagen area, the present-day municipalities (black lines) and the parishes, dated February 2, 1665 (dark grey lines), have been chosen. . . . 201

8.14. Map based on the combination of two parish maps from 1801 and 1870 showing population growth (%) per parish. . . . 202

9.1. A map of regions numbered as Pausanias's volumes of the Periegesis Hellados. . . . 208

9.2 (a) and (b). Passages of Pausanias as they appear in the Scaife Digital Library Viewer Interface, including format options for exporting the passage, word list, morphology, and commentary. . . . 214

9.3. The Recogito user interface, including example of a regional name, its location on the map by Pleiades gazetteer alignment, and comment box. . . . 217

10.1. Countries mentioned in *Hertig Fredrik av Normandie* and *Flores och Blanzeflor* in D 4a. . . . 231

10.2. Cities mentioned in *Hertig Fredrik av Normandie* and *Flores och Blanzeflor* in D 4a. . . . 232

11.1. The place-name data structure employed by the Norse World infrastructure. . . . 252

Tables

1.1. Types of non-names in Norse World. . . . 23

1.2. Types of localities in Norse World. . . . 24

2.1. Medieval parish churches and origin of data in cultural heritage collections. . . . 39

2.2. In the database structure, "Type of evidence" for "Cult manifestations" is divided into five categories. These are further divided into a number of more specific subcategories. . . . 45

6.1. Examples of toponyms from Frøya, Norway, with similar place-name expressions across different feature types. . . . 150

6.2. Concept table featuring "LocalityID" and "NameID." . . . 151

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

6.3. Concept table showing how "NameID" can be managed with toponyms compounded with place-name concepts of other toponyms. 152

6.4. Concept showing historical forms in the dataset. The different direct locations are represented by individual "LocalityIDs," whereas different indirect locations are represented by individual "NameIDs." 154

10.1. Place-names in the three manuscripts that all contain *Hertig Fredrik av Normandie* and *Flores och Blanzeflor*. 230

11.1 Overview of Old Swedish and Old Danish variant forms associated with the standard form "France" from the most frequent to the least in the Norse World resource. 259

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

INTRODUCTION

Alexandra Petrulevich and Simon Skovgaard Boeck*

OVER THE PAST ten years the spatial turn in the humanities in Scandinavia has resulted in a growing number of infrastructural projects aimed at facilitating interdisciplinary research into spatial aspects of a rich variety of materials, place-names, early modern inventories and cadastral maps, medieval literature and art, as well as Viking-Age and medieval runic inscriptions, to name just a few. This intensive development has brought about a number of challenges, as these projects differ with regard to their agendas, setups, and customized approaches to data, theories, and methods. A number of different solutions to common problems such as geocoding complex humanities data is of course inevitable, as different points of departure regarding the perceived needs of future users, research questions, and consequent priorities have shaped the projects' outputs. Nevertheless, for the development of the rapidly growing field of spatial research infrastructure studies in the humanities to be sustainable requires a conversation about the different ways we as a community understand, build, (re)use, maintain, and develop digital platforms and other types of infrastructure as well as the data they serve; another focal point of such a conversation would be the ongoing negotiation of best practices regarding spatial data management and the use of linked open data (LOD) in line with FAIR (findable, accessible, interoperable, reusable) principles. Consequently, the main aim of the current volume is to introduce the latest developments in the field, as well as to provide the possibility for such a dialogue in book format. The reader is served a smorgasbord of theoretical perspectives, methodological tools, and—most importantly—practical approaches to creating and talking about digital spatial research infrastructures (SRIs) in the humanities.

The volume introduces nine spatial infrastructure resources that are currently being developed: Norse World;[1] Mapping Saints;[2] the Icelandic Saga Map;[3] Nafnið.is;[4] TORA, a

* Alexandra Petrulevich (PhD Uppsala 2016) is Associate Senior Lecturer/Assistant Professor in Scandinavian Languages at Uppsala University, Sweden. Email: alexandra.petrulevich@nordiska.uu.se; ORCID iD: https://orcid.org/0000-0002-8478-2040.

Simon Skovgaard Boeck (PhD Copenhagen 2009) is Senior Editor at the Society for Danish Language and Literature, Denmark. Email: ss@dsl.dk; ORCID iD: https://orcid.org/0000-0001-5334-7241.

1 See www.uu.se/en/research/infrastructure/norseworld and https://norseworld.nordiska.uu.se (both accessed February 16, 2023).

2 See https://saints.dh.gu.se (accessed February 16, 2023).

3 See http://sagamap.hi.is/is (accessed February 16, 2023).

4 See https://nafnið.is and https://nafnid.is (both accessed February 16, 2023).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

topographical register at the National Archives of Sweden;[5] the Swedish Digital Place-Name Register;[6] the Swedish Open Cultural Heritage;[7] and DigDag, a digital atlas of the historical and administrative geography of Denmark.[8] This infrastructural effort has not emerged in a vacuum but is a consequence and welcome result of the growth in the study of early modern and medieval geographic space, literary cartography, and spatial thinking at a time of rapid digitization.[9] The existing and emerging digital SRIs facilitate the rethinking of traditional lines of humanistic research on spatiality and worldviews, innovation in methodology, and critical discussion of digitization outcomes. This volume thus also provides the research community with an opportunity to revisit traditional research questions in the context of new infrastructural environments. Although primarily aimed at medievalists and scholars of the early modern period, the volume offers a broader spatial and temporal scope with a contribution from classical studies. The classics have in many ways pioneered the application of digital methods to narrative spatial analysis and developed strong collaborative engagement with infrastructure, producing Pelagios,[10] an ever-growing platform for a plethora of spatial databases and gazetteers, as well as Recogito,[11] a digital annotation tool. These two successful examples show a pressing need for community building around SRIs for early modern and medieval Scandinavia to ensure sustainable design, long-term preservation, and further collaborative development.

Place-names, the modelling of place-name data, and place-name databases constitute one of the focal points of the volume, as the majority of the chapters deal with names or named places in one way or another.[12] In general, the place-name perspective, including manual or automated collation and processing of name data from texts of any kinds, remains rather undefined, if not to say absent from the consciousness of spatial humanities. In the age of digital gazetteers with pre-defined standardized structures,[13] place-names are very often reduced to mere attributes and are almost never theorized or processed any further. This volume provides several examples of how this structure can be elaborated, adapted, and further developed in accordance with the project's ambitions and needs. Most importantly, however, the volume offers a completely new

5 See https://riksarkivet.se/tora-english (accessed February 16, 2023).

6 See https://ortnamnsregistret.isof.se (accessed February 16, 2023).

7 See http://kulturarvsdata.se (accessed February 16, 2023).

8 See www.digdag.dk (accessed February 16, 2023).

9 E.g. Tuan, *Space and Place*; Warf and Arias, *The Spatial Turn*; Westphal, *Geocriticism*; Tally Jr., *Geocritical Explorations*; *Literary Cartographies*; *Topophrenia*; Boulton, Hawkes, and Stoner, *Place and Space in the Medieval World*.

10 See https://pelagios.org (accessed February 16, 2023).

11 See https://recogito.pelagios.org (accessed February 16, 2023).

12 Or nameless places processed as if they were named: see Skovgaard Boeck, this volume.

13 Goodchild and Hill, "Introduction to Digital Gazetteer Research"; see also Gammeltoft, and Petrulevich, both this volume.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

way of structuring place-name data.[14] These are innovative approaches to be considered by anyone interested in developing a spatial dataset from scratch and capturing the essence of place-names to produce as versatile a resource as possible. This focus on place-names also adds to the temporal complexities of the volume, as place-names coined hundreds or thousands of years ago are still in use today, not least in most of the geo-services we are constantly surrounded by.

The field of spatial humanities, centred on the question of location in space, has emerged to become a pioneering area of research that transcends traditional disciplinary boundaries and draws on geographic information system (GIS) technologies.[15] The multidisciplinary inquiry into spatiality across pre-modern materials requires adequate infrastructure resources that have not existed until very recently. For early modern and medieval Scandinavia, the work on building publicly available open-source SRIs is still under development.[16] There is an abundance of literature on spatial humanities and the use of GIS across humanities subjects, cross-interrogating the field on what it means to digitize a place as well as engaging in method development and critical discussion of GIS applications to born analogue data.[17] The challenges of designing, building, and sustaining long-term spatial infrastructures for humanistic research have so far not been addressed at length in a scholarly publication, however. Instead of following along a well-beaten path, the current volume thus breaks completely new ground.

Digital Spatial Research Infrastructures in the Humanities

What are research infrastructures (RIs) in the humanities? And what niche do digital SRIs occupy among them? There are plenty of definitions of the former by national and transnational policy-makers, funders, and interest organizations, such as national research councils, the European Commission, the European Science Foundation (ESF), and the Digital Research Infrastructure for the Arts and Humanities (DARIAH).[18] According to one of the broadest and most straightforward definitions, RIs are

14 See Gammeltoft, this volume.

15 Knowles and Hillier, *Placing History*; Bodenhamer, Corrigan, and Harris, *The Spatial Humanities*; Gregory and Geddes, *Toward Spatial Humanities*; Rossetto, "Theorizing Maps"; Cooper, Donaldson, and Murrieta-Flores, *Literary Mapping*; Murrieta-Flores and Howell, "Towards the Spatial Analysis"; Dunn, *A History of Place*.

16 Hafsal, Amundsen, and Gammeltoft, "Nytt digitalt liv"; Karsvall, "Historical Settlement Units"; Petrulevich, Backman, and Adams, "Medieval Macrospace through GIS"; Lethbridge, "Digital Mapping."

17 Travis, Ludlow, and Gyuris, *Historical Geography*; Dunn, *A History of Place*; Gregory and Geddes, *Toward Spatial Humanities*; Tally Jr., *Literary Cartographies*; von Lünen and Travis, *History and GIS*.

18 See Swedish Research Council, "The Swedish Research Council's Guide to Research Infrastructure 2018"; Research Council of Norway, "*Norwegian Roadmap for Research Infrastructure 2018*"; Danish Agency for Higher Education and Science, "Danish Roadmap for Research Infrastructure 2020"; European Commission, "European Research Infrastructures"; ESF, "Research Infrastructures in the Humanities"; DARIAH, "Mission and Vision."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

"facilities, resources, and services that are used by the research communities to conduct research."[19] In the ESF's Science Policy Briefing 42 on RIs in the digital humanities from 2011, infrastructures in spatial humanities were the subject of one of the case studies; the sector-specific challenges were defined as needs for data resources, interdisciplinary collaboration, and methodological developments.[20] Drawing on these definitions and state-of-the-art analyses, an SRI can be very broadly defined as a digital resource used for research on location-based data in spatial humanities and other fields. Additionally, RIs in general and SRIs in particular can be seen as nodes of knowledge production and dissemination incorporating people, networks, tools, methodologies, and so on.[21] The present volume gives an insight into the ongoing dialogue and negotiation of what RIs and SRIs are and can be both in theory and practice.

This dialogue becomes apparent not least in the chapters' different ways of understanding and denoting the type of spatial infrastructure this volume is about. Two main terms are used throughout the book to talk about digital spatial infrastructures in the humanities: *spatial research infrastructures* (SRIs) and *spatial data infrastructures* (SDIs). These two terms are to a large extent synonymous and can often be used interchangeably. There are at least three points of difference, however. SRIs are somewhat tighter in focus compared to spatial data infrastructures, an umbrella concept that incorporates all types of digital infrastructures serving spatial data, SDIs used in business and government included. In this respect, the term "spatial research infrastructure" highlights the main attribute of openly released digital resources built and used for research and financed with research money, be it money from government, non-profit organizations, or independent foundations, namely their purpose: research. By choosing to talk about SRIs, we also want to emphasize that the processes of designing, building, and developing infrastructures are research practices in themselves. There are always research questions shaping SRIs even if these are implicit or, at times, "not allowed." Without research questions and researchers and other professionals processing raw data—such as objects, texts, linguistic items—describing them, and, most importantly, the relationships between them, the infrastructures produced are more or less useless. The final nuance of difference relates to SRIs being—at least seemingly—more inclusive with respect to the type of content that is relevant or central for infrastructures of the kind. This point depends entirely on what definition of spatial data is at play, however. As this book shows, digital spatial research infrastructures in the humanities are not necessarily about numerically representing objects in a geographic coordinate system; some of the location-based materials presented in the volume, most notably place-names, can partially or as a whole lack coordinates in related SRIs. Finally,

19 Science Europe, "Research Infrastructures."

20 ESF Standing Committee for the Humanities, "Research Infrastructures in the Digital Humanities," 30.

21 See PARTHENOS, "What Is Infrastructure?"

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

the term "spatial research infrastructure" is more in line with the terminology used by policy-makers and research funders; see the overview above.

Why is it important to talk about SRIs? The rapid development toward more sustainable infrastructure work and general awareness, if not yet implementation, of LOD to link available data implies that SRIs themselves are becoming important players in the current and future research landscape. As researchers making use of SRIs are dependent on the choices, priorities, theories, and methods the infrastructure project teams have made and opted for, spatial research infrastructures will have a deep and lasting impact on the type of research it is at all possible to conduct. For this reason, it is of major importance to have an ongoing conversation as to where the field of spatial research infrastructures in the humanities is heading as well as to continue collaboratively developing and linking the already existing infrastructures. Another important goal to work toward is to re-evaluate the status of SRIs—or, indeed, RIs of any kind—as scholarly output as well as the status of the research work invested in these resources.[22] Infrastructure projects in the humanities are often treated as something that is not as valuable as "real" question-driven research. Infrastructures take years of work to produce and require massive research efforts to catalogue, annotate, categorize, edit, comment, normalize, lemmatize, and so on. Considering the significance of (S)RIs for research communities, it is high time to equate infrastructure work with other types of scholarly labour.

The Structure of This Volume

A scientific collection of papers is seldom consumed as a novel from the beginning to the end. Naturally, the chapters included are all independent entities that can be read in their own right. There are multiple connections between the contributions with respect to common themes, however, not least the projects' spatial perspective, and common challenges, not least related to choices and applications of theories and methods. For instance, as mentioned earlier, place-names have become one of the leading components of the book. It is a challenging task to divide the chapters into larger entities with common denominators, as these can hardly summarize all the emerging patterns of affinity. In general, the chapters of the volume fall into three categories: presentations of digital SRI projects; wide-ranging discussions of methods and methodological choices, as well as practical approaches to building and sustaining SRIs; and case studies drawing on the material of the Norse Perception of the World project. For this reason, the core of the present volume consists of three parts: Part One, "Digital Spatial Infrastructures in the Humanities"; Part Two, "Building and Sustaining Digital Spatial Infrastructures: Challenges and Solutions"; and Part Three, "The Norse Perception of the World: Medieval Spatiality in the Digital Age." At the same time, the reader has to bear in mind that all the chapters deal with single or multiple projects in one way

22 The Agreement on Reforming Research Assessment, finalized in July 2022, is a very significant recent global initiative addressing this issue.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

or another, and include highly relevant discussions of methods as well as empirical examples of their utilization. In other words, the chosen macrostructure is merely one possible compromise of many. As an addition to this macrostructure, cross-references constitute a highly relevant tool; by cross-referencing we hope to have brought to the fore the dialogue currently ongoing in the field as well as the many links—and, equally important, points of difference—between the contributions.

In the first part, five digital SRIs that are currently under development are presented. In Chapter 1, the editors walk the reader through how the digital gazetteer of East Norse medieval literature, Norse World, was designed, built, and further developed. The chapter offers practical advice for future spatial digitization projects with a focus on pre-modern literature, as well as suggesting possible uses of the web application and the project's data. In Chapter 2, Sara Ellis Nilsson, Terese Zachrisson, Anders Fröjmark, Lena Liepe, and Johan Åhlfeldt showcase the ways in which digital spatial methods can contribute to the understanding and interdisciplinary study of medieval "lived religion." The project "Mapping Lived Religion: the Medieval Cults of Saints in Sweden and Finland" carries out complex digitization and sustainability work digitizing and linking disparate materials from the Swedish National Historical Museums and the Swedish National Heritage Board. The chapter discusses the challenges associated with, for instance, mapping materials of different types, source preservation, and changing administrative borders, and it provides a number of solutions. Chapter 3, by Emily Lethbridge, describes two Icelandic SRIs: the Icelandic Saga Map and Nafnið.is. Both resources categorize and map Icelandic place-names; the first project deals with spatial information attested in the sagas of Icelanders, while the second is the result of an ambitious task to digitize the place-name archive held by the Árni Magnússon Institute for Icelandic Studies in Reykjavík. Lethbridge demonstrates convincingly how these two resources can complement each other and reveal connections between the medieval texts, the manuscripts they are attested in, and the place-names that are still preserved in the Icelandic cultural landscape. This and the two following contributions deal with the challenging task of turning originally analogue resources into powerful digital tools. Consequently, Chapter 4, by Olof Karsvall, discusses the methods applied, choices taken, and experiences learned from the Swedish LOD historical geographic register TORA, a topographical register at the National Archives of Sweden, wherein the sixteenth- and seventeenth-century source material—cadastral registers and large-scale maps—have been digitized and processed to produce an overview of over 25,000 geocoded historical settlements. Similarly, Björn Karlsson, Kristina Neumüller, and Elin Pihl (Chapter 5) summarize the ongoing work of making what is probably the world's largest place-name collection, held by the Institute for Language and Folklore (Isof) in Uppsala, Sweden, available to researchers and the general public in digital format. The chapter addresses the challenges of developing sustainable SRIs and the significance of long-term perspective at all stages of infrastructural work. The collection of approximately 3.7 million index cards of Swedish place-names was first digitized in the 1990s. Thirty years later the results of this early digitization still hamper the development of the new

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

incarnation of the Swedish digital place-name register; for this reason, the project team is forced to rethink database structures, methodologies, and design choices to produce as sustainable a resource as possible.

The second part of the volume focuses on the ongoing negotiations and implementations of best practices in the field with respect to building and sustaining SRIs. In Chapter 6, Peder Gammeltoft engages with the "spatio-temporal mess" of place-name databases, reconsidering the mainstream approach to handling place-name data in digital gazetteers. Place-names occur in etymologically and otherwise related clusters; moreover, one and the same locality can be associated with multiple names or name forms. Gammeltoft introduces the concept of a unique place-name identifier, and thus a novel approach to structuring place-name data in databases that would "enable coordination between multiple features with the same place-name origin, strengthen place-name standardization management and not least, more exactly represent place-name data across time, space, and domains of usage." The question of how to plan for (S)RI sustainability is the central element of Chapter 7. Agnieszka Backman and Marcus Smith address current best practices as well as what sustainability—with or without the implementation of LOD—can mean in different contexts, not least with respect to the scope of the infrastructure resource at hand. The chapter gives practical advice on how to achieve sustainable outputs in infrastructure projects. Additionally, Backman and Smith provide an insightful discussion of the diversity of outputs SRI projects deliver. The challenges of capturing datasets' spatial-temporal complexities in SRIs is further developed in Chapter 8, in which Peder Dam argues for integrating "time and space … into one dataset with time as an attribute parameter." In projects dealing with administrative divisions, this implies providing a border or an administrative polygon with start and end dates. The method has proved fruitful in DigDag, the digital atlas of the historical-administrative geography of Denmark, frequently used by its interdisciplinary audience. Yet another methodological approach to temporal and prosopographical data is actualized in Chapter 9, by Anna Foka, Elton Barker, Kyriaki Konstantinidou, Nasrin Mostofian, Brady Kiesling, Linda Talatas, O. Cenk Demiroglu, and Kajsa Palm. The authors reflect on the use of digital SRIs and annotation tools for mapping and analyses of Pausanias's *Periegesis Hellados* (*Description of Greece*), the focal point of the Digital Periegesis project. The chapter emphasizes the importance of collaborative approaches to SRIs, because multisectoral communities are absolutely necessary for infrastructures to stay relevant, be sustained, and be developed further in accordance with research needs.

The third part of the volume consists of three case studies all relating to Norse World, an interactive spatial-temporal resource for research into spatiality and worldviews in medieval literature from Sweden and Denmark. Norse World is the main output of the project "The Norse Perception of the World: A Mapping and Analysis of Foreign Place-Names in Medieval Swedish and Danish Texts," which has been central for current collaborative infrastructural development in the Nordic countries. In Chapter 10, Sofia Lodén discusses the role of travel in the Old Swedish translation of *Floire et Blancheflor*

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

in its European context—i.e., against the background of the other insular and continental versions, the French original included. Lodén focuses on the points of difference in descriptions of Floris/Floire's travel to Babylon in the texts and argues that the Nordic tradition prioritizes the external, "real" world motivation of the protagonist's actions compared to the continental interest in "the human mind and development." The Norse World resource is used for several case studies in philology and historical linguistics in the following chapter (Chapter 11). Alexandra Petrulevich shows that place-name variation data has much to offer in the study of textual criticism, genre, and language variation and change. Most importantly, however, the chapter reconsiders the current mainstream gazetteer structure and its approach to place-name materials, and offers both theory and methodology for dealing with place-names and place-name variants in SRIs in analytically meaningful way. In Chapter 12, Simon Skovgaard Boeck addresses the topical issue of extracting and processing relevant spatial references that do not bear names in some of the medieval source materials. This particular type of spatial references has caused much trouble for the Norse World project team. Although the spatial information is encoded in a non-prototypical way, it is still included in the resource because these spatial references are deemed crucial for interpretations and analyses of associated texts. The three chapters together can be seen as examples of cross-fertilization between SRIs and RI infrastructure studies as a field, on the one hand, and more traditional lines of humanistic research, on the other: the former facilitate the implementation of new methods in literary studies, to take just one example, while the methodology associated with the latter is still indispensable when processing raw material in the context of SRI development.

Finally, in the Concluding Remarks, Stuart Dunn summarizes and contextualizes the volume within the tradition of scholarship in spatial humanities and gives his perspectives on the book's contribution to the advancement of the field.

Final Remarks

This volume introduces a new, topical field of inquiry in spatial and digital humanities, digital spatial research infrastructure studies, and deepens the interdisciplinary scholarship on spatiality in pre-modern sources in the digital age. The reader is offered a comprehensive overview of currently developed SRIs with a focus on Scandinavia and beyond as well as critical perspectives on the outcomes of the ongoing rapid digitization in the Nordic countries. These resources provide the latest digital toolbox for customized qualitative and quantitative analyses of large amounts of geocoded humanities data, and thus further facilitate research in the digital age on spatiality in pre-modern narrative sources and societies. Most of the projects have a multidisciplinary background, engaging historians, art historians, linguists, philologists, onomasticians, literary scholars, geographers, research engineers, and specialists in digital humanities. Additionally, the current collection makes a solid contribution to the discussion of best practice solutions for collaborative engagement with digital SRIs for scholars and students across the humanities.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

We have worked on this book with a heterogeneous interdisciplinary readership in mind. First, the chapters will be of importance for postgraduates, researchers, and academics interested in pursuing digital SRI projects. Second, the spatial and other data delivered by the databases, interactive platforms, and other web applications presented are valuable sources of primary material for student theses as well as research papers. The volume is therefore an ideal introduction to the methodologies and approaches to data, coding, and visualization behind downloaded datasets. Some of the chapters, especially those in Part 2 and Part 3, can also be used for teaching digital humanities and spatial humanities at upper undergraduate and postgraduate level. Third, as much of the material presented in the volume belongs to the cultural heritage sector, the book will be of great help to professionals working at GLAM institutions (galleries, libraries, archives, and museums) who are keen to work with academics in devising collaborative infrastructure projects. Furthermore, as the spatial turn in the humanities has reshaped course structures and curricula, we anticipate that the projects, theories, and methodologies presented in the volume will have a broader appeal in an academic teaching context. Digital spatial analysis, text annotation, ontologies, and LOD applications appear nowadays on traditional curricula in the fields of history, medieval studies, onomastics, philology, manuscript studies, literature and archaeology, among others.

As we have outlined above, the present volume complements the existing literature on spatial humanities and GIS applications in various fields of the humanities by elucidating the processes of understanding, building, linking, and sustaining digital SRIs in the humanities as a collaborative enterprise. By including a considerable number of cross-references throughout the collection, we hope we have achieved and made visible an interdisciplinary multisectoral dialogue between project teams, institutions, networks, and countries. One common denominator appearing in most chapters are place-names, linguistic units with complex transmission histories and essential attributes of any digital gazetteer. Place-names have rarely been theorized or modelled in order to capture the many functions they have with respect to spatial orientation, cognition, and linking landscape features in clusters based on common etymologies and other factors. This book is one of the first contributions published under the umbrella of spatial humanities that explicitly addresses these issues.

In more general terms, the volume seeks to reconsider the value of academic labour put into infrastructure projects and equate these efforts, including the projects' outputs to question-driven research published in article or monography format. Digital spatial research infrastructures in the humanities are becoming key interdisciplinary hubs facilitating and, most importantly, shaping innovative research. In addition to serving data to external users, the infrastructures disseminate ideas, theories, and methods, and thus leave a considerable footprint on any study drawing on these resources. It is hard to overestimate the significance and the impact of these infrastructures on traditional disciplinary research from a long-term perspective when LOD technologies have become mainstream. For this reason, it is important to foster world-class research infrastructures by giving practitioners the academic credit they deserve.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Acknowledgements

The editors would like to express their gratitude to Jonathan Adams, the Society for Danish Language and Literature, the Department of Scandinavian Languages at Uppsala University, Letterstedtska föreningen, Niels Bohr Fondet, and the Place-Name Society of Uppsala for their generous contributions to making this book available as open access. This work was further supported by the Swedish Foundation for Humanities and Social Sciences Riksbankens Jubileumsfond Infrastructure under Grant IN16-0093:1.

Bibliography

Agreement on Reforming Research Assessment. www.scienceeurope.org/news/rra-agreement-final (accessed January 13, 2023).

Bodenhamer, David J., John Corrigan, and Trevor M. Harris, eds. *The Spatial Humanities: GIS and the Future of Humanities Scholarship*. Bloomington: Indiana University Press, 2010.

Boulton, Meg, Jane Hawkes, and Heidi Stoner, eds. *Place and Space in the Medieval World*. New York: Routledge, 2018.

Cooper, David J., Christopher Donaldson, and Patricia Murrieta-Flores, eds. *Literary Mapping in the Digital Age*. London: Routledge, 2016.

Danish Agency for Higher Education and Science. "Danish Roadmap for Research Infrastructure 2020." Copenhagen: Danish Agency for Higher Education and Science, 2021. https://ufm.dk/en/publications/2020/filer/danish-roadmap-for-research-infrastructure-2020.pdf (accessed June 10, 2021).

DigDag. www.digdag.dk (accessed February 16, 2023).

Digital Periegesis. www.periegesis.org (accessed February 16, 2023).

Digital Research Infrastructure for the Arts and Humanities (DARIAH). "Mission and Vision." www.dariah.eu/about/mission-vision (accessed June 10, 2021).

Dunn, Stuart. *A History of Place in the Digital Age*. Abingdon: Routledge, 2019.

ESF. "Research Infrastructures in the Humanities." http://archives.esf.org/hosting-experts/scientific-review-groups/humanities-hum/strategic-activities/research-infrastructures-in-the-humanities.html (accessed June 10, 2021).

ESF Standing Committee for the Humanities. "Research Infrastructures in the Digital Humanities," Science Policy Briefing 42. Strasbourg: ESF Standing Committee for the Humanities, 2011. http://archives.esf.org/fileadmin/Public_documents/Publications/spb42_RI_DigitalHumanities.pdf (accessed June 10, 2021).

European Commission. "European Research Infrastructures." https://ec.europa.eu/info/research-and-innovation/strategy/strategy-2020-2024/our-digital-future/european-research-infrastructures_en (accessed June 10, 2021).

Goodchild, Michael Frank, and Lauren L. Hill. "Introduction to Digital Gazetteer Research." *International Journal of Geographical Information Science* 22 (2008): 1039–44.

Gregory, Ian N., and Alistair Geddes, eds. *Toward Spatial Humanities: Historical GIS and Spatial History*. Bloomington: Indiana University Press, 2014.

Hafsal, Nils Aage, Hilde Rigmor Amundsen, and Peder Gammeltoft. "Nytt digitalt liv til en usynlig kulturarv i Vang." Forskning.no, May 16, 2019. https://blogg.forskning.no/kulturminnebloggen/nytt-digitalt-liv-til-en-usynlig-kulturarv-i-vang/1335875.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Icelandic Saga Map. http://sagamap.hi.is/is (accessed February 16, 2023).

Karsvall, Olof. "Historical Settlement Units as Linked Open Data." In *Proceedings of the Digital Humanities in the Nordic Countries 4th Conference (DHN 2019), Copenhagen, Denmark, March 5–8, 2019*, edited by Costanza Navarretta, Manex Agirrezabal, and Bente Maegaard, 259–69. Copenhagen: University of Copenhagen, Faculty of Humanities, 2019.

Knowles, Anne Kelly, and Amy Hillier, eds. *Placing History: How Maps, Spatial Data, and GIS Are Changing Historical Scholarship*. Redlands: Esri, 2008.

Lethbridge, Emily. "Digital Mapping and the Narrative Stratigraphy of Iceland." In *Historical Geography, GIScience and Textual Analysis: Landscapes of Time and Place*, edited by Charles Travis, Francis Ludlow, and Ferenc Gyuris, 19–32. Cham: Springer, 2020.

Mapping Saints. https://saints.dh.gu.se (accessed February 16, 2023).

Murrieta-Flores, Patricia, and Naomi Howell. "Towards the Spatial Analysis of Vague and Imaginary Place and Space: Evolving the Spatial Humanities through Medieval Romance." *Journal of Map & Geography Libraries* 13 (2017): 29–57.

Nafnið.is. https://nafnið.is and https://nafnid.is (both accessed February 16, 2023).

Norse World. www.uu.se/en/research/infrastructure/norseworld and https://norseworld.nordiska.uu.se (both accessed February 16, 2023).

PARTHENOS. "What Is Infrastructure?" https://training.parthenos-project.eu/sample-page/intro-to-ri/what-is-infrastructure (accessed June 10, 2021).

Pelagios. https://pelagios.org (accessed February 16, 2023).

Petrulevich, Alexandra. "The Multi-Layered Spatiality of the Global North: Spatial References and Spatial Constructions in Medieval East Norse Literature." In *The Global North: Spaces, Connections, and Networks before 1600*, edited by Carol Symes, 91–114. Leeds: Arc Humanities, 2021.

Petrulevich, Alexandra, Agnieszka Backman, and Jonathan Adams. "Medieval Macrospace through GIS: The Norse World Project Approach." *The Cartographic Journal* 57 (2020): 18–27.

Recogito. https://recogito.pelagios.org (accessed February 16, 2023).

Research Council of Norway. "Norwegian Roadmap for Research Infrastructure 2018." Oslo: Research Council of Norway, 2018. www.forskningsradet.no/siteassets/publikasjoner/1254037351440.pdf (accessed June 10, 2021).

Rossetto, Tania. "Theorizing Maps with Literature." *Progress in Human Geography* 38 (2014): 513–30.

Science Europe. "Research Infrastructures." www.scienceeurope.org/our-priorities/research-infrastructures (accessed June 10, 2021).

Swedish Digital Place-Name Register (Ortnamnsregistret). https://ortnamnsregistret.isof.se (accessed February 16, 2023).

Swedish National Heritage Board (Riksantikvarieämbetet). http://kulturarvsdata.se (accessed February 16, 2023).

Swedish Research Council. "The Swedish Research Council's Guide to Research Infrastructure 2018." Stockholm: Swedish Research Council, 2018. www.vr.se/download/18.312b62c9166b295ec241390/1541065048121/Guide-to-research-infrastructures_VR_2018.pdf (accessed June 10, 2021).

Tally Jr., Robert T., ed. *Geocritical Explorations: Space, Place, and Mapping in Literary and Cultural Studies*. New York: Palgrave Macmillan, 2011.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

——, ed. *Literary Cartographies: Spatiality, Representation, and Narrative*. New York: Palgrave Macmillan, 2014.

——. *Topophrenia: Place, Narrative, and the Spatial Imagination*. Bloomington: Indiana University Press, 2019.

TORA – Topographical Register at the Swedish National Archives. https://riksarkivet.se/tora-english (accessed February 16, 2023).

Tuan, Yi-Fu. *Space and Place: The Perspective of Experience*. London: Arnold, 1977.

Travis, Charles, Francis Ludlow, and Ferenc Gyuris, eds. *Historical Geography, GIScience and Textual Analysis: Landscapes of Time and Place*. Cham: Springer, 2020.

Von Lünen, Alexander, and Charles Travis, eds. *History and GIS: Epistemologies, Considerations and Reflections*. Dordrecht: Springer, 2013.

Warf, Barney, and Santa Arias, eds. *The Spatial Turn: Interdisciplinary Perspectives*. London: Routledge, 2009.

Westphal, Bertrand. *Geocriticism: Real and Fictional Spaces*. Translated by Robert T. Tally Jr. Basingstoke: Palgrave Macmillan, 2011.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

PART ONE

DIGITAL SPATIAL INFRASTRUCTURES IN THE HUMANITIES

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Chapter 1

NORSE WORLD FROM PLAN TO ACTION: BUILDING A DIGITAL GAZETTEER OF EAST NORSE MEDIEVAL LITERATURE STEP BY STEP

Alexandra Petrulevich and Simon Skovgaard Boeck*

EAST NORSE MEDIEVAL literature is a mine of information on how foreign lands were visualized and perceived in the Middle Ages. What places were written about and where? Are some places more popular in certain text types or at certain times? How do place-names link different texts? Is there a shared concept of spatiality? Any research aiming to uncover what pre-modern Scandinavians understood about places abroad requires as a minimum an index of foreign place-names and other spatial references in medieval manuscripts and other sources—an infrastructure that has not existed until very recently.

Norse World[1] is an interactive spatial-temporal resource for research into spatiality and worldviews in medieval fictional, non-biblical literature from Sweden and Denmark. The database comprises a large number of geocoded attestations of foreign place-names and non-proprial spatial references from a variety of East Norse texts excerpted at a manuscript level. In this chapter, we introduce the Norse World resource from the planning stages to the completion of the online platform, which enables sophisticated searches in the database of more than 6,500 attestations of spatial references. The chapter is conceived to be a guide to the what, how, and why of building a digital gazetteer[2] of a medieval literary corpus with an interdisciplinary user group in mind.

We have chosen to focus on three major issues. The first is how to deal with complex historical and linguistic data in a way that is compatible with simplified relational

* Alexandra Petrulevich (PhD Uppsala 2016) is Associate Senior Lecturer/Assistant Professor in Scandinavian Languages at Uppsala University, Sweden. Email: alexandra.petrulevich@nordiska.uu.se; ORCID iD: https://orcid.org/0000-0002-8478-2040.

Simon Skovgaard Boeck (PhD Copenhagen 2009) is Senior Editor at the Society for Danish Language and Literature, Denmark. Email: ss@dsl.dk; ORCID iD: https://orcid.org/0000-0001-5334-7241.

1 Petrulevich et al., "Norse World."

2 The term "digital gazetteer" is understood broadly in the chapter as a digital resource that provides information on named features by linking feature names, feature types and feature coordinates; see Goodchild and Hill, "Introduction to Digital Gazetteer Research," 1039.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

database schemas. Despite pilot trials, it is not unusual to discover new aspects of data or new data types one or two years into the excerpting work, with a database schema in place and paid for. The chapter provides several examples of how to handle these issues and the aspects of data and database design that it is crucial to take into account. Second, successful communication between scholars and developers or research engineers is a prerequisite for every successful infrastructure project in digital humanities. The chapter presents several lessons learned by the Norse World project that we hope will help others ensure effective project management and communication in project groups. Third, the chapter deals with the problem of visualizing the unvisualizable. Contemporary approaches to geocoded humanities data per default include mapping components for illustration purposes or analysis or both. What can or cannot be mapped in a literary dataset is never a straightforward issue, however. Similarly, the question of how problematic data such as fictional places or places with uncertain identifications can be geocoded without losing the ambiguity entirely is not easy to answer. Below, we present several techniques employed by the Norse World project to visualize a variety of problematic data types.

The Project and the Planning Stage

The project "The Norse Perception of the World: A Mapping and Analysis of Foreign Place-Names in Medieval Swedish and Danish Texts"[3] was conceived in 2016 to produce a spatial infrastructure platform for interdisciplinary humanities research on spatiality and worldviews in medieval East Norse[4] literature. The main outcome of the project, the Norse World platform or digital gazetteer, is an interactive spatial-temporal research infrastructure that aggregates and visualizes thousands of geocoded attestations of spatial references in the East Norse material. At the planning stage of the project we identified two major priorities, presented and discussed in more detail below: 1) a theoretically and methodologically informed philological approach to language data underpinning the entire infrastructure building; and 2) a spatialization framework including geocoding East Norse literary material for the purposes of illustration and spatial analyses. These priorities were set up in accordance with the perceived needs of future users, philologists, historians, onomasticians, linguists, literary scholars, and researchers from any other related fields. The project that started in March 2017 is still ongoing; the Norse World resource is still being worked on and developed. We are continually adding new data, such as new attestations, texts, and sources, to the project's database.

---

3 IN16-0093:1; funded by the Swedish Foundation for Humanities and Social Sciences Riksbankens Jubileumsfond from 2017 to 2022.

4 East Norse covers the two languages Old Swedish (including Old Gutnish) and Old Danish before 1530. The choice to incorporate Old Gutnish into Old Swedish might be seen as controversial. Nevertheless, it is relatively easy to filter the material for *Gutasagan* (*Gutasaga*), the only text in Old Gutnish present in the database.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

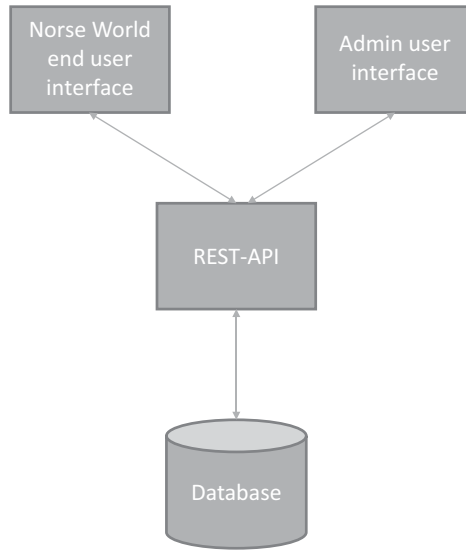


Figure 1.1. The Norse World system overview.

In technical terms, the Norse World digital spatial research infrastructure is a modular system consisting of four components: a database, a REST-API,[5] an admin user interface, and an interactive end user interface; see Figure 1.1. The modular structure allows for the future development, scaling, and updating of each individual component without affecting the rest of the system. The Norse World data and metadata can be accessed via the project's website or REST-API.[6] The website offers stable links[7] to most of the presented data items; the links can therefore be used to refer to a specific attestation of a spatial reference or text or any other structured piece of information available. The data at the website can be searched for and filtered in multiple ways.[8] Tailored datasets can then be downloaded for further analyses in CSV format.[9] The resource's content is released under Creative Commons Attribution 4.0 International License,[10] which allows free sharing and adapting on the condition that the Norse World resource is given appropriate credit.

5 An application programming interface that follows a particular type of architecture, namely REST (REpresentational State Transfer).

6 Petrulevich, "Infrastructure"; on the project's employment of REST-API and linked open data, see Backman and Smith, this volume.

7 Uniform Resource Locators: URLs.

8 Backman and Petrulevich, "Search and Filters."

9 Backman and Petrulevich, "Exporting the Data."

10 See https://creativecommons.org/licenses/by/4.0 (accessed February 16, 2023).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

The project's underpinning idea is the notion of geographically rendered medieval macrospace that encompasses literary representations of foreign places outside the empirically experienced world of the medieval audience.[11] Consequently, aiming at exposing medieval worldviews, we have chosen to collate and aggregate foreign spatial references—i.e., place-names and other location-based data—in East Norse medieval fictional, non-biblical texts from roughly 1100 until 1530. By "foreign" we mean those areas outside the current, modern-day borders of Sweden and Denmark.[12] Although place-names constitute a clear majority of spatial information excerpted by the project, many more types of spatial references, so-called "non-names," are included in the Norse World database.[13]

The project's raw material comprises East Norse literary texts preserved in manuscripts, fragments, and early printed books, as well as a couple of medieval runic inscriptions. We have delimited the East Norse literary corpus in accordance with the project's fundamental idea and thus excluded diplomas and charters, law texts, and biblical texts.[14] The religious and secular works that we assume contain relevant foreign spatial references belong to the following genres: chronicles and histories, such as *The Chronicle of Duke Erik* in Old Swedish and *Rimkrøniken* (*The Rhymed Chronicle*) in Old Danish; devotional works, such as Old Swedish *Själens tröst* (*Consolation of the Soul*) as well as its Danish translation, *Sjælens Trøst*; encyclopaedic and didactic works comprising, for instance, the Old Swedish and the Old Danish versions of *Lucidarius*; preaching and masses, exemplified by the Old Danish *Prædikener* i Copenhagen, the Arnamagnæan Manuscript Collection, AM 76 8vo (*Sermons* in AM 76 8vo); romances, such as the Old Swedish and the Old Danish adaptations of *Floris and Blancheflour* and *Duke Frederick of Normandy*; travel tales and guides, such as *Vejleder for Pilgrimme* (*Pilgrims' Guide to the Holy Land*) in Old Danish; and visions and revelations, such as *Heliga Birgitta, Uppenbarelser* (*Birgitta of Sweden, Revelations*).[15] Traditionally, the Old Swedish and the Old Danish language periods end with the sixteenth-century Bible translations, Swedish New Testament 1526 and Danish New Testament 1524

11 Harrison, *Medieval Space*, 1–7; Adams, "The Life of the Prophet Muḥammad in East Norse." For further discussion of macrospace and how it relates to the concept of microspace, see Petrulevich, Backman, and Adams, "Medieval Macrospace through GIS."

12 For a more detailed discussion of the project's definition of "foreign", see Adams, Backman, and Petrulevich, "Theoretical Considerations."

13 See the detailed presentation of non-names in the section "Reality Check: Discovering Data not Accounted for Previously", below; see also Petrulevich, "The Multi-Layered Spatiality," and Petrulevich, this volume, on why it is necessary to include multiple types of spatial references and spatial constructions when approaching literary spatiality.

14 For more details, see Adams, Backman, and Petrulevich, "Material."

15 For a complete presentation of the genre taxonomy, see Petrulevich, Backman, and Adams, "Data and Metadata"; for discussion of the project's definition of genre, see Petrulevich, "The Multi-Layered Spatiality," and Petrulevich, this volume.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

respectively. In the project, the cut-off point for medieval texts in either language has been harmonized to 1515, and, in case a medieval text exists only in a copy made after 1515, to 1530.

According to the main principle of the project's data gathering and data processing, each manuscript or other iteration of a text is read and analyzed within its own textual, material, historical, and other contexts.[16] The specific East Norse context accessed through close reading of texts in editions or manuscripts guides the categorization of spatial references as names or non-names as well as the identification and geographical localization of their referents. Consequently, place-names and other spatial references are attested and presented in their immediate textual context in the Norse World resource.[17]

The project has never had the ambition of "etymological mining"—that is, the reconstruction of name forms or restoration of the referents' type of locality or geographical whereabouts in accordance with assumed original or authoritative versions of the text.[18] For instance, the place-name *Mæret* from both the Swedish and the Danish versions of *Consolation of the Soul* is not a prototypical name, since it is homonymous with the common noun *mær* (sea) in the definite form. In the context of this specific work, however, *Mæret* has only one referent, the Mediterranean Sea, and, for this reason, is interpreted as a name. Likewise, multiple place-names from the two East Norse versions of *Floris and Blancheflour* have been identified differently compared to generally accepted localizations of similar names attested in continental versions of the work.[19]

The principle outlined above motivated the project's choice of manual data entry, since contextually defined rather than formal properties of language items are seen as qualifying for inclusion into the database. Generally, manual data-gathering and -processing methods were then, and still are, the only possible way forward for a similar project. The rapidly developing field of named entity recognition (NER) is still in its infancy with respect to the automated geoparsing of texts in older language varieties without standardized orthographies.[20] Moreover, other types of philological research infrastructures necessary for the success of a project of this scope, such as electronic

16 The project's choice of theory and method has been inspired by "new," descriptive or material philology; see Petrulevich, this volume, for more information.

17 For more information, see Petrulevich, Backman, and Adams, "Data and Metadata"; and Petrulevich, Backman, and Adams, "Medieval Macrospace through GIS."

18 At the lemma level, we correct minor spelling mistakes; see Petrulevich, this volume, for more information and examples. Any additional information on other possible identifications of place-names, including references to secondary literature, can be found in notes at the attestation level or at the standard form level, such as Backman, "Apolisborgh, Aplesburgh (Apolis Castle)."

19 For more information, see Petrulevich, Backman, and Adams, "Data and Metadata"; the project's identification of place-names in *Floris and Blancheflour* is discussed in Lodén, this volume.

20 For more information, discussion, and references, see Gammeltoft, Foka et al., and Petrulevich, all this volume.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

manuscript catalogues, digital facsimiles, and electronic editions of East Norse manuscripts and early prints, were then and still are unavailable at a scale that makes automated approaches possible.[21]

The state-of-the-art analysis of the field of digital spatial research infrastructures in the humanities revealed a lack of comparable resources that theoretically and methodologically match the project's focus on philological aspects of language data. The main sources of inspiration available at the time, Pleiades Gazetteer of the Ancient World (Pleiades),[22] Digital Atlas of the Roman Empire (DARE)[23] and the associated Pelagios project,[24] as well as the Icelandic Saga Map (ISM),[25] implement a traditional gazetteer structure that combines preferably one name, one feature type, and one set of two-dimensional coordinates. This model does not account for place-name variation in literary source material in an analytically meaningful way[26] or allow for quantitative analyses of variants.

The ambition to map manuscript witnesses rather than authoritative editions of pre-modern texts forced the Norse Perception of the World project to develop a name data model of its own.[27] The model accommodates place-name variation on several manifestation levels and introduces the terms "original form," "variant form," "lemma form," and "standard form." The project's focus on spatial references rather than places is the main reason why the Norse World platform differs from most of the resources available in the same field regarding its priorities and design. The project conducted pilot trials at an early stage of the application-writing process to test the suggested procedure for collection and categorization of spatial references and to create a database draft in an Excel worksheet.[28]

The project's choice of spatialization framework and geocoding procedure, including authoritative sources of coordinates, is likewise motivated by the interest in literary

21 For instance, the Digital Catalogue of Medieval and Early Modern Manuscripts in Sweden, Manuscripta, www.manuscripta.se/search (accessed February 16, 2023), was not available when the Norse World project was designed.

22 See https://pleiades.stoa.org (accessed February 16, 2023); for more information, see Foka et al., this volume.

23 See https://dh.gu.se/dare (accessed February 16, 2023); for more information, see Ellis Nilsson et al., this volume.

24 See https://pelagios.org (accessed February 16, 2023); for more information, see Foka et al., this volume.

25 See http://sagamap.hi.is/is (accessed February 16, 2023); for more information, see Lethbridge, this volume.

26 That is, linking variants to relevant metadata such as, for instance, work, manuscript, specific folio in the manuscript, etc.

27 See Petrulevich, this volume, and Petrulevich, Backman, and Adams, "Data and Metadata," for a more detailed presentation, visualization, and examples.

28 For more details, see the section "Reality Check: Discovering Data not Accounted for Previously", below.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

representations of spatial information as conveyed by East Norse texts.[29] Norse World thus maps literary places rather than actual historical or archaeological locations, which once again distinguishes the platform from the rest of the comparable resources.[30] Notwithstanding the general linguistic and temporal frames of the project outlined above—East Norse literary texts from before 1530—the textual and manuscript material itself often challenges any attempt to implement a relatively stable temporal and spatial frame. For instance, the Old Swedish *Consolation of the Soul* is a multi-layered compilation that encompasses a wide range of narratives from different sources, including excerpts from a biblical paraphrase as well as saints' lives. Moreover, the majority of texts and manuscripts have been in use for a long time and read for different purposes.[31] For these reasons, the project team opted for a largely anachronistic approach to geocoding based on modern coordinates already at the planning stage. Mapping is thus seen as a short cut to an overview of large amounts of geocoded data rather than an accurate representation of historical places from a specific time period.[32]

Reality Check: Discovering Data Not Accounted for Previously

The original project proposal stated that four types of spatial references were to be collected from the Old Swedish and Old Danish literary corpus: toponyms; adjectives;

29 For more details, see the section "Norse World Visualization Techniques", below.

30 For instance, for Pleiades, DARE, and Mapping Lived Religion, see Ellis Nilsson et al.—and also Dam, and Karsvall—all this volume. ISM is the resource closest to Norse World with respect to material mapped. The primary focus of ISM on place-names as linguistic invocations of actual places in Iceland differs from that of Norse World, however; see Lethbridge, and Petrulevich, both this volume.

31 See Backman, *Handskriftens materialitet*, 60–61; for more information, see Petrulevich, Backman, and Adams, "Medieval Macrospace through GIS."

32 Likewise, the "Norse Perception of the World" project does not collect spatial information about the artifacts containing the texts—that is manuscripts, early prints, and runic inscriptions. Too little is known about the geographical provenance of Swedish and Danish medieval manuscripts; for this reason, most of the material is catalogued as having its origin in Sweden or Denmark. The situation is thus remarkably different from what is known about geographical origins of many manuscripts in, for instance, Iceland. Geographical distributions of Icelandic manuscript data can be compared with the distribution of text versions and text redactions of the same work or spatial information within the manuscripts; see McDonald Werronen, *Popular Romance in Iceland*, 29–59, and Lethbridge, this volume. This type of analysis is impossible to perform on the corresponding East Norse material.

At present, spatial information on Old Swedish manuscripts' place of origin can, for instance, be found at Manuscripta www.manuscripta.se/search (accessed April 22, 2021), where filters and advanced search options include such alternatives as "Country of Location" or "Place-name." This resource was not available when the Norse World platform was designed, however. Norse World includes information on Old Swedish manuscripts' repositories, datings, types of support, and places of origin, etc., derived from Manuscripta; reference links are provided to the original resource; see Norse World, "Source and Related Metadata."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

inhabitant designations; and origin designations.[33] The toponyms in particular were divided into a number of subcategories, which reflects the fact that place-names are prototypical references used to denote locations and the well-established conventional terminology used in onomastics. In the proposal, these subcategories were defined and illustrated with examples from the primary material. In total, the grant application made use of at least twelve categories, as appears from the following overview:

1. toponyms, including:
   a) choronyms; b) hydronyms; c) hodonyms; d) oronyms; e) names of other natural features; f) names of fields; g) names of settlements; h) names of places of worship, sacral names; i) names of urban features, urban names;
2. adjectival forms of place-names;
3. inhabitant designations;
4. origin designations.

In theory, the adjectival forms of place-names were meant to be classified in the same way as the toponyms, and therefore the number of subcategories in fact was much larger: "These adjectives will be classified in the same manner as the toponyms ("fransos", "bemisker" = choronym/country; "romersk", "venedisk", "hagensker" = oikonym/city)."[34]

The project team has chosen to include non-proprial material because of perceived expectations of future users: "Although these terms are not place-names proper, they are important for our understanding of what medieval Scandinavians knew about places abroad and what associations they had with them."[35] This decision proved to be of much relevance when faced with material not accounted for previously. In the end, the database ended up with eight non-name categories, because among spatial references attested in the material there were, for instance, coins such as *florin* from Florence, languages such as *greska* (Greek), and noun bynames such as the Runic *romfarari* ("traveller to Rome"). All these categories of spatial references clearly belong to location-based data.

Table 1.1 shows an overview of types of non-names in the Norse World resource. The "Adjective" category is in fact not subdivided, as was planned initially. The inclusion of adverbs, a category with only two synonymous members, *utlændis* and *utenlands* ("abroad"), mirrors a slight alteration of the editorial practice, inasmuch as attestations without precise denotation of locality were included if these expressed orientation or other kinds of geographical perception. The frequently occurring adjective Old Swedish *fræmadher* ("foreign") as well as the noun phrase Old Swedish *Fræmadha land* ("foreign land")—treated as a choronym—are the most prominent examples of vaguely localized places. The main argument for inclusion of these language items relates to their function—that is, that they, similarly to the excerpted traditional geographical names

33 Adams, Backman, and Petrulevich, "Fornnordisk omvärldsuppfattning," 6.

34 Adams, Backman, and Petrulevich, "Fornnordisk omvärldsuppfattning," 7.

35 Adams, Backman, and Petrulevich, "Fornnordisk omvärldsuppfattning," 8.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Table 1.1 Types of non-names in Norse World.

Adjective
Adverb
Coin designation
Inhabitant designation
Language designation
Noun
Noun byname
Origin designation

and non-names, exemplify medieval understanding of the world, and therefore ought to be included. Vagueness is also the main characteristic feature of another group of location-based data, namely what we in the project group refer to as fictional places—that is, spatial references without localizations or with contextually problematic localizations;[36] this group of spatial references partly paved the way for the inclusion of the aforementioned *utlændis*, *Fræmadha land*, etc.

The original nine place-name categories had—it turned out—to be supplemented, since fortifications in particular were considered not to fit into the category of settlement names, which resulted in the category "Name of a man-made feature."

It was not just the linguistic categories discussed above that were supplemented in the course of the project. As the material was excerpted, it appeared that new categories of localities were needed, and at present the database includes fifty-five types of localities; see Table 1.2.

In practice, some of these categories are not yet used; for instance, no bridge, canal, marsh, or other site of Muslim worship has hitherto been found in the material.

"Larger region" is a new category of a purely administrative nature, introduced in order to support one of the project's visualization techniques.[37] Six places belong to this category: the Middle East; northern Africa; eastern Europe; northern Europe; southern Europe; and western Europe—and none of these were conceptualized in the medieval material.

The fact that the material studied in various ways extends beyond the limits thought of at the planning stage of the project is probably universal to all scholarly enterprises. In a digital humanities project, however, the simultaneous building of databases and other digital resources can increase the difficulty of altering principles at a later stage. In practice, this means that the digital structure often overrules another theoretically and methodologically informed structure, which from a scholarly point of view would

36 See Petrulevich, Backman, and Adams, "Data and Metadata," for a more detailed presentation and examples.

37 See the section "Norse World Visualization Techniques" below.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Table 1.2 Types of localities in Norse World.

Archbishopric	Bath	Bay	Beach	Bishopric
Bridge	Canal	Castle	Cave	Cemetery
Church	City	Continent	Country	Desert
Field	Fjord	Forest	Fortification	Garden
Gate	Grave	Gulf	Harbour	Hill
House	Island	Lake	Larger region	Market
Marsh	Monastery	Mosque	Mountain	Other place of worship
Other site of Jewish worship	Other site of Muslim worship	Pass	Peninsula	Region
River	Road	Sea	Shore	Spring
Strait	Street	Synagogue	Tower	Tree
Urban region	Valley	Village	Volcano	Well

be more ideal. The simple reason for that is the time and staff costs required for any larger alterations. Moreover, by changing the rules of the game several years into the project, scholars would have to return to the already analyzed material to see whether the alteration had impacted previous data entry considerations. Sometimes the benefits of alteration offset the extra effort, but, as the parsed material grows, so does the structural inertia.

At a rather late stage in the extracting of material to the Norse World resource, the project team had to deal with the Old Danish *Vejleder for Pilgrimme* (*Pilgrims' Guide to the Holy Land*), in which locations of interest for the project are quite often referred to without names. Whereas *Ioachims hws* ("House of Joachim") in this text can easily be interpreted as a place-name (probably referring to the contemporary Abbey Church of St. Anne), *Then stædh, som war fruæ giordhe sin(æ) bøner* ("The place where the Virgin Mary read her prayers") is not a name, even if the spatial reference does pinpoint a location.[38] Given that the *Vejleder* is a unique text that on a very concrete basis demonstrates a perception of the Middle East—especially Jerusalem and the Holy Land—as it describes these places instead of merely referring to them, it became clear that these nameless places would be sought after by the users of Norse World, and that therefore they had to be included. But, instead of introducing a new category parallel to toponyms, adjectives, inhabitant designations, and origin designations, the descriptions in *Vejleder* were treated as place-names. This practice—yielding variant forms and lemma forms as if the descriptions were names—is unfortunate from an onomastic point of view, but it meant that the places could be included in the database. In addition, by dealing with the special

38 That might be the Abbey Church of St. Mary of Mount Zion; see Skovgaard Boeck, this volume.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

case of *Vejleder* in a well-defined manner, the project could avoid having to reanalyze all the other texts to find examples of analogue descriptions in them.

The lesson to learn from this example is to choose the basis for a pilot investigation wisely. The pilot trials of the project were conducted on the place-name register of Henning's edition of the Old Swedish *Consolation of the Soul*, a religious treatise.[39] This choice was then justified—and still is—for two reasons. First, religious texts are a core domain in the East Norse literary corpus (probably more prevalent than the widespread chronicles and literary fiction), and, as such, *Consolation of the Soul* represents a prototypical text for the project. Second, the choice is reasonable from a very practical perspective: few East Norse text editions contain registers. Indeed, to establish an index to places in the East Norse corpus was precisely one of the purposes of the Norse World project. To include *Vejleder* in the preliminaries would have meant a lot of extra work. But, in hindsight, it would have been fruitful to base the proposal on pilot studies of several texts belonging to various genres as well as to include more peripheral religious texts in addition to the core narratives.

Building Norse World

At present it is more or less mainstream practice in science to implement innovative tech approaches and tools for effective project management and communication, such as the Scrum framework or social media.[40] Effective communication is obviously a necessity in a collaborative project environment, but it becomes even more critical if the parties involved come from different sectors and have different areas of expertise. The challenge is to bridge multiple gaps with respect to sector-specific communication standards, workflows, work environment cultures, and expertise, not to mention personality traits and individual preferences. Several issues related to effective communication and the challenges outlined above affected the progress of the Norse Perception of the World project. Two of the three original members of the project team[41] had never worked collaboratively before the project started in 2017. The redirection of workflow from solo projects pursued by humanists working alone to a multisectoral collaborative environment took much of the project's valuable time, partly due to the lack of support functions for digital humanities projects or effective interdisciplinary leadership within the university system where the project was placed.[42]

39 *Siælinna Thrøst*.

40 See, for instance, Adam, "A Project-Management Tool"; Delerue and Sicotte, "Effective Communication within Project Teams"; and Perkel, "How Scientists Use Slack."

41 Principal investigator Jonathan Adams and co-proposers Agnieszka Backman and Alexandra Petrulevich.

42 The Centre for Digital Humanities Uppsala at Uppsala University, www.abm.uu.se/cdhu-eng (accessed February 16, 2023), was established in 2018, two years after the project was granted funding. The Centre for Integrated Research on Culture and Society (CIRCUS) in charge of interdisciplinary initiatives in the humanities at Uppsala University, www.humsam.uu.se/circus-en (accessed February 16, 2023), was established a year later.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Communication challenges of this kind should have been—and were, of course—planned for. At the planning stage the project contacted an external tech company for an overview of the programming needs and times required for completion of each of the project's individual programming tasks, such as a user-friendly admin interface for data entry, a relational database, web design of the interactive platform, etc. The budget of 465 working hours based on the overview included 110 hours for meetings. This meeting budget easily could have been doubled, however. Since pilot trials were conducted, the researcher part of the project team was confident that we knew what we were building and approximately how this building process would go. The general idea that could not have been more wrong was that the programming would be conducted more or less separately from the rest of the project activities at the initial stage. Since none of the researchers had previous experience of tech workflows or collaborative digital humanities projects, the project once again would have greatly benefited from getting feedback on the project set-up from any type of digital humanities support function.

The initial stage of getting the project off the ground took approximately three times longer than expected. One of the major unforeseen obstacles was the public procurement regulations that the project's database and platform development part adhered to, a circumstance the project team was not aware of at the planning stage. Luckily, a compromise could be reached with the university administration, to the effect that Uppsala University IT services took over the programming tasks. Another obstacle related to the working situation of the project's researcher team. Two of four project members were stationed in Denmark, which had a significant impact on project management in general and internal communication in particular. Despite the weekly online meetings and the use of an online channel-based messaging platform[43] and other collaboration tools, it was difficult to meet the enormous need for constant input, feedback, and overall discussion of the project's tech components and set-up in the most efficient way.

Likewise, the programming part of the project team had little previous experience of working with researchers in a joint digital humanities project. The "programming hours" were soon transformed into "meeting hours", since we sat in meetings several days a week for about a year. On the one hand, the developers were expected to grasp and make use of philological and spatial humanities theories postulating logical links between different manifestations of language data and multi-layered metadata regarding spatial information as well as information about texts, sources, language, dating, etc. On the other hand, the researchers had at times little knowledge of what at all was possible to do or not regarding, for instance, database design. Moreover, it soon became apparent that the researchers sometimes saw things differently, which meant even more meetings to find solutions to the project's theoretical and methodological problems and to "translate" these solutions into relational links or other aspects of

43 Slack: https://slack.com/intl/en-se (accessed February 16, 2023).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

infrastructure building. The final product, the Norse World resource, shows multiple examples of compromises reached by the project team. For example, the language metadata indicating if a spatial reference is in Old Swedish or Old Danish is placed at the work level—that is, text level—rather than directly at attestation level. In this case, the developers' ambition to reduce the probability of error in the researcher team's workflow won over the researchers' standpoint that the language metadata belong with each and every attestation.

When first test versions of the interactive platform were produced, the project team organized several rounds of interdisciplinary trials by future users to collect feedback. Seminars and workshops were held for an interdisciplinary public at, for instance, the Centre for Medieval Studies, Stockholm University, and the Society for Danish Language and Literature, Copenhagen, in February and March 2018 respectively. The feedback was absolutely crucial to understand if the infrastructure under construction lived up to the audience's needs and expectations. We were particularly interested in design issues, because the project team could not reach agreement on the choice of the most adequate presentation technique of search results. It turned out that humanities researchers showed most interest in getting an overview of large quantities of data presented as a lengthy and boring table—a design choice the developer team had to accept.

To conclude, a collaborative multisectoral digital humanities project is a challenging enterprise that requires efficient project management and communication. The Norse Perception of the World project did not have the best possible conditions for executing the complex task of infrastructure building. We could not involve the tech company we originally consulted. We could not get the best website solution for the platform, because the website design associated with Uppsala University has to adhere to the university's corporate rules.[44] We could not implement the latest developments for data reuse and interoperability, so-called linked open data, in the field.[45] The university did not have any maintenance plans for humanities e-infrastructure, which made arranging the platform's sustainability far from straightforward.[46] What we needed was a general support function for digital humanities projects offering in-house consulting regarding project set-up, programming, web design, etc. Ideally, there would be developers hired by this support function in order to help researchers with their project from the planning stage until completion.[47] In this way, it would be possible to reduce the project's meeting time considerably. Another item on the wish list is dedicated consulting on leadership

44 After many rounds of negotiations, a compromise was reached with the university administration to allow the project to use an external page for the interactive platform: https://norseworld.nordiska.uu.se (accessed February 16, 2023). The description of the project and other documentation are stored at another university webpage: www.uu.se/en/research/infrastructure/norseworld (accessed February 16, 2023).

45 See Backman and Smith, this volume.

46 See Backman and Smith, this volume.

47 At the time of writing, the Centre for Digital Humanities Uppsala at Uppsala University is hiring several developers for this purpose.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

and communication in interdisciplinary environments, including implementing tech approaches to project management, such as Scrum, in digital humanities environments.

Norse World Visualization Techniques

All historical atlases and gazetteers have to deal with the spatial and temporal discontinuity that borders and landscape change over time.[48] To construct a map visualizing the medieval world from an East Norse perspective—covering a tumultuous period of some five hundred years—would be a research project in its own right. Furthermore, such a project would have to build on the data initially collected by the Norse Perception of the World project. As there were no gazetteers matching the project's needs already available,[49] we had to make do with modern cartographic visualizations of a world utterly different from the one perceived by medieval Danes and Swedes. This of course leads to an unfortunate anachronism, but in our view the benefits of visualization outweigh the disadvantages of chronological inaccuracy. To compensate, however, the Norse World resource allows users to alter the background map to a borderless and nameless map in watercolours.

In practical terms, most locations in the Norse World database are assigned with coordinates. This is straightforward, when the location in question is known and still exists, even though—as mentioned—borders have moved over the centuries. Thus, coordinates for England, Normandy, and Rome are easily copy-pasted from a digital gazetteer, normally from GeoNames,[50] and a permalink to the gazetteer is added to the database. The information found in the gazetteer is not questioned, and locations are always visualized as points, although, for a large number of places, polygons would have been preferable. Since we have chosen to employ a Leaflet-based clustering technique that requires point data, the lack of polygons was not seen as a major issue.[51] Information on the extent of a location is partly given in the database, however, where a variety of types of locality are used to distinguish between, for instance, cities, countries, regions, etc.

Problems arise only when a locality is not known today, and thus does not occur in a modern gazetteer.[52] In most cases, it is impossible to give precise coordinates to a locality. In particular, fictional places are problematic in this respect. Since fictional places are rather frequent in the East Norse material, it was necessary to find a way to visualize them as well. The solution to this problem was to embed places in larger areas: cities within countries, and countries within regions. In the Norse World database, this information is labelled "Located in." Based on the editor's reading of the concrete

48 See Dam, this volume.

49 See Petrulevich, Backman, and Adams, "Medieval Macrospace through GIS," and Petrulevich, this volume, for more information.

50 See www.geonames.org (accessed February 16, 2023).

51 For more information, see Petrulevich, "Data Visualisation."

52 GeoNames does include some historical sites that have been used in the project.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

text, it was often possible to locate a fictional place within a narrower span, and, for the sake of visualization, a "Show as" field was added to the database. For instance, the forest Asiant in the East Norse romance of *Duke Frederick of Normandy* is located in France, but visualized as Normandy, since the text "specifies that this forest is placed in Normandy," as it is stated in a note in the database entry for the standard form "Asiant."[53]

This solution proved useful to visualize non-fictional places as well, making it possible, ideally, to find all localities in, for instance, a specific country. And the hierarchy was thus added to most localities in the database, so that not only is Paris explicitly located in France but also adjectives, adverbs, coins, and all other spatial entities are given "Located in" attributes, and entities that are not themselves precisely located with coordinates are given "Show as" attributes.

It is important to emphasize that the localization and visualization of places are principally based on the texts, and that this can lead to disagreement with the texts' source texts and with our modern understanding. For instance, the fictional city Apolis in the East Norse *Floris and Blancheflour* is rendered without a visualization in the Norse World database, since relevant manuscripts do not mention a more precise location, even though some scholars argue that the form is a contamination based on the Charlemagne legend in which a fictive Spanish city, Nople or Noples, occurs.[54] Instead of locating Apolis in Spain, the notes of the database entry summarize this discussion with a reference.[55] Similarly, the city of Babylon appearing in the same text is, in the Norse World resource, identified with Babylon in present-day Iraq, mentioned in other texts as well. Even though French sources identify the Babylon of *Floris and Blancheflour* as another name for—or a suburb or part of—Egyptian Cairo, we argue—but perhaps not persuasively—that the existence of a biblical Babylon in the minds of medieval Swedes and Danes would lead them to conclude that the Babylon mentioned in *Flores and Blancheflour* was identical with this, when the text itself does not clearly point in another direction.[56]

Textual interpretation was also crucial when dealing with a frequent spatial entity of other-worldly nature: Paradise. As stated in the original proposal, " 'Paradis' when referring to the Garden of Eden and the source of the four rivers (after St. Augustine) is included, as it was believed to be somewhere around modern-day Iraq."[57] So far, Paradise has been excerpted 134 times in the corpus. The name occurs more often than that; the spatial reference is included in the database, however, only when the source text explicitly refers to it as a physical place in the world. In such cases, the spatial reference is visualized as located in the Middle East, because biblical places without evident modern equivalents are visualized as located in this region.[58]

53 Skovgaard Boeck, "Asiant."

54 Grieve, *Floire and Blancheflor*, 47–48.

55 See, e.g., Backman, "Apolisborgh, Aplesburgh (Apolis Castle)."

56 See discussion in Lodén, this volume.

57 Adams, Backman, and Petrulevich, "Fornnordisk omvärldsuppfattning," 7.

58 For more information, see Petrulevich, Backman, and Adams, "Data and Metadata."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Final Remarks

The Norse Perception of the World project has built one of the first humanities digital spatial infrastructures for research focused on literary representations of spatial information in medieval literature. The Norse World resource is one of the very first examples of this type of infrastructure nationally in Sweden and locally at Uppsala University. Moreover, the project's interest in names rather than places is another reason why Norse World occupies a niche of its own among largely comparable gazetteers. Obviously, leading a pioneering multisectoral project implied multiple challenges for the project team, since no support functions or off-the-peg solutions with respect to theory, methodology, or practicalities such as plans for maintenance, updates, and further development of applications were available at the time.

In this chapter, we have shared several lessons we have learned in the project, including approaches to pilot trials and new unexpected data types that may challenge the database design and the data entry process. It is preferable to conduct pilot trials on heterogeneous source material in order to discover potentially problematic aspects of data at an early stage. Another general piece of advice is to be creative when it comes to reinterpreting the project's database schema to incorporate more peripheral data types. As long as there is sufficient documentation, the infrastructure users will be able to deal with such reinterpretations, by, for instance, excluding peripheral data via filtering techniques when conducting tailored searches. As it was stated, the prototypical spatial references in the Norse World resource, place-names, still predominate in the database. It was crucial for the project to incorporate other data types, however, to ensure the database can be used to study medieval spatiality and worldviews by as many user groups as possible.

As for successful project management and communication, it is impossible to emphasize enough how crucial overarching support functions for digital humanities and other interdisciplinary initiatives are for success in infrastructure projects. The Norse World team often felt alone in their local departmental work environment building complex, multi-layered infrastructure for the whole humanities sector. We would have benefited enormously if we had had access to consulting services and could have started drafting a relational database at a much earlier stage. In this respect, it is of much importance to have access to both scholars and developers with experience of multisectoral collaborative projects. Dedicated leadership resources, overviews, and pilot trials of collaborative tools and frameworks such as Scrum are also much needed.

Finally, the Norse Perception of the World project introduced some innovative approaches to visualization in order to incorporate and enforce contextualized readings of East Norse literature in chosen visualization techniques. We have introduced several fields such as "Located in" and "Show as" into the database structure to be able to visualize fictional places as well as non-proprial data types. The fact that the project employs only point data can be seen as problematic, but the choice of appropriate clustering technique has been decisive in this respect. After all, the major priority of the project's spatialization framework and geocoding procedure was to give Norse World users an overview of large amounts of geocoded spatial references from medieval literature rather than represent historical and archaeological data with the highest grade of precision.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Bibliography

Adam, David. "A Project-Management Tool from the Tech Industry Could Benefit Your Lab." *Nature* 573 (2019): 151–53.

Adams, Jonathan. "The Life of the Prophet Muḥammad in East Norse." In *Fear and Loathing in the North: Jews and Muslims in Medieval Scandinavia and the Baltic Region*, edited by Jonathan Adams and Cordelia Heß, 203–38. Berlin: De Gruyter, 2015.

Adams, Jonathan, Agnieszka Backman, and Alexandra Petrulevich. "Fornnordisk omvärldsuppfattning: En kartering och analys av utländska ortnamn i svenska och danska texter från medeltiden." Research grant application. 2016.

Adams, Jonathan, Agnieszka Backman, and Alexandra Petrulevich. "Material." www.uu.se/en/research/infrastructure/norseworld/project/project-overview#anchor-753396 (accessed April 22, 2021).

Adams, Jonathan, Agnieszka Backman, and Alexandra Petrulevich. "Theoretical Considerations." www.uu.se/en/research/infrastructure/norseworld/project/project-overview#anchor-753404 (accessed April 22, 2021).

Backman, Agnieszka. "Apolisborgh, Aplesburgh (Apolis Castle)." https://norseworld.nordiska.uu.se/index.php?type=location&id=155 (accessed April 22, 2021).

Backman, Agnieszka. *Handskriftens materialitet: Studier i den fornsvenska samlingshandskriften Fru Elins bok (Codex Holmiensis D 3)*. Uppsala: Institutionen för nordiska språk, Uppsala University, 2017.

Backman, Agnieszka and Alexandra Petrulevich. "Exporting the Data." www.uu.se/en/research/infrastructure/norseworld/using-norse-world/exporting-the-data (accessed April 22, 2021).

Backman, Agnieszka and Alexandra Petrulevich. "Search and Filters." www.uu.se/en/research/infrastructure/norseworld/using-norse-world/search-and-filters (accessed April 22, 2021).

Copenhagen, the Arnamagnæan Manuscript Collection, AM 76 8vo.

Creative Commons. "Licenses." https://creativecommons.org/licenses/by/4.0 (accessed February 16, 2023).

Delerue, Hélène, and Hélène Sicotte. "Effective Communication within Project Teams: The Role of Social Media." *International Journal of Conceptions on Management and Social Sciences* 5 (2017): 1–6.

Digital Atlas of the Roman Empire (DARE). https://dh.gu.se/dare (accessed January 14, 2021).

GeoNames. www.geonames.org (accessed February 16, 2023).

Goodchild, Michael Frank, and Lauren L. Hill. "Introduction to Digital Gazetteer Research." *International Journal of Geographical Information Science* 22 (2008): 1039–44.

Grieve, Patricia. *Floire and Blancheflor and the European Romance*. Cambridge: Cambridge University Press, 1997.

Harrison, Dick. *Medieval Space: The Extent of Microspatial Knowledge in Western Europe during the Middle Ages*. Lund: Lund University Press, 1996.

Icelandic Saga Map. http://sagamap.hi.is/is (accessed February 16, 2023).

McDonald Werronen, Sheryl. *Popular Romance in Iceland*: *The Women*, *Worldviews*, *and Manuscript Witnesses of Nítíða saga*. Amsterdam: Amsterdam University Press, 2016.

Manuscripta. www.manuscripta.se/search (accessed February 16, 2023).

Pelagios. https://pelagios.org (accessed February 16, 2023).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

Perkel, Jeffrey M. "How Scientists Use Slack: Eight Ways Labs Benefit from the Popular Workplace Messaging Tool." *Nature* 541 (2017): 123–24.

Petrulevich, Alexandra. "Data Visualisation." www.uu.se/en/research/infrastructure/norseworld/infrastructure/data-visualisation (accessed April 22, 2021).

Petrulevich, Alexandra. "Infrastructure." www.uu.se/en/research/infrastructure/norseworld/infrastructure (accessed April 22, 2021).

Petrulevich, Alexandra. "Med ortnamnsvarianten i centrum: presentation av ett teoretiskt och metodologiskt verktyg för att analysera namn i skrift." *Meijerbergs arkiv för svensk ordforskning* 44 (2020): 289–306.

Petrulevich, Alexandra. "The Multi-Layered Spatiality of the Global North: Spatial References and Spatial Constructions in Medieval East Norse Literature." In *The Global North: Spaces, Connections, and Networks before 1600*, edited by Carol Symes, 91–114. Leeds: Arc Humanities, 2021.

Petrulevich, Alexandra, Agnieszka Backman, and Jonathan Adams. "Data and Metadata." www.uu.se/en/research/infrastructure/norseworld/infrastructure/data-and-metadata (accessed April 22, 2021).

Petrulevich, Alexandra, Agnieszka Backman, and Jonathan Adams. "Medieval Macrospace through GIS: The Norse World Project Approach." *The Cartographic Journal* 57 (2020): 18–27.

Petrulevich, Alexandra, Agnieszka Backman and Jonathan Adams. "Source and Related Metadata." www.uu.se/en/research/infrastructure/norseworld/infrastructure/data-and-metadata#anchor-753372 (accessed April 22, 2021).

Petrulevich, Alexandra, Agnieszka Backman, Jonathan Adams, Simon Skovgaard Boeck, Jessica Holmlund, Felix Marklund, Jorunn Hartmann, Andreas Lecerof, and Rasmus Ljungström. "Norse World." www.uu.se/en/research/infrastructure/norseworld and https://norseworld.nordiska.uu.se (both accessed April 22, 2021).

Pleiades Gazetteer of the Ancient World. https://pleiades.stoa.org (accessed January 14, 2021).

Siælinna thrøst: første delin aff the bokinne som kallas siælinna thrøst: efter Cod. Holm. A 108 (f.d. Cod. Ängsö). Edited by Samuel Henning. Uppsala: Almqvist & Wiksell, 1954.

Skovgaard Boeck, Simon. "Asiant." https://norseworld.nordiska.uu.se/index.php?type=location&id=233 (accessed April 22, 2021).

Slack. https://slack.com/intl/en-se (accessed February 16, 2023).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Chapter 2

MAPPING SAINTS: CREATING A DIGITAL SPATIAL RESEARCH INFRASTRUCTURE TO STUDY MEDIEVAL LIVED RELIGION

Sara Ellis Nilsson, Terese Zachrisson, Anders Fröjmark, Lena Liepe, and Johan Åhlfeldt*

THIS CHAPTER presents the ongoing project "Mapping Lived Religion: the Medieval Cults of Saints in Sweden and Finland" (MLR). It focuses on the project's development of a digital spatial data research infrastructure to answer questions about historical religious circumstances.[1] The project applies digital methods in order to achieve a greater understanding of medieval lived religion. The cults of saints have been chosen as the focus of this study as they reflect a particularly local character of the Christian religion. In addition, elements and traces left by veneration for the saints are an important part of cultural heritage, and many researchers have utilized these sources to study religious networks or aspects of cultural history. Often, however, the sources used have been limited to one type, or the data have been incomplete. The current project will provide digital access to a wide range of source categories, enabling more thorough interdisciplinary studies of the material. Another aspect, of direct relevance to this volume, is the importance of mapping these manifestations of devotion to the saints, thus anchoring our understanding of the past in the landscape.

In order to answer its research questions, the project requires a spatial data infrastructure—that is, an infrastructure for geographical information analysis that includes a combination of geographic, cultural heritage, and research data. MLR approaches the question of spatiality in terms of the geographical cultural landscape and the changes it experiences over time. Combining these two aspects allows for spatial and temporal analyses of the material. Thus, combining static spatial information with other details to create rich spatial information leads to better conclusions and more detailed knowledge about the period.[2] This project uses location-based data, both that created by

* The authors are based at Linnaeus University and the University of Gothenburg. Contact email for the corresponding author: sara.ellisnilsson@lnu.se. All authors contributed equally to this article. We would like to thank our work-placement students from Lund University, Andreas Blixt and Douglas Reinvik, and our research assistant, Dr. Steffen Hope, as well as the research engineers at Gothenburg Research Infrastructure in Digital Humanities (GRIDH) for their invaluable assistance with the project materials used in this article.

1 It represents a local or micro-infrastructure. This concept is discussed below.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

cultural heritage institutions and that which we ourselves create for relevant religious places.

The following sections provide a short introduction to the project and its digital methods, with a particular focus on those related to digital spatial data. In order to demonstrate how these methods have been applied, we present several case studies related to the research platform's mapping component and how we structure our research data. All of them explore how we approach the spatiality of lived religion—that is, mapping the cults of saints. Two of the cases in particular investigate questions of visualizing time and place. Throughout, and in a concluding discussion, we also consider the challenges that this ongoing project has faced.

Project Description

The MLR project is developing a comprehensive, online, open-access database of art historical, archaeological, and historical documents, with an interactive map.[3] The resulting research resource will be one of the project's principal publications.[4] The method applies the principles of linked open data (LOD)[5]—and thus is also part of larger national research macro-infrastructures, including Swedish Open Cultural Heritage (SOCH)[6]—and it is connected to the field of digital spatial humanities in its mapping component. In addition, we use existing cultural heritage data, and by the end of the project we will publish our data in, for example, SOCH. As the international heritage e-research PARTHENOS ("Pooling Activities, Resources and Tools for Heritage E-research Networking, Optimization and Synergies") project describes it, digital scholars are encouraged "to think of infrastructure as knowledge, as networks, as people, as tools, as data, and indeed perhaps as spaces as well, but always in the service of aggregating resources to make us better connected and more informed."[7] Moreover, using the term "infrastructure" to describe what we are creating indicates that our project is not just a

2 See a similar approach in Wrisley, "Locating Medieval French," 154. As Westphal states, "While it is still conceivable to isolate time from space, or history from geography, it seems intransigent or unwise to deliberately keep the two dimensions separate": Westphal, *Geocriticism*, 26.

3 The development of the platform and digital infrastructure is being done in collaboration with GRIDH at the University of Gothenburg. The project description section is based on previous project presentations and Ellis Nilsson, "Digital History."

4 The platform, Mapping Saints, can be found at https://saints.dh.gu.se (accessed April 16, 2021).

5 Linked open data will be presented in more detail below. See also a recent example of a project developing LOD vocabularies and identifiers for medieval studies projects in Finland, which is part of the Linked Open Data Infrastructure for Digital Humanities in Finland (LODI4DH), "a joint initiative of Aalto University, Department of Computer Science, and University of Helsinki (UH), Helsinki Centre for Digital Humanities (HELDIG), for creating a national data infrastructure and Linked Data services for open science." Hyvönen, "Linked Open Data Infrastructure."

6 Swedish Open Cultural Heritage Online, www.raa.se/in-english/digital-services/about-soch (accessed April 16, 2021).

7 PARTHENOS, "What Is Infrastructure?" https://training.parthenos-project.eu/sample-page/intro-to-ri/what-is-infrastructure (accessed April 16, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

research project but also a process of developing a research tool (micro-infrastructure) to enable saints' scholars, and others, to use digital maps of lived religion in their own research.[8]

In essence, we are building a research "infrastructure" in what the HESTIA ("Herodotus Encoded Space-Text-Imaging Archive") project describes as a "bottom up paradigm."[9] This includes linking datasets, and in our project it also involves combining digital and traditional scholarship, as it applies technologies for the digital mapping and analysis of historical spatiality related to place and location while also critically analyzing sources such as texts and material culture. Thus, the project aims for sustainability in terms of its digital infrastructure in order to enable future research in this field by others outside the project group.

In a project that focuses on the past, questions of where and when are integral in order to enable research analyses. The landscape encompasses the Swedish medieval ecclesiastical province—that is, most of modern Sweden, excluding the provinces of Bohuslän, Halland, Blekinge, Skåne, and Härjedalen and some areas of Dalarna, but including Finland and the Karelian Isthmus (now part of modern-day Russia).[10] The timescape has been set from the year of the ecclesiastical province's establishment, in 1164, to the consolidation of the Swedish Protestant Reformation at the Uppsala Synod, in 1593. Thus, future visualizations will be of medieval circumstances in the region. In addition, due to the nature of the source material that we are collecting, analyses of material from the seventeenth and eighteenth centuries will also be possible.

As the research platform is modular, it will be possible to build on, combine, and add functions to the research platform. For example, other regions could be added to the map in order to study additional ecclesiastical provinces. The structure of the research platform enables collaborative work within the project and with its partners in real time, and involves the import, export, editing, analysis, and publishing of data related to the cults of saints. The project uses different types of datasets for geographical data: 1) places associated with objects (e.g., churches, ruins, sculptures, and books); and 2) places in narrative texts (e.g., miracle stories and letters).

The source material is the main foundation of the database. It is comprised of medieval texts and objects, early modern inventories, and descriptions by antiquarians, as well as medieval religious places.[11] The material is in different

8 This use can be seen to be related to Deb Verhoeven's definition of infrastructure, which is similarly applied by the Time Layered Cultural Map (TLCMap) infrastructural project; infrastructure provides "the conditions of possibility for certain types of activity." Thus, our resource aims to enable future research. See TLCMap, "What Is TLCMap and Why?"

9 HESTIA investigates geographical concepts using digital tools to study ancient texts, in particular, as the name suggests, Herodotus's *Histories*. Barker et al., "HESTIA"; ESF, "Researchers' Input."

10 For a discussion of the Finnish and Russian aspects of the project, see Fröjmark, "Helgon i Viborg."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

stages of edition and digitization, from unedited to digitized. The major part of this source material cannot simply be downloaded. Thus, we need to do, and are already doing, an amount of editing within the project. Moreover, the project has enabled the digitization of two cultural heritage collections found at Statens historiska museer (the Swedish National History Museums: SHM) and Riksantikvarieämbetet (the Swedish National Heritage Board: RAÄ) respectively. These collaborations have digitized high-resolution images of Medeltidens bildvärld (Medieval Picture World: MB) and the analogue Ikonogafiska registret (Iconographical Register: IR). In general, the nature of the source material allows for interdisciplinary analysis in history, art history, and archaeology.[12]

Lived religion provides the project's theoretical framework for the exploration of lay religiosity and its manifestations in the daily lives of ordinary people. It is distinguished from the study of institutionally defined creeds and prescribed behaviour in that it focuses on "religion-as-lived"—that is, the attitudes, customs, and experiences of individuals. Its aim is to include in the understanding of religion the layers of everyday beliefs and practices that subtend and feed into the "explicit" religious life of a period. Religion is approached as a phenomenon that is embedded in the daily existence of people, being part of what they do rather than what they confess to believe.[13] It understands religion situationally, placing it in a social field within the domain of everyday life, practical activity, and shared beliefs. It is concerned with religion as cultural work: how people use it to construct their worlds and, in turn, are fundamentally shaped by the worlds they are making.[14] Textual and material sources for the cults of saints offer an excellent opportunity to study lived religion as it was practised by the learned and the lay alike. Calendars of saints' feast days, letters of donation to shrines, votive offerings, miracle stories, saints' images in church art, relics, pilgrim badges, and local traditions of holy wells are all testimony to the various forms that the cult of saints could take in the everyday life of the Middle Ages.

It is important to note that this chapter reflects a work in progress. Data collection is ongoing, and the database design and mapping are under development. Therefore, the visual aspects and digital methods and solutions as presented below might subsequently undergo modification. This chapter presents the state of the resource in the spring of 2022. Of the project's four main digital methods—LOD, digitization, digital spatial visualization, and digital transcription—spatialization is the focus of this chapter.

---

11 For a discussion of some of the sources as used in this project, see Zachrisson, "Medieval Church Objects," and Ellis Nilsson, "Fragments of a Year."

12 For further discussion of the challenges of digitizing art historical material and including metadata for digital analysis, see Kieven, "Research Infrastructures."

13 Haakedal, "Lived Religion in Norwegian Pupils"; McGuire, "*Lived Religion*"; Orsi, "Introduction to the Second Edition."

14 Orsi, "Introduction to the Second Edition," xxxii, xxxvii.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

Digital Methods

In keeping with this volume's focus on spatial data infrastructures, the project's methods related to spatialization—that is, how lived religion as expressed through the cults of saints is manifested in both time and geographical space—and the mapping component are discussed. The project's overarching and underlying infrastructure are both integrated into a larger research Infrastructure that is being developed by the Gothenberg Research Infrastructure in Digital Humanities (GRIDH), and that allows for the use of existing cultural heritage data and the publication of scholarly data as linked open data. This larger infrastructure is also responsible for the long-term availability and sustainability of data and integrated tools, and the necessary skills to maintain it. Thus, it is an institutional commitment rather than a commitment based on specific individuals. Each project on the platform is configurable according to its unique data model and specific analytical needs, such as working with the research questions related to the cults of saints as described above. This project is related to and builds on experiences previously made by others and members of this research group, which have built or are building spatial and ontological infrastructures. These include projects in the Pelagios network, the Digital Atlas of the Roman Empire (DARE), and Regnum Francorum Online.[15] Other, more recent, related projects include the World Historical Gazetteer (WHG) resource, discussed below.[16]

Our information model incorporates what we perceive is important when studying lived religion and how entities in the model relate to each other or are connected. At the centre of the model is the "Cult manifestation," which is the project's main analytical component. This term refers to when evidence for a saint's cult is "manifest", with a particular content, in a particular location, and during a specific period of time. For instance, it can refer to an object, a text, or a feature in the landscape that has been identified as having a particular connection to a saint's cult. Within "Cult manifestations," we have created "parent–child" relations in order to connect two separate, but related, manifestations.[17] The place of the "Cult manifestation" is in turn related to its physical location in the landscape and its jurisdiction in terms of parish and diocese, on the one hand, and secular authority, represented by province and kingdom, on the other. Places have a "Type of Place," such as cathedral, monastery, church, chapel, or holy well, but also town, port, or castle; these may not be related in themselves to a "Cult manifestation," but they are the parents of other places that have a manifestation. Other entities related to the "Cult manifestation" are the texts in which it is mentioned or the object in which it is observable. Texts and objects are, in turn, related to sources that help

15 See https://pelagios.org (accessed April 16, 2021); Åhlfeldt, "Digital Atlas of the Roman Empire"; and Åhlfeldt, Berman, and Wick, "Historical Gazetteer System Integration."

16 In addition, "Visualizing Medieval Places," a digital project mapping and locating places found in medieval texts, provides insight into historical, political, or geographical situations by visualizing data: Wrisley, "Locating Medieval French."

17 See below for examples.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

organize the source material: digital, in printed editions, or in manuscript collections. To a high degree, this issue relates to the source material that has survived, or source material that is readily available, at least in certain groups of material. As stated above, the project aims to compile a vast majority of the sources relevant to the spatial and temporal framing of this project. The compilation of textual evidence is an important undertaking in the project, whereas the compilation of artefacts, to a large extent, is already available through digitized cultural heritage collections. This latter group is where LOD methodologies come into play, and the way it is organized within SOCH. The database model is illustrated in Figure 2.1.

LOD is a method for data exchange between information systems. By locally maintaining persistent identifiers (HTTP URIs) to external data objects, it is possible to retrieve data on that object, including a picture representation. Furthermore, linked objects need to be defined in the same or a similar way to ensure there is an identity between objects. The identity can be weak or strong. This means that the total amount of information, both in our datasets and in external datasets, is available for analysis. In this information model, scholars and curators of cultural heritage data have a distributed responsibility for the data, each party contributing data to the best of their professional abilities.

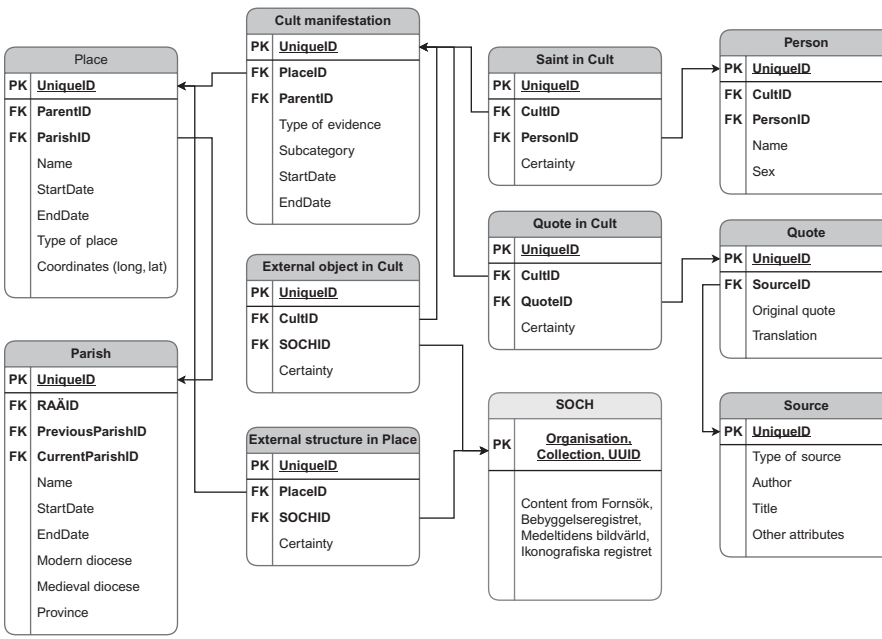


Figure 2.1. Database model of Mapping Saints (simplified). "PK" denotes primary key and "FK" denotes foreign key. Image by Johan Åhlfeldt.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Table 2.1 Medieval parish churches and origin of data in cultural heritage collections.

		Fornsök	
		Yes	*No*
BeBR	*Yes*	295	1564
	No	429	0
		724	1,564

Not only can objects be linked and shared, but also terminologies and vocabularies. Thus, the project uses authorities such as the Getty Research Institute's Art & Architecture Thesaurus (AAT) and Iconclass in order to make the data definitions talk to widely accepted scholarly vocabularies.[18] This way, the data can be used in future studies of the same areas.

In the area of medieval religious places, a great deal of work has already been done within cultural heritage collections. From the outset of this project, we realized that we would need to compile a register of all medieval cult places regardless of whether any cult activity could be attested in a specific place or not. The lack of evidence does not indicate that cults did not exist, only that we have no information about them. Although this compilation did not exist, there are various databases of religious places still in use in Bebyggelseregistret (the Swedish Protected Building Register: BeBR) and Fornsök (the archeological sites and monuments register) at RAÄ. Both registers have a very high coverage, and, in the case of Fornsök, in relation not only to archeological remains but also to sites mentioned in oral tradition or textual sources. The spatial coverage in both registers is very accurate too. Thus, the digitized geographical data for Sweden that we have used in the project is based on historical data available through BeBR and Fornsök, as well as in previous research. Our method involved extracting medieval cult buildings, parishes, holy sites, and their coordinates by means of semi-automated computer-aided processing, with minimal manual input by merging BeBR, churches still in use, and church and other related ruins in Fornsök. The outcome of the merging of the two datasets for parish churches is shown in Table 2.1.

There is a one-to-many relationship between the final register, which means that each record can have zero, one, or more references to existing cultural heritage entries in Fornsök and BeBR for Sweden; 295 medieval parish churches are defined in both BeBR and Fornsök, and 1,564 in BeBR alone. These references and their data are also available as LOD through SOCH. For the final selection of records in BeBR and Fornsök, all entries were checked manually. The initial work has therefore been complicated by the way in which these particular databases have been compiled and the fact that

18 See www.getty.edu/research/tools/vocabularies/aat/index.html and www.iconclass.org/help/outline (both accessed April 26, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

the categorization provided has not always been consistent. For example, in Fornsök, the method involved selecting monasteries (*kloster*), churches/chapels (*kyrka/kapell*), and holy wells (*källa med tradition*) that belonged to our time period; we were aware, however, that most of the holy wells registered in Fornsök did not belong to the medieval period. In this database, holy wells are often assigned to a variety of categories, such as "Spring, traditional" (*källa, tradition*), "Natural object/formation with associated usage, tradition or name" (*Naturföremål/-bildning med bruk, tradition eller namn*), or "Well/cold spring" (*brunn/kallkälla*). In order to work around this challenge, all holy wells included in our database are attested in written sources and then selected from Fornsök.

In addition, church or chapel remains in Fornsök could have been built after 1600; therefore, we checked for these in the available sources. Not all of the archaeological remains of medieval churches and chapels are classified as such in Fornsök; 244 belonged to the type "Cemetery, type: deserted churchyard" (*ödekyrkogård*); twelve belonged to the type "Place with tradition"; fourteen belonged to the type "Memorial" (*minnesmärke*); and eleven belonged to the type "Village/farm site" (*bytomt/gårdstomt*). These were all added manually. As mentioned, points harvested from BeBR and Fornsök were automatically imported into the database, and these places are visualized on the map. Nonetheless, manual assessment of the data was required to ensure the validity of the resource and geographical data with regard to the specified landscape and timescape. Fornsök largely lacks information about archaeological remains within cities. In order to verify archaeological finds and ruins of medieval holy places in urban settings, the archaeological reports from the excavations and analyses of medieval towns in Sweden, the series Medeltidsstaden (the Medieval City) has been consulted.

Supplementing the references to BeBR and Fornsök, we have included URIs to Wikidata. Some church ruins even have their own entry in Wikidata. With these three independent references, we see no need for additional authority data on places and buildings. GeoNames, popular in some digital collections for LOD purposes, was not chosen as an authority reference for our religious places and buildings because of its poor coverage for our entities.[19] Another possible authority, Topografiskt register, Riksarkivet (the Topographical Register at the Swedish National Archives: TORA), is a digital, topographical register published online in 2018.[20] TORA has a mapping interface and a backend application programming interface (API) that serves LOD. Its unit of observation is the *settlement unit* in pre-industrial society, which is geographically defined as the midpoint in the landscape where its core arable land—of a village, farm, manor, or hamlet—is located. The settlement units of TORA spatially connect a number of important digital historical resources, such as the large-scale geometric maps from the seventeenth century, *Suecia antiqua et hodierna* (*Sweden Past and Present*), administrative data, and place-names. The importance of TORA for the MLR project is to see where people actually lived in pre-industrial society and how this might relate

19 See www.geonames.org (accessed April 26, 2021).

20 See https://riksarkivet.se/tora-english (accessed April 16, 2021); see also Karsvall, this volume.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

to the cults of saints. Another benefit for MLR is to connect to TORA's digital sources. TORA is organized as LOD, and its data can be displayed within our interface. It remains to be resolved if and how TORA's settlement units will be referenced by our cult places, because they do not refer to the same entity.

The challenges in merging the two datasets from Fornsök and BeBR into a uniform dataset of medieval cult buildings, up to the year 1600, originate in their weaker temporal representation: almost non-existent in Fornsök, irregular in BeBR. For instance, there was a need to determine when a church was built if a later church contains part of a previous church on the same foundation. Dates for the construction of historical buildings are often available through BeBR and have automatically been imported and linked in the field "Date of construction (BeBR)," usually referring to when the current church was built, though not always. Other information had to be input manually, however, such as "Date, first indication" and "Date of destruction" for medieval buildings that share the same foundation as the current church and that are not included in BeBR, or for which previous research has a dating other than that found in BeBR. If the main parish church was originally situated in another location—a common occurrence in the Swedish material—it is not linked to BeBR but only to Fornsök. Moreover, all places need to be connected to a "ParishID" in our model; this means that, if a "ParishID" is missing, these locations do not function as they should in the database.

Another challenge has been to avoid duplicates in the project's merged register. To obtain a register with highly accurate temporal coverage for religious places and buildings, a great deal of manual processing of the data was required. Data on modern parishes (1950) to which these places belonged came with the original datasets. These modern data can be used as the initial building block for a register of medieval parishes. Nevertheless, the modern parishes do not reveal the medieval parish to which they belonged if it was different from the modern parish. To create an exhaustive register of *medieval* parishes another approach was necessary, and it included a good portion of computer-aided manual processing. Fortunately, Skatteverket (the Swedish Tax Agency) keeps a list of parishes that have existed throughout history, their origin, and their cessation as independent parishes.[21] This register is largely complete.

The addition of Finnish parishes and holy places is currently under way and under development. The method applied is as follows. Karl Gabriel Leinberg's genealogical study of the forming of parishes in Finland, published in 1906, is based on thorough documentary research, and serves as a tool for the project's reconstruction of the basic parochial organization of medieval Finland.[22] Leinberg's work contains information about "mother parishes" (*moderförsamlingar*),[23] the location of church and chapels, time of establishment, historical place-names, and modern names in Finnish and Swedish.

21 Skatteverket, "Sveriges församlingar genom tiderna."

22 Leinberg, *Finlands territoriala församlingars namn*.

23 If there are many chapelries in a parish, the one in which the parish priest resides is called a *moderförsamling* (mother parish) in Sweden.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

From this multitude of information, it was rather easy to find the proper entries in the digital Finnish cultural heritage collections for archaeological objects at Kulttuuriympäristön palveluikkuna (the Cultural Environment Service Window: Kyppi) and Valtakunnallisesti merkittävät rakennetut kulttuuriympäristot (Built Cultural Heritage Sites of National Interest: RKY) at the Finnish Heritage Agency (Museovirasto: FHA).[24] The coordinates are very precise and each entry has a scholarly article written in Finnish or Swedish. Unlike the Swedish registers, Kyppi and RKY are not part of a LOD solution for data exchange, although the entries have persistent HTTP URIs.[25]

The geographical information system (GIS) of the project's platform consists of background (raster) and vector layers. The background layers are the topographic web map, a Web Map Service (WMS) from Lantmäteriet (National Land Survey), Sweden, and another topographic map, a Tile Map Service (TMS), from the National Land Survey of Finland. The vector layers include the borders of Swedish parishes (polygon layer) in 1950 and Swedish provinces derived from the parish layer by RAÄ. It will be possible to produce a vector layer of all the Swedish dioceses from the parish layer, but the MLR project has not yet implemented this feature. These layers do not exactly reflect the borders of medieval Sweden but can be used as an approximation. Medieval Sweden consisted of the dioceses of Skara, Uppsala, Växjö, Linköping, Västerås, Strängnäs, and Åbo (Turku), the latter now in Finland, all founded by 1230. The Viborg diocese, in the eastern part of Finland, was founded in 1554 at the end of the timescale of this project. To our knowledge, no available dataset of the borders of Finnish parishes exists. In addition, TORA settlement units could be retrieved as a vector layer and put on the map using a WMS from Riksarkivet (the Swedish National Archives).

Vector layers with historical information about "Cult manifestations" could be produced in real time from the database and outputted as a GeoJSON dataset to be rendered on the visual map. Locations for cult places are defined only in the database table "Place." From the "Place" table, additional information can be accessed about a particular place in other tables, such as parish, diocese, or from external sources that are linked (for instance, from Fornsök or BeBR), and what took place there: "Cult manifestations" and external resources that describe and depict cult objects. It is possible to produce any layer from the attributes of a "Cult manifestation" and its related tables, such as a saint in the "Person" table, and their attributes respectively. Thus, a vector layer of "Cult manifestations" of a certain kind could be produced, involving a group of saints and within a certain time period. This way, comparisons of cults between dioceses can be made, or comparisons between types of saints or the gender of saints.

---

24 See www.kyppi.fi/palveluikkuna/portti/read/asp/default.aspx, www.rky.fi/read/asp/r_default.aspx, and www.museovirasto.fi/en (all accessed April 16, 2021).

25 For example, Helsinge Parish Church, northeast of Helsinki, has entries in both Kyppi and RKY. Note that the Swedish and Finnish version of RKY resides at different domains but with the same KOHDE ID: www.kyppi.fi/to.aspx?id=112.1000014825; www.rky.fi/read/asp/r_kohde_det.aspx?KOHDE_ID=1506; www.kulturmiljo.fi/read/asp/rsv_kohde_det.aspx?KOHDE_ID=1506 (all accessed April 16, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Study of change over time is also possible through the dating of "Cult manifestations." It could be visualized with different symbols or colours or as a map animation. All vector layers are interactive and connect to all data and images, both internal and external, related to the selected feature.

Spatialization and Lived Religion

Previous research in the field of mapping and analyzing historical phenomena includes that focused on place-names, myths, historical boundaries, and travel.[26] Recently larger projects, such as WHG, have emerged that aim to enable "spatial and temporal reasoning and visualization" in historical research.[27] WHG also has "a particular interest in annotating records concerning geographic movement, including individual journeys and expeditions."[28] These content and service providers hope to operate on a global scale. In our project, the geographical scale is smaller, while the research question provides a specific focus, but the aim—temporal and spatial analysis of a historical phenomenon—is similar. That space and spatialization offer an excellent opportunity to study lived religion in the past has also been highlighted in more traditional publications.[29]

A major task for the project is locating different sites of cult activity in relation to the saints in lived religion and incorporating them into our database as the aforementioned

26 There are a growing number of examples of projects working in this general area. For an example of mapping saints via their place-names, see Saints in Scottish Place-Names, https://saintsplaces.gla.ac.uk (accessed April 16, 2021). The Icelandic Saga Map is an interactive map of places in the Icelandic sagas, http://sagamap.hi.is/is (accessed April 16, 2021; see also Lethbridge, this volume). The Map of Myth, Legend and Folklore is an interactive map created partly via crowdsourcing and developed by English Heritage, https://mythsmap.english-heritage.org.uk (accessed April 16, 2021). Norse World is an interactive map developed by the "Norse Perception of the World" project to enable research into and visualization of foreign spatial references mentioned in medieval literature from Sweden and Denmark; see Petrulevich, Backman, Adams, Skovgaard Boeck, Holmlund, Marklund, Hartmann, Lecerof, and Ljungström, www.uu.se/en/research/infrastructure/norseworld and https://norseworld.nordiska.uu.se (both accessed April 16, 2021); see also Petrulevich and Skovgaard Boeck, this volume, and Petrulevich, Backman, and Adams, "Medieval Macrospace through GIS." Mapping travel is also addressed by using gazetteers, such as those of the ancient Greek world: Digital Periegesis, www.periegesis.org (accessed April 16, 2021; see Foka et al., this volume). Peripleo is a tool developed to explore data in time and space, part of Pelagios Commons; see Simon et al., "Peripleo." For an example of a simple approach to mapping travel and sanctity in an analysis of saints' legends, see Ellis Nilsson, "Not All Those Who Wander Are Lost."

27 WHG, "Introducing the World Historical Gazetteer." See also the Australian TLCMap project, which is developing strategies and tools to enable humanities scholars to use maps in historical research. Viewing change over time and "deep maps" are two of their key areas. See TLCMap, "What Is TLCMap and Why?"

28 WHG, "Traces."

29 See, for instance, Walsham, *The Reformation of the Landscape*, and Coster and Spicer, *Sacred Space in Early Modern Europe*.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

analytical entity, "Cult manifestation." This task includes not only more obvious sites, such as churches, chapels, and monasteries, but also sites in the natural landscape that in one way or another had a connection to lived religion and the cult of saints. One such category of cultic sites includes holy wells and sacred springs. Locating these is often a challenge, since the landmarks and directions given in the sources are often vague. As mentioned, however, we use the data from Fornsök that provide locations, which significantly facilitates identifying these sites. Once the coordinates for the spring or well have been established and created as a place on the map, further information is added to the template, such as the dates of the first indication of the site and the level of certainty as to its location, after which "Cult manifestations" connected to the site are created. An example is "Helge Svens källa" ("Holy Sven's spring") in Arboga ("PlaceID" 4942).[30] At this particular spring, only one "Cult manifestation" is known: the patronage of St. Sven of Arboga, mentioned in a court record from 1459.[31] This is entered into the database as "Patronage > Holy well > Sven of Arboga" ("ManifestationID" 291), according to the category hierarchies described in Table 2.2.[32] At other sites, multiple manifestations may be added, such as votive offerings ("Prayers and devotional acts > Votive offering"), and erected crosses ("Cult objects > Cross").

There are also cases when an exact location for a site cannot be established due to the fragmentary state of the sources, which presents another challenge to the visualization of religious sites. The extant correspondence of King Gustavus I indicates that the construction of a chapel was under way in 1526 in the hundred of Mark, only to cease the following year by order of the king.[33] The chapel was dedicated to an otherwise unknown local saint, in this source known only as the "Holy maid", and the foundation of the chapel had been made possible by gifts and contributions from the local populace; see Figure 2.2.[34] We know only the hundred in which the chapel was being built, not the parish. This omission initially presented an obstacle, since our database is built around the concept of parishes, and all our cult places are tied to specific "ParishIDs," enabling communication with external resources and other databases. Therefore, we created a fictional parish designated as "Unknown" and belonging to the diocese in which the hundred of Mark is located, as well as its modern municipality. This invention of a specific "unknown parish" makes it possible to distinguish it from similar locations in other parts of the country where the parish identity is also unknown.[35] The coordinates for the "Holy maid" chapel were placed next to the traditional administrative centre of

30 See https://saints.dh.gu.se/place/4942 (accessed February 17, 2023).

31 *Arboga stads tänkebok*, 111.

32 See https://saints.dh.gu.se/cult/291 (accessed February 17, 2023).

33 *Konung Gustaf den förstes registratur*, 3:217, 4:79.

34 See https://saints.dh.gu.se/place/5483 (accessed February 17, 2023).

35 A similar "Unknown parish" can be found in the (modern) diocese of Härnösand: https://saints.dh.gu.se/parish/2701 (accessed February 17, 2023). In addition, the identifier "All parishes" is used for a diocese, such as, for instance, Skara.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Table 2.2 In the database structure, "Type of evidence" for "Cult manifestations" is divided into five categories. These are further divided into a number of more specific subcategories of which a selection is shown here; vocabularies are based on the Getty AAT authority where applicable.

Two database categories related to "Cult manifestations"		
Type of evidence → Type of evidence, subcategory		
Cult objects → Altar cloth, altarpiece, architectural sculpture, baptismal font, bell, book (other), candelabra, chalice, chasuble, collection box, cope, cross, crown, devotional image, liturgical book, monstrance, mural painting, panel painting, paten, pilgrim badge, processional banner, processional cross, pyx, relic, reliquary, sculpture, seal, stained-glass window, tomb, unknown object.	**Feast day** → Calendar, dating by feast day, feast of the dedication of a church, festival, *festum chori*, *festum terrae*, indulgence granted on a feast day, letter, liturgical celebration, market, unknown observance.	**Patronage** → Altar, chapel, chapel in church, church, guild, holy well, hospital, natural object, prebend, religious house, shrine, tower, town.
	Narratives → Legend, miracle, oral tradition.	**Prayers and devotional acts** → Adornment of sculpture, candle, devotional act, indulgence, letter of donation, liturgical celebration, physical interaction, pilgrimage, prayer, procession, runic inscription, supplication, votive offerings.

the hundred, but the "Location certainty" box is marked as "Unknown" in the record; see Figure 2.2.

Sometimes challenges with correlations and overlappings with our key concepts of landscape and timescape have arisen when cult objects have changed their location at some point during the period of investigation. A case from Offerdal parish in northern Sweden provides a clear example of this issue. At the very end of our timeframe, in the 1580s, three sculptures were moved from the parish church and reinstated in three woodland chapels, maintained solely by the laity—which very much actualizes our perspective of lived religion. The sculptures remained in these chapels until 1621, when the situation was brought up in court as a case of "idolatry," resulting in the sculptures being burned, the chapels demolished, and parishioners fined. Among other things, it was revealed that several people had been involved in making votive offerings to one of the sculptures mentioned above, an image of St. Lawrence placed in a chapel in Landön. For instance, a woman named Magdalene from the village of Åse had made a promise

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

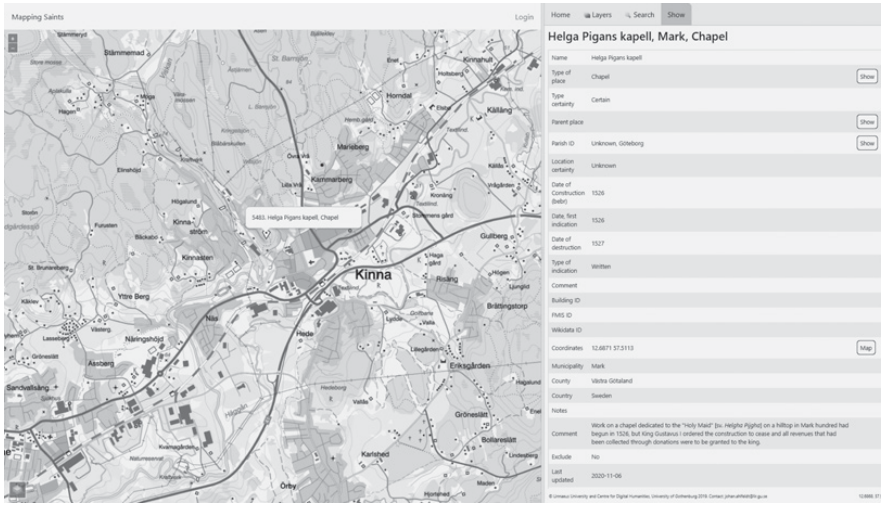


Figure 2.2. "PlaceID" 5483, the chapel of the "Holy maid" in Västergötland. Image by Sara Ellis Nilsson and Terese Zachrisson.

during a difficult childbirth to give something to St. Lawrence in Landön if her baby was safely delivered.[36]

In the case of this sculpture of St. Lawrence, there are several identifiable "Cult manifestations." First, the sculpture is added to the database as "Cult object > Sculpture > Lawrence." In its association with a particular saint, St. Lawrence, this model does not present a challenge; the challenge presents itself in the spatial and temporal sense. The sculpture needs to be added to the database in a sense that illustrates its spatial change over time: before about 1587 as placed in Offerdal parish church (PlaceID 2496), but after 1587 as placed in the Landön chapel (PlaceID 4716). As our definition of a "Cult manifestation" is that it is something that takes place in a specific location at a specific time, a manifestation cannot exist at more than one location at any given time. Thus, the sculpture in Offerdal parish church is considered a different manifestation of the cult of St. Lawrence from the sculpture placed in the Landön chapel, even though the manifestations are related to the same physical object.

In an attempt to visualize this relationship, the two manifestations of the sculpture of St. Lawrence are tied together in a hierarchical relationship: a parent "Cult manifestation." A copy of the post of the sculpture in Offerdal parish church (ManifestationID 2688) is entered into the database (ManifestationID 164), but with a different location (Landön chapel) and associated with a different time frame (1587–1621). Then, in order to

36 Zachrisson, "The Saint in the Woods," 8.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

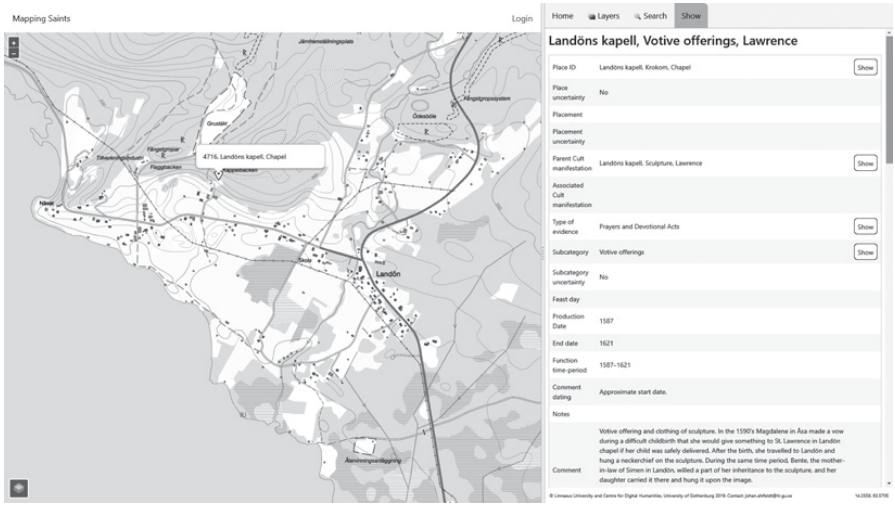


Figure 2.3. "Cult manifestation" #581, illustrating the votive practice associated with a sculpture of St. Lawrence in Landön chapel. Image by Sara Ellis Nilsson and Terese Zachrisson.

register the cult activity that took place in relation to the sculpture—that is, the votive practice—a second parent–layer connection is applied. Since we know only of this devotional practice from the period when the sculpture was placed in the Landön chapel, this manifestation ("Prayers and devotional acts > Votive offering > Lawrence") is tied to the second manifestation of the sculpture (#164), but not the first (#2688), as seen in Figure 2.3.[37]

Visualization of Miracles and Pilgrimage

The following section explores another central aspect of the project's application of timescape and landscape by discussing the movements of pilgrims. Lived religion in the medieval period was often a question of movements in the landscape by individual actors.[38] Some churches were especially attractive to pilgrims because of the presence of a saint's tomb, relics, or certain images that were regarded as miracle-working.

37 See https://saints.dh.gu.se/cult/164 and https://saints.dh.gu.se/cult/2688 (both accessed February 17, 2023).

38 These individuals belonged to all social groups and will be identifiable in the database as "Person (other)," "Type of living person", and—in a "Cult manifestation"—as "Role other person" (if not a saint).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Different categories of source materials are important for understanding the phenomenon of pilgrimage and its place in the landscape, such as miracle stories and pilgrim badges.

Miracle stories are stories told by pilgrims about the interventions of saints in situations of illness, distress at sea, troubles in childbirth, and many other difficult circumstances. In these situations, they, or the people around them, had turned to some saint and implored him or her for intercession before God. If they experienced relief in their situation, this appeal to the saint was followed by a pilgrimage to a shrine where the saint was venerated, usually the tomb of the saint. Help from the saints was also often sought directly at the shrines.

Miracle stories are thus a very important source material for the understanding of lived religion in the Middle Ages.[39] For our project, it is also important to know that many different places may be present in a miracle story.[40] Among them are the pilgrim's or *miraculé*'s home, the home of other people who act in the story, the shrine to which the pilgrimage is directed, and in some cases other shrines that were sought and/or places between which the *miraculé* made a voyage. As stated above, a number of places, typically at least two, figure in the miracle stories. In the following, examples of how we have dealt with multiple places within the same "Cult manifestation" are explored.

For instance, on May 18, 1407, Ingrid, a pregnant woman living near the bridge in Motala, was severely injured by a soldier for refusing to serve him a free drink. As a result, she was bedridden and the child in her womb was believed to be dead. The soldier evaded justice, but nevertheless made a vow to the Blessed Nils of Linköping to take the child to Linköping and make an offering if the woman was saved and her child born alive. Ingrid also promised to fulfil the vow even if the soldier did not. Ingrid improved and gave birth to a living child, and she made a pilgrimage to Linköping in the following year on the day of Apostles Peter and Paul (June 29, 1408). John, steward at the episcopal mansion in Vadstena, gave testimony and said that this was known by almost all of Motala parish. The deposition was made in the presence of Anund Markusson, vicar at the church of St Lars in Linköping.[41]

This dramatic story is rather uncomplicated when it comes to the places mentioned. Ingrid lived near the bridge in Motala. This location, as well as the circumstances of the events, makes it probable that she was an innkeeper. The vow

39 See Krötzl, "Parent–Child Relations," Österberg, *De små då*, and Myrdal and Bäärnhielm, *Kvinnor, barn & fester*, to mention just a few examples. A catalogue of miracle stories can be found in Myrdal and Bäärnhielm, *Kvinnor, barn & fester*, 133–54, and Myrdal and Bäärnhielm, "Katalog över nordiska mirakelberättelser".

40 On boundaries and identifying places in narrative sources in relation to "geocriticism", see Westphal, *Geocriticism*, 116–19.

41 "De miraculis S. Nicholai," 367–68.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

was directed to the Blessed Bishop Nils Hermansson, whose tomb was in Linköping Cathedral, so this is where the pilgrimage was directed the following year. One more place is mentioned, namely Vadstena, since a steward of the episcopal mansion of this town gave testimony to the miracle. Such testimonies were required when miracles were written down. Anund Markusson, vicar at St Lars church, may here be ascribed to the cathedral since he is known to have served there as a recorder of miracles. The original vow-maker, the soldier, cannot be ascribed to any particular place other than Motala, where he may have been a temporary visitor. On our map we would therefore need only to plot "Motala bridge," "Linköping Cathedral," and "Vadstena" (the episcopal mansion).

Many other cases, however, involve neighbours or other bystanders, influencers, and vow-makers, who may also give testimony at a later stage, during the canonization process. In these cases, the presentation of the miracle includes more factors to consider, both temporal and spatial. A good example is the case of a forty-year-old man in Ask parish near Motala who was struck by grave mental illness in September 1473. The neighbours did not see any other choice than to lock the poor man up, but they also united in a vow to the Blessed Katherine. They promised that the man would make a votive offering of an ox if he was cured. This took place, and the man fulfilled his vow in March the following year, adding a mass in honour of the Blessed Katherine. This story is known only because it was retold by the people involved in the canonization proceedings in Vadstena on August 28, 1475. The man, Amund, and two neighbours from the village of Alma in Ask parish, who had participated in making the vow, then gave testimony.[42]

The presentation in the database thus includes the original miracle that was experienced by Amund in his home parish, Ask, around September 8, 1473; his pilgrimage to the tomb of the Blessed Catherine in Vadstena Abbey church, which took place around March 25, 1474 (or possibly 1475); and the testimony in Vadstena by Amund himself and two people from the village of Alma, Nils and Johan, on August 28, 1475. Furthermore, the donation for the celebration of a mass in honour of the Blessed Catherine is also a manifestation of lived religion that is included in the database; see Figure 2.4.[43]

The places mentioned in this miracle story are located within a short distance from each other: Ask parish in the northeastern part of the map (see Figure 2.4), where the miraculously healed person Amund had his dwelling; and Vadstena, near Lake Vättern, where the tomb of the Blessed Katherine was located. In future versions of the map, the road between them will be visualized.

Pilgrim badges, which are artefacts, are another important source material for evidence of pilgrimage. They were manufactured at the shrines that were pilgrimage

42 *Processus seu negocium canonizacionis*, 97.

43 See https://saints.dh.gu.se/cult/2582 (accessed February 17, 2023).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

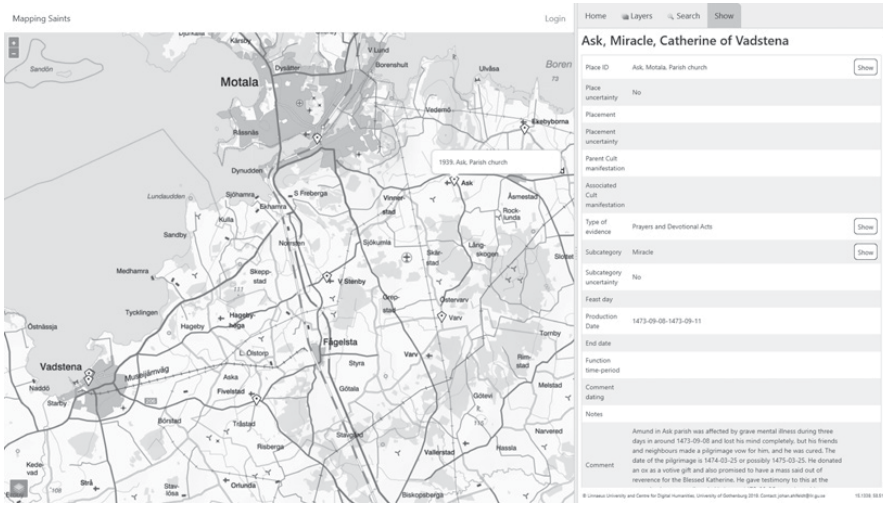


Figure 2.4. "Cult manifestation" #2582, a miracle of the Blessed Catherine of Vadstena. Image by Sara Ellis Nilsson and Terese Zachrisson.

sites and carried by pilgrims as a kind of souvenir. Some were attached to their clothes, and some were fastened on church bells in the pilgrims' home parishes.[44]

As stated, "Cult manifestations" that are related to each other need to have links between them in the database. These links may be either hierarchical ("parent–child") or non-hierarchical ("associated"). Discussions of how a certain connection should be classified are recurrent in our team. If, for example, a pilgrim badge from Vadstena Abbey is found in Källunge church on Gotland, a likely interpretation is that a person from Källunge made a pilgrimage to Vadstena and returned with this badge.[45] In the case of pilgrim badges, we have decided to input the pilgrimage to Vadstena as the parent "Cult manifestation," and the pilgrim badge as its child, since there would not have been any pilgrim badge had it not been for the pilgrimage. In the case of the miracle tales discussed above, it is instead the miracle that is the parent, since the pilgrimage to the tomb of the saint would not have occurred had it not been for the miracles.

The goal of pilgrimage associated with a certain pilgrim badge is not always known, but, with this reservation, every pilgrim badge generates at least two places on the project map: the place where it was found and the goal of the pilgrimage. A good number of the known pilgrim badges have not been found in archaeological excavations but

44 An overview of the state of research and a catalogue of the then–known pilgrim badges in present-day Sweden is found in Andersson, *Pilgrimsmärken och vallfart*.

45 Andersson, *Pilgrimsmärken och vallfart*, 30.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

attached to church bells. In such cases, we consider the fastening of the pilgrim badge on the bell as its own "Cult manifestation," associated with the pilgrim badge. The pilgrim badge in most cases carries the image of a saint, and by fastening the badge on the bell, which is the property of the parish, this saint becomes in a way a patron for the whole parish, and not only for the person who made the pilgrimage. This "Cult manifestation" does not generate a new place, since it is identical with the finding place, but the "Cult manifestations" at this geographic location are two: a pilgrimage and the fastening of the badge on the bell.

Some Additional Challenges with Mapping Lived Religion

The above presents a clear picture of our methods in developing this spatial data research infrastructure and provides concrete examples of its application, as well as addressing some of the issues inherent in these specific methods. There are, of course, additional challenges when developing this type of research platform. This final section addresses those that have been encountered up until this point and some that we anticipate. In certain cases, it also proposes a number of possible solutions.

As stated, our project connects the field of digital spatial humanities with traditional humanities through its use of texts and material culture as sources and its goal of mapping where expressions of lived religion took place.[46] This interdisciplinary approach, particularly in terms of combining disparate source material, is exciting but also presents a number of challenges. One of these challenges has been to ensure that texts and objects are both of equal weight in the database and that these forms of evidence for the cult of saints can be visualized in their associated locations. Our solution has been to interpret how a source reveals an expression of a saint's cult—that is, a "manifestation" of a saint's cult: the aforementioned "Cult manifestation." These "Cult manifestations" are all connected to a particular location, either a point or an area, on the map, and they are all dated. In theory, each manifestation—connected to a specific, overarching "Type of evidence" and a more specific "Type of evidence, subcategory," plus a place and a date—will provide a way of analyzing the development of a cult of particular saints in both space and time.

As is clear, each manifestation relies on extant source material, which presents challenges in terms of which sources have been preserved and the unevenness of their preservation, both within and across source categories. Indeed, this inequality of preservation affects in turn future visualizations or analyses of locations or places associated with these entities. For instance, the locations associated with pilgrimages found in the miracle stories are concentrated in and around Vadstena, and they are mostly connected to a handful of saints. This imbalance is due to source preservation as well as the activity and focus that, in particular, Birgitta of Sweden's and Katherine of Vadstena's cults enjoyed. The challenge in this case is to communicate that this aspect

46 See Dunn, *A History of Place*, 2–7, 13, 16–17.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

of our resource might provide skewed results in visualizing pilgrimages spatially due to the available source material.

In terms of geographical area, the project has also faced the challenge of changing borders over the centuries and nationalist history writing. The geographic limit of the project is the medieval ecclesiastical province of Uppsala, which includes territories in three modern countries, each with its own particularities in terms of archival traditions and availability of source material relevant for the project. As mentioned above, one of the project's goals and results is the creation of a register of medieval holy places not limited by current national boundaries, and which includes, among other places, churches, holy wells, and chapels. Creating this register has allowed us to connect "Cult manifestations" to potential holy or cult places identified in previous research and resources.

In relation to the above, and the digitizing of source material, the project has also made non-spatial material "spatial." In other words, work has been required in order to identify locations in the geographical landscape associated with particular "Cult manifestations." In the case of the art historical material, we have used the medieval locations of the artwork, when known. In the case of the medieval calendar fragments, their provenance has been determined to the diocese in the best case; in many instances, however, the only reliably identifiable provenance is the ecclesiastical province, a much less precise geographical reference than a specific church in a particular parish. In contrast, making the newly digitized, non-spatial material in Ikonografiska registret and Medeltidens bildvärld spatial has led to more precise locations, albeit often requiring an "Uncertain" marker for their medieval location. These variations in the associated spatial information create a challenge when analyzing or visualizing "Cult manifestations" in the landscape.

The project is developing a model and inputting data from sources that were produced over an approximately 400-year period. One of the challenges associated with this work has been inputting dates when the source material has been dated using different methods. For instance, some objects are dated to the "first half of the twelfth century" or "mid-twelfth century," while in some cases a more exact date, such as 1489, is available. These different dating conventions, or more or less precise dating practices, have required that we create date intervals ("notbeforedate" and "notafterdate") that are consistently applied throughout.[47] In addition, these variously dated sources have presented a challenge in terms of how "Cult manifestations" can best be visualized on our planned interactive map.

As indicated, the project has had to apply a critical perspective in its methods and in relation to previous research and previous datasets. This resource is also intended to be used by others for their own research; therefore, it is important that we are transparent about what our interpretations are based on. This transparency will be achieved in the contents of the introduction to the resource and the way in which the data is presented and searchable via the user interface. Furthermore, the person who inputs data will be

47 These intervals are based on the Syriac Reference Portal authority, "Approximate Dates," http://syriaca.org/documentation/dates.html (accessed April 16, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

acknowledged on each entry so that the user is aware of who is responsible for a certain interpretation.

One of the most important aspects, and challenges, of developing a digital research resource is ensuring its sustainability and preservation. Indeed, as increasingly required by funding bodies and other organizations, including the European Science Foundation, "researchers need to be sure of the accessibility, authoritativeness, context, stability and longevity of such resources" when doing research.[48] In fact, these considerations formed an important part of our initial discussions while planning the resource. The relatively short lifespan of other invaluable maps, inventories, and databases related to our work on the cults of saints were discussed.[49] Our project is hosted by GRIDH, where the material will be published and persistent identifiers of all the database objects will be made available, together with visualizations and other tools. GRIDH is responsible for maintaining data and integrated tools for the foreseeable future. In addition, data dumps will be stored at the Swedish National Data Service, and the relevant data will be published via SOCH at the project's conclusion.

The long-term perspective is very important for several reasons. As the resource is intended to be used by others, we need to be able to ensure that information can be updated at a later date. Moreover, the database needs to be searchable and interesting for the user in the long term. In addition, this resource is intended to be modified and supplemented in the future, such as by adding new data related to the cults of saints. The challenge in this instance is ensuring that the information provided is accurate and in line with the resource's aims.

Conclusions

The above describes and explores how digital research tools and methods can contribute to our understanding of medieval lived religion by studying its expression in the material and textual sources related to the cults of saints. This work is part of an ongoing digital infrastructure and research project that is building a comprehensive online database and mapping function so as to provide users (researchers, educators, and the public) with access to data from previously digitized cultural heritage collections and previous research, as well as research undertaken by the project. As part of this process, the project involves the digitization of material from the Swedish National Historical Museums and the Swedish National Heritage Board. Previously digitized material is put into a historical context in the framework of our research question. The project's digital methods, such as linked data, digitization, transcription, and spatialization, have been presented and discussed with a special focus on spatiality. In order to exemplify the process, we have presented several case studies that illustrate our application of the concept of "Cult manifestation," including how to input objects so that they can be

48 ESF, "Preservation and Sustainability."

49 For instance, Saints and Geography, www.saintsgeog.net/index.html (accessed April 16, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

mapped in time and space, even when the precise locations are unknown or an object has been moved. In addition, we have discussed how another type of "Cult manifestation," miracles, requires a different model that allows for multiple locations within the same manifestation. Finally, we have discussed an example of how one object, a pilgrim badge, can identify several different types of "Cult manifestation," which, in turn, are located in different places.

One of the most important results of this project will, of course, be the publicly accessible research infrastructure, consisting of our database (linked data) and map. In essence, the resource fits into the category of scholar-driven research publications that the ESF indicates need to be accepted as valid output of research projects and interdisciplinary tools.[50] It is of great importance that those who input the data—whether project members or collaborators—and the database are attributed in future research and future platforms.

A further aspect to consider in terms of long-term perspectives is that the future interface and map need to be user-friendly and have an attractive and intuitive design. This latter point is vital for a resource without a formal helpdesk.

Bibliography

Åhlfeldt, Johan. "Digital Atlas of the Roman Empire (DARE)." *Patristica Nordica Annuaria* 28 (2013): 18–21.

Åhlfeldt, Johan, Merrick Lex Berman, and Marc Wick. "Historical Gazetteer System Integration: CHGIS, *Regnum Francorum Online*, and GeoNames." In *Placing Names: Enriching and Integrating Gazetteers*, edited by Merrick Lex Berman, Ruth Mostern, and Humphrey Southall, 110–25. Bloomington: Indiana University Press, 2016.

Andersson, Lars. *Pilgrimsmärken och vallfart: Medeltida pilgrimskultur i Skandinavien*. Stockholm: Almqvist & Wiksell, 1989.

Arboga stads tänkebok, 1:1451–72. Edited by Erik Noreen and Torsten Wennström. Uppsala: Almqvist & Wiksell, 1935–1937.

Barker, Elton, Stefan Bouzarovski, Chris Pelling, and Leif Isaksen. "HESTIA (the Herodotus Encoded Space–Text–Imaging Archive): An Interdisciplinary Project." In ESF Standing Committee for the Humanities, "Research Infrastructures in the Digital Humanities," Science Policy Briefing 42, 16–17. Strasbourg: ESF Standing Committee for the Humanities, 2011. www.esf.org/fileadmin/user_upload/esf/RI_DigitalHumanities_B42_2011.pdf (accessed April 26, 2021).

Blaney, Jonathan. "Introduction to the Principles of Linked Open Data." *The Programming Historian* 6 (2017). DOI: 10.46430/phen0068 (accessed May 15, 2020).

Coster, Will, and Andrew Spicer. *Sacred Space in Early Modern Europe*. New York: Cambridge University Press, 2005.

"De miraculis S. Nicholai." Edited by Henrik Schück. *Antiqvarisk tidskrift för Sverige* 5 (1895): 333–400.

50 ESF, "Evaluation of Digital Research."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Digital Periegesis. www.periegesis.org (accessed April 16, 2021).

Dunn, Stuart. *A History of Place in the Digital Age.* Abingdon: Routledge, 2019.

Ellis Nilsson, Sara. "Digital History: Digitizing and Communicating the Past: A Case Study." In *Doing Digital Humanities: Concepts, Approaches, Cases*, edited by Joacim Hansson and Jonas Svensson, 219–39. Växjö: Linnaeus University Press, 2020.

——. "Fragments of a Year: Saints' Feasts in Swedish and Finnish Medieval Calendars (Part I)." Mapping Saints, January 15, 2020. https://blogg.lnu.se/mapping-saints/blog/finland/fragments-of-a-year-saints-feasts-in-swedish-and-finnish-medieval-calendars-part-i (accessed November 11, 2020).

——. " 'Not All Those Who Wander Are Lost': Saintly Travellers and Their Companions in Medieval Scandinavia." In *Travel, Pilgrimage and Social Interaction from Antiquity to the Middle Ages*, edited by Jenni Kuuliala and Jussi Rantala, 226–47. Abingdon: Routledge, 2019.

ESF. "Evaluation of Digital Research and Its Outputs." In ESF Standing Committee for the Humanities, "Research Infrastructures in the Digital Humanities," Science Policy Briefing 42, 24–25. Strasbourg: ESF Standing Committee for the Humanities, 2011. www.esf.org/fileadmin/user_upload/esf/RI_DigitalHumanities_B42_2011.pdf (accessed January 29, 2021).

——. "Preservation and Sustainability." In ESF Standing Committee for the Humanities, "Research Infrastructures in the Digital Humanities," Science Policy Briefing 42, 21–22. Strasbourg: ESF Standing Committee for the Humanities, 2011. www.esf.org/fileadmin/user_upload/esf/RI_DigitalHumanities_B42_2011.pdf (accessed January 29, 2021).

——. "Researchers' Input and Engagement in Producing RIs." In ESF Standing Committee for the Humanities, "Research Infrastructures in the Digital Humanities," Science Policy Briefing 42, 15–16. Strasbourg: ESF Standing Committee for the Humanities, 2011. www.esf.org/fileadmin/user_upload/esf/RI_DigitalHumanities_B42_2011.pdf (accessed January 26, 2021).

Europeana Foundation. "Linked Open Data: Introduction." https://pro.europeana.eu/page/linked-open-data (accessed May 15, 2020).

Fröjmark, Anders. "Helgon i Viborg." Mapping Saints, October 28, 2019. https://blogg.lnu.se/mapping-saints/blog/finland/helgon-i-viborg (accessed November 11, 2020).

——. "Telling the Miracle: The Meeting between Pilgrim and Scribe as Reflected in Swedish Miracle Collections." In *Miracles in Medieval Canonization Processes: Structures, Functions, and Methodologies*, edited by Christian Krötzl and Sari Katajala-Peltomaa, 131–55. Turnhout: Brepols, 2018.

GeoNames. www.geonames.org (accessed April 26, 2021).

Haakedal, Elisabeth. "Lived Religion in Norwegian Pupils' Religious Education Workbooks." In *Lived Religion: Conceptual, Empirical and Practical-Theoretical Approaches: Essays in Honor of Hans-Günter Heimbrock*, edited by Heinz Streib, Astrid Dinter, and Kerstin Söderblom, 39–51. Leiden: Brill, 2008.

Hyvonen, Eero. "Linked Open Data Infrastructure for Digital Humanities in Finland." In *Proceedings of Digital Humanities in the Nordic Countries: Proceedings of the Digital Humanities in the Nordic Countries 5th Conference Riga, Latvia, October 21–23, 2020*, edited by Sanita Reinsone, Inguna Skadiņa, Anda Baklāne, and Jānis Daugavietis, 254–59. Aachen: Aachen University, 2020. http://ceur-ws.org/Vol-2612/short10.pdf (accessed November 9, 2020).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Icelandic Saga Map. http://sagamap.hi.is/is (accessed April 16, 2021).

Kieven, Elisabeth. "Research Infrastructures for Historic Artefacts: Knowledge Networks." In ESF Standing Committee for the Humanities, "Research Infrastructures in the Digital Humanities," Science Policy Briefing 42, 13–15. Strasbourg: ESF Standing Committee for the Humanities, 2011. www.esf.org/fileadmin/user_upload/esf/RI_DigitalHumanities_B42_2011.pdf (accessed January 26, 2021).

Konung Gustaf den förstes registratur. Edited by Johan Axel Almquist et al. 29 vols. Stockholm: Riksarkivet, 1865–1868.

Krötzl, Christian. "Parent–Child Relations in Medieval Scandinavia according to Scandinavian Miracle Collections." *Scandinavian Journal of History* 14 (1989): 21–37.

Lantmäteriet. "Topografisk webbkarta Visning, översiktlig". www.lantmateriet.se/sv/Kartor-och-geografisk-information/geodataprodukter/produktlista/topografisk-webbkarta-visning-oversiktlig (accessed February 10, 2021).

Leinberg, Karl Gabriel. *Finlands territoriala församlingars namn, ålder, utbildning och utgrening*, 2nd edn. Helsinki: Suomen kirkkohistoriallisen seura, 1906.

Liepe, Lena. "What Is 'Lived Religion'?" Mapping Saints, March 23, 2020. https://blogg.lnu.se/mapping-saints/blog/saints/what-is-lived-religion (accessed November 11, 2020).

——. *Reliker och relikbruk i det medeltida Norden*. Stockholm: Runica et Mediaevalia, 2020.

Maanmittauslaitoksen avointen kartta-aineistojen lataus [Open Map Data from the National Land Survey of Finland]. https://kartat.kapsi.fi (accessed February 10, 2021).

McGuire, Meredith. *Lived Religion: Faith and Practice in Everyday Life*. New York: Oxford University Press, 2008.

Map of Myth, Legend and Folklore. https://mythsmap.english-heritage.org.uk (accessed April 16, 2021).

Mapping Saints. https://saints.dh.gu.se (accessed June 8, 2021).

Museiverket. "Byggda kulturmiljöer av riksintresse RKY." www.kulturmiljo.fi/read/asp/rsv_default.aspx (accessed February 10, 2021).

Museovirasto. "Arkeologiset kohteet," "Arkeologiska objekt" ["Archaeological Objects"]. Finnish Heritage Agency. www.kyppi.fi/palveluikkuna/mjreki/read/asp/r_default.aspx and www.kyppi.fi/palveluikkuna/mjreki/read/asp/rsv_default.aspx (accessed February 10, 2021).

——. "Valtakunnallisesti merkittävät rakennetut kulttuuriympäristot RKY" ["Database of Built Heritage RKY"]. Finnish Heritage Agency. www.rky.fi/read/asp/r_default.aspx (accessed February 10, 2021).

Myrdal, Janken, and Göran Bäärnhielm. "Katalog över nordiska mirakelberättelser." *Kyrkohistoriskt årsskrift* 121 (2021): 105–30.

——. *Kvinnor, barn & fester i medeltida mirakelberättelser*. Skara: Skaraborgs länsmuseum, 1994.

Orsi, Robert. "Introduction to the Second Edition: Fieldwork between the Present and the Past." In *The Madonna of 115th Street: Faith and Community in Italian Harlem, 1880–1950*, 3rd edn, edited by Robert Orsi, xxvii–lvi. New Haven: Yale University Press, 2010.

Österberg, Eva. *De små då: Perspektiv på barn i historien*. Stockholm: Natur & kultur, 2016.

Petrulevich, Alexandra, Agnieszka Backman, and Jonathan Adams. "Medieval Macrospace through GIS: The Norse World Project Approach." *The Cartographic Journal* 57 (2020): 18–27.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Petrulevich, Alexandra, Agnieszka Backman, Jonathan Adams, Simon Skovgaard Boeck, Jessica Holmlund, Felix Marklund, Jorunn Hartmann, Andreas Lecerof, and Rasmus Ljungström. "Norse World." www.uu.se/en/research/infrastructure/norseworld and https://norseworld.nordiska.uu.se (both accessed April 16, 2021).

Processus seu negocium canonizacionis B. Katerine de Vadstenis: Efter Cod. Holm. A 93. Edited by Isak Collijn. Uppsala: Svenska fornskriftsällskapet, 1942–1946. https://litteraturbanken.se/f%C3%B6rfattare/CollijnI/titlar/ProcessusSeuNegocium/sida/iii/faksimil (accessed February 10, 2021).

Riksantikvarieämbetet. "Bebyggelseregistret BeBR" ["Database of Built Heritage"]. www.raa.se/in-english/digital-services/about-bebr (accessed February 10, 2021).

——. "Fornsök" ["Database for Archaeological Sites and Monuments"]. www.raa.se/in-english/digital-services/about-fornsok (accessed February 10, 2021).

——. "K-samsök" ["Swedish Open Cultural Heritage"]. www.raa.se/in-english/digital-services/about-soch (accessed February 10, 2021).

Riksarkivet. "Topografiskt register på Riksarkivet: TORA" ["Topographical Register at the Swedish National Archives: TORA"]. https://riksarkivet.se/tora (accessed February 10, 2021).

Saints in Scottish Place-Names. https://saintsplaces.gla.ac.uk (accessed April 16, 2021).

Simon, Rainer, Leif Isaksen, Elton Barker, and Pau de Soto Cañamares. "Peripleo: A Tool for Exploring Heterogeneous Data through the Dimensions of Space and Time." *Code4Lib* 31 (2016). https://journal.code4lib.org/articles/11144 (accessed February 10, 2021).

Skatteverket. "Sveriges församlingar genom tiderna." www.skatteverket.se/privat/folkbokforing/omfolkbokforing/folkbokforingenigaridag/sverigesforsamlingargenomtiderna/forteckning.4.18e1b10334ebe8bc80003999.html (accessed February 11, 2021).

Suecia antiqua et hodierna. Edited by Erik Dahlbergh et al. 3 vols. [Stockholm], 1716. https://suecia.kb.se (accessed May 31, 2021).

TLCMap. "What Is TLCMap and Why?" https://tlcmap.org/about/devstrategy.php (accessed February 11, 2021).

Walsham, Alexandra. *The Reformation of the Landscape: Religion, Identity and Memory in Early Modern Britain and Ireland*. Oxford: Oxford University Press, 2011.

Westphal, Bertrand. *Geocriticism: Real and Fictional Spaces*. New York: Palgrave Macmillan, 2011.

World Historical Gazetteer. "Introducing the World Historical Gazetteer." http://whgazetteer.org/about (accessed February 8, 2021).

——. "Traces in World Historical Gazetteer." http://whgazetteer.org/tutorials/traces (accessed February 8, 2021).

Wrisley, David Joseph. "Locating Medieval French, or Why We Collect and Visualize the Geographic Information of Texts." *Speculum* 92 (2017): 145–69.

Zachrisson, Terese. "Medieval Church Objects and Early Modern Antiquarianism." Mapping Saints, November 8, 2019. https://blogg.lnu.se/mapping-saints/blog/saints/medieval-church-objects-and-early-modern-antiquarianism (accessed November 11, 2020).

——. "The Saint in the Woods: Semi-Domestic Shrines in Rural Sweden, c. 1500–1800." *Religions* 10 (2019). DOI: 10.3390/rel10060386 (accessed November 11, 2020).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Chapter 3

MEDIEVAL TO MODERN: USING SPATIAL DATA FROM THE DIGITAL PROJECTS ICELANDIC SAGA MAP AND NAFNIÐ.IS TO EXPLORE THE INTERACTION BETWEEN NARRATIVE AND PLACE IN ICELAND

Emily Lethbridge*

IN THIS CHAPTER, two digital projects that mediate Icelandic cultural landscapes are introduced and described. The development of both these spatial data projects has been led by the author of this chapter, and both projects are housed at the Árni Magnússon Institute for Icelandic Studies in Reykjavík, Iceland. After information about each project has been provided, a case study is given to illustrate some of the ways that the two online tools can be used to explore data-driven research questions about Icelandic cultural landscapes and their changing contours over time, from the medieval period to modern times. The two projects have, of course, drawn much inspiration from various older digital spatial projects, as well as being products more generally of the spatial turn in the humanities that has been gaining traction over the past couple of decades.[1] The format and functionality of the two projects are indebted in particular to online literary and cultural heritage mapping projects such as "Mapping the Lakes: A Literary GIS" (and the later, related project "Mapping Lake District Writing, 1622–1900"), the "Map of Early Modern London," the "Literary Atlas of Europe," and "Mapping Manuscript

* Emily Lethbridge has a PhD in medieval Icelandic language and literature from the University of Cambridge. She is currently Associate Research Professor and Head of the Onomastics Department at the Árni Magnússon Research Institute for Icelandic Studies, Reykjavík, Iceland. Her research explores the complex and dynamic relationships between medieval Icelandic narrative works (e.g., sagas of Icelanders) and the manuscript and landscape contexts through which these narratives were transmitted from the medieval period to the present day. She has also developed digital projects, such as the Icelandic Saga Map project and Nafnið.is, and teaches at the University of Iceland. Email: emily.lethbridge@arnastofnun.is. Appreciation and thanks are due to the editors of this volume for their helpful feedback on an earlier draft of this chapter, and also to Garðar Guðgeirsson for help with data analysis.

1 See, e.g., Bodenhamer, Corrigan, and Harris, *The Spatial Humanities*; Gregory and Geddes, *Toward Spatial Humanities*; Presner and Shepard, "Mapping the Geospatial Turn"; Cooper, Donaldson, and Murrieta-Flores, *Literary Mapping in the Digital Age*; Bushell, *Reading and Mapping Fiction*; Berman, Mostern, and Southall, *Placing Names*; and Travis, Ludlow, and Gyuris, *Historical Geography*.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Migrations," on the one hand, and, on the other hand, to more explicit place-name-oriented projects such as "NameSampo: A Workbench for Toponomastic Research," the "Berwickshire Place-Name Resource," and the "Key to English Place-Names," among other online toponomastic resources.[2] Projects such as the Norske stedsnavn resource and Norse World have been looked to for exemplary practice regarding data curation and publication, as well as for inspiration.[3]

Icelandic Saga Map

In 2011, interested in the important role that topography plays in medieval Icelandic *Íslendingasögur* ("sagas of Icelanders") narratives, I travelled around Iceland exploring the landscape settings of each saga. I became aware of the extensive geographical overlap between individual narratives, and the role that landscape played in transmitting these narratives (in tandem with parchment and paper manuscript copies of saga texts) from medieval to modern times.[4] Exploring at first hand how the events that the *Íslendingasögur* describe are mapped onto and around the landscape, and commemorated in place-names, was a compelling approach to this remarkable body of literature. No less illuminating was witnessing how Icelanders today engaged with their local and national saga heritage.[5] An interactive digital map was the obvious choice of media through which to display and interrogate, in a visual and dynamic way, the relationships between the sagas and the landscape.

The first iteration of the Icelandic Saga Map (ISM) project was launched in 2015.[6] The intended users included saga scholars and the general public; beyond these groups, it seems that the website has been used by teachers and tour guides, among others. From the outset ISM has been a collaborative project, with work financed by different funding bodies, technical development undertaken by three individuals, and data input

2 See www.lancaster.ac.uk/mappingthelakes, www.lancaster.ac.uk/fass/projects/spatialhum.wordpress/?page_id=43, https://mapoflondon.uvic.ca/index.htm, www.literaturatlas.eu/en, https://mappingmanuscriptmigrations.org, https://nimisampo.fi/en/app, https://berwickshire-placenames.glasgow.ac.uk and http://kepn.nottingham.ac.uk (all accessed March 3, 2023).

3 See https://toponymi.spraksamlingane.no/nb/app and www.uu.se/en/research/infrastructure/norseworld (both accessed May 9, 2021). On the latter project, see further Chapter 1 in the present volume.

4 See Lethbridge (with Krieg and Hartman), "Mapping Environmental Memory." On the simultaneous transmission of the sagas in landscape and manuscript contexts, see Lethbridge, "The Icelandic Sagas and Saga Landscapes."

5 Blogposts written at the time are still available at http://sagasteads.blogspot.com (accessed May 10, 2021), and a short documentary film, *Memories of Old Awake*, that was produced by Emily Lethbridge and Patrick Chadwick for the University of Cambridge about the relationship between living Icelanders and saga protagonists can be watched online at www.youtube.com/watch?v=2Z4_BhW1sI8.

6 See https://sagamap.hi.is (accessed May 8, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

and curation by a number of student interns.[7] The primary task was geo-referencing texts of the forty or so sagas in the *Íslendingasögur* genre. Coordinates for Icelandic place-names were generally taken from the Landmælingar Íslands (National Land Survey of Iceland) database or the Ja.is yellow pages and map resource; coordinates for places outside Iceland (since the narratives' geographical stage often extends beyond Iceland) were taken from sources such as Google Maps, cross-checked in some instances with gazetteers such as the Getty Thesaurus of Geographic Names Online or GeoNames.[8] Subsequently other medieval Icelandic genres have been added to the database, namely the *þættir* (short tales of Icelanders), *Orkneyinga saga* (the saga of the Orkney Islanders) and *Færeyinga saga* (the saga of the Faroe Islanders), selections from *Sturlunga saga* and *biskupasögur* (contemporary sagas and bishops' sagas), and historical works such as *Landnámabók* and annals. In addition, several nineteenth-century Icelandic travel books that describe visits to saga-sites have been geo-referenced and added to the database. The core dataset thus comprises geo-referenced place-names in a relational (PostgreSQL) database (see Figure 3.1 for a diagram of entity relationships): place-names are linked to sagas (and specific chapters within sagas), and other information specified includes fields such as "Place-type." Users can select one saga (or other text) or multiple sagas; places in the selected narrative(s) display on the map view, while the text (with hyperlinked place-names) is displayed alongside. Selecting point data on the map view brings up information about other texts in which that place appears.

Participation in the NSF-funded data infrastructure project DataArc[9] (2016–2021) provided the opportunity to overhaul the ISM backend and migrate the system over to a Django Python Web framework, and to implement a shared ontological mapping framework that enables conceptual linking between ISM data and the various other textual and environmental archaeological datasets that are part of the DataArc project. In addition to this, a "manuscript layer" was added to the database: information about

7 The ISM project has received funding from Rannís (Rannsóknamiðstöð Íslands, the Icelandic Centre for Research: Rannsóknasjóður grant 2014, Rannsóknasjóður Sigrúnar Ástrósar Sigurðardóttur og Haralds Sigurðssonar grant 2015), Háskóli Íslands (University of Iceland: Rannsóknarsjóður grant 2016, first prize in Hagnýtingarverðlaun/Applied Science competition, 2015), and the US National Science Foundation (2016). Programmers involved are Trausti Dagsson (development of full-scale database), Pétur Húni Björnsson (extension of database), and Logi Ragnarsson (prototype). Gísli Pálsson, Hjördís Erna Sigurðardóttir, Jack Hartley, Magnús Jochum Pálsson, Nikola Macháčková, and Zachary Melton have all worked on aspects of data input on the project.

8 See www.lmi.is, https://ja.is, https://google.is/maps, www.getty.edu/research/tools/vocabularies/tgn, and www.geonames.org (all accessed May 9, 2021). Note that, for consistency, modern Icelandic orthography is used in this chapter for all place-names; modern Icelandic is the default orthography for place-names in the ISM database too, although orthographical variation is of course found in extant manuscript texts, and it would be interesting to chart this variation and make it accessible to ISM users.

9 Full project title: "Building Cyberinfrastructure to Enable Interdisciplinary Research on the Long-Term Human Ecodynamics of the North Atlantic" (2016–2021). See the project website at www.data-arc.org and the data discovery tool at https://ui.data-arc.org (both accessed May 9, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

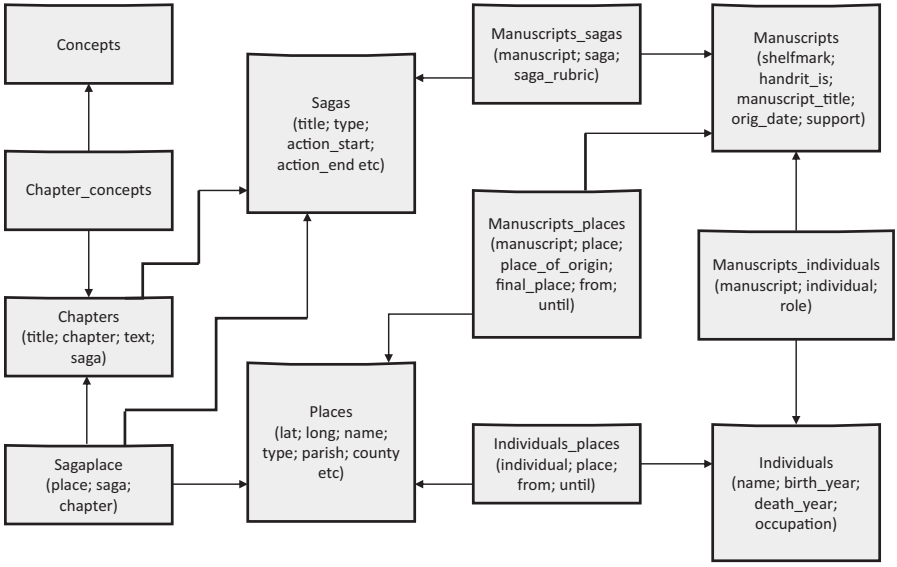


Figure 3.1. Entity relationship diagram of Icelandic Saga Map backend. Image by Pétur Húni Björnsson and Emily Lethbridge.

all Icelandic manuscripts that preserve texts of the *Íslendingasögur*, both parchment and paper, dating from the thirteenth century to the nineteenth, and places these manuscripts have been associated with, was compiled and input. The incorporation of this dataset enhances the potential of ISM as a tool that supports efforts to explore the dynamic and reciprocal relationship between narrative and place, and the transmission of saga narratives in geographical space. When the sagas were first put down in writing, their narrative contours were shaped in various ways by the landscapes in which their events take place; the influence exerted by landscape on saga narrative was, moreover, sustained for as long as the sagas were copied and retold in their landscape settings. Equally, the Icelandic landscape itself—cultural perceptions of it, and even ideological, intellectual, and political uses of it—has been shaped as a result of the transmission of saga narratives in and around it over the course of many centuries.[10]

The process of developing ISM highlighted various methodological challenges inherent in any attempt to "map" this corpus of narratives. The nature of place-names and their propensity to change over time, to be moved or transferred from one place to another, to fall out of use and subsequently be brought back into the toponymicon presents one set of issues—in conjunction with landscape change, whether this is on

10 See, e.g., Wyatt, "The Landscape of the Icelandic Sagas"; Lethbridge, "The Icelandic Sagas and Saga Landscapes"; and Bolender and Aldred, "A Restless Medieval?"

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

account of human activity or natural geomorphological processes.[11] While the association of most place-names in medieval Icelandic written sources with geographical locations that bear the same name in contemporary landscapes is on the whole relatively secure, there are nonetheless some ambiguous or problematic cases. A recurrent theme in saga scholarship in the late nineteenth and twentieth centuries (explored in particular in introductions to textual editions of the sagas, in archaeological reports, in articles printed in local or regional publications, and in travel books on Iceland authored by foreign visitors) revolved around attempts to definitively identify such moot places. Such lines of enquiry were (and are still, when attempted) complicated methodologically, however, by literary critical assumptions regarding genre and the nature of these narrative works—which is to say, their assumed "historicity," or their lack of it.[12] My opinion is that an approach to the sagas as a narrative genre that acknowledges the ways in which places and landscapes in them are simultaneously real *and* imagined (drawing on the work of cultural geographer Edward W. Soja, and literary theorists Sally Bushell, Robert T. Tally Jr., and Bertrand Westphal, among others) is more productive, giving room for understanding the interactive and reciprocal relationship between narrative and place over time.

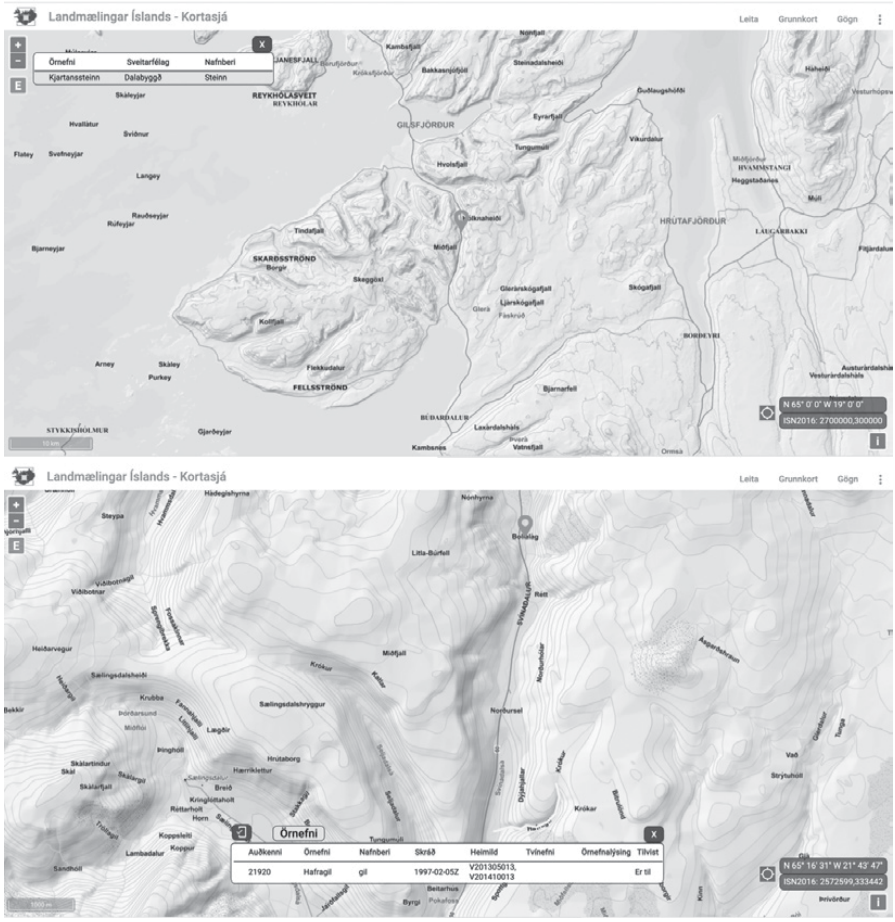
A good example to illustrate these points is the identification of Kjartanssteinn ("Kjartan's stone"), a large rock that the saga hero Kjartan Ólafsson is said to have had behind him as he fought off attackers, who, in the end, killed him on the spot. The story of Kjartan's last fight is told in *Laxdæla saga* (chapters 48 to 49), and the encounter is supposed to have happened somewhere in the Svínadalur Valley in the Dalir region, in west Iceland. The saga describes the immediate topography and mentions a gully called Hafragil (or Hafrsgil, a variant reading in some manuscripts), where the attackers hide before they ambush Kjartan, who is travelling south through the valley. The attack happens once Kjartan reaches this gully, and the saga narrator mentions the stone, which is where Kjartan tells his attackers to come and get him.[13] But nothing more is said about the stone in the saga narrative, and it is not given a name either in any extant textual witnesses. Today, a large boulder that sits in a prominent place some 4.5 km north of Hafragil is often given the name Kjartanssteinn and said to be the spot where Kjartan died, in the arms of his foster-brother Bolli, who delivered the killer blow. As can be seen from the screenshots (see Figures 3.2 (a) and (b)), Bolli is also commemorated in the present-day landscape in the place-name Bollalág ("Bolli's hollow"). Nineteenth- and twentieth-century scholars and commentators have made various attempts to "explain" the discrepancy regarding the lack of a large rock in the close vicinity

11 On instability in the Icelandic toponymicon, see, e.g., Sveinbjörn Rafnsson, *Byggðaleifar*, with regard to local areas in the east of Iceland. On landscape change in Iceland, see, e.g., Caseldine, Russell, Harðardóttir, and Knudsen, *Iceland*.

12 See, e.g., Callow, "Dating and Origins"; O'Connor, "History and Fiction"; and Grøsfjeld, *Sagakritikkens historie*.

13 "En þá Kjartan bar brátt at, er þeir riðu hart, ok er þeir kómu suðr yfir gilit, þá sá þeir fyrirsátina ok kenndu mennina. Kjartan spratt þegar af baki ok sneri í móti þeim Ósvífrssonum. Þar stóð steinn einn mikill. Þar bað Kjartan þá við taka." Einar Ólafur Sveinsson, *Laxdœla saga*, 152.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -



Figures 3.2 (a) and (b). Screenshots of LMÍ maps showing the locations of Kjartanssteinn, Bollalág, and Hafragil according to data in the LMÍ database. Images by Emily Lethbridge.

of Hafragil. Some supported the identification of the rock 4.5 km to the north as the "authentic" Kjartanssteinn but others disputed this identification, arguing, for example, that landscape change must be the cause of the lack of a large boulder near Hafragil, and that the boulder that had to have once been there—the "original" Kjartanssteinn—must have been swept away by spring thaws or some other natural process. The possibility that the boulder might have been a literary elaboration or adaptation on the part of the saga writer has not been allowed for, except in the context of this "proving" the sagas to be "unreliable" records for the events they describe.[14]

14 See, e.g., Sigurður Vigfússon, "Rannsókn," 67–69; Kålund, *Íslenskir sögustaðir*, 2:106; Þorsteinn Þorsteinsson, "Bærinn," 58; and Árni Björnsson, "Safnað."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Two other categories of saga place-names that presented challenges regarding "locating" and deciding on GIS coordinates for the purposes of displaying locations on the ISM map interface are 1) Icelandic toponyms that simply disappeared from the toponymicon at some point after the sagas were written down, and 2) places and place-names beyond Iceland that could not be accurately pinpointed. It is important to remember that, although the *Íslendingasögur* are very much anchored in Icelandic landscapes, Iceland is connected in these narratives to the wider world, and saga protagonists travel abroad regularly for trade, to gain honour, or on account of a sentence of outlawry, for example.[15] Thus, saga locations include places around Scandinavia (for example, at the courts of Scandinavian kings) and the British Isles, places further to the east (Grettir Ásmundarson, for example, is avenged in Constantinople), and further to the west: Greenland and North America. These places stand apart in certain ways from the examples discussed in the preceding paragraph, generally being higher-level—for instance, settlement names, and even whole areas—as is the case regarding regions on the eastern seaboard of North America, as described in *Eiríks saga rauða* and *Grænlendinga saga*, for example. Considerable academic (and public) debate has unfolded regarding where, for example, saga writers might have believed Helluland ("slab-land"), Markland ("forest-land"), Vín- or Vinland ("vine/wine-land"), Furðustrandir ("marvellous beaches"), Leifsbúðir ("Leifur's camp"), Krossanes ("cross peninsula"), Bjarney ("bear island"), Straumsfjörður ("current fjord"), Hóp ("lagoon"), and Kjalarnes ("keel peninsula") in North America to have been.[16] And what about Einfætingaland ("uniped-land")?[17] In each of these cases, for the purposes of the ISM map interface displaying a location, a pin was put down in the area believed in scholarly discussion to have been likely—but efforts have been made on the website and in print publications to underline the fact that the location of a pin ought not to be interpreted as a definitive statement regarding the location of such ambiguous toponyms.[18] In addition, work is ongoing on implementing an "(un)certainty scale" for individual toponyms that appear on the ISM user interface, along the lines of the solutions proposed by the "Literary Atlas of Europe" project.[19] The key point here is that what is being mapped is both real and imagined—and that the relationship between saga narrative and geographical place is complex, entangled, and dynamic.

15 See, e.g., Barraclough, "Travel"; and Jesch, "Geography and Travel."

16 See the detailed discussion in Gísli Sigurðsson, *The Medieval Icelandic Saga*, especially at 272–302. As is very often the case, there is a political and ideological dimension to place-names and motivations for ascertaining their location: in this case, there is a history of indigenous erasure and white supremacy that needs to be acknowledged. See, e.g., Crocker, "What We Talk About," and, more generally, Höfig, "Vínland and White Nationalism."

17 See, e.g., Larrington, "Undruðusk þá," 112.

18 See, e.g., Lethbridge, "Digital Mapping," 25–26, where the issue of merging literary mapping or cartography with more "historical" GIS cartographic practices is discussed.

19 See further Reuschel and Hurni, "Modelling Uncertain Geodata."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Nafnið.is

Nafnið.is an online user interface that provides free access to scanned and searchable versions of documents in the place-name archive held by the Árni Magnússon Institute for Icelandic Studies in Reykjavík.[20] The parts of the archive that have been made accessible in the first iteration of the Nafnið.is project comprise approximately 12,000 items in mixed media (text documents, printed maps that have been annotated by hand, hand-drawn maps, images).[21] The project was funded by an infrastructure grant awarded by Rannís (Rannsóknamiðstöð Íslands, the Icelandic Centre for Research) in 2018, and by a University of Iceland grant awarded in 2020; the beta version of the database and user interface was opened for public use in December 2020.

The archive as it is today has a long history. The oldest document preserved in the collection is a handwritten register of names for fishing stations (Icelandic: *fiskimið*) off the coast of northern Iceland that were noted down in the mid-nineteenth century by Jón Klemensson, a local district sheriff (d. 1862). Another early set of documents includes handwritten working drafts, along with finished versions in fair copy, of place-name registers for individual farms in parts of southern Iceland; these registers were put together by Brynjúlfur Jónsson (d. 1914), who was a pioneering figure in the earliest efforts to collect Icelandic place-names on an organized, farm-by-farm basis in the early twentieth century. After Brynjúlfur's time, place-name collection became one of the official responsibilities of Hið íslenzka fornleifafélagið (the Icelandic Archaeological Society), and individuals were given grants to fund the necessary fieldwork.[22] Documents from these times include place-name registers for Bárðastrandarsýsla in western Iceland, assembled in the 1930s by Samúel Eggertsson. Place-name registers compiled by individuals working as part of the Icelandic Archaeological Society's initiative were held by Þjóðminjasafn Íslands (the National Museum of Iceland) until the establishment in 1969 of a special division within the Þjóðminjasafn, Örnefnastofnun Þjóðminjasafns (the National Museum of Iceland's Place-Name Institute), whose sole responsibility was the collection and curation of place-name material. Þórhallur Vilmundarson was appointed head of this new division, which later became autonomous in 1998 under the name Örnefnastofnun Íslands (the Place-Name Institute of Iceland), with Svavar Sigmundsson as its head. Finally, in 2006, Örnefnastofnun Íslands became part of the

20 See https://nafnið.is and https://nafnid.is (both accessed May 9, 2021).

21 Other items in the archive include working materials produced by the Danish army as part of its surveying work in the early twentieth century; working materials produced by Samúel Eggertsson (d. 1949), a cartographer, designer, and place-name collector; card indexes that contain, e.g., registers of Icelandic place-names in North America, and place-names that occur in medieval charters (*fornbréf*); various accessions books; and records of meetings held by the Örnefnanefnd Íslands (Place-Name Committee of Iceland).

22 In an account of the annual meeting for 1918, the suggestion that "að félagið gengist fyrir því að safna örnefnum um allt land og skrásetja þau" ("that the group should organize the collection of place-names around the country, and register them") was agreed upon. See Hið íslenska fornleifafélag, "Skýrsla," 36.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Árni Magnússon Institute for Icelandic Studies, and the place-name collection became the responsibility of the onomastics department (Nafnfræðisvið) of this research institute.[23]

The work of Örnefnastofnun Þjóðminjasafns and, subsequently, Örnefnastofnun Íslands centred heavily around filling out the existing place-name record of Iceland on an organized basis so that records existed of place-names used (or known of) on all farms in Iceland.[24] To this end, older records were revised and expanded, and questionnaires were sent out that asked for more detail about certain points (e.g., the orthography and/or origins of certain place-names, what landscape features place-names referred to, information about farming practices, folktales associated with place-names, etc.). The core of the Icelandic place-name archive that has just been digitized and opened to the public and to researchers is thus an extensive corpus of documents that differs in certain respects from many other Scandinavian place-name collections in being a set of descriptive records of individual farm estates, rather than card-indexed records of toponyms accompanied by, for example, notes on pronunciation, alternative spellings, or written sources. Whereas, earlier in the history of place-name collection in Iceland, prominent figures such as Björn M. Olsen and Kristján Eldjárn noted how far behind other Scandinavian countries Iceland was in getting such initiatives going, the result of the great efforts put into collecting not only the place-names themselves but also huge amounts of contextual detail (environmental, agricultural, cultural, linguistic) makes the archive today an extraordinarily rich repository of information about the landscape of Iceland.[25] As well as including some half a million toponyms (many of which are micro-toponyms), the records were produced over a period of time when human interaction with the landscape was changing suddenly and dramatically in a myriad of ways, partly as a result of the introduction of technological advances in agriculture, partly as the result of a shift in settlement patterns, previously stable for many centuries.

Building the Nafnið.is database and user interface was a large and complex project that required the coordinated technical development efforts of several individuals based at the Árni Magnússon Institute and at our partner institute, Landmælingar Íslands, as well as a team of students whose work was directed by me and my colleague within the onomastics department, Aðalsteinn Hákonarson. The students worked their way methodically through the archive, checking paper records against PDF files; cataloguing each document electronically in a Django web framework set up by the project programmers, Trausti Dagsson and Pétur Húni Björnsson; inputting information

23 For further details, see Svavar Sigmundsson, "Ortnamnsforskning"; and Jónína Hafsteinsdóttir, "Annáll."

24 Þórhallur Vilmundarson published a very detailed booklet covering all aspects of how to collect and organize place-name data in 1972 under the title "Leiðbeiningar um örnefnaskráning."

25 Björn M. Ólsen, "Rannsóknir"; Kristján Eldjárn, "Nokkrar leiðbeiningar." Björn M. Ólsen (1850–1919) was the first rector of the University of Iceland and professor of Icelandic language and culture from the university's founding in 1911. Kristján Eldjárn (1916–1982) was an archaeologist, head of the National Museum of Iceland, and, between 1968 and 1980, president of Iceland.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

in each case about the type of document, primary collector, and informants (adding their dates of birth and death when possible); and checking over the OCR-generated list of place-names associated with each individual document. Each document was assigned a geographical location so that the distribution might be displayed in the map view section of the user interface; where possible, GIS coordinates for individual toponyms in respective documents also appear, with that data drawn from the Landmælingar Íslands database.[26] Other work (some of which is ongoing) involved scanning documents that did not exist in digital form, typing up documents that existed only in handwritten copy (and therefore could not be put through the OCR process developed for extracting text and place-names from the text corpus), and building an API to enable those users wishing to download the data directly themselves; see Figure 3.3 for a diagram of the database's entity relationships.[27]

The search interface enables the user to input a place-name (this might be a landscape feature, or a farm name, for example), and the search returns all results for that toponym. Filters that can be applied to search results include geographical area (county or parish) and type of document (place-name register, follow-up questionnaire, answers to questionnaires, maps, etc.); date of production will be added as a filter in the future. Alternatively, the collection can be browsed "from above," by region, so that all records for a defined area can be identified using the map view. Once a specific record is selected (whether via a point on the map, or the title of a document that appears in the list of search results), the document itself can be viewed (and downloaded) via a PDF viewer, and the list of place-names included in it are displayed in alphabetical order. Searches can be saved, with individual files bookmarked for later inspection. The structure of the database also allows users to move from one record to another on the basis of individuals who are associated with any single document (whether collectors or informants). Although there is, naturally, room for improvement in certain areas, the website nonetheless enables unprecedented access to these important materials, and its launch was hailed as a significant milestone in the Árni Magnússon Institute's efforts to make its collections more accessible to researchers and the general public alike.

26 At the time of writing, only approximately one-quarter of the toponyms recorded in the archive have been given GIS coordinates and are entered in the Landmælingar Íslands database.

27 The website and the data are published under a CC-BY 4.0 licence. This is in line with the open-access implementation policy adopted by the Árni Magnússon Institute for Icelandic Studies (see further https://arnastofnun.is/is/stefna-um-opinn-adgang-og-opin-gogn), itself part of the "opin gögn" (open data) policy (https://opingogn.is) and the "opin vísindi" (open science) policy (https://opinvisindi.is) supported by the Icelandic government. Landmælingar Íslands is a leading open-access data provider in Iceland, having taken steps to implement the European Commission's INSPIRE Knowledge Base regarding infrastructure for spatial information in Europe (see https://inspire.ec.europa.eu; accessed May 9, 2021), and following Open Geospatial Consortium standards (www.ogc.org; accessed May 9, 2021). See details at https://leidbeiningar.lmi.is/opin-gogn-lmi (accessed May 9, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

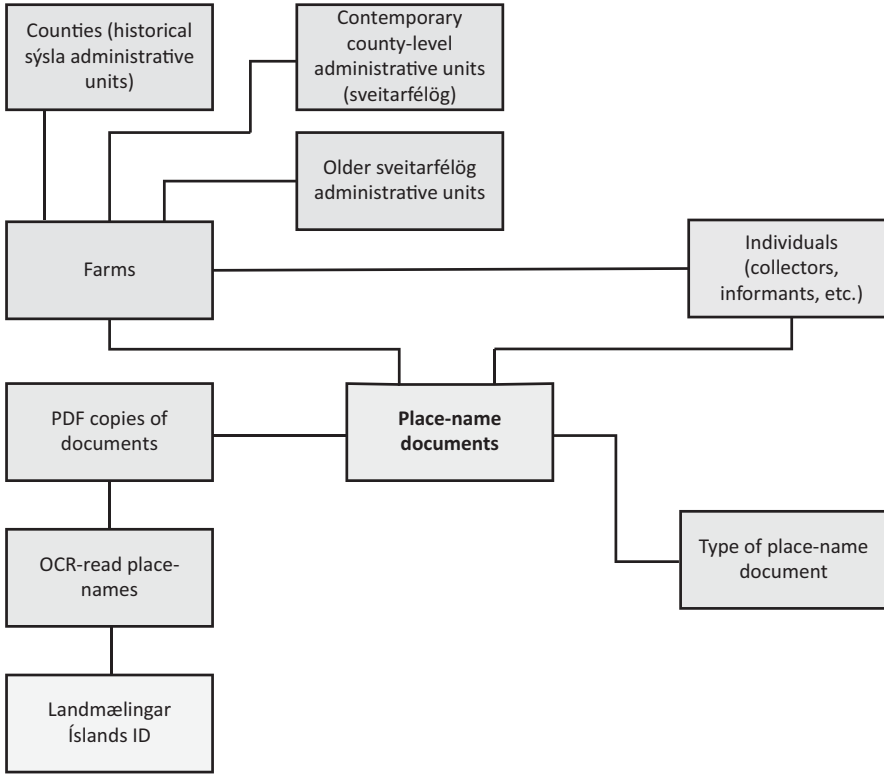


Figure 3.3. Entity relationship diagram of Nafnið.is backend.
Image by Pétur Húni Björnsson and Emily Lethbridge.

Case Study: Grettir Ásmundarson and His Place in the Icelandic Landscape

In this case study, *Grettis saga Ásmundarsonar* (*The Saga of Grettir Ásmundarson*) has been selected to demonstrate some of the ways that the two spatial data tools under focus here, ISM and Nafnið.is, might be utilized in tandem to explore the narrative and its place in the Icelandic landscape, past and present, from a spatial perspective.

Grettis saga and Icelandic Saga Map

The action of *Grettis saga* takes place for the most part in the tenth century and early eleventh century, though, in the largely stable version that is preserved in extant manuscripts, it is thought to have been written in the fourteenth century. The main narrative of *Grettis saga* tells the story of how Grettir, the most famous of all Icelandic outlaws, was sentenced to outlawry but survived, on the run, around Iceland for nearly 20 years. Before Grettir is introduced to the story, something of his family history is told, including the circumstances of his grandfather's emigration from Norway to Iceland.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

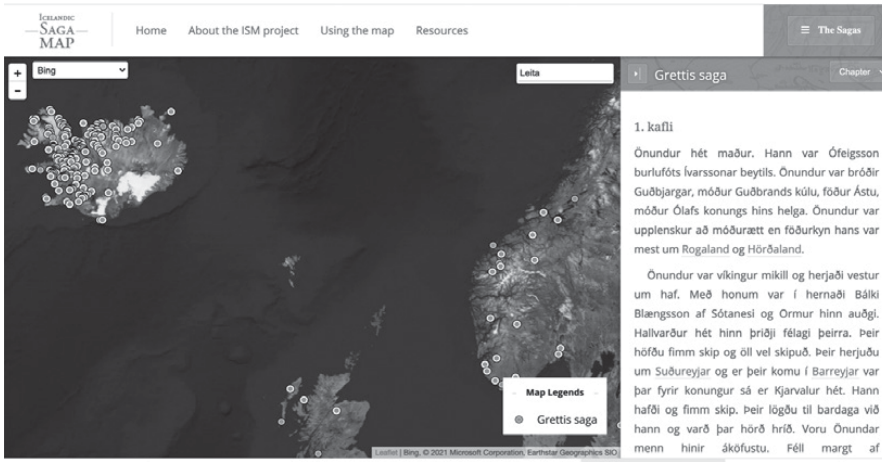


Figure 3.4. Screenshot of Icelandic Saga Map showing geographical places named in *Grettis saga*. Image by Emily Lethbridge.

Selecting *Grettis saga* on the ISM website brings up all the point data associated with it (that is, all the place-names that it was possible to geo-reference), and we have a clear picture of how this narrative is spatially situated or anchored (see Figure 3.4, a screenshot of ISM that shows geographical places named in *Grettis saga*). Iceland is, unsurprisingly, the geographical focus point of the narrative, but places elsewhere in Scandinavia and even beyond are part of the narrative too; Grettir's death, related at the end of the saga, is avenged by a brother in Constantinople, as already noted above. From this visualization, something of an insight into the worldview of medieval Icelanders can be extrapolated: we get a sense of places beyond Iceland that saga audiences would be familiar with, on the basis of their mention in saga narratives at least.

Querying the data in the ISM database, we can do more than just look at where action in *Grettis saga* takes place. The total number of places named in *Grettis saga* with spatial coordinates in the database is 286; these places are mentioned on 519 occasions.[28] Of all the places that are geo-referenced, those that are mentioned most frequently over the course of the narrative are 1) Bjarg (nineteen references), 2) Norway (sixteen references), 3) Drangey (fourteen references), 4) Iceland (thirteen references), and 5) Borgarfjörður (nine references). The data thus give us a quantitative basis on

28 Note that a manual count of places in *Grettis saga* in the index of the Íslenzk fornrit edition gives 292 place-names (including, e.g., names of thing sites, country names, area names); a handful of places have not made it into the ISM database on the grounds that GIS coordinates could not be decided. It is worth making the point that, here (and elsewhere in the discussion), figures given for numbers of place-names, etc., will always be somewhat uncertain, not least because of variation between manuscript witnesses of the same saga, for example, or later editorial interventions or decisions.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

which to back up assumptions regarding the places that are of greatest importance, or have the greatest prominence, in the narrative. From reading the saga, it comes as no surprise that Bjarg, Grettir's birthplace and family farm, should be the place that is named most often. Movement between Norway and Iceland is a key dynamic of the saga too—both in the early part, which describes Grettir's grandfather's emigration from Norway to Iceland, and in Grettir's own story, which includes travel to Norway from Iceland, and back (it is in Norway that the event leading to his sentence as an outlaw occurs: the accidental burning of a group of merchants in a hall). Drangey is the island in Skagafjörður in northern Iceland where Grettir spends the last three years of his life, before he is killed there by his enemies; Borgarfjörður is a region in the west of Iceland where Grettir spends time in hiding—under the protection of Björn in Hítardalur, for example, and in adjoining highland areas such as Arnarvatnsheiði.

Since every place-name entered into the database has a place type associated with it, we can also query the data to establish the types of place that are most common, and least common.[29] We find that, of the 286 discrete places that are named in *Grettis saga*, 102 are farms (mentioned on 186 occasions in total); forty-one are regions or large areas (such as Borgarfjörður, mentioned on sixty-seven occasions); eighteen valleys are named (mentioned on twenty-nine occasions); seventeen fjords (mentioned on forty-one occasions); eleven rivers (mentioned on fifteen occasions); ten islands (mentioned on twenty-nine occasions); eight harbours (mentioned on twelve occasions); eight countries (mentioned on thirty-eight occasions); seven hills (mentioned on eight occasions); seven assembly sites (mentioned on eleven occasions) … and so on. Conclusions drawn on the basis of these figures will inevitably be subjective to some degree, not least since the place type framework adopted for the ISM data was created on an ad hoc basis and not extrapolated from any existing ontology, such as CIDOC-CRM or Historic Landscape Characterisation.[30] In addition, the figures need to be taken as a guide suggesting trends rather than as absolute, not least on account of human fallibility, as well as because of differences between extant manuscript witnesses of any given saga, and, equally, between different editions of a saga. Nonetheless, together with qualitative readings of the saga, the varying proportion of different place types that occur in the *Grettis saga* narrative might be seen to constitute the saga's unique "topographical stamp" or topographical signature. We might not need data to tell us that *Grettis saga* takes place over a wide geographical area (hence a large number of farms),

29 The place types are not exhaustive and were identified in the early period of working on the project. They are, broadly speaking, divided into three categories: place types or landscape features associated with human settlement or landscape intervention (e.g., farms, outbuildings, fields, etc.); natural features (e.g., hills, moors, bodies of water, etc.); and political or administrative units of varying sizes (e.g., administrative areas and also countries). A useful future refinement would be to standardize the place types so that they are in line with, e.g., the place types used by Landmælingar Íslands in its database (see www.lmi.is/static/files/ornefni/birtingarflokkar-list_100120_bg.pdf; accessed May 9, 2021).

30 See www.cidoc-crm.org and https://historicengland.org.uk/research/methods/characterisation/historic-landscape-characterisation (both accessed May 9, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

nor the fact that Grettir's many years as an outlaw probably constitutes one explanation for the many regions or local areas that features in the narrative, for example. But there may well be something more in such patterns or characteristics: is eleven rivers a high number of rivers on average for a saga in this corpus? Or eight harbours? Or ten islands? Concurrently, what place types appear only rarely, or not at all? Significant patterns might conceivably be seen more clearly, too, if the equivalent data for other sagas were to be analyzed in the same way alongside the *Grettis saga* data. This is something for a later paper, however.

I will turn now to look at a subgroup of toponymic data derived from *Grettis saga* that provides a link to the next question to be considered as part of this case study: that of the transmission of the saga in the context of the landscape. This dataset comprises twenty-six place-names mentioned in the saga for which etymologies (folk etymologies in some but not necessarily all cases) are provided. These etymologies are either explicit (i.e., the toponym is said to have arisen on account of a character's involvement in a specific event that is recounted in the saga narrative itself) or implicit (i.e., when an anthroponym that forms part of a compound toponym is attached to a character in the narrative said to live at the place in question).[31] In total, there are fifteen examples of the latter category of place-names, whose origins are implicitly assumed to be associated with a character who appears in a narrative context in the saga. These are:

- *Bálkastaðir* (farm associated with Bálki; chap. 5);
- *Ófeigsstaðir* (farm associated with Ófeigur; chap. 6);
- *Þrándarholt* (farm associated with Þrándur; chap. 6);
- *Grettisgeil* (path associated with Ófeigur Grettir; chap. 10);
- *Ingólfsfjörður* (fjord associated with Ingólfur; chap. 11);
- *Eyvindarfjörður* (fjord associated with Eyvindur; chap. 11);
- *Ásmundargnúpur* (mountain/farm associated with Ásmundur; chap. 13);
- *Torfustaðir* (farm associated with Skáld-Torfi; chap. 15);
- *Auðunarstaðir* (farm associated with Auðunn; chap. 15);
- *Ásgeirsá* (farm associated with Ásgeir; chap. 15);
- *Böðvarshólar* (farm associated with Böðvar; chap. 30);
- *Þórhallsstaðir* (farm associated with Þórhallur; chap. 32);
- *Hjaltadalur* (valley associated with Hjalti; chap. 70);
- *Höfðaströnd* (coastal area associated with Höfði; chap. 70);
- *Steinsstaðir* (farm associated with Steinn; chap. 70).

The origin of the place-name Drangey ("rock-stack island") is implicitly suggested in its appearance, as described to Grettir by his uncle in chapter 67. A further ten place-names that are mentioned in the saga are accompanied by explicit etymological anecdotes

31 All these place-names are geo-referenced and can be searched for on the ISM website map interface.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

(as per the first etymological category described above); here, the action described in the saga is directly commemorated in the landscape in specific toponyms. These toponyms are:

- *Tréfótshaugur* ("tree-leg's mound," a burial mound where Grettir's grandfather Önundur tréfótur is said to have been buried; chap. 11);
- *Grettishaf* ("Grettir's lifted stone," a stone that Grettir lifts up from the ground to demonstrate his strength, and that subsequently bears this name; he does this on three separate occasions in the saga, in three different places; chaps. 16, 30, 59);
- *Spjótsmýri* ("spear-mire," a bog where Grettir is said to have lost his spear; chap. 49);
- *Grettisoddi* ("Grettir's point," a spit where Grettir fought a battle; chap. 60);
- *Þórisdalur* ("Þórir's valley," a valley that Grettir names after the giant, Þórir, who lives there; chap. 61);
- *Hæringshlaup* ("Hæringur's leap," a cliff on Drangey off which a man called Hæringur jumps; chap. 76);
- *Grettisbúr* ("Grettir's pantry," a shed in which the man who kills Grettir, Þorbjörn öngull, keeps Grettir's severed head, preserved in salt; chap. 82);
- *Grettisþúfa* ("Grettir's hummock," a mound somewhere in the elevated Stórisandur highland area where Þorbjörn öngull abandons Grettir's head and buries it; chap. 84).

These ten places are all in the west and north of Iceland, with one cluster in Hrútafjörður (where Grettir was born), another cluster in the north on Drangey (where Grettir was killed) and the nearby mainland (where his body was taken to), and a third cluster in Hítardalur (where Grettir hid out for some years with the help of a friend). Other single points are in the Strandir area of the West Fjords, where Grettir's paternal grandfather settled and was buried, and north of the Þingvellir national assembly site; two other points are in the western part of the Icelandic highlands. It is perhaps not surprising that these explicit etymological anecdotes are attached to place-names that are themselves near significant places in the saga and in Grettir's life, according to the saga narrative. These places may well have had a special resonance in oral tradition: orally transmitted tales about Grettir were probably passed down from one generation to the next until the time came when these tales were combined into a written whole. Ultimately, though, it is not possible to know when these ten place-names came into existence and whether or how much they pre-date the composition date of the saga itself in the textual form that we know it (believed to be in the late thirteenth, or even fourteenth, century).[32] The processual nature of the relationship between these narratives (in their oral form, which we can only guess at, and also in their written

32 For discussion about the age, place of composition, and authorship of the saga, see Guðni Jónsson's Íslensk fornrit edition of *Grettis saga* at lxviii–lxxv. Guðni Jónsson (xlvii, n1) notes that the saga itself indicates that the place-name Spjótsmýri (ON: Spjótsmýrr) did not come into existence before the late thirteenth century: the saga records how the spear was found in the latter years of Sturla Þórðarson's life (1214–1284).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

forms) is one of the most fascinating aspects of a spatial-data-based approach to the saga corpus. Place-names were clearly an important source for saga-writing: in the course of creating sophisticated, literary written works, authors and/or scribes drew on toponymical etymologies that in many cases may have circulated previously in oral tradition, but nonetheless have been "invented" at a time later than that to which they purport to date according to their saga narrative context. The Icelandic landscape and individual topographical features gave rise to saga narratives: anecdotes were drawn out of the landscape and commemorated in it. Even once the sagas were written down, the landscape still played a vital role in transmitting the stories, which were worked out in detail on parchment.[33]

The final set of data that we can extract from the ISM database and query is information about manuscripts that preserve texts of *Grettis saga*, and the places around Iceland these manuscripts have been associated with from the time of their production until their accession into the collections in which they are held today. On the basis of the large number of parchment and paper manuscripts in which *Grettis saga* is preserved—as well as the evidence of various poetic rewritings of the narrative, such as those in the *rímur* form, for example—it can be assumed that *Grettis saga* has always been among the most popular *Íslendingasögur* in Iceland from the medieval period to modern times.[34] In an article published in 2000, Guðvarður Már Gunnlaugsson provided a detailed survey of *Grettis saga* manuscripts, counting fifty-eight in total. Of these fifty-eight, three are parchment manuscripts from the fifteenth century; two are parchment manuscripts from the sixteenth century; twenty-seven are paper manuscripts from the seventeenth century; twenty-one are paper manuscripts from the eighteenth century; and five are paper manuscripts from the nineteenth century.[35] Information about each of these fifty-eight manuscripts was added to the ISM database. As well as the manuscript shelfmark and contents (i.e., other sagas or other texts), individuals who are known to have been associated with respective manuscripts are catalogued (with a note made of their role where known—i.e., scribe, owner, borrower, etc.), together with geographical places or areas associated with the manuscripts (i.e., place of production, where known; or places where they were kept under the ownership of known individuals). The information was gathered from several sources: Handrit.is was the main source, but other printed catalogues for collections that hold Icelandic manuscripts were consulted when necessary, as well as published scholarship such as (in the case of *Grettis saga*) the aforementioned article by Guðvarður Már Gunnlaugsson.[36]

33 See further Lethbridge, "The Icelandic Sagas and Saga Landscapes."

34 See Hastrup, "Tracing Tradition," on *Grettis saga* and its popularity in Iceland from medieval to modern times; see also Guðvarður Már Gunnlaugsson, "Grettir."

35 Guðvarður Már Gunnlaugsson, "Grettir," 61.

36 See https://handrit.is (accessed May 9, 2021). Handrit.is is the online catalogue for Icelandic manuscripts kept in major collections at the Árni Magnússon Institute for Icelandic Studies, Reykjavík; the National and University Library of Iceland, Landsbókasafn Íslands – Háskólabókasafn;

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

From the information collated thus far, around fifty places have been identified that are associated with extant manuscripts preserving a text of *Grettis saga*. The majority of these places are in Iceland but some locations associated with manuscripts are elsewhere in Scandinavia (Copenhagen, Uppsala, Stockholm, Bergen, Oslo), Britain (London, Oxford), and Germany (Rostock), for example.[37] For all manuscripts, the place where they have ended up (i.e., the geographical location of the collection in which they are preserved) is known. Often, however, the place of origin and/or the locations of other places where manuscripts were kept or owned (i.e., geographical information relating to their subsequent provenance) may be only partially known. In general, more information is available regarding where post-medieval Icelandic paper manuscripts were produced, since scribes often provided their name and noted the place and date of writing in a colophon in these copies. With only a very few exceptions, such scribal colophons are not found in medieval parchment manuscripts, and thus other evidence (primarily paleographical) must be marshalled to ascertain place and date of production. Information about provenance—who owned a manuscript after its production, and where they kept it, for example—is sometimes gleaned from ownership inscriptions or other marginalia. The overall picture regarding the geographical distribution of places where manuscripts were produced and later kept or owned is thus uneven, especially with regard to the older, parchment manuscripts. But, even allowing for incompleteness, map-based visualizations of the data that can be gathered still have the potential to help identify trends and patterns concerning the production and dissemination of saga texts, such as varying regional interest in one or other saga over time.

Exporting the data into an online custom base map program such as Google Maps, for example, we can sort and display the spatial data according to century, place of origin, and final place, as well as seeing multiple places associated with a selected manuscript, which gives us an idea of how far and where this particular manuscript has travelled over its lifetime (see Figures 3.5 to 3.8).[38] A detailed analysis of the data and discernible patterns is beyond the scope of this chapter, but it is interesting to note tendencies such as the fact that most manuscripts containing *Grettis saga* are associated with locations in the northwest and north of Iceland (the West Fjords, Skagafjörður, Eyjafjörður), with another cluster in the southwest. Hardly any manuscripts with *Grettis saga* texts seem to have been in circulation in eastern Iceland, at least on the basis of the evidence available. Further avenues for analysis emerge when the manuscript data for *Grettis saga* are combined with data for places named in the saga: the spatial data can help us to identify the cases in which manuscript scribes and/or owners were copying and reading *Grettis saga* in, or very near to, key places in the saga narrative itself—i.e., in the north,

---

and the Arnamagnæan Institute repository, Department of Nordic Studies and Linguistics, University of Copenhagen.

37 Yet more manuscript witnesses of *Grettis saga* may be among Icelandic manuscripts that ended up in private or local collections in North America, having travelled west with Icelanders who emigrated in the nineteenth and early twentieth centuries. See Parsons, "Albert Jóhannesson."

38 See https://google.com/maps (accessed May 9, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

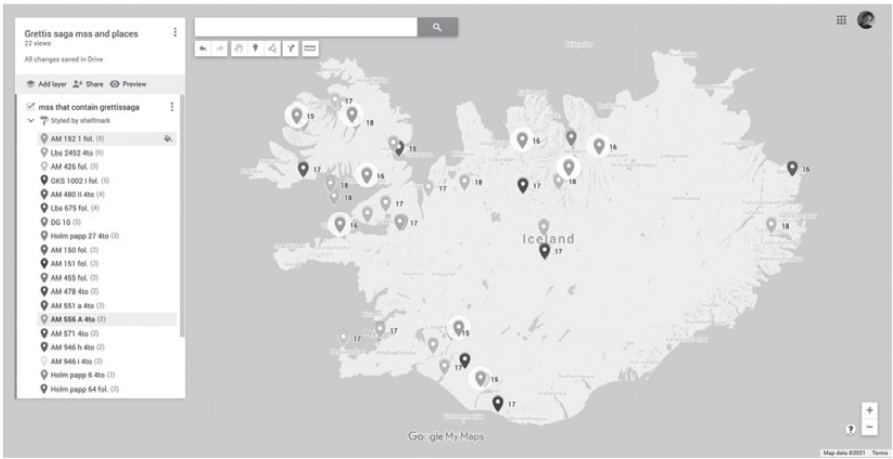


Figure 3.5. Screenshot of Google MyMaps interface showing geographical places associated with *Grettis saga* manuscripts, organized by manuscript shelfmark. Image by Emily Lethbridge.

Figure 3.6. Screenshot of Google MyMaps interface showing geographical places associated with *Grettis saga* manuscripts, organized by date of manuscript. Image by Emily Lethbridge.

where Grettir was born and died (see Figure 3.9). We might reasonably expect that, in these areas, oral traditions about Grettir would have been more widespread. The idea, too, that people might have read aloud from a manuscript containing *Grettis saga* on a farmstead that is named in the saga itself gives rise to a certain suggestion of resonance, with narrative and local landscape fusing together. In this respect it is perhaps not surprising that significantly fewer manuscripts are associated with places in the east since this part of the country plays only a minimal part in the narrative. Being able to

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

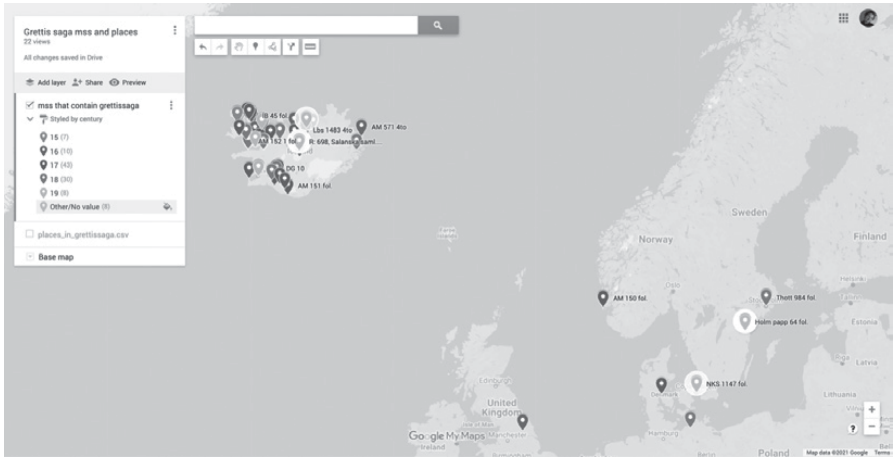


Figure 3.7. Screenshot of Google MyMaps interface showing geographical places associated with *Grettis saga* manuscripts, organized by date of manuscript and showing manuscript locations outside Iceland. Image by Emily Lethbridge.

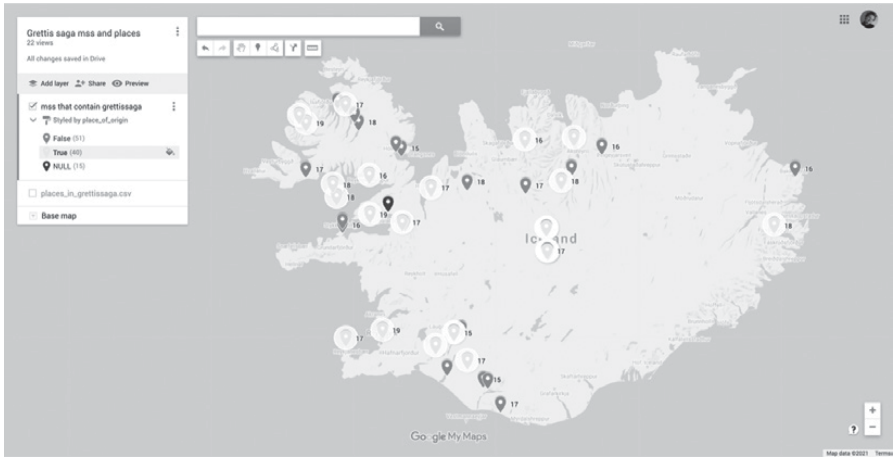


Figure 3.8. Screenshot of Google MyMaps interface showing geographical places associated with *Grettis saga* manuscripts, organized by place of origin (true/false). Image by Emily Lethbridge.

combine data about places named in the *Grettis saga* narrative with places where the narrative was physically consumed (whether read aloud directly from the manuscript, extemporized orally with the manuscript as a prop, or read silently, as examples of three possible scenarios) opens up the possibility for more granular, case-study-based considerations of the saga's literal dissemination in the physical (but also culturally constructed) landscape.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

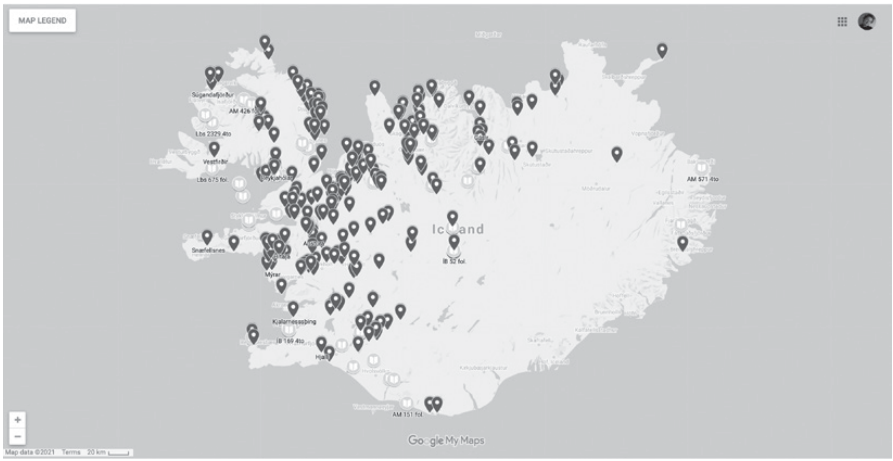


Figure 3.9. Screenshot of Google MyMaps interface showing geographical places associated with *Grettis saga* manuscripts and geographical places named in *Grettis saga*. Image by Emily Lethbridge.

Grettis saga and Nafnið.is

Turning to Nafnið.is, there are two simple methods to see the spatial data associated with Grettir Ásmundarson that is present in documents preserved in the place-name archive at the Árni Magnússon Institute for Icelandic Research. The first way involves searching for place-names that preserve the name "Grettir," by entering a search for "Grettis*," for example, to see what results are returned.[39] The second way involves selecting documents for key farms or other places named in the saga and reading through these records, looking for references to the saga and to place-names associated with saga characters and/or events. As already noted above, there are several place-names in the saga itself whose etymological origins are explicitly associated with Grettir and his personal name: Grettisoddi, Grettisbúr, Grettisþúfa, and three separate examples of Grettishaf. In what follows, I focus on these place-names and trace them in the place-name records, hoping to illustrate how these records correspond with, and make references to, the saga itself—or not, as the case may be.

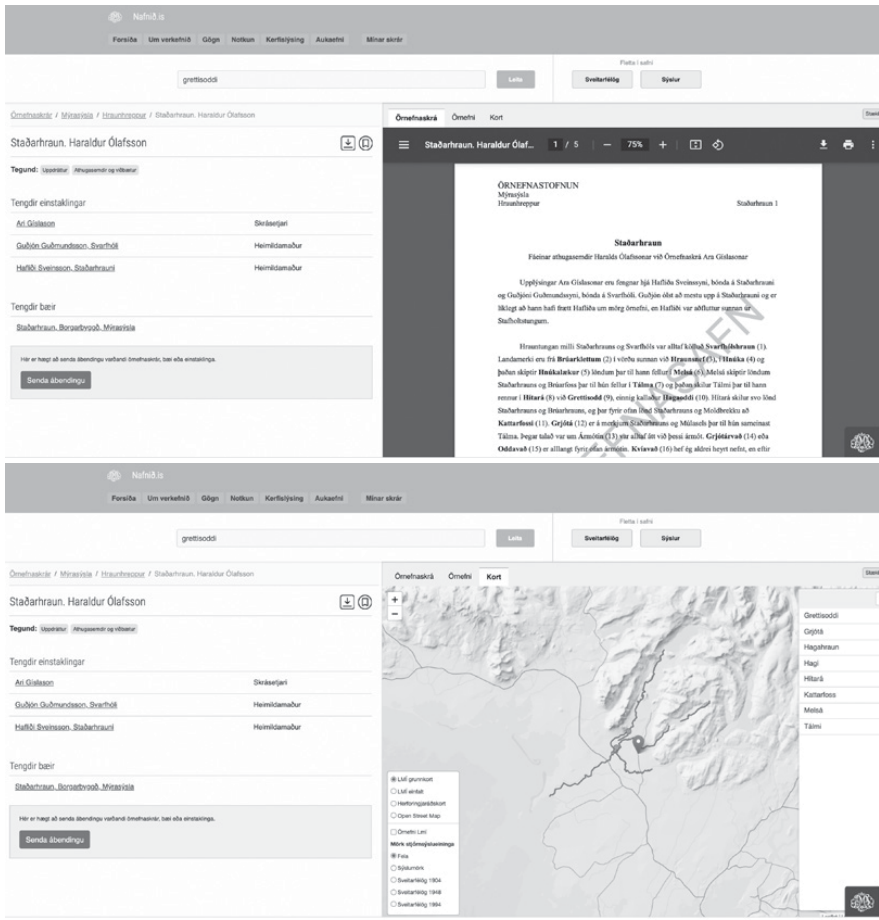
Grettisoddi

"Grettisoddi" is recorded in two documents: one for the farm Staðarhraun in Mýrasýsla, and the other for the neighbouring farm Hagi. The Staðarhraun record was put together by a certain Haraldur Ólafsson as a supplement to an older document for Staðarhraun compiled by the place-name collector Ari Gíslason in the 1960s; it adds to the place-names recorded by Ari and gives extra context and description (see Figure 3.10 (a)).[40]

39 Note that the asterisk enables a search of all place-names beginning with whatever precedes it.

40 See https://nafnid.is/ornefnaskra/15915 for the younger Staðarhraun record and https://nafnid.is/ornefnaskra/15914 for Ari's older record (both online records accessed May 9, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -



Figures 3.10 (a) and (b). Screenshots of Nafnið.is interface showing the place-name record for Staðarhraun and location of toponyms in the record (e.g., Grettisoddi) that have been given geographical coordinates. Images by Emily Lethbridge.

In Haraldur's record, the location of Grettisoddi is described as being where the river Tálmi runs into the river Hítará (see Figure 3.10 (b)); Grettisoddi is apparently also known by the name "Hagaoddi," according to Haraldur. The record for Hagi was compiled by Ari on the basis of information from the same informants as for Staðarhraun. In it, "Grettisoddi" is named in the context of describing a grassy, low-lying area south of the farm, variously known as "Hagaoddi," "Grettisoddi," or "Orrustuoddi" ("Battle spit"). This source notes that the last name (i.e., Orrustuoddi) must be the more "correct" once, since it was here that Grettir fought against the men from the district of Mýrar.[41]

41 The place-name record is online at https://nafnid.is/ornefnaskra/15807 (accessed May 9, 2021). The Icelandic note reads: "Suður frá bæ tekur svo við láglendi allmikið og grasi vaxið svæði.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Grettisbúr

A search for Grettisbúr, said in the saga to be on the estate of the farm of Viðvík in Skagafjörður, north Iceland, returns no results in Nafnið.is. No reference to the place-name could be found in other written sources, confirming the assumption that it has disappeared from the used toponymicon, although it is not possible to say whether this might have happened in the medieval period or at some later point in time.[42] When the Danish philologist Kristian Kålund (1844–1919) was in the area in the 1870s, conducting the historical-topographical research that was published in 1882 under the title *Bidrag til en historisk-topografisk Beskrivelse af Island*, he drew a blank, although he did note that a certain stone near one of the Viðvík outbuildings was said to mark the burial place of another character in the saga: the witch and foster-mother of Grettir's enemy, Þorbjörn öngull, the farmer of Viðvík.[43] This oral tradition is found in one of the documents for Viðvík in the place-name archive. The record in question is a document compiled by a certain Björn Jónasson at the behest of Margeir Jónsson (1889–1943) a place-name collector who worked extensively at amassing records in the north of Iceland on behalf of the place-name division at Þjóðminjasafn Íslands. In a footnote, Björn notes that, when he was around twenty years old, he had heard an old man who lived at Viðvík as a child, and who died around 1925, say that near the dairy, there was once a small hill or mound believed to be the grave of this malevolent female character. *Grettis saga* describes how this woman uses magic to bring about the circumstances that lead to Grettir's death. Moreover, according to Björn's account, the spot was thought to be haunted or cursed, and the old man had once seen a small and evil-looking old woman by the mound, though Björn could not remember the details of her dress as they were given to him then, apart from that she had some kind of a dark head-dress and big horn buttons on a black outer garment.[44]

Þetta hefur verið nefnt ýmsum nöfnum, Hagaoddi (18), Grettisoddi (19) eða Orrustuoddi (20), og mun það nafn vera það rétta. Þar barðist Grettir við þá Mýramenn" ["To the south of the farm is a big stretch of low-lying land and a grass-covered area. This has been known by several names, Hagaoddi (18), Grettisoddi (19) or Orrustuoddi (20), and this latter name must be the correct one. It is there that Grettir fought with the men from Mýrar"].

42 Other Icelandic sources checked include the corpus of medieval charters (Íslensk fornbréf), Árni Magnússon and Páll Vídalín's *Jarðabók* from the early eighteenth century, Eggert Ólafsson and Bjarni Pálsson's *Ferðabók* from the mid-eighteenth century, and Sveinn Pálsson's *Ferðabók* from the late eighteenth century.

43 Kålund, *Íslenskir sögustaðir*, 3:59.

44 The place-name record is online at https://nafnid.is/ornefnaskra/18960 (accessed May 9, 2021). The Icelandic text reads as follows: "Þegar ég var um tvítugt, heyrði ég gamlan mann, sem í æsku dvaldi í Viðvík, Rögnvald Jónasson á Þröm, d[áinn] um 1925?, segja frá því, að örfáa faðma frá fjósinu hefði verið lítill hóll eða stór púfa og gamlir menn hefðu sagt, að þar væri dysjuð fóstra Þorbjarnar önguls (sjá Grettissögu), er drap Gretti með gjörningum. Voru púfur þar í kring og sagði karl, að reimleikaorð hefði legið á þessum stað. Einu sinni kvaðst hann hafa séð þar kerlingu (hjá hólnum), lága vexti, en afar gildvaxna, með stóra, dökka skuplu á höfði og ófríða og illilega á svipinn. Hann lýsti búningi hennar að nokkru, en ekki man ég þá lýsingu með vissu, nema stórir hornhnappar voru í sauðsvartri utanhafnarspjör, sem hún var í."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Grettisþúfa

Grettisþúfa (the spot where Þorbjörn öngull abandoned Grettir's head in chapter 84 on his way to the Alþingi) is said in the saga to be somewhere in the elevated highland area known then as "Sandur" (and today as "Stórisandur"), north of Langjökull in west Iceland, across which lay the old Skagfirðingavegur route between districts. While no spot with this name has been recorded as identifiable in the past couple of centuries or so, and possibly earlier (as with Grettisbúr, it is not possible to ascertain when the place-name fell out of use), some have suggested that the landmark known as Grettishæð may be the feature to which the earlier Grettisþúfa referred.[45] A document by Björn Bergmann recording Stórisandur place-names (just under eighty in total) in the place-name archive makes this assertion ("mun vera sami staður og nefndur er Grettisþúfa í Grettissögu" ["must be the same place as that which is called Grettisþúfa in *Grettis saga*"]).[46] A search for "Grettisþúfa" in Nafnið.is, however, does come up with a result, though in the place-name record for the farm of Bjarg.[47] Compared with some place-name records, this document is short and there is no context or explanation for the name "Grettisþúfa" here, though other sources (including the oral source of the current farmer) assert that the name marks the spot in the homefield at Bjarg where Grettir's head was eventually buried. Chapter 84 of the saga states that Grettir's head was buried at Bjarg by the church there; no church remains on the site today. The spot was protected in law in 1931 by Matthías Þórðarson, head of Þjóðminjasafn Íslands and in charge of Icelandic antiquities at the time, and it has never been excavated. When I interviewed the present farmer in 2011, he said that bad consequences would ensue if the spot was interfered with; this sounds like a modern articulation of the widespread Icelandic folktale belief whereby certain patches known as "álagablettir" have a curse on them, and ill events come to pass if they are mowed or dug into.

Grettishaf

In the place-name record for Bjarg mentioned above, there are three references to large rocks that each have the name "Grettistak" ("Grettir's take/lift"). The saga does not mention these particular rocks in any context, though it does refer to three other boulders in other areas that Grettir lifts to prove his strength and to entertain himself. According to the saga, each of these three boulders is given the name "Grettishaf" after Grettir has performed his feat of strength, and the saga locates one by the Sleðaás ridge, near Þingvellir in southwest Iceland, where Grettir stops with others to eat before riding north after the Alþingi (chap. 16); the second at Hrútafjarðarháls in northwest Iceland, not very far from Bjarg (chap. 30); and the third on the mountain Fagraskógarfjall in west Iceland, where Grettir hides out for a time in the west of the country (chap. 59).

---

45 Geographic coordinates for Grettishæð: N 65° 3' 24'' W 19° 58' 33'', taken from the LMÍ online map interface, https://kortasja.lmi.is/mapview/?application=kortasja (accessed May 9, 2021).

46 See https://nafnid.is/ornefnaskra/18002 (accessed April 25, 2022). See also *Grettis saga*, 268n1.

47 See https://nafnid.is/ornefnaskra/25072 (accessed May 9, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Several instances of "Grettishaf" come up when the name is queried in Nafnið.is. In records for Þingvellir, however, a "Grettistak" is recorded but no "Grettishaf."[48] Similarly, no "Grettishaf" is documented in records that cover the area around the Hrútafjarðarháls ridge, but a "Grettistak" is located on the ridge.[49] In a record for the nearby farm of Þóroddsstaðir, the stone is mentioned in the context of a description of the area and landmarks near the old route over the ridge.[50] The large stone is said to be in the east of the Sandhólahraun lava field: "[T]his stone is known from *Grettis saga*, and Grettir is supposed to have lifted it. Sigfús Jónsson estimates the stone to weigh about ten tons, and it lies on a smooth whaleback rock base, in such a way that its two corners rest on the base and another little stone is wedged underneath it. This is a very unusual position and it is unbelievable that Grettir lifted this stone."[51] The record for another nearby farm, Sveðjustaðir, also mentions the "Grettistak" and states explicitly that it marks the boundary between the two farms of Þóroddsstaðir and Sveðjustaðir.[52]

Finally, in the place-name records for Hítárdalur, where Fagraskógarfjall is, no "Grettishaf" (or "Grettistak") is recorded, though Kristian Kålund notes the presence of a large stone or cliff "that is [the] Grettishaf named in the saga" under the mountain, on a sandy strip of land near the road.[53] The name "Grettisbæli" ("Grettir's lair"), on the other hand, is recorded in the place-name documents, as, for example, in a record for Hítárdalur.[54] *Grettis saga* describes how Björn Hítárdalskappi, a chieftain in the valley, suggests Grettir hides in a concealed place up on the mountainside, and Grettir lives there for three years: it's a strategically good place, according to Björn in the saga, and he refers to it as a *bæli*, or an animal's lair or bird's nest.[55] In one of the place-name

48 See https://nafnid.is/ornefnaskra/24648 (accessed April 25, 2022). See also https://ferlir.is/grettistak-undir-sledaasi (accessed May 9, 2021) for discussion about attempts to locate the stone.

49 Geographic coordinates for Grettistak: N 65° 14' 31'' W 21° 0' 50'', taken from the LMÍ online map interface, https://kortasja.lmi.is/mapview/?application=kortasja (accessed May 9, 2021).

50 The place-name record for Þóroddsstaðir is online at https://nafnid.is/ornefnaskra/25063 (accessed May 9, 2021).

51 The Icelandic in the place-name record for Þóroddsstaðir (link in previous footnote) reads: "Norðan við Skútadrög eru þrír hólar hver austur af öðrum, Lestarmannahólar (33), en eftir þeim lá gamli vegurinn yfir Hrútafjarðarháls. Austur af Lestarmannahólum tekur við stór urð, kölluð Sandhólahraun (34), og austarlega í því er stór steinn, nefndur Grettistak (35), á merkjum. Steinn þessi er þekktur úr Grettissögu, og á Grettir að hafa fengist við hann. Sigfús Jónsson áætlar, að steinninn sé um 10 tonn að þyngd, og hvílir hann ofan á hvalbaki, þannig að tvö horn hans standa niður úr og annar lítill stein er skorðaður undir hann. Er þetta mjög óvenjuleg staða og ótrúlegt, að Grettir hafi ráðið við steininn."

52 The place-name record for Sveðjustaðir is online at https://nafnid.is/ornefnaskra/25166 (accessed May 9, 2021).

53 Kålund, *Íslenskir sögustaðir*, 2:50.

54 Online at https://nafnid.is/ornefnaskra/15847 (accessed May 9, 2021).

55 The description in *Grettis saga* is in chapter 58. The Icelandic text reads: "Björn mælti: "At því hefi ek hugað at í því fjalli, sem fram gengr fyrir útan Hítará, mun vera vígi gott ok þó fylgsni, ef klóklega er um búit. Er þar bora í gegnum fjallit, ok sér það neðan af veginum, því at þjóðgatan liggr

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

records for the nearby farm of Moldbrekka we find the note that "east of the farm up under Grettisbæli are some level grassy areas called Sandengi. Above Sandengi … is a very high hill that comes out of the mountain and Grettisbæli is at the top of this. This whole mountain is now called Grettisbæli. People who have climbed up to Grettisbæli have told me that it looks different today to the description in *Grettis saga*."[56]

Other *Grettis-* toponyms in the place-name archive

A search for "Grettisbæli" in Nafnið.is brings up examples of this place-name in other areas. Indeed, when a search for "Grettis*" is input, approximately 150 or so results are returned. As well as the many examples of "Grettistak/tök" (more than fifty) and "Grettishaf" (around ten), other names include "Grettisdý," "Grettisflói," "Grettisgeil," "Grettisgjá," "Grettisgluggi," "Grettishagi," "Grettishella," "Grettishjalli," "Grettishlaup," "Grettishóll," "Grettishryggur," "Grettishylur," "Grettiskista," "Grettisklettur," "Grettiskví," "Grettislaug," "Grettislág," "Grettisleiði," "Grettislækur," "Grettismýri," "Grettisreitur," "Grettisskarð," "Grettisskáli," "Grettissker," "Grettisskriða," "Grettisskyrta," "Grettisspor," "Grettissteinn," "Grettisstillur," "Grettisstrengur," "Grettistangi," "Grettistjörn," and "Grettisvarða."[57] Guðvarður Már Gunnlaugsson notes in his article from 2000 that he came to a rough figure of around 120 place-names associated with Grettir after a loose search, and including twentieth-century names such as "Grettisgata" in Reykajvík, as well as other names related to *Grettis saga* but not containing the element "Grettir-" as the first part of the compound (e.g., "Hallmundarhellir," "Hallmundarhrauni," and "Skeggjahola" in Hvítársíða, "Ásdísarlundur" in Miðfjörður).[58]

Without mapping the location of each example returned by the Nafnið.is search, and looking at every record, it is not possible to say how many of these places are explicitly associated with Grettir Ásmundarson. We might of course expect a few of these "Grettir-" place-names not to be connected with him: other individuals naturally bore the personal name "Grettir," although it has never been a very common name in Iceland.[59] But one

---

niðri undir, en sandbrekka svá brǫtt fyrir ofan, at fáir menn munu upp komask, ef einn maðr rǫskur er til varnar uppi í bœlinu. Nú lízk mér það helzt ráð ok umtalsmál, at vera þar, því at þaðan er hœgt at leita til fanga ofan á Mýrar ok út til sjávar." Guðni Jónsson, *Grettis saga*, 186.

56 The place-name record for Moldbrekka is online at https://nafnid.is/ornefnaskra/12679 (accessed May 9, 2021). The Icelandic text reads: "Austur frá bænum og upp undir Grettisbæli (10) eru sléttar grundir kallaðar Sandengi (11). Upp af Sandengi (skerst) gengur mjög hátt fell út úr fjallinu og er Grettisbæli efst í því. Fell þetta er nú orðið kallað Grettisbæli.—Það hafa þeir menn sagt mér, er gengið hafa upp í Grettisbæli, að þar líti nú öðruvísi út en sagt er frá í Grettissögu."

57 These are almost all landscape features, mostly on a small scale but at varying elevations: gullies, hollows, cliffs, ridges, hills, mounds, spits, streams, cairns, skerries, among other features. "Grettisskáli" ("Grettir's hall") is a manmade feature by Arnarvatn, the low, grassed-over foundations of a small building; "Grettisleiði" ("Grettir's gravemound") is a small grassy hump on the farm of Fagranes in Skagafjörður where it is said that Grettir's body was buried.

58 Guðvarður Már Gunnlaugsson, "Grettir," 50.

59 See, e.g., Guðrún Kvaran, *Nöfn*, 242; Hastrup, "Tracing Tradition," 168–69.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

of the notable things about the relationship between Grettir's story and the Icelandic landscape is precisely how great an inspiration the figure of Grettir seems to have been to Icelanders over time, playing out in their interaction with the landscape and their perception of places through the lens of Grettir, his experiences as an outlaw, and his legendary strength. The proliferation of names for natural features all around Iceland (albeit with a particular concentration in the west and north)—with large glacial erratic boulders in the biggest category—is evidence for the popularity of Grettir and his story beyond the manuscript pages of his written saga from the medieval period onwards, and the popular conception of his greater-than-human stature and ability to stay alive on the run in hostile highland environments where others would not survive. In his discussion of "Grettir-" place-names, Guðvarður Már Gunnlaugsson cites Guðni Jónsson (the editor of the Íslensk fornrit edition of *Grettis saga*), who claimed: "In Iceland, no other figure has as many place-names associated with them as Grettir. The majority of them must be from later times, but some are doubtless older than the saga, such as the Grettisbæli names. The place-names show how Grettir grew in the general consciousness as time passed, becoming a kind of half-troll on the basis of the Grettistak and Grettishlaup place-names, where no human person could have moved [such rocks]."[60] Similarly, Guðmundur Andri Thorsson wrote: "All around the country are gullies and hills, peaks and stones that bear Grettir's name. If a gully is impassable, a peak unscalable, a stone so large that no-one could lift it, popular tradition immediately attached Grettir's name to it."[61]

Mapping meaning

That the figure of Grettir—both in the saga itself and in later popular tradition—is truly larger than life should have become clear in the course of the discussion above. It is not surprising that so many toponyms should be associated with him. But, although other saga characters might not have left quite as deep a footprint as Grettir on the Icelandic landscape, their stories are nevertheless very much traceable and legible in the landscape, just as Grettir's is. Toponyms that commemorate them and their deeds are testament to the active reception of their sagas in the landscape, alongside the act of copying written versions of their narratives from older manuscripts into new ones. The importance of landscape, topographical features, and place-names in the construction of cultural memory has been examined by scholars working within the field of memory studies as well as those within Norse studies.[62] In the case of the *Íslendingasögur*, the landscape is a key to opening up and understanding the sagas, and, similarly, the sagas are a key to opening up

60 *Grettis saga*, lvii–lviii; cited by Guðvarður Már Gunnlaugsson, "Grettir," 49.

61 "Um allt land eru gljúfur og hæðir, tindar og steinar sem bara nafn Grettis. Sé gljúfur ófært, tindur ókleifur, steinn svo mikill að enginn lyftir virðist alþýða manna umsvifalaust hafa tengt nafn Grettis þar við." Guðmundur Andri Thorsson, "Grettla," 100; also cited by Guðvarður Már Gunnlaugsson, "Grettir," 49–50.

62 See, for example, Nora, "Between Memory and History"; Assmann, *Cultural Memory*, 44–45; Hermann, "Memorial Landscapes" and "Saga Literature."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

and understanding the landscape, and the dynamic ways in which it has been culturally constructed over time. This picture would be extended yet further with the addition of relevant data drawn from, for example, the folktale record of Iceland as digitized on platforms such as Ísmús.is and Sagnagrunnur, or from other spatial data projects that map medieval Scandinavian textual and material culture, such as the previously mentioned Norse World resource.[63]

Digital tools, especially those that have a GIS mapping dimension, make it possible to assemble, query, and link or overlay different kinds of data that relate to the literary spaces or geographies of selected narratives, as well as to the "real-world" geographical locations that are associated with these narratives' transmission and dissemination over time—albeit not without challenges or complications, as discussed above. In the case of the sagas, we are not simply mapping literature, but mapping literature that is inextricably woven together with political, social, economic and environmental history in various ways. Rather than stymying us, though, the technical and intellectual challenges encountered help to sharpen our critical understanding of the nature of the narratives we are interrogating and their place in the culture and society that produced and subsequently consumed them. Beyond this, we are forced to interrogate "what it means to map," as the editors of a recent volume about literary mapping put it.[64] Cumulatively, the data allow us to draw up quantitative lines of enquiry as well as qualitative ones, and analysis leads to new nuances, even to new conceptualizations of the relationship between place and story and how this evolved over time. Intertextuality becomes a dominant theme: we become more alert to the spatial signature of individual saga narratives, and how this relates to their transmission history in space and over time, from medieval to modern. What I have attempted to do here in the case study part of this chapter, presenting and analyzing spatial data from the *Grettis saga* narrative as drawn from the ISM database, and combining it with related data in the Nafnið.is database, gives only an idea of what data analytics is capable of revealing. The coming years are sure to be an exciting digital ride for everyone working with spatial data in this field, and it is to be hoped that the collaborative implementation of LOD-driven principles across the community will not only help with sustainability issues for individual projects but will also generate all kinds of new research questions and answers.

Bibliography

Assmann, Jan. *Cultural Memory and Early Civilization: Writing, Remembrance, and Political Imagination*. Cambridge: Cambridge University Press, 2011.

Árni Björnsson. "Safnað til lýsingar á sögustöðum." *Þjóðviljinn* 231 (1964): 7.

Árni Magnússon Institute for Icelandic Studies. "Open Access Policy." https://arnastofnun.is/is/stefna-um-opinn-adgang-og-opin-gogn (accessed May 9, 2021].

63 See www.ismus.is and https://sagnagrunnur.com/en (both accessed May 13, 2021).

64 Cooper, Donaldson, and Murrieta-Flores, "Introduction," 11.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Barraclough, Eleanor. "Travel." In *The Routledge Research Companion to the Medieval Icelandic Sagas*, edited by Ármann Jakobsson and Sverrir Jakobsson, 210–17. Abingdon: Routledge, 2017.

Berman, Merrick Lex, Ruth Mostern, and Humphrey Southall, eds. *Placing Names: Enriching and Integrating Gazetteers*. Bloomington: Indiana University Press, 2016.

Berwickshire Place-Name Resource. https://berwickshire-placenames.glasgow.ac.uk (accessed May 10, 2021).

Björn M. Ólsen. "Rannsóknir um örnefni á Norðurlöndum." *Skírnir* 84 (1910): 365–67.

Bodenhamer, David J., John Corrigan, and Trevor M. Harris, eds. *The Spatial Humanities: GIS and the Future of Humanities Scholarship*. Bloomington: Indiana University Press, 2010.

Bolender, Douglas, and Oscar Aldred. "A Restless Medieval? Archaeologies and Saga-Steads in the Viking Age North Atlantic." *Postmedieval: A Journal of Medieval Cultural Studies* 4 (2013): 136–49.

Bushell, Sally. *Reading and Mapping Fiction: Spatialising the Literary Text*. Cambridge: Cambridge University Press, 2020.

Callow, Chris. "Dating and Origins." In *The Routledge Research Companion to the Medieval Icelandic Sagas*, edited by Ármann Jakobsson and Sverrir Jakobsson, 15–33. Abingdon: Routledge, 2017.

Caseldine, Chris, Andrew Russell, Jórunn Harðardóttir, and Óskar Knudsen, eds. *Iceland: Modern Processes and Past Environments*. Amsterdam: Elsevier, 2005.

CIDOC-CRM. www.cidoc-crm.org (accessed May 9, 2021).

Cooper, David, Christopher Donaldson, and Patricia Murrieta-Flores. "Introduction: Rethinking Literary Mapping." In *Literary Mapping in the Digital Age*, edited by David Cooper, Christopher Donaldson, and Patricia Murrieta-Flores, 1–21. London: Routledge, 2016.

——, eds. *Literary Mapping in the Digital Age*. London: Routledge, 2016.

Crocker, Chris. "What We Talk About When We Talk about Vínland: History, Whiteness, Indigenous Erasure, and the Early Norse Presence in Newfoundland." *Canadian Journal of History* 55 (2020): 91–122.

DataArc. www.data-arc.org and https://ui.data-arc.org (both accessed May 9, 2021).

Einar Ólafur Sveinsson, ed. *Laxdœla saga. Halldórs þættir Snorrasonar. Stúfs þáttr*. Reykjavík: Hið íslenska fornritafélag, 1934.

Ferlir. https://ferlir.is (accessed May 9, 2021).

GeoNames. www.geonames.org (accessed May 9, 2021).

Getty Thesaurus of Geographic Names Online. www.getty.edu/research/tools/vocabularies/tgn (accessed May 9, 2021).

Gísli Sigurðsson. *The Medieval Icelandic Saga and Oral Tradition: A Discourse on Method*. Cambridge, MA: Harvard University Press, 2002.

Google Maps. https://google.is/maps (accessed May 9, 2021).

Gregory, Ian N., and Alistair Geddes, eds. *Toward Spatial Humanities: Historical GIS and Spatial History*. Bloomington: Indiana University Press, 2014.

Grøsfjeld Jr., Sigvald. *Sagakritikkens historie: Hovedlinjer i norsk og nordisk forskning på sagaenes troverdighet fra Torfæus til vår tid*. Stavanger: Saga bok, 2016.

Guðmundur Andri Thorsson. "Grettla." *Skáldskaparmál* 1 (1990): 100–17.

Guðni Jónsson, ed. *Grettis saga*. Reykjavík: Hið Íslenska fornritafélag, 1936.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Guðrún Kvaran, with Sigurður Jónsson frá Arnarvatni. *Nöfn Íslendinga: Ný útgáfa*. Reykjavík: Forlagið, 2011.

Guðvarður Már Gunnlaugsson. "Grettir vondum vættum." *Gripla* 11 (2000): 37–78.

Handrit.is. https://handrit.is (accessed May 9, 2021).

Hastrup, Kirsten. "Tracing Tradition: An Anthropological Perspective on *Grettis saga Ásmundarsonar*." In Kirsten Hastrup, *Island of Anthropology: Studies in Past and Present Iceland*, 154–83. Odense: Odense University Press, 1990.

Hermann, Pernille. "Memorial Landscapes." In *Handbook of Pre-Modern Nordic Memory Studies: Interdisciplinary Approaches*, edited by Jürg Glauser, Pernille Hermann, and Stephen A. Mitchell, vol. 1, 627–37. Berlin: de Gruyter, 2018.

——. "Saga Literature, Cultural Memory, and Storage." *Scandinavian Studies* 85 (2013): 332–54.

Hið íslenska fornleifafélag. "Skýrsla: Ársfundur hins íslenska fornleifafjelags 1918." *Árbók hins íslenska fornleifafélags* 33 (1918): 36–40.

Historic Landscape Characterisation. https://historicengland.org.uk/research/methods/characterisation/historic-landscape-characterisation (accessed May 9, 2021).

Höfig, Verena. "Vínland and White Nationalism." In *From Iceland to the Americas: Vinland and Historical Imagination*, edited by Tim William Machan and Jón Karl Helgason, 77–98. Manchester: Manchester University Press, 2020.

Icelandic Saga Map. https://sagamap.hi.is (accessed May 8, 2021).

INSPIRE Knowledge Base. https://inspire.ec.europa.eu (accessed May 9, 2021).

Ísmus.is. www.ismus.is (accessed May 9, 2021).

Ja.is. https://ja.is (accessed May 9, 2021).

Jesch, Judith. "Geography and Travel." In *A Companion to Old Norse-Icelandic Literature and Culture*, edited by Rory McTurk, 119–35. Oxford: Blackwell, 2005.

Jónína Hafsteinsdóttir. "Annáll örnefnasöfnunar." Árni Magnússon Institute for Icelandic Studies. www.arnastofnun.is/is/utgafa-og-gagnasofn/pistlar/annall-ornefnasofnunar (accessed May 9, 2021).

Kålund, Kristian. *Íslenskir sögustaðir*. 4 vols. Reykjavík: Örn og Örlygur, 1984–1986 [translated by Haraldur Matthíasson from the original Danish edition: *Bidrag til en historisk-topografisk Beskrivelse af Island*, 2 vols., Copenhagen, 1877–1882].

Key to English Place-Names. http://kepn.nottingham.ac.uk (accessed April 4, 2022).

Kristján Eldjárn. "Nokkrar leiðbeiningar um örnefnasöfnun." *Skinfaxi* 36 (1945): 45–50.

Landmælingar Íslands (National Land Survey of Iceland). https://lmi.is (accessed May 9, 2021).

Larrington, Carolyne. " 'Undruðusk þá, sem fyrir var': Wonder, Vínland and Mediaeval Travel Narratives." *Mediaeval Scandinavia* 14 (2004): 91–114.

Lethbridge, Emily. "Digital Mapping and the Narrative Stratigraphy of Iceland." In *Historical Geography, GIScience and Textual Analysis: Landscapes of Time and Place*, edited by Charles Travis, Francis Ludlow, and Ferenc Gyuris, 19–32. Cham: Springer, 2020.

——. "The Icelandic Sagas and Saga Landscapes: Writing, Reading and Retelling *Íslendingasögur* Narratives." *Gripla* 27 (2016): 51–92.

Lethbridge, Emily, with C. Parker Krieg and Steven Hartman. "Mapping Environmental Memory through Literature: A Conversation with Emily Lethbridge and Steven Hartman." In *Situating Sustainability: A Handbook of Contexts and Concepts*, edited by C. Parker Krieg and Reetta Toivanen, 269–91. Helsinki: Helsinki University Press, 2021.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Literary Atlas of Europe. www.literaturatlas.eu/en (accessed May 10, 2021).
Map of Early Modern London. https://mapoflondon.uvic.ca/index.htm (accessed May 10, 2021).
Mapping the Lakes: A Literary GIS. www.lancaster.ac.uk/mappingthelakes (accessed May 10, 2021).
Mapping Lake District Writing, 1622–1900. www.lancaster.ac.uk/fass/projects/spatialhum.wordpress/?page_id=43 (accessed May 10, 2021).
Mapping Manuscript Migrations. https://mappingmanuscriptmigrations.org (accessed May 10, 2021).
Memories of Old Awake [documentary film]. www.youtube.com/watch?v=2Z4_BhW1sI8 (accessed May 10, 2021).
Mundal, Else, and Jonas Wellendorf, eds. *Oral Art Forms and Their Passage into Writing*. Copenhagen: Museum Tusculanum, 2008.
Nafnið.is. https://nafnið.is and https://nafnid.is (both accessed May 9, 2021).
NameSampo: A Workbench for Toponomastic Research. https://nimisampo.fi/en/app (accessed May 10, 2021).
Nora, Pierre. "Between Memory and History: Les lieux de mémoire." *Representations* 26 (1989): 7–24.
Norse World. www.uu.se/en/research/infrastructure/norseworld (accessed May 10, 2021).
Norske stedsnavn. https://toponymi.spraksamlingane.no/nb/app (accessed May 10, 2021).
O'Connor, Ralph. "History and Fiction." In *The Routledge Research Companion to the Medieval Icelandic Sagas*, edited by Ármann Jakobsson and Sverrir Jakobsson, 88–110. Abingdon: Routledge, 2017.
Open Geospatial Consortium. www.ogc.org (accessed May 9, 2021).
Opin gögn. https://opingogn.is (accessed May 9, 2021).
Opin vísindi. https://opinvisindi.is (accessed May 9, 2021).
Parsons, Katelin Marit. "Albert Jóhannesson and the Scribes of Hecla Island." *Gripla* 30 (2019): 7–46.
Presner, Todd, and David Shepard. "Mapping the Geospatial Turn." In *A New Companion to the Digital Humanities*, edited by Susan Schreibman, Ray Siemens, and John Unsworth, 201–12. Malden: Wiley Blackwell, 2016.
Reuschel, Anne-Kathrin, and Lorenz Hurni. "Modelling Uncertain Geodata for the Literary Atlas of Europe." In *Understanding Different Geographies*, edited by Karel Kriz, William Cartwright, and Michaela Kinberger, 135–57. Berlin: Springer, 2013.
Saga-steads of Iceland. http://sagasteads.blogspot.com (accessed May 10, 2021).
Sagnagrunnur. https://sagnagrunnur.com/en (accessed May 13, 2021).
Sigurður Vigfússon. "Rannsókn í Breiðafjarðardölum og í Þórsnesþingi og um hina nyrðri strönd 1881." *Árbók Hins íslenzka fornleifafélags* 2 (1882): 60–105.
Svavar Sigmundsson. "Ortnamnsforskning på Island." In *Nefningar: Greinar eftir Svavar Sigmundsson gefnar út í tilefni af sjötugsafmæli hans 7. September 2009*, edited by Ari Páll Kristinsson, Guðrún Kvaran, and Hallgrímur J. Ámundason, 1–21. Reykjavík: Stofnun Árna Magnússonar í íslenskum fræðum, 2009 [first published in *Scripta Islandica* 19 (1968): 19–38].
Sveinbjörn Rafnsson. *Byggaðleifar í Hrafnkelsdal og á Brúardölum: Brot úr byggðasögu Íslands*. Reykjavík: Rit Hins íslenska fornleifafélags, 1991.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Travis, Charles, Francis Ludlow, and Ferenc Gyuris, eds. *Historical Geography, GIScience and Textual Analysis: Landscapes of Time and Place*. Cham: Springer, 2020.

Wyatt, Ian. "The Landscape of the Icelandic Sagas: Text, Place and National Identity." *Landscapes* 5 (2004): 55–72.

Þorsteinn Þorsteinsson. "Bærinn Hafratindar." *Árbók Hins íslenzka fornleifafélags* 41 (1928): 54–58.

Þórhallur Vilmundarson. "Leiðbeiningar um örnefnaskráning." Reykjavík: Örnefnastofnun Þjóðminjasafnsins, 1972.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Chapter 4

TORA: TOPOGRAPHICAL REGISTER AT THE SWEDISH NATIONAL ARCHIVES

Olof Karsvall*

FOR RESEARCH ON historical landscapes and settlements, Sweden holds two comprehensive source materials: the cadastral registers from the sixteenth century and the large-scale maps from the seventeenth century. These sources describe and depict hamlets and farms during the early modern period but are also invaluable for tracing medieval landscapes. For several years work has been going on at the National Archives in Stockholm to make them available for research.

A digital and spatial entrance to these sources has now been created called TORA: Topographical Register at the National Archives (Riksarkivet).[1] The core of this register consists of 26,000 geo-referenced *historical settlement units* to which other data are linked, above all 15,000 digitized historical maps. The work has been coordinated by the National Archives of Sweden, which is also responsible for the data created within the project. Coordinates are assigned using geographical information system (GIS) technologies, and web applications have been created using linked open data (LOD) techniques. With a map search, it is possible to acquire an overview of historical settlements and see their locations on today's modern map.

This chapter addresses the methods, choices, and experiences gained from the TORA project (2015–2019). Above all, the question of how large-scale historical maps can form the basis for a historical GIS (HGIS) is discussed. A further discussion relates to questions on how to model historical data as linked data.

---

* Research Manager, the National Archives of Sweden, olof.karsvall@riksarkivet.se. Karsvall holds a PhD in agrarian history, an MS in computer science, and a BSocSc in human geography. Since 2005 Karsvall has been working on research projects concerning historical maps and research databases at the National Archives in Stockholm.

1 Riksarkivet, "TORA," https://riksarkivet.se/tora-english (accessed May 24, 2021). The TORA project has been conducted with external funding from Kungl. Vitterhetsakademien and Riksbankens Jubileumsfond as a collaboration between cultural heritage institutions and the research community: the National Archives of Sweden, the Institute for Language and Folklore, and researchers at Uppsala University, Stockholm University, and the Swedish University of Agricultural Sciences.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

Historical GIS as a Tool and Method

GIS as a term refers to tools and applications for creating spatial data. It is also used in connection with methods and analysis of spatial data, such as the visualization and plotting of spatial data on digital maps. As a discipline in science, the development of GIS can, among others, be traced to the early work of geographer Torsten Hägerstrand, who highlighted the idea of setting spatial coordinates to landscape elements.[2] In the 1950s and 1960s digital methods were used to capture and analyze geographical data in connection with regional planning and by geographers in general. As the amount of data has increased, especially since the 1990s and through the use of satellite data and geodesy for automatic geometric measuring, GIS has become integrated into a variety of types of systems. Historical GIS (HGIS) is much developed as a subdiscipline related to methods within GIS that historians, geographers, archaeologists, and other scholars use to analyze and understand historical landscapes and change over time and space. HGIS has also been considered a research field of its own.[3]

A common problem, related to GIS in general but especially HGIS, is data capture and data accuracy. The spatial data used in HGIS are usually created by researchers through the interpretation and analysis of archaeological remains or by extracting information from historical maps, aerial photos, or satellite images. As part of a GIS, the source excerpts will be associated with coordinates corresponding to positions on the Earth's surface. The data can be in raster and vector formats, and may include lines, polygons (areas), and point objects according to a predefined coordinate system, such as the World Geodetic System 1984 (WGS 84) and Swedish reference frame 1999 (SWEREF 99).[4] It can be limited to geographical positions, as longitude and latitude coordinates (X and Y coordinates), but it can also include height, to add a third spatial dimension (Z coordinates). Hence, the methods used for collecting historical data for a GIS must be documented, preferably as metadata associated with spatial coordinates. Otherwise, it will be difficult for future users to understand and assess data quality and see possible errors and limitations.

As part of data capture, the most common challenge for HGIS is probably managing changes over time. Historical data cannot be easily mapped or geo-referenced to modern maps as landscapes are constantly changing. Urbanization and other societal changes affect the landscape. For instance, the boundaries of administrative divisions, such as parishes and counties, tend to change.[5] Boundaries may be adjusted, new divisions can be added or subdivided, and divisions may be replaced and renamed. This has implications for historical and longitudinal studies. In order to track and compare

2 Ellegård and Svedin, "Torsten Hägerstrand's Time-Geography," 8.

3 Gregory and Ell, *Historical GIS Technologies*, 1.

4 Lantmäteriet, "SWEREF 99"; National Geospatial-Intelligence Agency, "WGS 84."

5 See Dam, this volume.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

population statistics related to administrative divisions, such changes need to be taken into account. Historical comparisons may therefore involve data manipulation. Areal interpolation is one such spatio-temporal technique, used to transfer data between the source unit and the target unit.[6] The boundaries of administrative divisions over time are difficult to reconstruct, however. It may be easier to reconstruct the boundaries based on the known locations of individual settlements.[7] Another option would be to relate the data collected to places represented by point objects instead of polygons. A point object allows comparisons over time without consideration of administrative division changes, although it requires a method for setting points.

A prerequisite for HGIS is access to the source material and primary historical maps. Besides ancient remains and heritage sites, registered by authorities, and written sources about geography and places, there is no better source than maps for approaching and understanding historical landscapes. The sources needed depend, of course, on an HGIS's area of use. Modern GIS data may be combined with historical data. For example, the regional distribution of population data can be illustrated with approximate administrative boundaries. Open data from services such as GeoNames and other map services could then be used.[8] To answer questions about historical settlements, landscapes, and other spatial phenomena, however, an HGIS is likely needed. For instance, when measuring an archaeological site for protection according to law, accurate measurement and observation in the field are necessary. When analyzing and compiling the distribution of settlements during the Middle Ages and early modern time, the places need to be defined on the basis of historical sources. An important aspect is thus the scale or level of detail for which an HGIS is intended.

What basic units should be used, then, in historical GISs? In Sweden, taxes and other levies have been reported as land holdings (*hemman*) related to hamlets and other settlements, sorted by parish, counties, and provinces. Such accounting first appeared during the Middle Ages and became formalized during the first half of the sixteenth century under the rule of Gustav I.[9] *Kronans jordeböcker* (the Crown's cadastres) from this period set the standard for accounting until the end of the nineteenth century, when taxes on land holdings ceased. The number of individual land holdings changes over time; most of the settlements (hamlets and villages) remain, however. Based on the cadastral sources, it is possible to reconstruct the sixteenth-century village community and part of the social structure and follow the developments in more recent periods. Settlements, within which agriculture was organized in rural society, are therefore suitable as basic units in a historical GIS and the chosen method for TORA.

---

6 Gregory and Ell, *Historical GIS Technologies*, 138.

7 Berman, "Boundaries or Networks," 121.

8 See www.geonames.org (accessed May 24, 2021).

9 Brunius, *Vasatidens samhälle*, 26–29.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

The approach shares some similarities with historical atlases, lexicons, and dictionaries, where the core consists of an index of geographical names and places.[10] A characteristic of these older standard works is the categorization of geographical units, from planets and moons, down to continents, countries, regions, cities, towns, etc. Today's web services in this area of study are often referred to as gazetteers—i.e., lists, registers, or authority files of different types of geographical elements (places, lakes, roads, etc.).[11] The method chosen for the TORA project is not based on hierarchies of geographical units, however. Only places found in the historical sources and maps have been included in the project, and geo-referencing and linking to the original sources form the basis. The inspiration for the TORA project thus does not come from gazetteers; rather, the task has been to compile geographical data on settlements from selected source materials.

The aim has also been to provide an HGIS as open data for reuse.[12] Within the digital humanities and cultural heritage sector there is a trend toward using application program interface (API) and uniform resource identifiers (URIs) to promote open data on the Web. This opens up for the integration and linking of different types of sources, as well as crowdsourcing for adding statements and metadata, not least Wikidata, which aggregates data from many sources and has a large collection of geographical units.[13] Historical geographical data are also collected, by, for example, the Pelagios network.[14] The challenges are much the same as before, however. How should historical places be defined and conceptualized? Which places should be included, and how can time and space be handled and treated as data in a historical GIS?

Seventeenth-Century Maps of Rural Settlements

Theoretically, a historical GIS of Sweden could be based on the central (state) archives from the early modern period. As mentioned, the cadastres from the middle of the sixteenth century cover much of the settlements at the time. The possibility of setting spatial coordinates for locations in GIS is dependent on the availability of historical maps, however. The map archive in Sweden is comprehensive. For the seventeenth century alone there are about 15,000 so-called large-scale cadastral or geometrical maps, covering about a third of all settlements and farms during this time. Starting in the middle of the eighteenth century, land surveying was intensified as a result of Swedish

10 Early works in this field in Sweden are *Geographie öfver konungariket Swerige*, by Eric Tuneld, and *Utförlig geografie och Geografiskt lexicon*, by Daniel Djurberg, published in the late eighteenth century.

11 Goodchild and Hill, "Introduction to Digital Gazetteer Research," 1040–41.

12 All data in TORA can be used freely. Pending a general policy within the National Archives, there is as yet no licence, such as Creative Commons.

13 The Wikimedia Foundation, www.wikidata.org/wiki/Wikidata:Main_Page (accessed May 24, 2021).

14 The Pelagios Network, https://pelagios.org (accessed May 24, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

land reforms. This means that almost every settlement in Sweden had been surveyed and depicted on a large-scale map before the beginning of the twentieth century, often more than once. The exceptions apply to manors and holdings that belonged to privileged classes (the nobility), which the Crown had less interest in mapping. The nobility's land possessions, which during the sixteenth and seventeenth centuries amounted to about 25 percent of Sweden, were often located within settlements where the Crown or free farmers also owned land, however. The surveyors mapped all the cultivated land within hamlets. Therefore, much of the nobility's land (the tenants' holdings) is included on the maps made by the Crown. Some noble landowners, including Axel Oxenstierna, hired surveyors to measure their manors and land properties. Several of these map collections have been preserved and are included in TORA.[15]

The mapping was carried out by land surveyors in the field, on site in each hamlet, through observations and measurements of the land using a plain table and measuring instruments. Initially, a scale of 1: 5,000 was used, but other scales—from 1: 2,000 up to 1: 10,000—also occur. The geometrical method for accurate mapping, based on triangulation, can be traced back to work by, not least, Gemma Frisius in the 1530s. Techniques for measuring land are much older, and were widely used during the Middle Ages for land assessment and taxation. The new invention, dating to the end of the sixteenth century, was the method of transferring land measurements to accurate maps, made to scale, on paper.[16]

It was, therefore, a rather new mapping method and map production that the Swedish Crown adopted and developed during the 1630s, when the initiative was taken to train surveyors and start surveying farmland. The Swedish government likely took impressions from similar maps, such as polder maps and other estate maps made a few decades beforehand in the Netherlands. Unique to Sweden is that the initiative to map the entire country began as early as the first half of the seventeenth century. Although geometrical mapping occurred earlier in other countries, no similar systematic mapping is seen elsewhere at this time, often not taking place till the nineteenth century.[17]

What also distinguishes the Swedish maps is the central control of the process and uniformity in map production. The mapping initiative came from King Gustav II Adolf in 1628 and was planned by his close associates.[18] At the start, a small group of students from Uppsala University were trained as surveyors by cartographer Anders Bureus. In the early 1630s they were dispatched across the country and began to map the hamlets, parish by parish.[19] Towns and important industries, such as mines, were also mapped,

15 See, for example, "Projekt Äldre geometriska kartor, Riksarkivet, SE/RA/81003/2/Fiholm," Riksarkivet, https://sok.riksarkivet.se/bildvisning/R0000493 (accessed May 24, 2021).

16 Wästfelt, "Ambiguous Use of Geographical Information Systems," 212–13.

17 For instance, the large-scale mapping of the Austrian Empire from 1817 to the 1880s; see Dolejš and Forejt, "Franziscean Cadastre in Landscape Structure Research," 132.

18 *Samlingar i Landtmäteri*, 1–4.

19 *Samlingar i Landtmäteri*, 6; Tollin, "De första lantmätarna," 16–17.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

but a large number of maps depict rural settlements. The work was guided through letters and instructions from the Stockholm Palace. The instructions, which were refined several times during the 1630s and 1640s, provide invaluable information on how the mapping was supposed to be carried out. The surveyors were expected to map and compile the information in the same way. The same measuring units and map colours would be used. To a large extent, these rules were met, although the cartographic styles varied between different surveyors. The maps also became more uniform over time, especially during the 1640s.

The purpose of the mapping is stated in royal letters. By having all farms and land measured and mapped, the Crown wanted to be informed about the conditions for agriculture across the country—that is, to be able to "overview and ponder" each hamlet and farm holding.[20] This motive needs to be seen in connection with the great power and military state that Sweden was at this time. The mapping has also been linked to the military thinking and ideology of the time.[21] The large-scale maps can be seen as tools for control of territorial areas of strategic and economic interest. At the same time as Sweden conquered land around the Baltic Sea, the Crown wanted to increase control over settlements and agriculture within the country. The maps also came to be of more practical use. By defining property boundaries for settlements and farms, land disputes—which often occurred—were assumed to be prevented.[22] Few of the maps appear to have been used, however, as they are preserved in very good condition.[23]

The geometrical mapping was closely linked to the state's fiscal (cadastral) management. Until the 1680s the maps were collected in the Chamber at Stockholm Palace. Here the bailiffs' tax reports on each farm holding were registered. By the middle of the sixteenth century the cadastres constituted a comprehensive land register of Sweden. The maps were designed similarly, and the surveyors would use excerpts from the land registers. In this way, they had information on every hamlet and farm to be surveyed. The text description that belongs to every map, titled *Notarum Explicatio*, is partly transcribed from the land registers. The surveyors then contributed with more details concerning the size of land, yield, soil quality, etc. Some of the information the surveyors provided, such as access to the forest, fishing, and grazing, also occurs in the sixteenth century registers. Through the surveyors' work in the seventeenth century, though, this information is systematically recorded for each hamlet for the first time.

Registrations of land ownership and holdings, which monasteries, churches, and other elites had carried out since the Middle Ages, thus laid the foundation for the geometrical mapping in the seventeenth century. The main difference and contribution concern the maps' spatial contents, which on a large scale show farmsteads, fields, meadows, etc., and the overall farming organization. Today the maps are not only images

20 *Samlingar i Landtmäteri*, 1.

21 Baigent, "Monarchs, Ministers, and Maps," 50–52.

22 *Samlingar i Landtmäteri*, 15.

23 How the maps were used by the Crown at the time has not been studied in any detail.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

of seventeenth-century rural society, they are also a valuable source for understanding how landscapes develop over time. Thanks to the high level of detail, and the measuring of individual farms and fields, the maps can also be used to investigate and formulate hypotheses on older rural conditions. This is especially true of the late Middle Ages and the sixteenth century. The settlement development was then characterized by the desertion and reorganization of farmland—processes that can be traced in the seventeenth-century maps.[24]

Although the geometrical method allowed for accurate measurements, this does not mean that all maps are accurate or free from inaccuracies. Besides the generalizations and simplifications that accompany cartography, the surveyors worked under time pressure. The names of about forty surveyors are known from the first half of the seventeenth century. They did not work alone but had the help of assistants, which becomes evident if the so-called concept maps or original sketches are surveyed.[25] One of the more productive surveyors from this time was Johan Larsson Groth, who was in service from 1633 to 1648. He appears as the author of almost 1,400 maps, which represents an average of about ninety mappings per year. Such a high work rate is explained by the fact that he used several assistants. Even if a surveyor worked most of the year, time needed to be set aside for travel. Bad weather could also hinder work. In addition, to complete the maps, the conceptual field maps needed to be transferred to coloured renovated maps. Even with the help of several assistants, the surveyors could not spend more than one to three days per village.[26]

The errors and omissions that appear in these historical maps are therefore probably due to lack of time. The methods used were accurate, but sections and parts of the maps were measured with greater accuracy than others. The cultivated fields were mapped, but not the outlying land, including forest and pasture. The farmsteads and other buildings are marked on the maps with stylized symbols. More effort was devoted to mapping the cultivated arable land, meadows, property boundaries, and fences separating the fields.

An example, the hamlet of Östra Älgsjö, will illustrate this; see Figure 4.1. The surveyor Johan Larsson made two renovated versions of this hamlet. The two map images are very similar, which means that they are probably based on the same original concept map. The hamlet is located on the border between the districts (hundreds) of Aska and Göstring in the province of Östergötland. The maps were bound into volumes by district, which explains the two versions. The main focus of the maps is thus the distribution of arable land and meadowland. Three farmsteads are marked next to the lake. Patterns of stylized trees indicate wooded areas. Less information is provided about the farmstead. It was more important to describe the plots of land than to depict actual farmsteads, although the village green—that is, the common area of the farmsteads—is

24 Karsvall, *Utjordar och ödegårdar*.

25 Helmfrid, *Östergötland "Västanstång,"* 15.

26 Tollin, "De första lantmätarna," 30.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Figure 4.1. Östra Älgsjö, Bjälbo parish. The image to the left shows a map by Johan Larsson made around 1635–1637. Source: Projekt Äldre geometriska kartor, Lantmäteriet, SE/RA/81003/1/D5, Riksarkivet, D5:284–85 https://sok.riksarkivet.se/bildvisning/R0000162_00153. The map to the right, dated 1638–1639, depicts the same hamlet and is made by the same surveyor. Projekt Äldre geometriska kartor, Lantmäteriet, SE/RA/81003/1/D7, Riksarkivet, D7:191, https://sok.riksarkivet.se/bildvisning/R0000164_00111. Images are in the public domain.

demarcated. The road that leads through the hamlet is marked on both maps, but more details are provided on the Göstring map; see Figure 4.1. The Göstring map also shows traces of abandoned farms. The surveyor reported two uninhabited units, the so-called *utjordar*, which are noted with the numbers 4 and 5 next to the farmsteads. The Aska map also shows traces of lost farms, in the form of long narrow parcels, which run north–south and east–west through the arable fields. It is known from research that such field patterns are often remnants of previously abandoned farms.[27] The same phenomenon can thus be reported in different ways. The Aska map shows separated arable parcels; the Göstring map includes a text description along with a marker on the map. This also applies to other phenomena: information about hop gardens, mills, and other belongings could be either depicted on the map or reported as a note. The maps content thus needs to be read carefully and examined with consideration of other (younger) maps and sources.

The great value of geometrical maps in landscape research, apart from their function as a source for historical GISs, is their high level of detail. The spatial organization of hamlets, the conditions and allocation of cultivated fields, farmsteads, arable land, and meadows, as well as fences, pastures, streams, etc., are all reproduced clearly. The text

27 Karsvall, *Utjordar och ödegårdar*, 22–35.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

descriptions that complement the visual components of each map indicate the sizes of the different fields and each farm's share of the land.

These historical maps are not only suitable for the interpretation of the seventeenth-century landscapes; they can also be used for reconstructions of older, medieval, historical landscapes. The settlements that were surveyed in the seventeenth century had, in most cases, been formed much earlier. In historical geography, the long-lived basic patterns of rural settlements have been used for so-called retrogressive studies of medieval settlements and landscapes.[28] It is, of course, difficult to prove when and how settlements developed. Older sources must be considered, but no other sources clearly show the actual location and spatial organization of settlements and individual holdings. The large-scale maps in Sweden could therefore form the basis for an extensive historical GIS that can be useful in different ways, not least for research and community planning; see Figure 4.2.

Settlements as Basic Units in TORA

A starting point is the question as to how settlements described on historical maps can be represented with coordinates in a GIS. The preferred method, used in the TORA project, has been developed in previous map projects at the National Archives of Sweden.[29] Each settlement, described on a geometrical map, is identified and geo-referenced as a point object (a coordinate pair) in GIS. Each point object represents the territory of a settlement (as a hamlet)—more specifically, the cultivated area of the property. In other words, the coordinates in TORA show where each settlement has been located, according to the historical maps. They do not mark positions for individual farms or physical buildings; rather, the point object refers to the settlements as a unit or property.

Representing villages, hamlets, cities, etc. with the help of point objects is common in GIS. For instance, Google Maps or the map service provided by the Swedish Land Survey (Lantmäteriet) show places on interactive online maps as point objects.[30] Using today's coordinates for a historical GIS provides approximate identifications of many historic settlements that remain today, such as well-preserved older cities. But these coordinates have little significance for the places and the land occupied by rural farms hundreds of years ago. The transformation of the landscape, not least the expansion of towns and municipalities, means that modern geographical data do not correlate to historical places. Place-names can be preserved, but the accurate location of the former hamlet is today not obvious without the help of historical maps. Moreover, the principles of how coordinates are set today are not clear. Modern geo-referencing services provide different coordinates for the same geographical place. The coordinates from

28 Karsvall, "Retrogressiv metod," 412.

29 Tollin and Karsvall, "Sveriges äldre geometriska kartor," 99–102; Riksarkivet, "Sveriges äldsta storskaliga kartor."

30 Google, "Google Maps," www.google.com/maps; Lantmäteriet, "Min karta," https://minkarta.lantmateriet.se (both accessed May 24, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

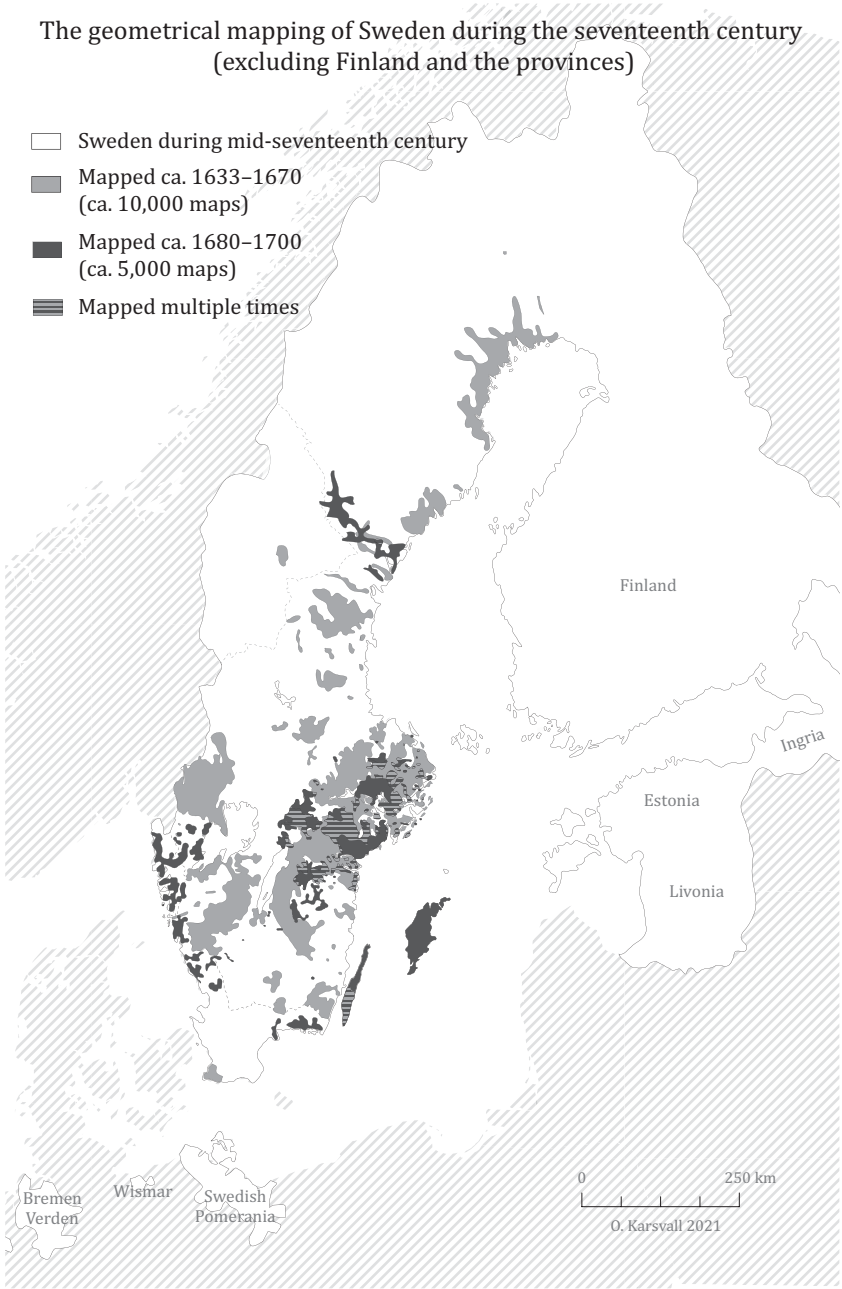


Figure 4.2. The extent of large-scale maps in Sweden during the seventeenth century. Image by Olof Karsvall.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

the Swedish Land Survey refer to locations of official place-names on the map, using a cartographic and stylistic principle. A GIS pointing to the sites of historical settlements would therefore be an important addition.

Settlements could also be defined by polygons, with lines as vector data, corresponding to the villages' boundaries. The seventeenth-century maps usually show the property boundaries. In theory, it should be possible to transfer the villages' boundaries to a GIS, but this requires map rectifications—that is, scaling and adapting historical maps to modern coordinate systems.[31] Such work is time-consuming and suitable for detailed studies but is not an appropriate method when creating an HGIS for thousands of units.

The central concept created for TORA is the "historical settlement unit."[32] The term "settlement" is preferred over "hamlet" or "village," because the registration also includes uninhabited places, such as deserted and abandoned farms. By referring to "historical" settlements, although many places still exist today, it is said that they are spatially defined on the basis of historical maps. In other words, the core of TORA consists of well-defined early modern rural settlements, but other types of settlements, such as manors, towns, and smaller isolated single farms, are also included.

Most settlements of that time in Sweden were, in a European context, smaller hamlets of two or three farms. In a hamlet, the farmsteads stood close to each other. The land was divided into fields and subdivided into plots and parcels of different sizes and shapes. The plots were intermingled and distributed according to rules and customs (known as *tegskifte*). Such division and scattering of plots characterized many rural settlements from the Middle Ages until the late eighteenth century. It should be mentioned that how farms and hamlets in practice cooperated and functioned as agrarian units does not have to correspond to the formal cadastral registration and the way land surveyors mapped the hamlets in the seventeenth century. Farms from several hamlets often cooperated regarding, for instance, sowing, harvest, fencing, and pastures.[33]

Nevertheless, the functional appearance of the hamlet, its size, and patterns of land distribution are of less importance for the GIS registration. Regardless of size and appearance, any settlement that occurs in a historical source and that can be located on a map can be defined as a settlement unit in TORA. No categorization or typology takes place. Instead, the registration is based on source references, primarily links to the historical maps.

In order to be able to locate and set GIS coordinates, it is crucial that the area of cultivated land within the property boundary for a hamlet can be identified and separated from other settlements. Each village constituted a property area, consisting of arable land, meadows, paddocks, and other land types, which were spatially defined within the property boundary and marked on the map. The property boundaries on

31 Wästfelt, "Ambiguous Use of Geographical Information Systems," 210.

32 Karsvall, "Historical Settlement Units," 260.

33 Jupiter, *The Function of Open Fields*, 15–16.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

the historical maps are therefore important for setting coordinates, as they show how different villages border each other. The borders are shown on the maps with dotted lines. On some maps, the boundaries appear indirectly, through the fences, which two or more hamlets could share, and which could coincide with property boundaries. When the coordinates are set in TORA, the cultivated land is in the centre. The aim is to place the coordinates in a central location for each settlement, primarily in the core arable land next to the farmsteads, barns, and other buildings. The arable land closest to the settlement often has the best soil and can be assumed to be the land that first came under cultivation.

In historical research in Sweden, the oldest part of the arable land is referred to as the *kärnåker*, which is "core arable land." This is the original or oldest part of the arable land, which farmers had used most intensively. Studies of core arable land and their patterns are used when the origin or genealogy of settlements are studied.[34] The core arable land is found next to the farm buildings, especially barns, because the fields needed to be fertilized from manure. It was most beneficial, and least strenuous, to have the source of the manure next to the fields.

It is thus the continuous sowing, ploughing, and fertilization of the arable that makes it a suitable geographical reference marker for settlement units in the medieval and early modern period. Farmsteads and other buildings could be abandoned, relocated, and rebuilt in new locations. Arable land, on the other hand, remained. Land that the farmers had once taken under cultivation and invested time on appears to be resilient. Admittedly, the arable ground lay in fallow every second or third year, meaning it was left unused to restore nutrition. During a crisis arable land could be converted into a meadow permanently. The best plots of land were seldom abandoned, however.

In some cases, though, the setting of spatial coordinates of settlements may be unclear or arbitrary. New farms—those established close in time to the surveyors' mapping—have, of course, no core field used for a longer period. There is usually some arable land, however, that the spatial coordinates could be based on. In parts of central and northern Scandinavia, rural settlements did not depend on grain cultivation but, rather, on extensive cultivation, animal husbandry (pastoralism), fishing, and other activities. Access to meadows, forest, and water was then more important than arable land. Historical maps, however, show that even the hamlets in the far north, where settlements were often found along rivers, lakes, and bays, had arable land under cultivation. This also applies to the smallest isolated farms in the forest areas. The arable land can thus form the basis for geographical coordinates in an HGIS for most rural settlements. When no arable land existed, which may apply to deserted settlements, the meadowland or other cultivated parts can be used as spatial markers.

It should be emphasized that the coordinates in TORA do not mark arable land per se. The arable land, and hypotheses about where the core parts have been located, constitute the main principle for where the coordinates in TORA are to be set.

34 See Ericsson, *Terra mediaevalis*, 329–30.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

The coordinates in TORA thus correspond to an estimated point of reference: the core part of the settlement units; see the next section below. GIS registration according to this principle presupposes access to historical large-scale maps, which clearly depict the hamlets, their boundaries, and the distribution of land. The coordinate source is, in other words, always a historical map. On the oldest Swedish maps from the seventeenth century, which have been used in TORA, the spatial organization of settlements is read directly from the map itself.

No map archive covers a whole country. To create a nationwide register, the seventeenth-century maps need to be supplemented with large-scale maps from the eighteenth and nineteenth centuries. The next step for TORA would be to include GIS registration of units based on younger maps. Changes over time then need to be handled. By adding younger data, new settlements will appear, and those previously defined may be abandoned or relocated.

Method for Setting Spatial Coordinates

The discussion has so far been about the principle of how historical settlement units are defined. A further question is how the settlements are geo-referenced—that is, how the information from the historical maps is transferred to modern maps and assigned GIS coordinates in a modern coordinate system.

To identify the settlements, each map is read and processed manually. The transfer to GIS is also a manual step, in which the map image is visually interpreted and placed on a modern map. Points and line objects on the historical map, not least property boundaries, field patterns, roads, ditches, and impediments such as slopes and other terrain forms, are compared with today's landscape and maps. Despite major changes in the landscape over the centuries, several elements are usually preserved, which can form the basis for geo-referencing.

Reading and interpreting historical maps from the seventeenth century against today's maps and landscape is associated with several difficulties. Settlements that no longer exist, which have been deserted as a result of urbanization, for example, are obviously more difficult to locate. The traces of previous agriculture may be gone. Roads, boundaries, and other natural elements, such as watercourses and terrain forms, often remain, however, and these can form the basis for an approximate location of former settlements. Settlements and agrarian land thus do not need to remain today in order to be registered by the TORA project. The precondition is that the landscape information in the historical map can be transferred to and placed on a present-day modern map.

Historical maps also contain various scale errors. More precisely, different parts of the map were measured with different degrees of precision. The surveyor measured a map from different positions, which were later combined into one map image. Some parts could be measured better than others, and, when connecting the different parts, angular errors could occur. The distances between different parts of the map, such as between the plots, fields, and meadows, can, therefore, be misleading. The map can also be reversed; in other words, the upward direction is not always north as on a modern

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

map, even though there is a north arrow illustrated on the map. These difficulties lead, above all, to problems when large-scale maps are rectified—that is, when lines and areas on a historical map are transferred to polygons. Setting coordinates as point objects, which occurs in TORA, is much easier.

One way to get round the various sources of error found in older maps is to compare them with other historical maps. A seventeenth-century map that is compared with maps from the eighteenth and the nineteenth centuries, over the same hamlet, is easier to interpret and relate to today's landscape in a GIS. The changes that have taken place over time can then more easily be decoded and interpreted into their spatial context.

Adding settlements in TORA is thus always based on interpretations of where a hamlet has been located in relation to today's landscape. The registration, therefore, involves a certain amount of uncertainty that needs to be documented. In TORA, spatial uncertainty is registered as *coordinate accuracy* according to a three-point scale, as "high," "medium," or "low"—similar to the *precision* mark-up used in the Text Encoding Initiative (TEI).[35] "High" precision means that the core arable land or central parts of the settlements have been matched against a modern map in a GIS. Since a point object in TORA represents the cultivated land of a hamlet and not a physical object on the ground, a margin of error of 50 to 100 metres is tolerated. "Medium" precision means that the unit can be located in an assumed correct location, but with uncertainty about where the core parts of the settlement are located. These coordinates, therefore, become more approximate, with an estimated error distance to the location of 200 to 400 metres. "Low" precision means that there is greater uncertainty about the spatial registration. References to historical maps still allow a presumed location to be given coordinates, which indicates where the settlement may have been placed with a margin of error of 1 kilometre. Uncertain units can, hopefully, be located more accurately in the future.

Out of 26,000 units currently in TORA, 80 percent are registered as high, 12 percent as medium, and 2 percent as low accuracy. The presence of high precision reflects that most registrations, when there are historical maps available, can be matched to modern maps. In addition, there are units in TORA—about 6 percent—that have been registered *without* spatial coordinates. This applies to hamlets and other units, which appear in older maps or are mentioned in medieval or early modern written sources, but no longer exist and cannot be located today.

The work of setting coordinates in a GIS has been time-consuming. The work started in 2001 and has continued with varying intensity up to the present day. A trained person is able to register ten to fifteen units per hour. It would be possible to continue to register systematically, area by area, in order to create a comprehensive historical GIS of settlements in Sweden. Since most large-scale maps from the seventeenth century have been included in TORA, the next step of the project needs to be based on later maps.

---

35 Text Encoding Initiative Consortium, "P5: Guidelines for Electronic Text Encoding and Interchange."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

The ever-changing landscape might then be a problem when the HGIS covers data extracted from sources of different dates. For example, how could restructured and relocated units be spatially defined? Regarding hamlets that have been divided into several units or relocated, should they be registered twice, as separate units, or defined once, marking out the first known location? The latter principle so far applies in TORA.[36] Many of the eighteenth-century hamlets refer to the same places as the previous ones, although new settlements have to be added. During the nineteenth century land and settlements were transformed more quickly and more drastically. Presumably, such late units cannot be included in TORA, as this would mean too many new methodological choices. Therefore, a limit should be set at around the year 1800 regarding the units and historical maps that should be included in TORA.

To summarize, coordinate accuracy is an important attribute that is attached to every TORA settlement unit. In addition to the coordinates, which are stored as data according to SWEREF 99 and WGS 84 standards, reference is included to the historical maps that form the basis for the coordinates. Primarily, the oldest maps from the seventeenth century can be used, but so can maps from the eighteenth century.

TORA and Related Datasets

The aim of the TORA project has been not only to establish a historical GIS but also to enable links to other datasets and sources. An HGIS becomes much more useful if it is related to data found in historical sources and databases. As described, TORA is structured as a simple register of the settlement units with relatively few attribute data regarding primary spatial coordinates, place-names, accuracy, and references to historical maps. The register can be used to plot the location and distribution of historical settlements on digital maps. It can also serve as a geospatial index in data-driven research on historical places and place-names. For example, by using named entity recognition, the place-names appearing in editions of medieval letters could be automatically matched with the names and in TORA.[37] The real benefit arises, however, when more datasets—data from medieval and early modern sources—are linked to the HGIS.

Six datasets, related to different historical sources, have so far been added to TORA. Two datasets, which are connected to TORA, concern excerpts from seventeenth-century geometrical maps. One is related to maps from the 1630s and 1640s, and the other to later maps from the end of the seventeenth century.[38] These datasets compile the cadastral information that the surveyors provided on the maps, above all regarding the size of individual farms (holdings). In addition, GIS data have been created corresponding to the physical objects the surveyors' have depicted on the maps, such as farmsteads, church buildings, and watermills. All these data, including 15,000 settlements, are linked to TORA. For instance, Tollsta was first mapped in 1636, and

36 See also Dam, this volume.

37 Karsvall and Borin, "SDHK meets NER," 44–47.

38 Riksarkivet, "Sveriges äldsta storskaliga kartor."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

later in 1690.[39] In the future, transcripts of the map texts, statistics, and GIS data from the maps will be added to the TORA URI.

Another database linked to TORA is the digital edition of the *Suecia antiqua et hodierna*.[40] It includes the engravings and drawings of towns and manors that Erik Dahlbergh initiated during the second half of the seventeenth century. The whole collection refers to 231 settlement units in TORA. Several of these also appear in the seventeenth-century maps. For instance, a drawing of the fortification of Borgholm Castle was first made in 1625. In 1683 its land and surroundings were surveyed on a geometrical map. Both maps and the engravings from the *Suecia* collection have been linked to TORA.[41] In other cases, there are no historical maps of the places depicted in the *Suecia* collection. The images in *Suecia*, together with modern maps, have then formed the basis for the coordinate setting. Drawings are in most cases not suitable as coordinate sources, but, since the places depicted in *Suecia* apply to towns and other known places, the coordinates can be determined by using modern maps.

A similar principle of setting coordinates to well-known places has been applied in a database of Swedish manors managed by economic historian Göran Ulväng.[42] At present this database contains information on some 4,000 manors and similar institutions in Sweden, documented in written sources from the Middle Ages and later. Two-thirds of these correspond to settlements that have already been defined in TORA by historical maps. Using younger maps, especially from the eighteenth and nineteenth centuries, it has been possible to set coordinates for the remaining ones, often with high accuracy, as the places are usually well known and present in today's landscape.

The largest addition to TORA has come from the digitization and inclusion of the standard work *Det medeltida Sverige* (DMS).[43] All settlements reported in the book volumes, published before 2021, have been added to TORA. This has resulted in an addition of over 7,000 settlement units. The GIS registration has been based on the oldest available map, usually a map from the eighteenth century or later. It can be perceived as anachronistic to add coordinates to settlements known only in medieval and sixteenth-century sources. Before the seventeenth century, however, no maps are available. A historical GIS of medieval settlements thus needs to lean toward complementary younger sources and archaeology. As previously stated, the hamlets' core cultivated land and property boundaries are often stable over a longer period. This means that not only seventeenth-century maps but also younger, detailed large-scale maps are important sources when interpreting medieval settlement patterns. Mentions of places in medieval written sources, such as letters and accounts, can thus form the basis for registration in TORA, although the coordinates in GIS are based on younger

39 Riksarkivet, "TORA."

40 Kungliga biblioteket, "Suecia."

41 Riksarkivet, "TORA."

42 Svenska herrgårdar, www.svenskaherrgardar.se (accessed May 24, 2021).

43 Riksarkivet, "Medieval Sweden DMS."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

maps. There are also reports on undefined hamlets and farms in DMS that cannot be located. These are still registered in TORA as settlement units without coordinates. In this way, the entire DMS will be connected with TORA. The digitization of DMS is an ongoing project at the National Archives. Links to the information reported in DMS, on land acquisitions and other subjects, will be gradually added to TORA. DMS will also be a digital service in the future, with TORA to be used as a map service.

The sixth dataset connected to TORA applies to another standard work on place-names and name evidence called Sveriges ortnamn (SO).[44] As a pilot study, parts of the content from one book have been related to the geographical locations in TORA.[45] For instance, Mångsbo settlement in the hundred of Våla is geocoded based on a seventeenth-century map and assigned a TORA ID (9837). The identifier has then been added to a prototype of a digital SO, based on XML and the TEI mark-up standard, following the principle used for DMS. Descriptions in SO and DMS that contain TORA ID could be exported and integrated into the TORA map service. As a result, it is possible to view Mångsbo and other settlements, with details from the two digital editions and the historical maps, in one place.[46]

In this way, through collaborations with researchers and by including several datasets, the number of settlement units in TORA has increased. Henceforth, it would be possible to include more of SO, not least the provinces that still to a large extent lack TORA coordinates, such as Scania. Above all, TORA serves as a hub, connecting and providing a spatial entrance to datasets that otherwise are kept separated and lack geo-references.

A Linked Data Approach

The method of linking and embedding datasets from various sources utilizes linked data (or linked open data) principles and technologies. The basic idea of linked data, formulated by Tim Berners-Lee, is that the Internet is to function as a large database—more precisely, a semantic and interconnected web.[47] In the TORA case this means that the data have been modelled and published on the Web according to a few basic principles.

The reason why a linked data approach is used in TORA is related to a broader issue, namely the requirements placed on research data today. Research data are usually created for specific purposes in research projects and are collected and designed to handle the problems and questions that the researchers try to answer. It may serve as raw material, from where some parts are included in the analysis, compilation, and results, but the data themselves can also be the result, such as a digital edition, catalogue or service of a collection, or several related sources.

---

44 Institutet för språk och folkminnen, "Sveriges ortnamn."

45 Wahlberg, *Ortnamnen i Västmanlands län*.

46 Riksarkivet, "Mångsbo," http://toramaptest.riksarkivet.se/view/9837/en (accessed May 24, 2021).

47 Berners-Lee, "Linked Data."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

As the Internet is the channel for all types of digital publishing, terms such as "data," "database", and "dataset" become synonymous and less important to keep apart. Data on the Web could easily be adopted and remixed for purposes other than those they were originally established for. Several benefits can easily be highlighted. There is an increase in transparency, and possibly also data quality, as a wider audience takes part of the data, and corrects, reuses, and builds on what has previously been created. Technological development, not least in the field of artificial intelligence, promotes data-driven research that uses and adapts data in a machine-readable way. This will very likely change the way research data should be made available. It is no longer sufficient to publish data behind a custom interface, such as a search application, which facilitates some users but prevents access to all data, data reuse, and data-driven methods. Moreover, Web applications created in research projects tend to become obsolete when the projects are completed. The need for special interfaces or websites is also, in my opinion, often overestimated. An easier way, at least in some cases, would be to make data available through repositories for direct access and download, although dynamic data, frequently updated, will need some services. In those cases, the research data could be made available via existing major infrastructures. A problem within HGIS and humanities, in general, is that such research infrastructures are lacking.

That being said, the long-term goal of TORA is to establish a digital research infrastructure for historic settlements within Sweden, Finland, and the Baltic region—the areas that were mapped during the seventeenth century. Early in the project the decision was made to use linked data as a method for this infrastructure. Creating a large database of all information related to historical settlement would simply not be possible. As shown, the datasets and sources used in TORA are simply too diverse to be integrated into a single data model and ontology.

A linked data approach enables a decentralized solution, whereby each dataset is described separately and linked together according to a few basic principles. One principle is about making data linkable by using uniform resource identifiers.[48] It is thus a matter of exposing data using the HTTP addresses as identifiers that point out the unique records. In TORA, each settlement unit has a unique URI under the National Archives, according to the pattern: data.riksarkivet.se/tora/[identifier].

Another linked data principle is to model the data according to the Resource Description Framework (RDF).[49] The data are expressed as relations between a subject, predicate, and an object—so-called triplets: statements that express links between URIs or string values. Standardized vocabularies such as the Simple Knowledge Organization System (SKOS)[50] and Dublin Core[51] are used to define the predicates. One such relation (triple) is as follows: TORA ID 9837 (subject),[52] having a preferred name (predicate)

48 Berners-Lee, "Linked Data."

49 W3C, "Resource Description Framework (RDF)."

50 W3C, "SKOS Simple Knowledge Organization System."

51 Dublin Core, "DCMI Metadata Terms."

52 Riksarkivet, "Mångsbo," https://data.riksarkivet.se/tora/9837 (accessed May 24, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

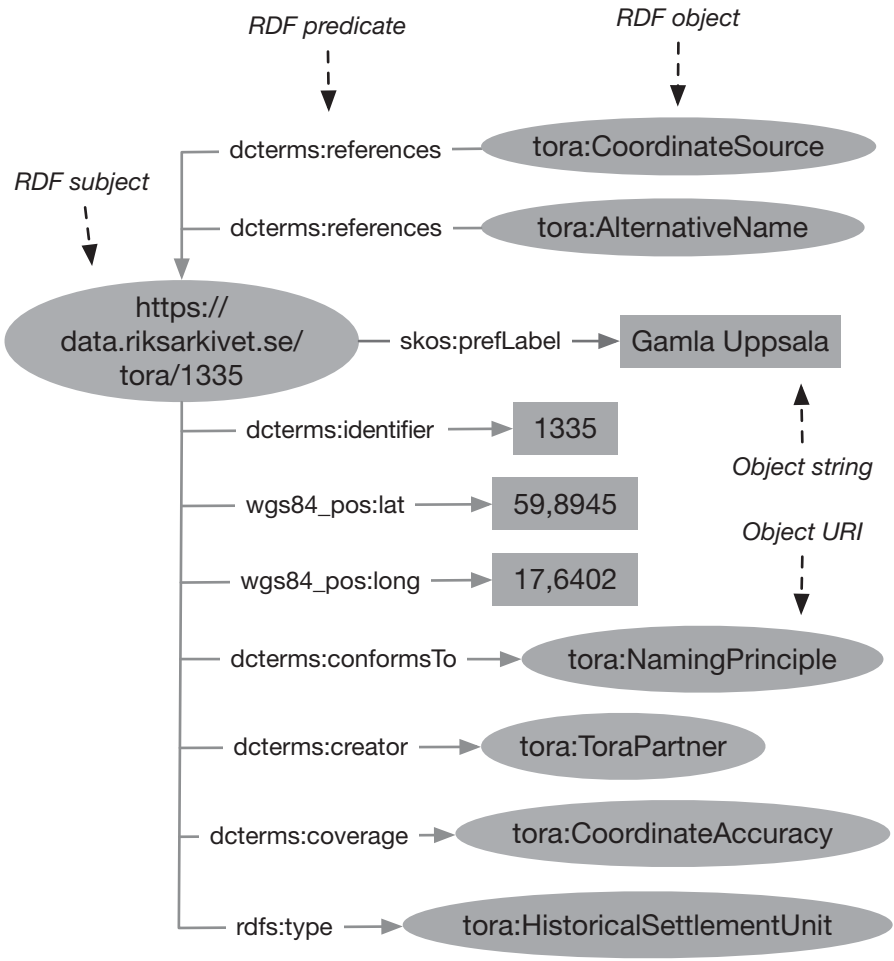


Figure 4.3. Data model or graph in RDF used to describe relations (triples) in TORA. Image by Olof Karsvall.

defined using skos:prefLabel,[53] pointing to "Mångsbo" (object) as a data string value.[54] The central parts of the TORA graph are exemplified in Figure 4.3.

An aim of linked data is to make statements explicitly understandable by humans and machines. Relationships and terms that express general phenomena (such as names,

53 See W3C, "SKOS Simple Knowledge Organization System: Preferred Label," www.w3.org/2009/08/skos-reference/skos.html#prefLabel (accessed May 24, 2021).

54 The creation of historical settlement units as Linked Open Data is described in more detail in Karsvall, "Historical Settlement Units."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

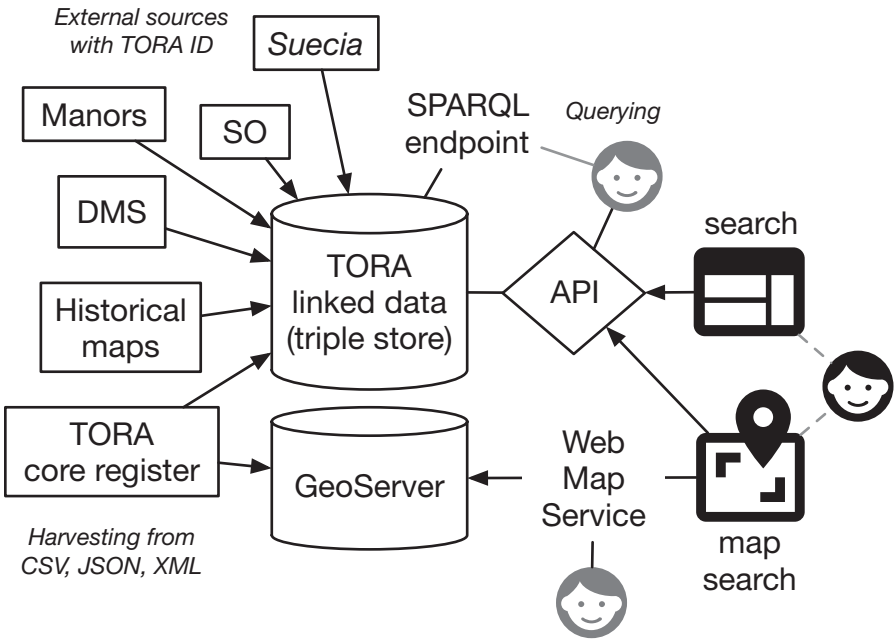


Figure 4.4. Architecture and data flows in TORA. Image by Olof Karsvall.

events, sources, dates, etc.) can in most cases be mapped to existing vocabularies. Most concepts used in TORA are therefore based on standards. In order to express historical places, other domain-specific terms are also needed. The central concept in TORA, "historical settlement unit," refers to the agrarian settlements that were registered and surveyed during the Middle Ages and early modern period. Adding this term clarifies that these are historical settlements that should not be confused with modern GIS data. Hence, linked data statements can be expressed freely, as long as they express RDF triples and URIs to name the relationships.

To illustrate how TORA uses linked data, the architecture and the data flows should be commented on; see Figure 4.4. The extended RDF graph consists of two parts: a "core" part, holding the basic register of historical settlements and its spatial coordinates; and a "cache", holding all the other data that are being harvested from various sources. The "cache" is a temporary storage, in the sense that related datasets are created somewhere else; hence, the harvesting process has to be redone as soon as the data are updated at the source. In both cases, the datasets are added to TORA by harvesting and mapping to the RDF model. The core TORA register, DMS, SO, and the historical maps are harvested from CSV and JSON files. In the case of the *Suecia* collection, the data are retrieved from an open API,[55] which

55 Kungliga biblioteket, "Xsearch." An example (Aspnäs, TORA ID 12320): http://libris.kb.se/xsearch?query=uri:(data.riksarkivet.se/tora/12320)&format=marcxml (accessed May 24, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

enables a more or less seamless data embedding. All transformations are made using mainly JavaScript on the TORA server. The RDF statements are then stored using a so-called triple store database, which exposes each settlement and its related data in RDF formats.

There are several ways of accessing the data: either using the linked data API or a SPARQL endpoint, or by downloading and embedding settlement units as RDF files.[56] As another alternative, there is a GIS server that can plot the spatial data of each settlement unit on maps, which also connect with open-source applications such as QGIS.[57] Using these data sources, a map search application has been built that serves as a frontend to the historical settlements units.[58]

Linking historical data in this way is thus a method of mapping and combining data from different sources. Datasets added to TORA need to hold a TORA ID, but may otherwise have different formats and structures. Through a process of RDF mapping, metadata and content from various sources are directly embedded in TORA. The continued development for TORA will be about adding other historical datasets, and thus creating a larger graph of relations between historical settlements and historical sources.[59]

Final Remarks and Conclusions

The historical GIS called TORA that has been described and discussed in this chapter compiles historical places, more particularly rural settlements in medieval and early modern Sweden. Historical maps and other sources have been systematically reviewed for reconstructions of the actual sites for historical places in Sweden. The core in TORA consists of "historical settlement units"—more precisely, villages, hamlets, and farms.

A basic question for any historical GIS is how units and places are to be defined and conceptualized. The starting point must be taken from source material that can be extracted and transformed into GIS data, especially historical maps and sources with location references. The tradition of registering hamlets and farms in Sweden on a national level goes back to the 1530s. Related to this, surveyors measured, described, and depicted the farmland during the seventeenth century. These large-scale maps are therefore suitable as the basis for an HGIS. A method for assigning accurate coordinates from large-scale maps has been further developed in the TORA project. The settlement units are geo-referenced as spatial point objects showing the locations on a modern map with references to the oldest large-scale map or several maps.

Researchers can integrate the TORA register into their own datasets. It is also a service on its own, proving data harvested from related sources. Duplication of work will

56 See Riksarkivet, "TORA."

57 See QGIS, https://qgis.org/en/site (accessed May 24, 2021).

58 Riksarkivet, "TORA," http://toramaptest.riksarkivet.se (accessed May 24, 2021).

59 The documentation, datasets, and code of the TORA service will be available at the National Archives as open data in the future. For updates, see Riksarkivet, "TORA."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

be avoided if places appearing in historical sources are defined by spatial coordinates once. Moreover, the reuse of place identifiers (URIs) promotes data analysis. Different sources that deal with a certain place or area can be compiled and compared based on geographical locations. For example, when a dataset of medieval settlements is linked to TORA, it will be possible to create a map that shows its spatial distribution, according to and with reference to the oldest known maps. The analysis can be combined with other GIS data, such as that related to ancient remains. In fact, a large amount of data from historical sources is linked to places in some way. For instance, manuscript sources (as diplomas) are created in specific places and often deal with issues such as land transactions that can be linked to places. The point to be made is that datasets that lack geo-references can be analyzed spatially if they are connected to an HGIS.

A future challenge is whether HGISs created for different countries can be harmonized and compared. TORA is built using seventeenth-century large-scale maps that are unique to Sweden and Finland, although it is possible to create HGIS coordinates using a simplified method. As highlighted in this chapter, other sources, such as engravings depicting landscapes and written sources describing places and place-names, could be used as coordinate sources in an HGIS. The minimum requirement is one historical source and a declaration (metadata) about coordinate accuracy and a coordinate reference system. HGISs built as linked data can be simplified and made lightweight because most of the metadata needed to analyze historical places are extracted from other linked sources.

Undoubtedly, the historical GIS of settlements, as well as administrative divisions, are important in historical research, as basic registers and for creating geo-references to source materials. The use of HGIS data would likely increase if they are expressed as linked data and act as nodes on the Web, available to a wider audience. Linked data principles can also form the basis for collaboration between HGIS projects, digital historians, and others, as a way to share data and applications, which is the model for the future.

Bibliography

Baigent, Elizabeth. “Monarchs, Ministers, and Maps: The Geometrical Mapping of Early Modern Sweden in International Perspective.” In *Nationalutgåva av de äldre geometriska kartorna*, edited by Birgitta Roeck Hansen, 23–60. Stockholm: Kungl. Vitterhets historie och antikvitets akademien, 2005.

Berman, Lex Merrick. “Boundaries or Networks in Historical GIS: Concepts of Measuring Space and Administrative Geography in Chinese History.” *Historical Geography* 33 (2005): 118–33.

Berners-Lee, Tim. “Linked Data.” World Wide Web Consortium (W3C). www.w3.org/DesignIssues/LinkedData.html (accessed May 24, 2021).

Brunius, Jan. *Vasatidens samhälle: En vägledning till arkiven 1520–1620 i Riksarkivet*. Stockholm: Riksarkivet, 2010.

Dolejš, Martin, and Michal Forejt. “Franziscean Cadastre in Landscape Structure Research: A Systematic Review.” *Quaestiones Geographicae* 38 (2019): 131–44.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

Ellegård, Kajsa, and Uno Svedin. "Torsten Hägerstrand's Time-Geography as the Cradle of the Activity Approach in Transport Geography." *Journal of Transport Geography* 23 (2012): 17–25.

Ericsson, Alf. Terra mediaevalis: Jordvärderingssystem i medeltidens Sverige. Diss. Uppsala: Sveriges lantbruksuniversitet, 2012. https://pub.epsilon.slu.se/9224 (accessed May 24, 2021).

GeoNames. www.geonames.org (accessed May 24, 2021).

Goodchild, Michael F., and Lauren L. Hill. "Introduction to Digital Gazetteer Research," *International Journal of Geographical Information Science* 22 (2008): 1039–44.

Google Maps. www.google.com/maps (accessed May 24, 2021).

Gregory, Ian N., and Paul S. Ell. *Historical GIS Technologies, Methodologies, and Scholarship*. Cambridge: Cambridge University Press, 2008.

Helmfrid, Staffan. Östergötland "Västanstång": Studien über die ältere Agrarlandschaft und ihre Genese. Diss. Stockholm: Stockholm University, 1962.

Institutet för språk och folkminnen. "Sveriges ortnamn." www.isof.se/sprak/namn/ortnamn/sveriges-ortnamn.html (accessed May 24, 2021).

Jupiter, Kristofer. The Function of Open Fields: Agriculture in Early Modern Sweden. Diss. Uppsala: Sveriges lantbruksuniversitet, 2020. https://pub.epsilon.slu.se/17423 (accessed May 24, 2021).

Karsvall, Olof. "Historical Settlement Units as Linked Open Data." In *Proceedings of the Digital Humanities in the Nordic Countries 4th Conference (DHN 2019), Copenhagen, Denmark, March 5–8, 2019*, edited by Costanza Navarretta, Manex Agirrezabal, and Bente Maegaard, 259–69. Copenhagen: University of Copenhagen, Faculty of Humanities, 2019.

——. "Retrogressiv metod: En översikt med exempel från historisk geografi och agrarhistoria." *Historisk tidskrift* 133 (2013): 411–35.

——. Utjordar och ödegårdar: En studie i retrogressiv metod. Diss. Uppsala: Sveriges lantbruksuniversitet, 2016. https://pub.epsilon.slu.se/13711 (accessed May 24, 2021).

Karsvall, Olof, and Lars Borin. "SDHK Meets NER: Linking Place Names with Medieval Charters and Historical Maps," In *Proceedings of the Digital Humanities in the Nordic Countries 3rd Conference (DHN 2018), Helsinki, Finland, March 7–9, 2018*, 38–55. Copenhagen: University of Copenhagen, Faculty of Humanities, 2018.

Kungliga biblioteket. "Suecia." https://suecia.kb.se (accessed May 24, 2021).

——. "Xsearch." http://librishelp.libris.kb.se/help/xsearch_swe.jsp (accessed May 24, 2021).

Lantmäteriet. "Min karta." https://minkarta.lantmateriet.se (accessed May 24, 2021).

——. "SWEREF 99." www.lantmateriet.se/sv/Kartor-och-geografisk-information/gps-geodesi-och-swepos/Referenssystem/Tredimensionella-system/SWEREF-99 (accessed May 24, 2021).

National Geospatial-Intelligence Agency. "WGS 84." https://earth-info.nga.mil (accessed May 24, 2021).

Pelagios. https://pelagios.org (accessed May 24, 2021).

QGIS. https://qgis.org/en/site (accessed May 24, 2021).

Riksarkivet. "Medieval Sweden DMS." https://riksarkivet.se/medieval-sweden-dms (accessed May 24, 2021).

——. "Projekt Äldre geometriska kartor, Lantmäteriet, SE/RA/81003/1/D7." https://sok.riksarkivet.se/bildvisning/R0000164_00111 (accessed May 24, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

——. “Projekt Äldre geometriska kartor, Lantmäteriet, SE/RA/81003/1/D5.” https://sok.riksarkivet.se/bildvisning/R0000162_00153 (accessed May 24, 2021).

——. “Sveriges äldsta storskaliga kartor.” https://riksarkivet.se/geometriska (accessed May 24, 2021).

Samlingar i Landtmäteri: Första samlingen Instruktioner och Bref 1628–1699. Edited by Viktor Ekstrand. Stockholm: Isaac Marcus, 1901.

Svenska herrgårdar. www.svenskaherrgardar.se (accessed May 24, 2021).

Text Encoding Initiative Consortium. “P5: Guidelines for Electronic Text Encoding and Interchange.” https://tei-c.org/release/doc/tei-p5-doc/en/html/ref-precision.html (accessed May 24, 2021).

Tollin, Clas. “De första lantmätarna.” In *1600-talets jordbrukslandskap: En introduktion till de äldre geometriska kartorna*, edited by Mats Höglund, 16 –31. Stockholm: Riksarkivet, 2008.

Tollin, Clas, and Olof Karsvall. “Sveriges äldre geometriska kartor: Ett världsarv görs tillgängligt,” *Bebyggelsehistorisk tidskrift* 60 (2010): 94–103.

TORA – Topographical Register at the Swedish National Archives. https://riksarkivet.se/tora-english (accessed May 9, 2021).

Wahlberg, Mats. *Ortnamnen i Västmanlands län: Heby kommun, Norra delen: Bebyggelsenamn*. Uppsala: Ortnamnsarkivet, 1988. http://sprakochfolkminnen.diva-portal.org/smash/get/diva2:1106775/FULLTEXT01.pdf (accessed May 24, 2021).

Wikidata. www.wikidata.org/wiki/Wikidata:Main_Page (accessed May 24, 2021).

Wästfelt, Anders. “Ambiguous Use of Geographical Information Systems for the Rectification of Large-Scale Geometric Maps.” *The Cartographic Journal* 57 (2020): 209–20.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

Chapter 5

TOWARD DIGITAL SPATIALITY: RETHINKING THE WORLD'S LARGEST PLACE-NAME COLLECTION

Björn Karlsson, Kristina Neumüller, and Elin Pihl*

THE PLACE-NAME COLLECTION at the Institute for Language and Folklore (abbreviated in Swedish as Isof) in Uppsala consists of about 3.7 million cards with information about names from all over Sweden (and some from other parts of the world). It is, to our knowledge, the world's largest place-name collection. Thanks to digitization, which was already under way in the middle of the 1990s, the collection has been accessible online for over fifteen years. The development of the database has been compromised, however, by the analogue way of thinking about digital matters that characterized the initial digitization process. The relatively early digitization of the collection can thus be said to gradually have changed from an advantage to a significant hindrance, and we are now facing the challenge of turning the existing, rather unwieldy place-name database into a more useful and powerful resource, optimized for data-driven spatial research. The first steps have been taken by introducing a new data structure and the potential to geocode name data in the database, but there are many more steps to come. Both the past and the present are described in this chapter, together with an outline of our plans for the future.

The Development of the Place-Name Collection

It was in the early twentieth century that the first steps to create a place-name collection were taken. In 1902 a Royal Place-Name Committee was established, assigned to organize a systematic investigation of Swedish place-names. The results were to be published in a place-name series, with the Norwegian series Norske Gaardnavne serving as a model.[1] The goal was to describe and interpret all names within Swedish borders, with a detailed list of existing spellings and pronunciations for each name. In order to succeed in their task, the committee set about collecting information about Swedish place-names, in

* Björn Karlsson is a software developer, and Kristina Neumüller and Elin Pihl (https://orcid.org/0000-0001-7990-0148) are research archivists specializing in place-names at the Institute for Language and Folklore (Isof). Email: bjorn.karlsson@isof.se, kristina.neumuller@isof.se, and elin.pihl@isof.se.

1 Rygh, *Norske Gaardnavne*.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

written historical sources and specialist literature and through the on-site interviewing of local informants, sometimes with a detailed map of the area. The name forms were written down in the Swedish dialect alphabet (Swedish: *Landsmålsalfabetet*), a very detailed phonetic notation system,[2] most often together with some kind of note on the location, and sometimes with other kinds of information about the name or the place.

In the 1920s the need to organize the increasing quantity of place-name material in a proper archive became obvious, and in 1928 the Swedish Place-Names Archives was founded. No one responsible for the archives at the time could possibly have imagined that, about eighty years later, the place-name information they were collecting and systematizing would be made available for the general public. The material in the archive was intended for specialists in place-names, familiar with its background, structure, purpose, and—not least—its many abbreviations. It was not considered a problem that an outsider would not easily be able to decipher the information in the place-name collection, nor understand the meaning of the abbreviations.

Over the years that followed, however, not only did the collected material continue to grow, but so did the interest in the material from others besides onomasticians.[3] The place-name information turned out to be useful for philologists and other linguists, archaeologists, and researchers in agrarian history, as well as anyone interested in local history or genealogy. Moreover, access to place-name material was fundamental for people working with place-names at public authorities, such as Lantmäteriet (the Swedish mapping, cadastral, and land registration authority).

Hence, when an opportunity to finance the digitization of the place-name collection arose in the early 1990s, it was an easy decision to go ahead with the project. Deciding exactly how to carry out the process was not quite as easy, as no similar digitization project existed to serve as a model. A pilot project was therefore conducted, and after that the intricate procedure of scanning all the archive cards and registering their content was initiated. The material was then published gradually, with the last step being a rather time-consuming quality check. In 2008 the whole register was finally available online.

The First Attempt to Make the Collections Available Online

One of the main features of the first interface of the Swedish digital place-name register[4] was to display the archive cards in the exact same order as found in the physical archive. In the archive, the material is organized parish by parish, following the administrative division that prevailed in Sweden in 1951. Within each parish there are four thematic sections (see Figure 5.1), and within each section the place-names are arranged

2 See Lundell, "The Swedish Dialect Alphabet."

3 Onomasticians are researchers within the field of names, personal names, place-names, and other names. Here, of course, the focus is place-names.

4 See www4.isof.se/NAU-ortnamn/index.htm (accessed June 7, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

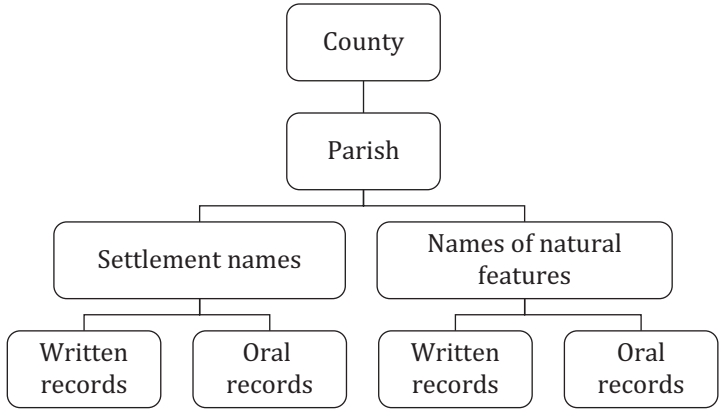


Figure 5.1. The structure of the Swedish place-name collection in the archive of Isof. Image by Elin Pihl.

alphabetically. Further, within each place-name, the cards are sorted chronologically, displaying the oldest attestation first.

Even though the organization of the physical collection was copied, however, not all the information on the cards was transferred to digital text. Each physical card received its own post, hereafter called an "archive post." The data transferred from the physical card to the archive post were as follows: the place-name (in a standardized modern form, as found in the records[5] of Lantmäteriet); whether it classifies the name of a settlement or of a natural feature; whether it represents an older spelling or an oral record; what kind of locality the name denotes (and in this field many different values existed); and then the parish (Swedish: *socken*), district (Swedish: *härad* or equivalent), county (Swedish: *län*), province (Swedish: *landskap*), and country (with only Sweden, Åland,[6] Finland, Estonia and "the rest of the world" as actual values). All archive posts were also labelled with a language—Swedish, Sami, or Finnish—but these labels are not

5 Not all names in the Place-Names Archives can be found in the registers of Lantmäteriet, but since the Spelling Reform in 1906 it was stated that the names should follow common spelling rules and that old spellings or decorative spellings should be avoided, and therefore all the place-names in the Place-Name Archives were standardized according to existing rules. Sometimes, however, there have been problems etymologizing the name, and therefore a problem deciding the correct spelling of the name. In other cases common spelling rules have changed over time, and the recordings from before that change have not been altered according to the new spelling, but new entries have. Sometimes the official name has been changed by Lantmäteriet. Thus, there are names that have been registered with different spellings. This is something we try to amend, but the changes have to be made manually, and therefore there are still some names that appear to be different place-names even though they are just different spellings of the same name.

6 Åland is not a country but an autonomous region of Finland. It has been treated as a country in the Swedish place-name collection, however.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Nr	Ortnamn	Lokal	Socken	Härad	Län
1	Uppsala	gd	Huddinge	Svartlösa hd	Stockholms
2	Uppsala	gd	Huddinge	Svartlösa hd	Stockholms
3	Uppsala	gd	Huddinge	Svartlösa hd	Stockholms
4	Uppsala	riven gd	Huddinge	Svartlösa hd	Stockholms
5	Uppsala	ägomark	Huddinge	Svartlösa hd	Stockholms
6	Uppsala	biskopsdöme	---	Allmänt	Uppsala
7	Uppsala	stift o. stad	Uppsala st.	---	Uppsala
8	Uppsala	stad o. stift	Uppsala st.	---	Uppsala
9	Uppsala	stad	Uppsala st.	---	Uppsala
10	Uppsala	stad	Uppsala st.	---	Uppsala
11	Uppsala	stad och stift	Uppsala st.	---	Uppsala
12	Uppsala	stad	Uppsala st.	---	Uppsala
13	?Uppsala(?)	stad	Uppsala st.	---	Uppsala
14	Uppsala	stad o. stift	Uppsala st.	---	Uppsala
15	Uppsala	stad och stift	Uppsala st.	---	Uppsala

Figure 5.2. Search results in the old version of the Swedish digital place-name register. Image by Björn Karlsson.

reliable, as many of the original Sami or Finnish names have been classified as Swedish.[7] The archive posts that had references to literature were marked as containing an interpretation of the name, even though the post sometimes just refers to a description of the locality. All posts also were provided with a hidden identifier, a text string, in order to connect the scanned images of cards with the correct archive posts and to arrange the order of the digital archive posts; these identifiers are still used, but they are hidden from everyone except the software developers, and no new ones are created.

Each row in the digital table with archive posts represented one archive card in the physical collection; see Figure 5.2. If both sides of the card were used, each side had its own row in the table with archive posts. The physical card was visible in the form of a PDF copy (stored in a file system outside the database) whenever the user clicked on a name. Thus, the datings of the written records, the different spellings of the name, the pronunciation, and any other information on the physical card could be read by users, but no such information was transferred into the database.

The lack of complete digitized data caused problems updating the chronological order within each place-name when new information was being added. The only way not to disrupt the structure was to insert each new post manually, one by one. To import files with several hundred posts was thus out of the question. As a result, while the physical archive was being updated, the digital register paradoxically was not, and with every year that passed the divergence between the two grew bigger and bigger. The information that was added to the physical collection primarily concerned references

7 These classifications have been transferred to the new digital register since they at least give a hint of the possible different origins of place-names in Sweden. If we decide to change the labels, the changes will have to be made manually by an expert in Sami and Finnish, and we have so far not been able to prioritize this step.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

to recently published literature. The absence of these references in the digital register meant that it could no longer be relied on for keeping up to date with current research. The users of the digital version were therefore put at an unfortunate disadvantage.

The need for a restructuring was not only due to the need for data updates but also, as shown, because of how the existing data were organized. Which of the posts actually denote the same locality could not be deduced from the data. When searching for the place-name "Uppsala," over 5,000 hits would be retrieved—a result that revealed the total number of archive posts for "Uppsala" in the database (or cards in the archive), but not how many different places named "Uppsala" there are. The hits could be sorted by parish and thus give a clue as to which posts denoted the same locality, but, on the whole, the system could not be said to be very practical.

Since it was evident that the existing flat structure would need to be replaced, the question arose how best to reorganize the digital material in a manner that would preserve all archive information without being conservative in its structure. It was clear that the best way to proceed was to cut the digital version loose from being an exact mirroring of the physical one and allow it to develop a structure of its own. The new structure had to facilitate maintaining, updating, and displaying the data, and it also needed to be forward-looking in order to pave the way for future developments and additions.

Second Attempt to Make the Collections (More) Available

What was missing in the first version of the Swedish digital place-name register was a hierarchical structure in which all archive posts concerned with one and the same place-name were bundled together under a common heading. The ability to single out each unique place-name, instead of each and every archive post concerning the same place-name, would simplify the search for relevant names and places, and also make it possible to connect the place-name (and hence all the archive posts related to that name) to point coordinates or a geographic area (a polygon).

Nevertheless, the data at hand, as described above, consisted only of a few fields and was not substantial enough, and so it was not possible to immediately implement the desired structure and identify which archive posts denoted the same place-names and therefore should be kept together. The standardized name form and the parish information helped make an initial connection, but the unique place-name could not be based on the geographical location only, since there are sometimes homonymous place-names within the same parish.[8] A rough division in names of settlements and of natural features made it possible to split up homonymous names denoting widely different localities—e.g., "Lillsjön" in the parish of Grums, Värmland, which is to be regarded as two unique names, since the one "Lillsjön" denotes a lake and the other "Lillsjön" denotes a settlement (even though it is clear that the settlement name emanates from the lake

8 See Gammeltoft, this volume.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

name). But this was not enough for a significant number of homonymous names, since the different names often belonged to the same group of names of settlements or of natural features. It became apparent that it was crucial to discern the kind of locality that the names are denoting, and the only information to help us along was the data field containing information about locality. As mentioned, this field contained numerous different words and abbreviations—e.g., the Swedish word *gård*, pl. *gårdar* ("farm"), could be rendered as *gård*, *g*, *g.*, *gd*, *gårdar*, *gdr*, *gdar*, *gd:ar*, *f.d. gd, nu försvunnen gård*, *förr gd*, etc.

First, we had to identify which words were used when denoting a certain locality. With every difference in spelling counted, the number of different words, abbreviations, etc., reached over 85,000 varieties. Unfortunately, the most common words were "non-existing" and "locality missing" —i.e., where there was either no definition of locality or an uncertainty about the locality (marked with a question mark), or where the persons transcribing the card had missed filling in the information in the right field. Next in line was the word *åker* ("field," "arable land"), demonstrating how many of the names in the archive actually describe non-settlements. When the most common varieties were identified, they were clustered together under a few catch-all terms—i.e., "area" (Swedish: *område*),[9] "artifact" (Swedish: *anläggning*),[10] "ground" (Swedish: *terräng*), "land" (Swedish: *ägomark*),[11] "name element" (Swedish: *ortnamnselement*), "people" (Swedish: *personer*),[12] "settlement" (Swedish: *bebyggelse*), "water" (Swedish: *vatten*), and "watercourses" (Swedish: *vattendrag*). Being able to make this distinction, we could match the posts that had the same name, within the same parish and the same catch-all term for locality, and trust that most of the posts were bundled under the correct place-name. Some names came to be bundled together even though they denoted different places, however, and some were separated even though they indeed denoted the same place. This is something we will not be able to solve automatically but must attend to manually.

Having linked most of the posts concerning the same place-name, we finally reached the hierarchy we wanted. In the new digital register the top level containing the unique place-name is called *Ortnamn* ("Place-Name") and all the archive posts belonging to the same place-name are found in the sub-level *Arkivposter* ("Archive Posts"). To ensure users can get an overview of relevant place-names, the locality type and parish (and higher administrative units) are displayed together with the place-name in the search results in the web application *Ortnamnsregistret* ("Place-Name Register"); see Figure 5.3. Users start by searching for a place-name (or parts of a place-name) and then go on to

9 Containing names denoting (parts of) parishes, counties, neighbourhoods, municipalities, etc.

10 Containing names denoting bridges, roads, ditches, gates, lighthouses, etc.

11 The difference between "ground" and "land" is often confusing, but as a guideline "land" incorporates those names designating lands used in farming while "ground" tends to contain names of natural features.

12 Even though the archive is a place-names archive it still holds local names for people connected to a place, and certain names emanating from places but considered personal names.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

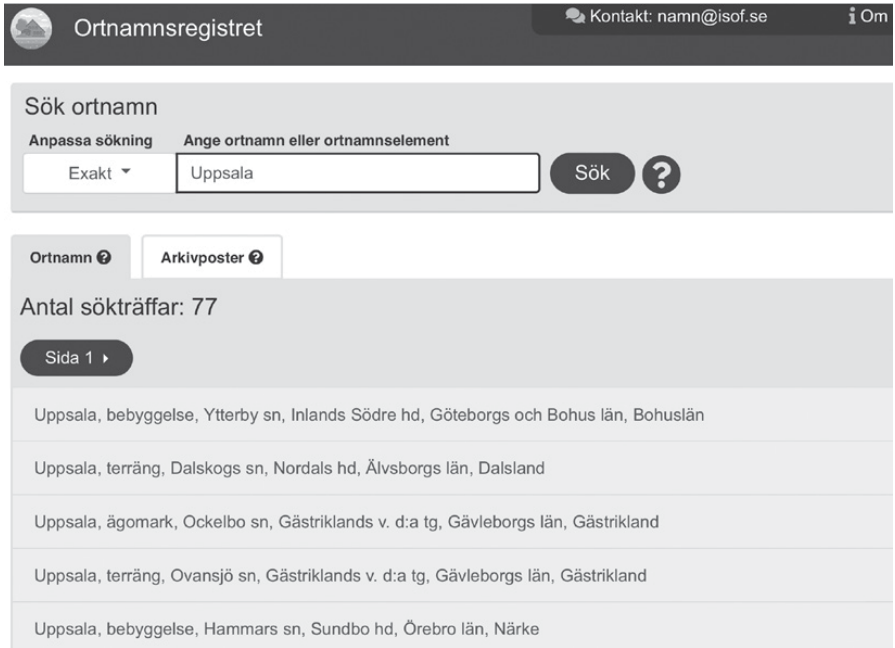


Figure 5.3. The new Swedish digital place-name register, displaying the results of the simple search for "Uppsala." Image by Björn Karlsson.

view the archive posts that belong to the chosen place-name.[13] The archive posts are listed according to information type: "written record" (Swedish: *belägg*)—i.e., older spellings of the name in handwritten sources;[14] "oral record" (Swedish: *uppteckning*)—i.e., the pronunciation of the name written in Swedish dialect alphabet; and "references" (Swedish: *litteraturhänvisning*) to literature that in some way deals with the name or place. Information about place-names and archive posts are continually being added to the digital place-name collection, but, due to lack of resources and of space,[15] no more cards are added to the physical place-name archive.

The new Swedish digital place-name register was first tested within Isof's own staff, and with a few handpicked experts. After the comments and suggestions had been taken into consideration and applied, we finally launched a beta version in March 2020,

13 It is also possible to view all the place-names belonging to a certain parish, but then some adjustments to the search fields are necessary.

14 There is an ongoing project to display all the written records in chronological order, displaying the year of the record together with each archive post.

15 And also a belief that it is unnecessary and uneconomical to keep double versions of the same information.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

accompanied by a REST (REpresentational State Transfer) web service.[16] What is much appreciated in the new version is that, instead of the over 5,000 hits shown in the old register (exhibiting how many cards with that name that existed in the archive), a search for "Uppsala" in the new database results in seventy-seven matches corresponding to the number of locations carrying this name that are recorded in the place-name collection. In other words, each of these seventy-seven places bears the same name, and therefore the result shows seventy-seven place-names (i.e., one place equals one place-name, even though the names of two or more places may be identical). Linked to each place-name are archive posts showing every instance (recorded in the collection) of the specific name used for the specific place.

The How and Why of the New Digital Register

The new Swedish digital place-name register has more components than the first one: the publicly available web application that makes it possible to search the database; the editing tool that makes it possible to edit existing archive posts and add new place-names and/or archive posts; and a REST web service. The data are stored in a MariaDB database and Elasticsearch is used for searching. Figure 5.4 illustrates interrelations in the system. In the following section we describe the system in more detail.

MariaDB Database

The MariaDB database is a digital copy of the physical place-names collection when it comes to the card register, but with an architecture and relations stretching far beyond the potentials of the physical archive; see Figure 5.5. All data in the Swedish digital place-name register are in Swedish only.

In Figure 5.5, each row in the table "PlaceName" represents a unique place-name. The goal is that there should not be two or more rows that represent the same place-name, but that goal has not yet been fulfilled. It is not easy to extract the unique set of place-names from 3.7 million archive posts. The physical card uses the official spelling of the place-name, but, since the collections have been added to for almost a century and some official names have changed, there are still some place-names that have two or more different spellings (and therefore are two or more different place-names until archivists manually bring them together to one row).

A place-name is usually related to a specific parish, but some place-names are not. For example, the name of a district is not related to a specific parish, which is only logical, since the district is found at a higher administrative level and consists of many parishes. Those place-names that are not related to a specific parish are, however, related to a row in the table "District;" see Figure 5.5. Today over 90 percent of the place-names have the related parish as a coordinate source. This means that the coordinates shown for the place-name are the same as the coordinates for the parish that the place-name

16 See https://PlaceNameService.isof.se (accessed June 7, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

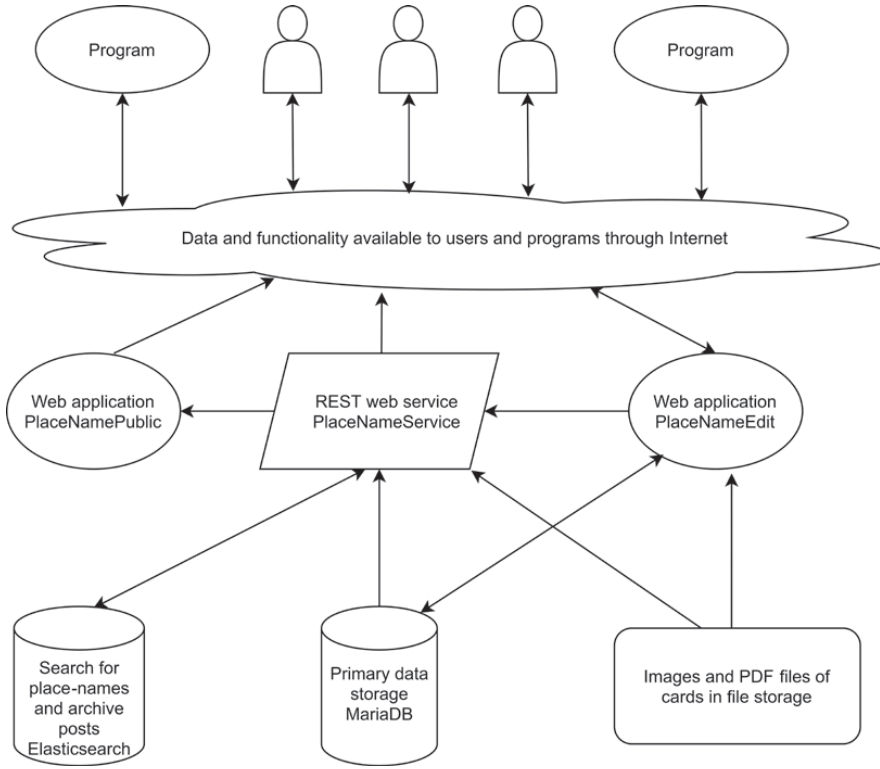


Figure 5.4. System description. Image by Björn Karlsson.

belongs to. The church is often used as a position for parishes, but sometimes it is a geographically central position. The table "PlaceName" has a string with the field "type," which holds information about the kind of locality the name belongs to—e.g., "settlement" or "watercourse."

Most rows in the table "ArchivePost" (see Figure 5.5) are related to a physical card. If both sides of a card have been used, two rows exist in the table, one for each side of the card. New archive posts that are added to the place-name collection do not have a corresponding card, which of course also means that there is no image or PDF file of a card. Each archive post is related to one place-name. Each archive post is also related to exactly one so-called project. The word "project" is used in the editing tool PlaceNameEdit (see below) for clearly defined and delimited information sources. For example, if we do an on-site interview in a parish, that would be a project, and, if we were to make excerpts from an old source that has not yet been added to the register, that would be another project. In addition, each book or volume, etc., that we extract examples from becomes a project of its own. It is only when a project is published in the editing tool that the information is available to external users. Each project contains only

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

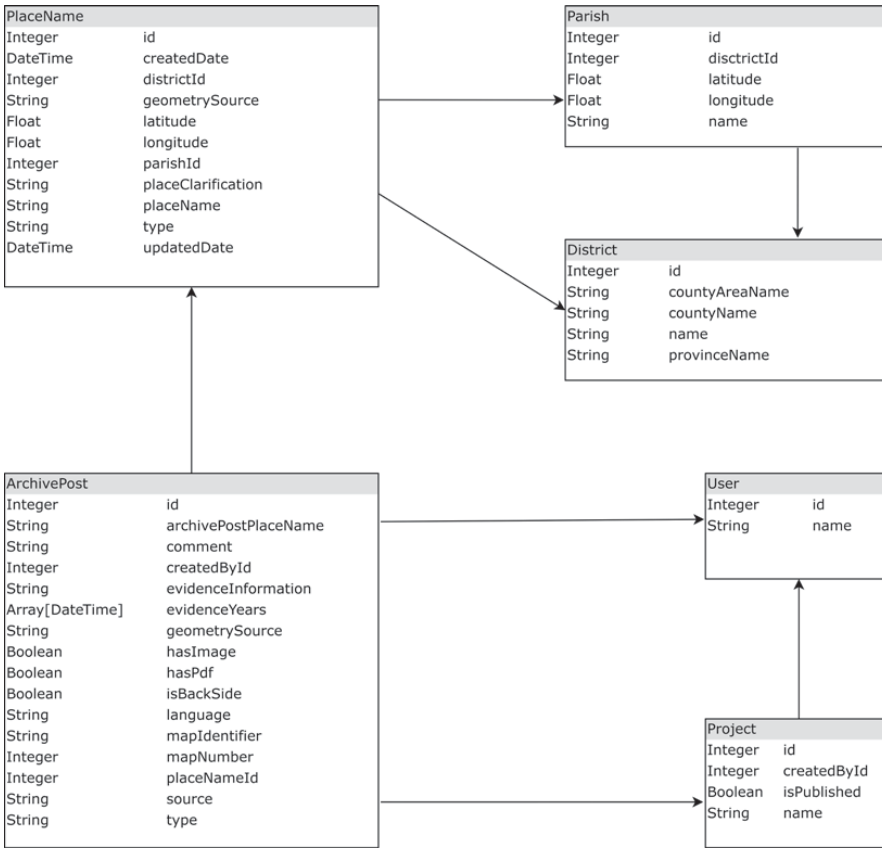


Figure 5.5. The design of the Swedish digital place-name register. Image by Björn Karlsson.

archive posts of the same type. There are, as mentioned above, three types of archive posts: written records, oral records, and references.

Each parish is related to a single district. The table "District," as shown in Figure 5.5, contains information about districts, counties and provinces in Sweden.[17]

Additionally, Isof uses so-called history tables for the most important data types and those data types that change often. Each history table is related to exactly one of the standard tables and has the same columns as the standard table plus some extra columns that contain extra information about changes. A history table contains the complete history of changes (including current values) that the standard tables have

17 It also contains information about countries or areas other than Sweden. These countries and areas (except for Sweden) have no information in the fields "name," "countyName," and "provinceName" in the table "District."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

had over time. They are very useful for amending data-processing errors. The technique trigger, which is available in most SQL databases, is used to update history tables with changes. An advantage of using triggers is that all changes are caught in the history tables, and not just changes that are made by programs such as PlaceNameEdit (see below) but also changes that are made by software developers using SQL statements directly to the database. The updating of history tables should be as simple and fast as possible, and we therefore try to avoid the use of foreign keys or indexes in history tables, which could cause slow database changes.

Currently, much of the information in the database is identified by a serial number that ranges from one and upward for each data type. This is not an ideal identification for data, and it should be improved to at least some kind of globally unique identifier in the future.

Elasticsearch Database

We have two different databases: MariaDB and the search database Elasticsearch.[18] This takes extra resources but has been judged to be worthwhile because of the characteristics that Elasticsearch has. It is fast and has many different search alternatives, which we use in the new Swedish digital place-name register.[19]

Elasticsearch is not an SQL database in which data is stored in fixed tables with fixed columns. Instead, data are stored as documents, and JSON is used for the input and output of documents. A "document" is similar to a row in a table in an SQL database. In Elasticsearch, documents representing the same type of data (for example, place-names) are similar to a table in an SQL database. Documents contain fields where each field has a name and a value. The value is of a certain data type, such as text, numbers, Boolean value, etc. One field in a document is similar to the value of one column in one row in an SQL database. The main difference is that documents are more flexible. Elasticsearch does not complain if you add a new field to a document, and it is common that fields contain structured data with its own fields.

Two types of documents are stored in Elasticsearch: place-names and archive posts. The reason for this duplication of data is that Elasticsearch has search functionality that is not found in MariaDB. Both types of documents have extra information added in Elasticsearch compared to the information stored in MariaDB for the same data type. The reason for this is that we have decided to make each document in Elasticsearch self-explanatory without the need of extra information. This makes it easier and faster to return requested data from Elasticsearch without the need to aggregate information from several data types. Some fields in the place-name and archive post documents

18 It is built on top of Apache Lucene, which handles the data storage.

19 Elasticsearch is also fault-tolerant, distributed, and scalable, but these characteristics are not used today. Currently, Elasticsearch is installed on only one server with no redundancy. If usage of the Swedish place-name register grows in the future, however, we are well prepared to increase capacities.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

have been added only to be able to apply specific search criteria. This information is not returned out of PlaceNameService (see below). One example of this is that place-name documents in Elasticsearch contain a field with information about the types of archive posts that belong to the place-name.

It is possible to store documents in Elasticsearch without specifying the data type that exists in the fields in the document. Elasticsearch tries to infer the data type for a new field from the first JSON document containing that field that is inserted into Elasticsearch. In reality, the data type is often defined in advance in order to get the desired behaviour from Elasticsearch. For example, both sorting and searching in Swedish alphabetical order require that the user specify the data type for text fields in a specific way. Default language for text fields in Elasticsearch is English, which does not have the Swedish characters *å*, *ä*, and *ö*. If support is needed for other languages than English in Elasticsearch (version 7.X), the user has to install the Elasticsearch plugin analysis-icu on the computer where Elasticsearch is installed.

The Public Application

Most of the information[20] in the place-name database is publicly available through an online application called Ortnamnsregistret (Place-Name Register).[21] PlaceNamePublic is the informal name used during system development. To avoid any misunderstandings we will henceforth use the name PlaceNamePublic when describing the new digital public register.

In PlaceNamePublic, the same searches made in the first digital register are possible, but the new hierarchical structure is visible in the search result, and some new features are available. As with the first digital register, the user can search in the whole of the database for a certain place-name. The user can also refine the search through different search criteria if the area and the type of information are known. The search will be conducted both within place-names and archive posts, making it possible to find alternative names and older official names that are not in use today.

To start with, a simple search box is visible; see Figure 5.6. There is a blank field into which the user types a name or part of a name or any combination of letters (where the Swedish word "Sökord" ["key word"] is visible before entering any letters). The letters the user types become a search string that is matched against the place-names in the database. Already at this stage, by using the drop-down menu to the left, search strings can be directed to match with eight different alternatives: "Börjar med" ("Begins with"), "Innehåller" ("Contains"), "Slutar med" ("Ends with"), "Liknande" ("Similar"), "Exakt" ("Exact"), "Jokertecken" ("Wildcard search"), "Id för ortnamn" ("Place-name ID"), and "Id för arkivpost" ("Archive post ID"). The "Similar" search makes it possible to search for

20 Projects in the editing tool are not publicly available until they are approved by a place-name expert. There are also some posts in the database with more information, but these are very few and have been regarded as unnecessary to present in the public application.

21 See https://ortnamnsregistret.isof.se (accessed June 7, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

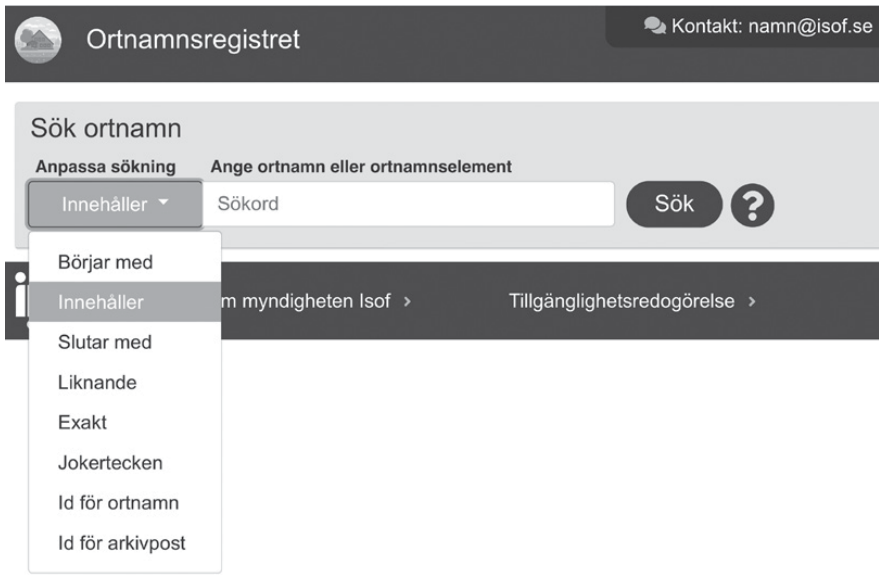


Figure 5.6. The simple search entry function in the Swedish digital place-name register. Image by Björn Karlsson.

place-names that are difficult to spell or that have changed over the years. For example, if the user searches for "Jöteborg," the search result will also show "Göteborg." In "Wildcard search" the character "?" matches exactly one character and the character "*" matches zero or more characters. "Wildcard search" can be used to get statistics about how common different name parts or name elements are within place-names. For example, "Wildcard search" with the search string "*sjö*berg *" (*sjö* is the Swedish word for "lake" and *berg* is the Swedish word for "mountain") will show how many place-names include the elements *sjö* and *berg* regardless of whether the names have any letters before *sjö* or in between *sjö* and *berg* (e.g., a genitive *s* or a plural *ar*) or if the names end with a simple *berg* or with a definite article, etc. The search for "Place-name ID" and "Archive post ID" makes it possible to search for an exact hit—i.e., when making a reference to a specific place-name or a specific archive post.

In order to refine search results, users can press the "plus" sign or click on the link that reads "Fler sökalternativ" ("More options") at the right side of the web page. Then the search can be limited geographically (by choosing parish, district, county, province, and country); by language (but, as explained above, a major portion of the names will be counted as Swedish even though they might have a different origin); by name type (where only the choice between "settlement names," "nature names" [i.e., names of natural features], "name elements," and "personal denotations" can be made); and, finally, by the type of archive posts that are connected to the place-name (the options being "written records," "oral records," or "references"). If the user selects a specific type of archive post,

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

this means that the place-name in the search result has at least one archive post of this type. Any combination of these search criteria can be used when searching for place-names.

It is also possible to leave the initial search box empty, unfold the expanded search box, and search for all the names in a certain parish, or all the names of natural features that have archive cards that are oral records, and so on.

When a place-name has been entered into the search field, the search may be adjusted in line with the desired criteria, and the related place-names are found in a list below the search. Since the search is based on the hierarchy described in the previous section, the user gets a more precise idea of how many places, in Sweden, are known by the same name. Moreover, all the catch-all terms for locality and the locating administrative units are visible in the search results. It is also possible to download the search result as an Excel file containing information about locality (both the new catch-all term and the original designation from the first digital version), the parish and the other levels of administrative units and country, and language, as well as a unique ID number referring to the place-name (not the archive posts).

Each unique place-name is found in a single row, and, by clicking on the name, the user can view all the archive posts belonging to the chosen place-name. If the user simply wants to view more detailed information on the chosen place-name, the user can use the "plus" sign to the right in the same row.

The archive posts are displayed in a predefined order in case there are posts of all three types, the order being: "written records," "references," and "oral records." The written records are sorted by the year when the source was written. In case there are any spelling differences, the archive posts are sorted alphabetically.

One of the new features that has been appreciated and utilized by our users is the function to send comments about specific archive posts to us. When viewing a certain archive card the user can choose to push the button that reads "? Frågor och synpunkter" ("Questions and remarks"), and then a fill-in form appears into which the user can type a question or a comment (which is mandatory), an email address (optional), and a phone number (also optional). The form contains information about the actual archive post. The staff working with the register (and questions about place-names) receive an automatically generated email with all information needed to respond to the comments or simply correct mistakes.

We provide documentation about the PlaceNamePublic resource, such as how PlaceNamePublic works, with a description of how to search for names and how to process the information on the archive cards, as well as on PlaceNamePublic's structure and background. There are also some shorter help texts found next to most search criteria. The documentation and web application interface are available only in Swedish.

Internal Web Application for Data Maintenance

In the first digital register it was not possible to add information that would break up the structure of the already existing posts. The ability to add information is crucial for remaining an attractive source of knowledge, however. So, when given the chance to remake the whole system of the digital place-names register, the idea of an independent

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

editing tool emerged, and hence the internal web application PlaceNameEdit was born. In the application the user can edit information about place-names, archive posts, parishes, districts, and projects (where the new information can be defined to a certain resource), as well as manage the users of the application itself. The tool is developed for place-name experts within Isof, which means that no software-developing skills are needed to add or edit information. The web application is developed by Isof's software developers, and most of the web application's user interface was generated with the Django Baker tool.

Changes in place-names and archive posts are collected within projects (see the "MariaDB Database" section above). Information belonging to a project may be publicly visible or not depending on the current status for the project; the status is changed by the place-name experts. This means that it is possible to publish a set of updates at the same time, but it also means that others can check the added information before it is made publicly available.

REST Web Service

PlaceNamePublic receives all place-name information through a REST web service called PlaceNameService. PlaceNamePublic or any future client applications have no knowledge of where and how data are stored, which is a desirable feature as it makes it easier to change data storage with little or no impact on client applications. PlaceNameService makes place-name information available to anyone who wants to include the data in their own application.

Swagger has been implemented in PlaceNameService.[22] Swagger extends the functionality of a web service and makes it possible to test the web service in a web browser and also view information about the web service REST API. REST web services normally return data in JSON format or resources such as images or documents in their formats. Documentation about PlaceNameService, http addresses, and parameters can be found with the help of Swagger. Returned data are not yet documented in Swagger but can be viewed by testing the web service functionality with Swagger.

There is much resemblance between PlaceNamePublic's functions and PlaceNameService's functions, but with the latter there is also the possibility to receive information about types of data that can be used for searching for place-names, the status for PlaceNameService, the OpenAPI Specification schema for PlaceNameService,[23] and copying information about place-names and archive posts from MariaDB to Elasticsearch (this last functionality is only for internal usage at Isof and is not described in Swagger).

22 Enter https://PlaceNameService.isof.se in a web browser to view the Swagger interface of PlaceNameService (accessed June 7, 2021).

23 OpenAPI Specification of PlaceNameService can be retrieved in two different formats. OpenAPI Specification in JSON format is retrieved by the web address https://PlaceNameService.isof.se/openapi-schema-json (accessed June 7, 2021). OpenAPI Specification in YAML format is retrieved by the web address https://PlaceNameService.isof.se/openapi-schema-yaml (accessed June 7, 2021). OpenAPI Specifications can be used by software development tools to automatically generate client side code in different programming languages. This makes it easier to construct software that communicates with REST web services.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

PlaceNameService is currently available to anyone without requiring any identification of the user of the web service. This may change if needed in the future. The documentation and REST web service interface are in English.

Even though we do not know what will happen in the future, we can be sure that things will change. Therefore, PlaceNameService uses two different techniques that will help in the future to handle changes in the web service functionality and data.

PlaceNameService has a version number in the web address; the "v1" part in the web address https://PlaceNameService.isof.se/v1/geo-reference/provinces is the version number. If we need to make changes (that are not compatible with version "v1") to the web service API, a new version "v2" will be created. Versions "v1" and "v2" would both be supported by PlaceNameService during a transitional period until all programs that use version "v1" have been updated to version "v2."

Most of the returned data in the JSON format have a field named "fields" that currently contains an empty array. This array may in the future be populated with objects whereby each instance represents one value associated with the type of data that it belongs to. Adding fields to the JSON data object directly on the highest level will result in problems for client applications to PlaceNameService that use hard-typed programming languages.

Most returned data contain a field named "identifier" that currently has no meaningful value. This field should in the future be used for some kind of globally unique identifier for each type of data. Due to a lack of resources it has not yet been realized, but it is a prioritized next step.

System and Data Management

Changes in place-name-related information are normally made by place-name experts who use the web application PlaceNameEdit. Occasionally software developers help the place-name experts to make the same change to a large dataset directly into the database by using SQL statements.

One of the place-name experts is designated to communicate with the software developers about improvements to existing functionality and the development of new functionality in the place-name register system. This place-name expert gathers responses from public users and place-name experts alike and makes decisions about the changes that should be implemented next.

All information (data in databases, software and files showing cards) in the Swedish digital place-name register is copied once a day to a backup. This ensures that the register can be restored in case of hardware or software problems.

Software changes all the time. Most software is updated at least a couple of times each year. It is the software developers' and system administrators' responsibility to periodically update the software that is used to construct the programs.[24] If software is not

24 Only those techniques that are most relevant in this context are listed here. All these techniques except for Red Hat are free to use without costs: Ubuntu 20.X, a Linux operating system on

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

updated, security risks and maintenance problems will increase with time. Sometimes updates of external software result in changes in the code of Isof's applications.

Moving forward

Even though we have accomplished a major improvement to the Swedish digital place-name register, there are still many more changes we wish to make, both on the technical side and from a user (internal and external alike) point of view.

One of the prioritized next steps is to include another place-name collection within Isof, specialized in Scanian place-names, the so-called Skånsk ortnamnsdatabas (Scanian place-name database).[25] The physical archive is located in Lund and was digitized at a later stage. Some lessons had been learned from the earlier digitization project, and more information was transferred from the physical card to the digital system. This causes some problems, however, when trying to merge the two databases. The Scanian place-name collection has information about approximately 800,000 archive posts.[26] A large quantity of place-name material from the Scanian database is not found in the general register, but there are also posts in the larger register that are not found in the Scanian database, mostly recently added references to literature. We still have not resolved how to overcome these challenges, but our aim is to incorporate the Scanian database into the place-name register so that users will no longer need to search in two different web applications.

The new register makes it possible to add more exact coordinates and polygons, and we hope to be able to add a map to make all the names' distribution visible. There are developments within Isof in fields other than place-names that make use of a standardized map, and we are exploring the possibilities of developing this map to be used for our register as well. There are steps that need to be taken before we can show the names on a map, however, such as where to place the name considering that

development computer; Red Hat 7, a Linux operating system, on test and production servers; PyCharm Community Edition, a development tool, on development computer; Python 3.X, a programming language; Django 3.2.X, a framework for developing Python programs; Django Baker, a tool that automatically generates a web application, has created much of the functionality in PlaceNameEdit; input to Django Baker is a description of the tables in the database; Django REST framework, a tool for developing REST web services with Python, is used in PlaceNameService; Django REST Swagger, a tool for implementing Swagger in REST web services developed with Django, is used in PlaceNameService; Python package elasticsearch is used in PlaceNameService; the Python package Pandas is used in PlaceNamePublic to create Excel files; Elasticsearch, a fast and flexible search tool where data are stored as documents; MariaDB, a SQL database, on test and production servers; Gogs, a version control system that is locally installed and based on Git; HTML, CSS, and JavaScript are the basic techniques for building web applications; jQuery is used to add functionality to web applications; and Bootstrap 4.X is used to make PlaceNamePublic responsive to different screen sizes and to add visual elements to the web application.

25 Skånsk ortnamnsdatabas, https://www3.isof.se/beb (accessed June 1, 2021).

26 And these 800,000 posts are just the digitized ones; approximately 200,000 archive posts have not yet been digitized.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

names sometimes "move," accounting for the fact that named places grow in different directions during the time we have recordings, or discovering how to automatically use other sources that already have assigned coordinates.

Another improvement we wish to make is to digitize more of the information on the physical card. With more information digitized, new searches can be done, and other ways to arrange the material may help discover new findings. One way of digitizing the physical cards could be to register data by using optical character recognition (OCR) and handwritten text recognition (HTR) technologies. A fair share of the cards are machine-written, but they are still outnumbered by the many handwritten ones. There are tools such as Transkribus[27] that can be trained to transcribe handwritten text, but the cards are written by many different hands, and the amount of text on the cards is sparse—not nearly enough to train a tool such as Transkribus. Even if it was possible to gather enough text by the same hand, the fact is that the cards were scanned at only 200 dpi, making it harder for the OCR or HTR technologies to actually decipher the text. Another reason for adding more of the information found on the cards is that people in general are becoming less and less used to reading handwritten texts, and even relatively neat and legible handwriting will no doubt prove difficult to decipher for many users in the future.

Aside from the information on the physical cards, the archive also contains other kinds of documents that have so far not been made publicly available. Perhaps the most important of these are maps documenting the locations of recorded place-names. Also very useful are the compilations of settlement names found in the province records and the land registers found at the Swedish National Archives, covering the period between the early sixteenth century and the late nineteenth century. We are still exploring ways to make these assets digitally available, but our hope is that they can be connected and be searchable from the place-name register.

On the line of more information, we would like to enhance the Swagger interface so that the users may find explanations as to the kind of information the returned data consist of. Today users can find information about how data are retrieved, but no explanations about the returned data are given.

To reduce complexity in the system design and decrease maintenance costs, we would like to use only Elasticsearch for data storage. Likewise, PlaceNameEdit should use only PlaceNameService for all data handling, including access to images and PDF files. This would result in fewer dependencies between system components. Fewer dependencies imply easier administration and easier further development of the system. The editing tool should also be made more powerful and flexible so that the users can easily carry out most of the changes that they need to do themselves.

On a smaller scale, we aim to create a definition of the geographical regions that is consistent with the book *Årsbok för Sveriges kommuner 34*, published in 1951.[28] Today there are some differences between the book and the definitions of geographical regions

27 See https://readcoop.eu/transkribus/?sc=Transkribus (accessed June 7, 2021).

28 Statistiska centralbyrån, *Årsbok för Sveriges kommuner 34*.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

in the Swedish place-name collection. When we have a correct definition we would like to move on to create exact coordinates or polygons for all the place-names. This would enable us to show the names on maps and generate a better understanding of the distribution of different names.

There is definitely a need to add some kind of globally unique identifiers to all pieces of non-trivial data. This should have been done before the introduction of the new place-name register, but time was the limiting factor. Another useful step would be to include the Swedish place-name collection into the linked open data (LOD) structure. In the REST web service, we plan to add support for place-name information downloading. This should make it possible for others to create their own copies of the Swedish place-name collection.

In the public web application PlaceNamePublic, the needs of place-name experts and public users decide the functionality that should be added next. The development project for the first version of PlaceNamePublic did not have enough resources to perform extensive user tests, but user tests are one of the best ways to improve the usability of software, and we hope to be able to perform such tests in the future. There is also a need for more automatic tests within the REST web service PlaceNameService.

As has been seen, we would like to meet our users' expectations. The register does not contain the one thing that many users expect to find, namely etymologies and interpretations of place-names. There are indeed references to advanced onomastic literature, where many etymologies can be found, but these are often not easily accessible to the public, and some references are written with so many abbreviations that the reference is intelligible only to the onomasticians at Isof. There is an onomastic series at Isof, however, called Sveriges ortnamn ("Place-Names of Sweden"),[29] that strives to give a possible interpretation to all the names in our place-name collection. This is of course a huge task, and perhaps a mission impossible, but some volumes have been produced covering different parts of Sweden. In the interdisciplinary project TORA we tried to digitize one of the volumes in the series.[30] We learned much, and hopefully we can use this experience and make a connection between the onomastic series and the digital place-names register so that interpretations can be found in PlaceNamePublic.

There is also a need to enrich our collection. Today we cannot enrol students and the like to gather place-names for us, but have to rely on local heritage societies and other laymen interested in place-names to gather more information on site or from older, not previously extracted, records. We therefore want to create a web application that makes it possible for anyone to contribute to the Swedish place-name collection. Isof already has a web application[31] on which crowdsourcing is used to transcribe pieces of folklore on cards into digital information. One possibility is to use the same web application, but with other fields, to collect more information from the physical place-name cards into

29 Institutet för språk och folkminnen, "Sveriges ortnamn."

30 See Karsvall, this volume.

31 The web application is called Folke and can be reached at https://sok.folke.isof.se.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

the corresponding archive posts. The crowdsourcing contribution can either improve the quality of existing data or add new place-name data. Hopefully, it will also be possible to add new types of content, such as pictures of the place in question, or sound files displaying the modern and local pronunciation. The information must be delivered in a controlled manner, however, otherwise the data quality may decline.

It is to be hoped that all these suggestions—and more—will be carried out, and users of the digital place-name register will be able to search and find much more information than was possible previously, delivered in a more structured and intelligible way, and also to download and create their own databases and presentations of place-names. Moreover, with a crowdsourcing tool, we hope that the public will want to participate in creating a richer and more reliable place-name collection for future onomasticians and lay users.

Bibliography

Lundell, Johan August. "The Swedish Dialect Alphabet." *Studia Neophilologica* 1 (1928): 1–17.

Ortnamnsregistret (Swedish Digital Place-Name Register), first version. www4.isof.se/NAU-ortnamn/index.htm (accessed June 7, 2021).

Ortnamnsregistret (Swedish Digital Place-Name Register), second version. https://ortnamnsregistret.isof.se (accessed June 7, 2021).

PlaceNameService. https://PlaceNameService.isof.se (accessed June 7, 2021).

Rygh, Oluf. *Norske Gaardnavne: Oplysninger samlede til Brug ved Matrikelens Revision efter offentlig Foranstaltning udg. med tilføiede Forklaringer*. *Forord og Indledning*. 19 vols. Kristiania (Oslo): I Kommission hos Cammermeyer, 1887–1936.

Skånsk ortnamnsdatabas. www3.isof.se/beb (accessed June 7, 2021).

Statistiska centralbyrån. *Årsbok för Sveriges kommuner 34*. Stockholm: Kungl. boktryckeriet P. A. Norstedt & söner, 1951.

Sveriges ortnamn. Series A, 77 vols. Uppsala: Institutet för språk och folkminnen, 1906–. www.isof.se/sprak/namn/ortnamn/sveriges-ortnamn.html (accessed June 7, 2021) [earlier: På offentligt uppdrag utg. av Kungl. ortnamnskommissionen. *Sveriges ortnamn*. Uppsala: Lundequistska bokh].

TORA – Topografiskt register på Riksarkivet (Topographical Register at the Swedish National Archives). https://riksarkivet.se/tora and https://tora.entryscape.net/wp (both accessed June 7, 2021).

Transkribus. https://readcoop.eu/transkribus/?sc=Transkribus (accessed June 7, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

PART TWO

BUILDING AND SUSTAINING DIGITAL SPATIAL INFRASTRUCTURES: CHALLENGES AND SOLUTIONS

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Chapter 6

PLACE-NAME DATABASES: A SPATIO-TEMPORAL MESS

Peder Gammeltoft*

THE SYSTEMATIC USE of place-names is not a new thing. Ever since the first geographies, maps, and gazetteers, place-names have been a main source of localization. Until recently localization was usually only indirect and stated by association with a certain administrative unit or country. It was not until the so-called "spatial turn" that direct location—coordinate-based geodata—came to be considered important. Now direct location is of scientific and societal importance and in everyday use everywhere. In digital onomastics, however, geolocated place-name data are only just beginning to play a serious role as master data for cultural and historical research, as well as for research into linguistic data with a geographic profile. There are several reasons, but this is largely the result of what has been described as the "nature" of place-names: linguistic and locational complexity.

This chapter shows that place-names may have multiple references in terms of both *place* and *name*. No one has previously focused on this methodological and theoretical problem, although the examples given are common to geolocation-oriented digital onomastics. The solution is to introduce the notion of a unique place-name concept identifier to geographical datasets to enable the linking of the same place-name form across feature locations. This will enable coordination between multiple features with the same place-name origin, strengthen place-name standardization management, and, not least, more exactly represent place-name data across time, space, and domains of usage.

Place-names constitute one of the more important means of communication, as they furnish us with spatial "anchors" around which we construct our lives, identity, and history. Without the possibility of forming a mental map of reference to understand our relation with other places, people, and events, we would not be able to place ourselves in relation to the world in which we exist. Place-names give us a location framework with

* Peder Gammeltoft is Scientific Manager of the Norwegian Language Collections (*Språksamlingane*), the home of three of the largest dictionaries and the most substantial dialect collections in Norway, as well as all the main place-name collections and many Old Norse resources. Previously Gammeltoft was Associate Professor in Name Research at the University of Copenhagen, focusing on place-names, in particular Scandinavian place-names in the British Isles, Normandy, and the North Atlantic. He is Norwegian representative of UNGEGN (United Nations Group of Experts on Geographical Names) and he is a driving force in place-name digitization in Denmark and Norway. Email: peder.gammeltoft@uib.no.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

which to situate us in relation to what we learn, experience, and realize. It is, therefore, somewhat surprising that place-names do not loom very large in either linguistic research or in the field of human geography.

In linguistic research, place-names are generally seen as being uncomplicated bits of language belonging to the category of proper nouns that mainly function as "filler" in conversation. In human geography, place-names are often seen either as simple attribute data[1] or as fuzzy locators.[2] Nonetheless, place-names play a significant role in the humanities to express indirect location,[3] and the systematic utilization of place-names in geography has been in existence since the first geographies, atlases, maps, and gazetteers.

Within the emergent fields of computational humanities and spatial humanities, place-names are realized to be important geolocators, particularly within corpus research and socio-spatial text marking.[4] Here, a special research field dedicated to named entity recognition (NER) is in full development.[5] Names and textual references to people and places are subject to specialized mark-up to tease out the social and spatial framework of a text or group of texts. This field is still maturing, but place-names are recognized to be quite complex data elements. They are difficult to distinguish from other NER object types: personal names.[6] This is because place-names can be created from personal names, such as the state of *Victoria* in Australia (named after the British Queen Victoria), while personal names and personal designations may be based on place-names, such as the Duke of *Edinburgh*, *Milton* Friedman, and Ernest *Hemingway*. An even greater problem, however, is stability of writing—or, rather, the lack of it—over time.

Place-Name Aspects and Data Integration

Our notion of language, particularly written language, is that of stability, guided by norms and conventions, often even national standards. An official standardized written norm as a concept generally harks back only to the late nineteenth century, however, and place-name standardization and dedicated bodies regulating the spelling of place-names are generally a twentieth-century phenomenon. Thus, place-name spellings may vary considerably over time, and a medieval written manifestation of a place-name may often differ incomprehensibly from its modern form. Although this has partly been remedied by means of the science of toponymy and the publication of place-name volumes containing individual place-names and all their temporal

1 European Commission, "INSPIRE Data Specification," 20.

2 Jones and Purves, "Geographical Information Retrieval," 216, 221.

3 Ell, "GIS, e-Science and the Humanities Grid," 148–49.

4 See Dunn, this volume, 217.

5 Won, Murrieta-Flores, and Martins, "Ensemble Named Entity Recognition (NER)."

6 Ruokolainen and Kettunen, "Name the Name," 152.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

manifestations, the integration of place-names into digital spatial infrastructure has never been entirely successful.

What has been lacking in digital spatial infrastructures so far is a recognition that a "deeper" reading of place-names and their nature is essential. By using the concept of "deep mapping,"[7] it is possible to create a social and spatial narrative of the historical and contemporary human experience of a place-name through a limitless range of sources.[8] To achieve this, there are three aspects of place-names that must be combined correctly to achieve this: *location*, *reference*, and *time*. If these aspects are addressed correctly, we will achieve a major leap forward in the integration of spatiality and quantitative research into humanities—as we will finally be able to perform sophisticated space-time queries on large amounts of geographical, statistical, and literary data through dedicated digital spatial research infrastructures. For examples, see Chapters 8 and 9 for instances of space-time integration in digital humanities infrastructures.[9]

When discussing spatial place-name databases and suitable data models, we must make sure that we have in advance taken the abovementioned core aspects of place-names (*location*, *reference*, and *time*) into account.

Location

Before geographic information system (GIS) technologies became mainstream, place-name location was usually given as part of an administrative unit, or as labels on maps. Place-name location was thus usually indirect and did not give an exact reference to the locality, as expressed by Karen Kemp: "Direct locations are those that are stated in coordinates … Indirect location uses references to other objects whose direct location is known. The two most used indirect references are place-names and addresses."[10]

With the introduction of GIS technologies into the humanities, it became common to see direct location (geolocation) and indirect location combined in digital place-name data. Today geolocated place-names play an important role in digital humanities as master data for cultural, historical, and linguistic data with a geographic feature profile.

An untold premise of geolocation, however, is that it is direct-location-oriented, be it point, multi-point, line, or polygon. Geolocation furnishes a feature with an impression of certainty and definiteness through direct location. Even in research projects in which unknown or fictive places have been mapped in a GIS, geolocation embodies the results with this same sense of certainty. In this way, direct location is at odds with the general nature of place-names, which, although mono-referential in nature, are multifaceted and capable of signifying several referents at the same time.

---

7 Bodenhamer, Corrigan, and Harris, "Introduction: Deep Maps and the Spatial Humanities," 1.

8 Ridge, Lafreniere, and Nesbit, "Creating Deep Maps and Spatial Narratives," 177–84.

9 See Dam, and Foka et al., both this volume.

10 Kemp, "Geographic Information Science," 44.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

In traditional place-name publications, multifaceting is found where several feature types are given for one and the same name. For instance, in *Svenskt ortnamnslexikon*, the place-name *Kiruna* is given as "**Kiruna** kn, stad, Lappland,"[11] with Kiruna described as the name of a municipality (Swedish: *kn* = *kommun*), and at the same time a city (Swedish: *stad*) within a given part of Sweden (Lappland). Likewise, in the series *Danmarks stednavne*, the Danish place-name *Allerslev* is given as "**Allerslev**, lb., s.,"[12] betraying the name as being used both of a village (Danish: *lb*. = *landsby*) as well as of a parish (Danish: *s*. = *sogn*).

Although both *Kiruna* and *Allerslev* are said to be referring to two distinct feature types—in each case a settlement and an administrative unit—this does not mean that localization is ambiguous, as the settlements are nested within the administrative units; see Figure 6.1. The *boundaries* of locations are ambiguous, but, given that localization is not direct (in the form of coordinates), this is not an issue. A precise determination of the exact location is purely contextual. It can be determined only from examining the communicative situation or the document in which the name occurs, through determination of the subject matter and text position near geographical references.

The function of indirect location is to refer to the area where the place-name is found. The type of locality of the place-name is normally implicit from the communicative situation and thus not directly stated. This function goes directly against the finiteness of direct location, which must have a specific geographical location and a specific feature type. In the cases where the place-name expression refers to only one geographical location, there is no problem with this model. The problem typically arises when administrative units assume the name of an existing local place-name expression. An example of this is the name of *Blåvandshuk*. Not only is it the name of the headland that forms the most westerly point of Denmark, it is also the short-form place-name of the local parish, and earlier also the name of the local municipality. In this case, "Blåvandshuk" is one place-name reference with three direct locations: a headland feature, a parish, and a historical municipality. Each direct location has its own distinct spatial extent and its own distinct feature type, and all have their own temporality. Only the communicative context may determine which exact location is meant by the linguistic expression "Blåvandshuk."

Traditional geolocation cannot handle this ambiguity of localization in its data model, as localization must be definite. So, to represent reality, the traditional geolocation model must focus solely on direct location, establish three distinct entries, and consider everything else as being attribute data; see Figure 6.1. Each entry has its own feature type (one headland, one parish, and one historical municipality) and geometric object type (one point and two polygons, respectively), and shares same place-name attribute (Blåvandshuk). The combination of coordinates, feature type, and object type defines the

11 Wahlberg, *Svenskt ortnamnslexikon*, 176.

12 Jørgensen, *Danmarks Stednavne nr. 26*, 134.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

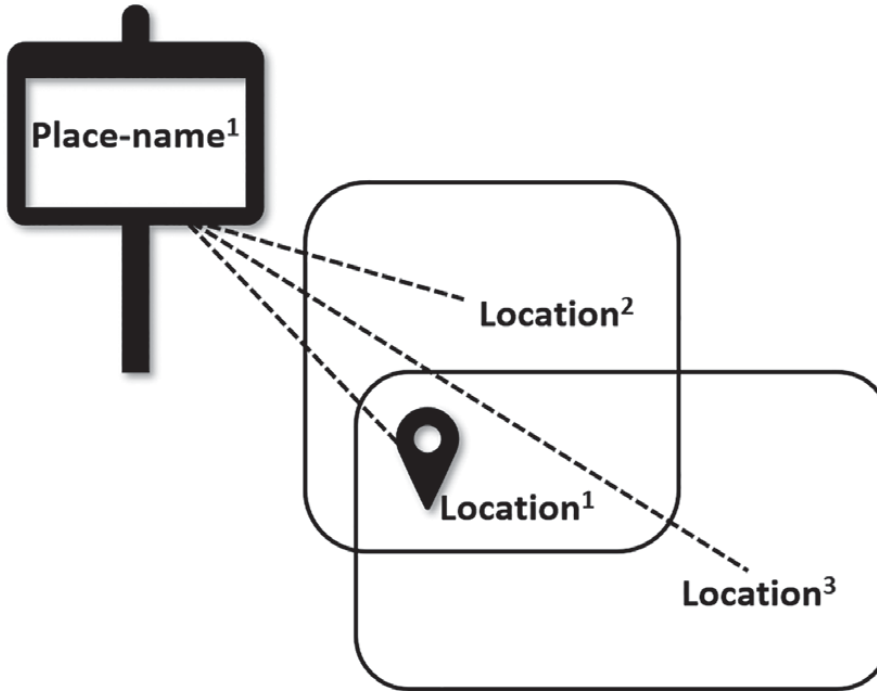


Figure 6.1. Schematic overview of indirect location as used in place-name research. The place-name expression is here used as the name attribute for three different locations. An example of this is the Danish place-name "Ringsted." The name itself is an indirect location referring to three direct locations, as it is both the name of a town (Location 1), the short form of a municipality (Location 2), and a county (Location 3) in the period 1662–1748. In the first example, direct location is given as a point, whereas the second and third examples are administrative units represented by polygons. The third example, Location 3, represents a historical entity, whereas the other examples are current entities. Image by Peder Gammeltoft.

object and supplies it with "uniqueness"; the place-name expression is a mere attribute of no significant relevance to the direct location. In this model, the three occurrences of "Blåvandshuk" are individual entities, and the fact that they share the same place-name attribute form is purely coincidental. No effort is given to indicate a relationship of origin between the three Blåvandshuk localities, as this is not relevant to a direct location model of representation.

Reference

Let us leave the problem of one place-name expression being able to refer to multiple locations for a moment, and concentrate on the concept of direct location, or reference. In its purest form, direct location is a set of coordinates and a set of attributes supplying us with the necessary information about the feature the object represents. The most

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

important attribute is probably one stating the feature type of the geometric object, followed by an official code, such as the official number 555 given to represent the above historical municipality of Blåvandshuk,[13] again followed by the place-name of the feature. This is a model that works well for most geolocations, particularly representations of administrative units. Since place-names are normally mono-referential—that is, a place-name refers to one feature only—this model is in principle on par with the nature of place-names. With language and geography, however, things are not as simple as that. Mono-referentiality does not exclude one feature from having several names, and nor does it exclude the same place-name expression to be used for several features. Depending on the cultural, linguistic, and ethnic make-up of the surrounding user groups, any feature may have several names. For instance, *Lomtjernet*, in Sør-Varanger in northern Norway, bears a Kven[14] name as well, *Kaakkurinlampi*. What is it we are seeing here?

In toponymic research, it is well known that one and the same feature may have several names. It may, as illustrated by Figure 6.2, be a result of several languages being spoken in the same region at the same time. This is probably the most common reason, but there are also other possibilities, such as independent naming of the same feature from different points of view, differences in user group focus, or naming because of differences in usage. The first possibility, independent naming, can be exemplified by the Norwegian mountain *Kråkvasstinden* in Oppdal, Trøndelag, which is also known as *Sandåhøa*. This mountain has a very steep face with a pronounced peak when observed from the northeast, but from the west and southwest it looks merely like a sloping hill. This has given rise to the parallel names of Kråkvasstinden, with the generic *-tinden* ("the peak"), and Sandåhøa, with the generic *-høa* ("the hill," "elevation"). Both names are, incidentally, official names for this feature.[15] Differences in naming focus by different user group and differences in usage are most easily found in multicultural environments where the different cultural segments live by separate means of existence. If one cultural segment lives mainly by farming, another by fishing, and a third by transhumance, it is natural that naming will reflect what each cultural segment sees as important about a locality. An example of this is the three names of the north Norwegian settlement of *Mikkeli* or *Kersantti* in Nordreisa in Troms and Finnmark. The settlement's Kven names reflect ownership of the settlement (once owned by Kersantin Mikkeli).[16] The Norwegian-language name of the locality, *Andsjøen*, is seemingly a name transfer from Trøndelag, presumably commemorating the "old

13 Nordic Group for Regional Analysis, *Regional Development in the Nordic Countries*, 139.

14 The Kven people constitute a Balto-Finnic ethnic minority in Norway. They are descended from Finnish peasants and fishermen who emigrated from the northern parts of Finland to northern Norway in the eighteenth and nineteenth centuries. Their language, Kven, is a mutually intelligible dialect of Finnish. In 2005 Kven received the status of a legal minority language in Norway within the framework of the European Charter for Regional or Minority Languages.

15 See https://stadnamn.kartverket.no/fakta/861998 (accessed February 16, 2021).

16 See www.kvenskestedsnavn.no/stedsnavn/view/8156 (accessed February 16, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

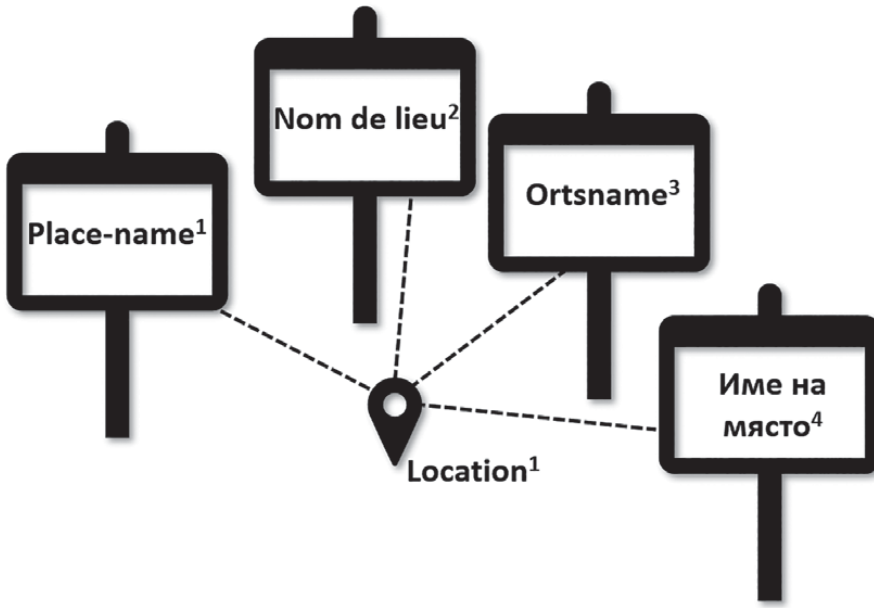


Figure 6.2. Example of direct location with multiple place-names in different languages. Direct location is here represented by a point location of a named feature. This direct location is known by multiple names, which is typical of multilingual areas. Here, Location 1 is known by four indirect locations in English (Place-name 1), French (Nom de lieu 2), German (Ortsname 3), and Bulgarian (Име на място 4). Image by Peder Gammeltoft.

home" of an earlier settler.[17] Here, only the Norwegian-language form has attained official status.[18]

The traditional way to handle this in geolocation is twofold. Either you can add as many localities to a feature as there are place-names, or, more often, additional attribute fields containing variant names are added. With either solution, there are several problems. The first, one location per place-name, creates a lot of feature doubling. The result is a geolocation system that is complicated and difficult to manage. It is impossible to ascertain if the place-names belong to one and the same feature, or if we are really dealing with several different features (with different place-names). In this case, the identification of several place-names to the same topographical feature relies on being able to equate coordinates and feature types, or through internal cross-referencing attributes. With the second possibility, there are no problems in establishing a unique object for a feature, as all variation is handled in the attribute fields. The problem here,

17 Rygh et al., *Norske Gaardnavne*, 17:187.

18 See https://stadnamn.kartverket.no/fakta/929739 (accessed February 16, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

however, is one of the retrievability and gradation of status of alternative forms: which are official, and which are not? How are several alternative forms handled: all place-name forms placed in one additional attribute field, or separate fields for each possible alternative form? In addition, placing alternative forms in a separate attribute field automatically establishes the entry in the main place-name form attribute field as the more important in relation to any other alternatives, even if they have co-official status. This second type of direct place-name field and "variants" field is a typical feature of, for instance, the GeoNames datasets, where, for example, the Moldovan place-name of *Chişcăreni*, in its "Alternate names" field, features the following alternatives: *Chiscareni*, *Chişcăreni*, *Kishkaren'*, *Kishkareni*, *Kishkareny*, *Kishkaren'*, *Kishkaryany*, *Kishkereni*, *Lazo*, *Лазо*.[19] It is clear that there are at least two distinct place-name forms, Chişcăreni and Lazo, each with multiple name forms. Whether these are place-name forms in different languages or different temporal manifestations, or represent different written standards, is entirely impossible to figure out. It is also impossible to see which forms are official place-name forms and which are not.

From the examples in the subsections above, it is clear that place-names can have multi-referentiality for both *location* and *reference*. No one has seemingly focused on this theoretical problem previously, although, to the user of geolocation-oriented digital onomastics, this is a constantly recurring challenge—and one threatening the sustainability of spatial onomastic infrastructures. In database terms we are dealing with a many-to-many relationship between location and reference—between place and name, so to speak. Fortunately, it is possible to overcome this with a well-structured relational database or web-based semantic data model. It is not the only challenge of spatial humanities data, though. We must also consider the time aspect: temporality.

Time

In spatial humanities, the temporal aspect is extremely important: as soon as we have to query anything more than just a handful of decades old, we run into changes in language—changes that only accelerate the further back in time the study goes. A recent French digitization and XML mark-up project used NER technology to mark up geographical information from French sixteenth- and seventeenth-century texts. The main challenge was the problem of differences between seventeenth-century spelling and modern French.[20] The project's solution was to modernize the text prior to mark-up.[21] The problem is, however: how do you know how to normalize earlier place-name spellings to modern spelling? The answer is, of course, only with great difficulty—unless you already have full knowledge of previous spellings of any given name. For languages with a long-established written norm or tradition (such as French and English), this is

19 See https://download.geonames.org/export/dump/MD.zip (accessed June 21, 2020).

20 Kogkitsidou and Gambette, "Normalisation of the 16th and 17th Century Texts," 28–32.

21 Kogkitsidou and Gambette, "Normalisation of the 16th and 17th Century Texts," 32.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

less of a problem as compared with languages with short-duration written standards, a high degree of allowed (dialectal) variation, or no established written standard.

Written standards emerged only relatively recently. For most countries, written standards usually do not go further back than a century or so. Prior to this people had a more free or open attitude to writing—one that relied on several socio-cultural factors, fashions, and personal preferences, combined with factors such as personal background and personal written competence. In the sixteenth and seventeenth centuries, for instance, writing was often ornate and opulent, adding as many characters to a word as at all acceptable. For example, the Danish manor of *Overgård*, Randers Kommune, had no fewer than fourteen different spellings of its name over a 150-year period from the middle of the sixteenth century to the end of the seventeenth, ranging from forms such as *Owergaard*, *Ofuergord*, *Ofvergaardt*, and *Offuergaardt* to *Offuergaardtt* and *Offvergaardtt*.[22] Similarly, in Norway, the island and farm of *Io* is historically spelled *Hia*, *Iha*, *Ju*, *Hin*, *Iden*, *Ie*n.[23] The current, regulated form is now *Io*. Since 1886, however, when Norwegian place-name normalization began in earnest, it has had regularly occurring written variant forms: *Io*, *Ien*, and *Iden*.

These examples show, that to understand and use place-names in a temporal dimension, it is necessary to abandon our modern notion of linguistic stability. Historical linguistics has taught us that language is in continuous change and is always evolving.[24] But what is not relayed to a great extent is how individual tastes and general socio-cultural trends also influence what we see in historical documents.[25] Place-names seem to be much exposed to variety, perhaps even more than the ordinary word stock. At the same time, we also must abandon the notion of written stability over time; this is entirely a modern feature, derived from the notion of a standard written form; see Figure 6.3. It is clear in the above Norwegian example of Io that place-names both adhere and do not adhere to standard written form even after a written standard is established. Some sources render the correct authorized form (*Io*), others use earlier established forms (*Iden* and *Ien*). Instead of viewing spelling as a time span feature, it is better to see spelling as individual time instances, almost as small linguistic "flashes," reliant on the individual writer's preferences, present norm, traditions, and source-internal factors (such as reliance on earlier sources, type of commission and payment for the assignment), among others. This also means that every place-name may have written forms, historical as well as present, that have hitherto not been collected. The more forms collected for each name, however, the greater the certainty in assigning correct location to a place-name.

---

22 Overgård, Randers Kommune. Not yet published in *Danmarks Stednavne*: http://danmarksstednavne.navneforskning.ku.dk/?deeplink=8be2494cdbae452d9790257bb3889f32 (accessed February 16, 2021).

23 Rygh et al., *Norske gaardnavne*, 11:379.

24 Hauser, Chomsky, and Fitch, "The Faculty of Language."

25 See Petrulevich, this volume, 190–98.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

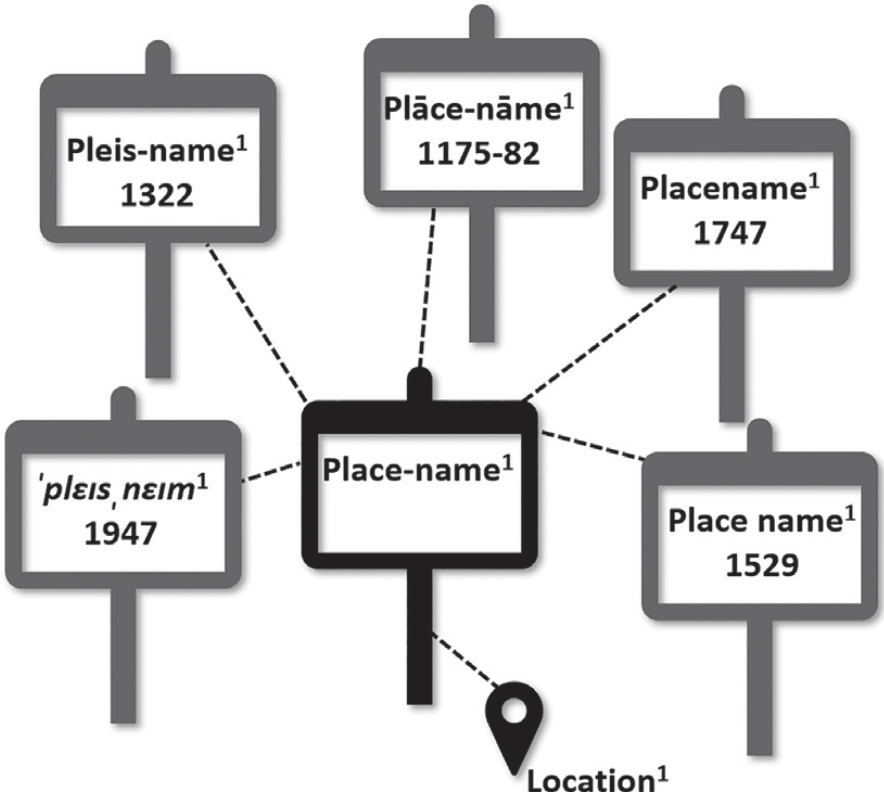


Figure 6.3. Schematic example of current and previous spellings of a place-name. In this example, direct location (Location 1) has one indirect location in the form of a current place-name, here represented by the black road sign, Place-name 1. This place-name has a number of temporal manifestations associated from 1175–1182, 1322, 1529, 1747, and 1947, here represented by road signs. These temporal manifestations are all expressions of one and the same indirect location but associated with a direct location (Location 1) though the relation of the direct location to a current indirect location (Place-name 1). See also Table 6.4 for a schematic representation. Image by Peder Gammeltoft.

Location, Reference and Time: Can They Be Handled Together?

As the previous sections have shown, place-names have very complex space-time profiles. As illustrated, one place-name form may refer to one or more localities, and, similarly, one locality may be bestowed one or more place-names. In addition to all this, a place-name may also have varying spellings over time, occasionally of great variation. Not only must many-to-many relations be handled between location and place-name; when adding the temporal factor to spatial place-name databases, the complexity increases to having to handle many-to-many-to-many relations.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

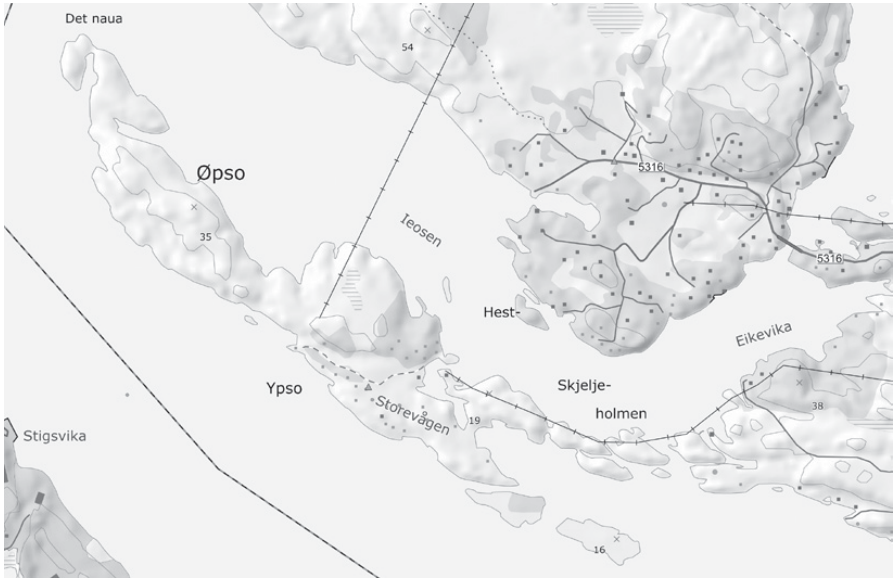


Figure 6.4. Map showing result of not stating a same-origin place-name relationship between localities/feature types. If a place-name geodata data model does not have an association between localities of the same name origin, the possibility that official spelling updates are not synchronized between all same-origin place-name expressions is extremely likely, as in this case. The island name "Øpso" and the settlement name "Ypso" are different modern manifestations of one and the same indirect location, now represented with six individual direct locations—Ypso, a settlement area, and Øpso, an island—as well as a four single settlements (shown as orange dots). This mistake has recently been corrected. Image ©Kartverket, CC-BY 4.0.

So far, this problem has never been solved nor addressed satisfactorily. There may be several reasons for this. First, spatial place-name databases are not very common, and precise localization is not very important for them. Similarly, spatial infrastructures of official organizations, such as national mapping agencies, are usually not concerned about the origin or history of their location attribute data, including place-names. By not paying heed to the place-name stock in a spatial infrastructure, however, you end up in a situation where you run the risk of re-authorizing the written norm for one place-name locality without setting the same norm for what is clearly the same name, but of another locality (and with a different feature type). A recent example of this was seen with the name of an island on the west coast of Norway, *Øpso* (which, by the way, is the neighbouring island to Io, mentioned above). On the official online map of Norway, Norgeskart[26] (see Figure 6.4), the name of the island, *Øpso*, is written in the

26 See www.norgeskart.no (accessed February 16, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

upper centre of the page.[27] Also on the map, in the lower centre, is the name *Ypso*, which was previously the official name of the main settlement area of the island.[28] Zooming in reveals that one farm settlement (also a cadastral unit),[29] and three individual farm units, go under the name of Øpso.[30] When checking with the Statens kartverk, it turns out that the place-name form Ypso was incorrect. It was an earlier authorized form, but had been re-authorized as Øpso in 2004, alongside all other localities with this name. It was promptly corrected by the Statens kartverk.

Why the settlement area name was left out of the 2004 authorization is irrelevant. What is important is to recognize that, by not having control of the localities that share identical place-name concepts, it is very easy to miss place-name forms that should have been re-authorized. In other words, place-name management becomes very accident-prone. Mistakes such as this one will inevitably lead to confusion and go against best practices for place-name standardization. According to the principles set up by the United Nations Group of Experts on Geographical Names (UNGEGN), and expressed in resolution UNCSGN I/4,[31] standardization should be in adherence to spelling rules and variant forms should be avoided.[32]

The way to solve this is, in principle, simple. An additional attribute needs to be assigned to the spatial dataset—i.e., a place-name-expression-specific ID. When dealing with attribute IDs, it is necessary to know what they stand for. In principle, there are two kinds of IDs available. There are identifiers that represent, or signify, an eternally constant value; and then there are identifiers that signify a concept, whose appearance, size, or name may vary over time or from dataset to dataset. In other words, the first type identifies a constant, whereas the second type identifies a variable merely acting as a placeholder. Both types are unique values, but their application varies. Coordinates are usually considered to be constants; should a set of coordinates be changed by a location being moved, the coordinates automatically gain a new value. Whatever the coordinates represent is constant for as long as the values are unmodified. In reality, however, a set of coordinates is usually also represented by its own attribute ID, so as to keep control of the feature the coordinates represent. The ID for an administrative unit is constant, but the object—or concept—it signifies is not. There will be constant revisions to its extent, and possibly also to its name label(s). But any changes to the signified will not have any

27 See https://stadnamn.kartverket.no/fakta/6927 (accessed February 16, 2021).

28 See https://stadnamn.kartverket.no/fakta/287108 (accessed February 16, 2021); corrected to Øpso after April 1, 2021.

29 See https://stadnamn.kartverket.no/fakta/703656 (accessed February 16, 2021).

30 See https://stadnamn.kartverket.no/fakta/97652, https://stadnamn.kartverket.no/fakta/218626, and https://stadnamn.kartverket.no/fakta/703655 (all accessed February 16, 2021).

31 UNCSGN Resolutions, I/4, https://unstats.un.org/unsd/ungegn/documents/RES_UN_E_updated_1-11_CONF.pdf (accessed February 16, 2021).

32 See also UNCSGN Resolutions, IV/2. https://unstats.un.org/unsd/ungegn/documents/RES_UN_E_updated_1-11_CONF.pdf (accessed February 16, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

effect on the ID, as it functions as a placeholder. Even though we think of IDs as signifying constants, most IDs act as placeholders for concepts capable of variation.

Place-names, as discussed above, are also variable in time. So, any place-name ID must be seen as a time-variable ID placeholder. The dynamics of location-specific ID variables and place-name specific ID time variables are explored in the following sections.

Traditional spatial place-name databases, whether from national mapping agencies or from research institutions, are generally of the type "one feature, one place-name." In recent years, however, coinciding mainly with growing recognition of the rights of linguistic minorities, there has been a general awareness that one locality may have different written expressions (see above). Despite this awareness, it has seemingly escaped notice that the same name expression can be used for different localities and widely different feature types. The evidence of this is seen in the fact that spatial place-name databases always have unique identifiers for the locality itself, and usually for the feature type too. There is no identifier for the named expression, however—and certainly not one that transcends the individual geographical locality.

Since place-names are indirect locators,[33] the actual referent a place-name expression signifies is "fuzzy." It is meant only to create a cognitive connection in the mental map of the name users. The "nature" or "being" of place-names is thus not to say exactly where the locality is or what it is but, rather, to establish a spatial framework within which to conceptualize what is being conveyed during communication. The fact that one place-name expression may refer to several different kinds of localities, or features, is irrelevant for the communication, and, if specification is needed, then additional markers may be supplied—such as "farm," "village," or "parish"—to point out a specific locality. The mechanisms behind this are related to the notion of *metonymy* (association by proximity), and, more specifically, *polyonymy* (association to multiple distinct, but related referents).

To illustrate this problem, let us venture to the small island of *Frøya* just off the coast of western Norway. On this tiny island we find several examples of the same name occurring for different localities and feature types; see Table 6.1.

Three of the above six examples are settlements that have gained their name from a nearby natural feature by means of metonymy, be it an island (*Frøy*a), a beach (*Stranda*; literally, "the Beach") or a bay (*Ånnevika*). Thus, all six examples are distinct localities of different feature types, but there are only three distinct name expressions. Given the size of the island, barely 5.5 km by 7 km in size, it should be relatively simple to retain similar spellings for different features. Nevertheless, when operating datasets with some 1 million named localities and feature types from different data sources created, maintained, and used by different government and local government agencies, the issue quickly becomes evident: it is impossible to keep control of spellings. The above example

33 Bucher, Tiainen, Ellet, Acheson, Laurent, and Boissel, "Data Linking," 12.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Table 6.1 Examples of toponyms from Frøya, Norway, with similar place-name expressions across different feature types. The different direct locations are represented by individual "LocalityIDs" (10001 and 10002).

LocalityID	Expression	Feature_Type
10001	Frøya	Island
10002	Frøya	Settlement
10003	Stranda	Smallholding
10004	Stranda	Beach
10005	Ånnevika	Farm
10006	Ånnevika	Bay

of *Øpso/Ypso* shows how the management of place-names can swing out of control if the entire place-name material of a given area is not considered.

The problem outlined is not just a trivial onomastic conundrum dreamed up in an academic setting. This issue relates to how we manage place-name datasets and how we secure and implement a uniform means of place-name management—and, ultimately, gain a uniform means of standardization. If we do not have an overview of if or when a place-name expression occurs as the name of different feature types—or possibly even in another dataset—how can we be certain that we are dealing with the right place-name and the right feature? The answer is: we cannot, unless we start looking at place-name expressions as attribute data on par with other attribute variables, such as administrative units and statistics. The solution is, in principle, simple.

The Solution

The answer to this issue is to add a unique identifier (UID) to the geodata as well as a UID for the place-name concept variable (here: "NameID"). If this is done, then it is possible to control and monitor the place-name inventory. The "NameID" functions across time, space, and expression and acts purely as a placeholder. The "NameID" acts as a UID of a place-name as a conceptual unit, not as an ID for the named expression of the actual geographical locality. If there is a need to distinguish the written expression of one feature type from another feature type with the same "NameID," this is simply done by combining the UID's "LocalityID" with the "NameID." In this way, 10005_CCC is distinct from 10006_CCC; see Table 6.2. (Similarly, should the need arise to distinguish across time or datasets, this can be accomplished by adding the combination of "Source" and "Year" [of the source expression] to the ID string; see Table 6.4). In addition, if certain feature types are being investigated, then this is sorted simply by including attribute data on the feature type in the query.

The advantage of having individual ID values for different variables in a geodata dataset lies in the transformability and scalability of data. Each dataset and individual

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Table 6.2 Concept table featuring "LocalityID" and "NameID." The different direct locations are represented by individual "LocalityIDs," whereas different indirect locations are represented by individual "NameIDs." Because the expression "Frøya" is one indirect location with two direct locations, it is given one "NameID" (AAA) and two "LocalityIDs" (10001 and 10002).

LocalityID	NameID	Expression	Feature_Type
10001	AAA	Frøya	Island
10002	AAA	Frøya	Settlement
10003	BBB	Stranda	Smallholding
10004	BBB	Stranda	Beach
10005	CCC	Ånnevika	Farm
10006	CCC	Ånnevika	Bay

data entry can exist in its own right, at the same time as becoming a subset of other datasets. The level of detail and the focus of information—location, reference, time, and source, or a combination of these—is determined by the way IDs are combined to make up the subset. If a focus on location is needed, then "LocalityID" must be included. If, on the other hand, the place-name is in focus, then the "NameID" is the guiding ID in the combination of new subsets. In this way, the same data can be used for displaying place-name geodata, either as used by national mapping agencies, when the focus is on displaying correct location, or for place-name specific data, as used in applications and database systems aimed at traditional onomastic research into the origin of place-names.

Not everything is perfect in the model, however. It cannot be used without insight into onomastics as a discipline and to understand the "nature" of toponyms, as outlined above. The consequence of this inclusion is that onomastics moves into the realm of geodata management for good; *name* has finally found its *place* in geodata, so to speak. The inclusion of a place-name concept ID ("NameID") makes data transformation easier, but it does have a trade-off, namely the added complexity of determining which "NameIDs" belong together internally and across datasets.

The benefits of adding an ID for the place-name concept are considerable, however. They do not stop with the ability to control the spelling of the same name concept across localities or feature types. The "NameID" attribute can be extended to forming part of other toponyms whose names derive, fully or in part, from other place-name concepts. In the island of *Frøya*, there is an abundance of examples where name concepts form part of other name concepts. To take two of the previous name concept examples, *Frøya* occurs as the specific of *Frøya kyrkje*, *Frøyadalen*, *Frøynes*, *Frøyaskjera*, *Frøyagrunnene*, *Frøya-Skorpeflua*, and *Frøysjøen*, whereas *Ånnevika* features as part of *Ånnevikholmen*. By adding information on the composition of a toponym, it is possible to make the relationship between place-names and derived compound place-names explicit. This

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

Table 6.3 Concept table showing how "NameID" can be managed with toponyms compounded with place-name concepts of other toponyms. The indirect location Frøya (AAA) occurs as the specific in, e.g., the compound place-name "Frøyadalen" ("NameID" EEE), which is stated in the "NameID_Composition" column. The individual compound elements are highlighted in bold.

LocalityID	NameID	Expression	Feature_Type	NameID_Composition
10001	AAA	Frøya	Island	
10002	AAA	Frøya	Settlement	
10007	DDD	Frøya kyrkje	Church	**AAA** | **kyrkje**
10007	AAA	Frøya	Church	
10008	EEE	Frøyadalen	Valley	**AAA** | **dal** + def.art. sg.
10009	FFF	Frøynes	Promontory	**AAA**/root | **nes**
10010	GGG	Frøyaskjera	Sea-rock	**AAA** | **skjer** + def.art. pl.
10011	HHH	Frøyagrunnene	Shallows	**AAA** | **grunn** + def.art. pl.
10012	III	Frøya-Skorpeflua	Shallows	**AAA** | **ØØØ**
10013	JJJ	Frøysjøen	Fjord	**AAA**/root | **sjø** + def. art. sg
10005	CCC	Ånnevika	Farm	
10006	CCC	Ånnevika	Bay	
10014	LLL	Ånnevikholmen	Islet	**CCC**/root | **holm** + def. art.sg

relationship is here conceptually shown in the column "NameID_Composition"; see Table 6.3. When an element in a compound place-name is derived from another place-name, this is recorded by adding the "NameID" of the original place-name expression.

First, it is important to state the linguistic relationship between different name concepts, especially the role that one place-name concept has as part of another compound place-name concept. In Table 6.3, the compound divide is marked by a vertical line, or pipe. Both *Frøya* and *Ånnevika* occur as part of other place-name compounds in the table, forming the specific element of the new place-name constructions. The role of a specific is to point out what is special about a locality. When a place-name concept occurs as the specific, it is to signal the proximity of the compounded place-name to the place-name forming the specific element. The other part of a place-name concept, usually called the generic, is usually a word stating the type of locality carrying the place-name. Occasionally, place-names are compounded solely with place-names. An example of this is *Frøya-Skorpeflua*, which is the result of the compounding of two place-name concepts, *Frøya* ("NameID": AAA) and *Skorpeflua* ("NameID": ØØØ). Again, the specific element is used to state its proximity to the locality Frøya. The reason for this is to single out the name from a nearby—and similarly named *Skorpeflua*, usually compounded *Botne-Skorpeflua* for distinction.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

It will often be necessary to include information about how a name concept forms part of another and how it is declined, etc. Depending on the type of language, the internal relationship between compound elements may be stated in different ways and may be expressed in the field "NameID_Composition," if needed. Place-name compounds such as *Frøynes* and *Ånnevikholmen* contain only the root form of the specific element. This is marked with a suffixed */root* in the table. Likewise, the definite article is expressed as part of the generic element in *Ånnevikholmen* by the expression *+def.art.sg*.

Since this model does not have a specific focus, it also allows for several name forms for the same feature and to describe their internal relationship. In Table 6.3, "LocalityID" 10007 has two "NameIDs" and thus occurs twice. The primary place-name concept of "LocalityID" 10007 is *Frøya kyrkje* ("NameID": DDD). It is what is usually termed an institutional name of a locality. As an institution, the church on this island is known both under its shorthand form, *Frøya* ("NameID": AAA), as well as under its full institutional name, *Frøya kyrkje* ("NameID": DDD). The latter is itself a compound of "NameID": AAA and the Norwegian term for a church, *kyrkje*. The compound relationship is described in its "NameID_Composition" field and readily allows for a greater understanding of the occurrence of two similarly "competing" place-name concepts for the same place-name locality.

So far, the temporal aspect has not been mentioned. Although temporal manifestations often relate to both a name and an object, it is important to be aware that the nature of historical sources does not always make it possible to establish the exact direct location that the historical form describes. Therefore, the important thing—as in traditional historical linguistic name research—is to align a temporal manifestation (also called source form and historical form) to the name, rather than any current location. Thus, it is best only to add a "NameID" to temporal manifestations and forms giving linguistic information, such as pronunciation; see Table 6.4. This allows temporal manifestations to be analyzed under one place-name expression, as well as to be related to one or more direct locations. This is possible through the association of a "LocalityID" with a "NameID." Should a historical form be able to be associated with a direct location, it is always possible to assign it the "LocalityID" of the direct location in question, to hard-code it to its direct location.

The reason why it is important to align a temporal manifestation to the "NameID" is to ensure that the model is as close as possible to reality and to secure the scalability of the model. Since all place-name expressions are indirect locations with the possibility of referring to more than one direct location, the model needs to be scaled to accommodate this possibility. Therefore, all place-name expressions, be they current, historical, sound recordings, or phonetic renderings, should be related to a direct location ("LocalityID") only by means of association with an indirect location ("NameID"). This ensures the usability of the data model for geodata purposes as well as catering for toponymic research. Most of all, though, it avoids the doubling of data in the database, as historical forms do not need to be entered multiple times, owing to multiple direct locations.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Table 6.4 Concept showing historical forms in the dataset. The different direct locations are represented by individual "LocalityIDs," whereas different indirect locations are represented by individual "NameIDs." Because the expression "Frøya" is one indirect location with two direct locations, it is given one "NameID" (AAA) three two "LocalityIDs" (10001, 10002, and 10007). The column "Status" states whether the expression is current, historical, or a pronunciation. Note that historical forms and pronunciation are related only to the "NameID," and not also the "Locality ID." This relation is given through the association of the "NameID" with a "LocalityID." Date and source are given only for historical forms and pronunciation forms, as this information is not strictly necessary for current name forms.

LocalityID	NameID	Expression	Feature_Type	Status	Date	Source	NameID_Composition
10001	AAA	Frøya	Island	Current			
10002	AAA	Frøya	Settlement	Current			
10007	DDD	Frøya kyrkje	Church	Current			**AAA | | kyrkje**
10007	AAA	Frøya	Church	Current			
	AAA	Frøien		Historical	1919	Rygh NG	
	AAA	frøi´na		Pronunication	1919	Rygh NG	
	AAA	Frøen		Historical	1723	Mat.	
	AAA	Frøenn		Historical	1603	Jb.	
	AAA	Ffrøø		Historical	1516–1521	NRJ. II 134.	
10005	CCC	Ånnevika	Farm	Current			
10006	CCC	Ånnevika	Bay	Current			
	CCC	Aannevik		Historical	1919	Rygh NG	
	CCC	å`ŋŋevíķa		Pronunication	1919	Rygh NG	
	CCC	Annevig		Historical	1723	Mat.	
	CCC	Onneuigen		Historical	1667	Mat.	
	CCC	Arreuigen		Historical	1608	Jb.	
	CCC	Arnneuigh		Historical	1563	Jb.	

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Conclusion

It is my hope that this chapter has displayed the clear benefits of implementing place-name concept variables to geodata as individual "NameIDs." The "NameID" gives place-name datasets unprecedented control, transformability, and scalability of place at the same time as liberating place-name data from the straightjacket of geolocation. Granted, such an implementation presupposes knowledge of the "nature" of place-names, but the extra effort in terms of the acquisition of onomastic knowledge is easily offset by the increased usability of datasets across domains, time, and foci.

Some fields will be able to reap considerable benefits, such as place-name management and place-name standardization. By introducing onomastic principles to a geodata model, it is possible to move away from a strictly geo-oriented view of toponymic geodata to finally see them for what they are: multifaceted gems of location and communicative information.

One thing I have not touched upon, and which is outside the scope of this chapter, is its applicability across database system. The data model concept devised here is mainly inspired by web-based semantic data models, but it can equally well be used either with a traditional relational database system or in a hierarchical database environment. In both models the addition of another ID variable is a simple operation, but the introduction of a cross-feature unique place-name concept variable to geolocated place-name data is an effective way to create linkage across features—a feature that is much needed in computational humanities,[34] as this will enable linkage and coordination between multiple features with the same name origin and more exactly represent place-name data across time, space, and usage. Most importantly, however, it will enable a more flexible integration of place-name data into other data infrastructures—spatial or non-spatial.

Bibliography

"Andsjøen." Faktaark, Statens kartverk. https://stadnamn.kartverket.no/fakta/929739 (accessed February 16, 2021).

Bodenhamer, David J., John Corrigan, and Trevor M. Harris. "Introduction: Deep Maps and the Spatial Humanities". In *Deep Maps and Spatial Narratives*, edited by David J. Bodenhamer, John Corrigan, and Trevor M. Harris, 1–6. Bloomington: Indiana University Press, 2015.

Bucher, Bénédicte, Esa Tiainen, Thomas Ellet, Elise Acheson, Dominique Laurent, and Sylvain Boissel. "Data Linking by Indirect Spatial Referencing Systems," workshop report. Leuven: EuroSDR, 2019.

Ell, Paul S. "GIS, e-Science and the Humanities Grid." In *The Spatial Humanities: GIS and the Future of Humanities Scholarship*, edited by David J. Bodenhamer, John Corrigan, and Trevor M. Harris, 143–66. Bloomington: Indiana University Press, 2010.

34 See Foka et al., this volume, 158–64.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

European Commission. “INSPIRE Data Specification on Geographical Names: Guidelines.” Brussels: INSPIRE Thematic Working Group Geographical Names, 2009. https://inspire.ec.europa.eu/documents/Data_Specifications/INSPIRE_DataSpecification_GN_v3.0.pdf (accessed April 16, 2021).

GeoNames. “Moldova Dataset.” https://download.geonames.org/export/dump/MD.zip (accessed June 21, 2020).

Hauser, Marc D., Noam Chomsky, and W. Tecumseh Fitch. “The Faculty of Language: What Is It, Who Has It, and How Did It Evolve?” In *The Evolution of Human Language: Biolinguistic Perspectives*, edited by Richard K. Larson, Viviane Déprez, and Hiroko Yamakido, 14–42. Cambridge: Cambridge University Press, 2010.

Jones, Christopher B., and Ross Purves. “Geographical Information Retrieval.” *International Journal of Geographical Information Science* 22 (2008): 219–28.

Jørgensen, Bent, ed. *Danmarks Stednavne*, vol. 26, *Stednavne i Roskilde Amt*. Copenhagen: Copenhagen University, 2013.

Kemp, Karen K. “Geographic Information Science and Spatial Analysis for the Humanities.” In *The Spatial Humanities: GIS and the Future of Humanities Scholarship*, edited by David J. Bodenhamer, John Corrigan, and Trevor M. Harris, 31–56. Bloomington: Indiana University Press, 2010.

Kogkitsidou, Eleni, and Philippe Gambette. “Normalisation of the 16th and 17th Century Texts in French and Geographical Named Entity Recognition.” In *GeoHumanities 2020: Proceedings of the 4th ACM SIGSPATIAL Workshop on Geospatial Humanities*, edited by Ludovic Moncla, Patricia Murrieta-Flores, and Carmen Brando, 28–34. New York: Association for Computing Machinery, 2020.

“Kråkvasstinden”/“Sandåhøa.” Faktaark, Statens kartverk. https://stadnamn.kartverket.no/fakta/861998 (accessed February 16, 2021).

Kvenske stedsnavn. “Mikkeli.” www.kvenskestedsnavn.no/stedsnavn/view/8156 (accessed February 16, 2021).

Natural Resources Canada. *Resolutions Adopted at the Eleven United Nations Conferences on the Standardization of Geographical Names: 1967, 1972, 1977, 1982, 1987, 1992, 1998, 2002, 2007, 2012, 2017*. Ottawa: Natural Resources Canada, 2019. https://unstats.un.org/unsd/ungegn/documents/RES_UN_E_updated_1-11_CONF.pdf (accessed February 16, 2021).

Nordic Group for Regional Analysis. *Regional Development in the Nordic Countries: NOGRAN Periodic Report 1994/95*. Copenhagen: Nordic Council of Ministers, 1995.

Norgeskart. www.norgeskart.no (accessed February 16, 2021).

Overgård. http://danmarksstednavne.navneforskning.ku.dk/?deeplink=8be2494cdbae452d9790257bb3889f32 (accessed February 16, 2021).

Ridge, Mia, Don Lafreniere, and Scott Nesbit, “Creating Deep Maps and Spatial Narratives through Design”. *International Journal of Humanities and Arts Computing* 7 (2013): 176–89.

Ruokolainen, Teemu, and Kimmo Kettunen. “Name the Name: Named Entity Recognition in OCRed 19th and Early 20th Century Finnish Newspaper and Journal Collection Data.” In *Proceedings of the Digital Humanities in the Nordic Countries 5th Conference, Riga, Latvia, October 21–23, 2020*, edited by Sanita Reinsone, Inguna Skadiņa, Anda Baklāne, and Jānis Daugavietis, 137–56. Aachen: Aachen University, 2020.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Rygh, Oluf, et.al. *Norske Gaardnavne: Oplysninger samlede til Brug ved Matrikelens Revision*. 18 vols. Kristiania (Oslo): W. C. Fabritius & sønners bogtrikkeri, 1910–1911.

Vasardani, Maria, Stephan Winter, and Kai-Florian Richter, "Locating Place Names from Place Descriptions." *International Journal of Geographical Information Science* 27 (2013): 2509–32.

Wahlberg, Mats, ed. *Svenskt Ortnamnslexikon*. Uppsala: Institutet för språk och folkminnen, 2016.

Won, Miguel, Patricia Murrieta-Flores, and Bruno Martins. "Ensemble Named Entity Recognition (NER): Evaluating NER Tools in the Identification of Place Names in Historical Corpora." *Frontiers in Digital Humanities* 5 (2018). DOI: 10.3389/fdigh.2018.00002 (accessed February 16, 2021).

"Ypso." Faktaark, Statens kartverk. https://stadnamn.kartverket.no/fakta/287108 (accessed February 16, 2021).

"Øpso (1)." Faktaark, Statens kartverk. https://stadnamn.kartverket.no/fakta/6927 (accessed February 16, 2021).

"Øpso (2)." Faktaark, Statens kartverk. https://stadnamn.kartverket.no/fakta/703656 (accessed February 16, 2021).

"Øpso (3)." Faktaark, Statens kartverk. https://stadnamn.kartverket.no/fakta/97652 (accessed February 16, 2021).

"Øpso (4)." Faktaark, Statens kartverk. https://stadnamn.kartverket.no/fakta/218626 (accessed February 16, 2021).

"Øpso (5)." Faktaark, Statens kartverk. https://stadnamn.kartverket.no/fakta/703655 (accessed February 16, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Chapter 7

SUSTAINABILITY AND BEST PRACTICES FOR LINKED DATA HERITAGE RESOURCES: SOME CASE STUDIES FROM SWEDEN

Agnieszka Backman and Marcus Smith*

digital infrastructure projects and scholarship are becoming increasingly significant, and digital projects within the humanities are becoming the norm rather than the exception. At the time of writing, in 2020 and 2021, this trend was thrown into sharp relief when the Covid-19 pandemic forced most scholars to work from home and digital access to cultural heritage went from being desirable to essential. In this chapter we describe and argue for best-practice approaches to digital humanities data involving or in relation to linked open data (LOD), which uses standardized definitions, design principles, ontologies, and open licences to create opportunities for reuse across datasets. It furthermore allows scholars to interrogate data from multiple sources to answer research questions in ways that were not previously possible, and provides the opportunity to enrich or compare datasets with one another.

A digital project should not simply be an analogue project but done with computers; it has its own challenges, but also offers new opportunities. One difference is long-term access: "Digital work does not, and in fact cannot, valorize durability in the same way as conventional modes of scholarship because digital workspaces are connected to the ever-changing ecosystem of the Internet."[1] In the humanities, there is an expectation for

* Agnieszka Backman, Uppsala University, got her PhD in Scandinavian languages in 2017 from Uppsala University on the dissertation *The Materiality of the Manuscript: Studies in Codex Holmiensis D 3, the Old Swedish Multitext Manuscript Fru Elins bok*. From 2017 to 2019 she worked on the "Norse Perception of the World" project, helping develop a digital platform for interdisciplinary research. From 2019 to 2021 she was a Wallenberg Postdoctoral Fellow at Stanford University, working on a project on the materialities of medieval manuscripts in digital repositories by using social semiotics to investigate the affordances of digitized manuscripts. ORCID iD: https://orcid.org/0000-0002-9233-0407.

Marcus Smith, Swedish National Heritage Board, read archaeology (BA) and archaeological information systems (MSc) at the University of York, and Viking and early medieval studies (Magister) at Uppsala University. He is chair of the Swedish chapter of Computer Applications and Quantitative Methods in Archaeology (CAA) and has previously worked at the Archaeology Data Service and the Council for British Archaeology. Since 2012 he has been based at the Swedish National Heritage Board in Visby, where he works with the SOCH linked open data aggregation platform on digital archaeological fieldwork documentation and the digitization of runic inscriptions. Email: marcus.smith@raa.se; ORCID iD: https://orcid.org/0000-0002-7438-5498.

1 Morreale, "Medieval Digital Humanities," 5.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

the output to be relevant and preserved for decades or even hundreds of years, such as in the form of archived books in libraries. In contrast, the output of digital humanities projects can often be radically different from conventional scholarship. Although humanities research is likely to result in, for example, articles or monographs, it's equally likely that the result of a digital humanities project will be an interactive online resource, digital media, or a digital dataset, which brings with it new challenges of sustainability.

Part of the problem is funding. The current system for funding is not set up for digital projects: the assumption is that a project will run and at the end produce a deliverable, not a resource with ongoing upkeep costs, such as hosting or maintenance. To really take advantage of open datasets this needs to be resolved, but it can mean different things for different kinds of projects, and this chapter will help in navigating between them. The system being what it is, it is nonetheless somewhat possible to successfully plan for or accommodate a digital project.

This chapter deals with a number of concepts and acronyms that may be unfamiliar to readers unacquainted with linked open data; a glossary is provided at the end of the chapter to explain many of these terms, with references for further reading.

The Case for Linked Open Data

The principles of linked open data and the semantic web were first articulated by Sir Tim Berners-Lee as a logical extension of the World Wide Web.[2] They need not be recounted in detail here but, in essence, instead of a disparate web of human-readable linked *documents*, linked data consists of a semantic web of machine-readable linked *data*, where by "semantic" we mean that edges (links) between nodes (resources) describe the nature of the relation they represent, and where IRIs[3] are used not only as unique identifiers for records and digital objects but also, ideally, as resolvable addresses on the World Wide Web.[4]

In much the same way that HTML is the standard of interchange used to describe the web of documents we're familiar with, the Resource Description Framework (RDF) is the model used to describe the web of data. RDF statements take the form of simple three-part statements, *subject* → *predicate* → *object*, in which a thing—the *subject*, typically identified by its IRI or following on from another statement—is described using attributes or properties—the *predicate*, given using an IRI—that take either string values, an IRI, or a reference to the subject of another such triple: the *object*. All

2 Tim Berners-Lee, "Linked Data."

3 Internationalized resource identifiers, a generalization of URIs (uniform resource identifiers). These are unique machine-readable identifiers that include—but are not limited to—the resolvable URLs most Internet users are familiar with. See Duerst and Suignard, "RFC 3987" (IRIs), Berners-Lee, Fielding, and Masinter, "RFC 2396" (URIs), and URI Planning Interest Group, "URIs, URLs, and URNs," for the (lack of) distinction between URIs and URLs.

4 "Resolvable" in the sense that such identifiers take the form of valid locations on the global Internet and return structured data when accessed.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

assertions in the web of linked data, from the abstract to the nuanced, are built using this simple, yet powerful, pattern. Linked data services can be queried both singly and in a federated fashion—combining results across multiple systems simultaneously—using the SPARQL query language, which acts as a common application programming interface (API) for RDF resources.[5]

Open—in the sense of openly licensed—data need not necessarily be *linked*, however, and Berners-Lee has proposed a five-star model describing various levels of open data, from unstructured documents published on the web (one star), through structured data published on the web, using open formats, using linkable IRIs as identifiers, to fully linked open data that links itself to other resources (five stars).[6]

From the perspective of researchers, publishing and making use of linked open data offer a number of benefits. At a basic level, publishing as linked open data provides an opportunity to present and highlight data in an accessible, standardized, and reusable way—data that may otherwise be obscured in articles or languish sealed in appendices in traditional publications. The key way in which linked data publication differs from other solutions to this problem, such as tabular data, data papers, or online journals, is that, by its very nature, it places a dataset within a broader context on the semantic web, and allows it to be easily augmented by, compared with, and combined with other related datasets.

In traditional, "analogue" humanities research, datasets are seldom given centre stage, so even an ephemeral resource with properly archived data is a big step up in research transparency. It is also in line with the perspective of open science,[7] FAIR data,[8] and "open research that advocates for exposing the research process rather than hiding the mess behind authoritative results,"[9] and will also be a source for future studies of research processes, investigating our time's preconceived notions and biases.

The strengths of linked open data are interoperability, interconnectedness, and reusability. By publishing data on the web using persistent dereferenceable identifiers, it is easier to cite, check, and reuse. By describing data with the help of shared vocabularies—expressed as, for example, SKOS[10] or RDFS[11]—and according to the frameworks of established ontologies—expressed as OWL.[12] By making use of

5 Harris, Seaborne, and Prud'hommeaux, "SPARQL 1.1 Query Language."

6 Tim Berners-Lee, "Linked Data."

7 See, for instance, the Center for Open Science, www.cos.io (accessed May 11, 2021), and European Commission, "Open Science."

8 Findable, Accessible, Interoperable, Reusable; see www.go-fair.org/fair-principles (accessed May 11, 2021).

9 Rockwell, Day, Yu, and Engel, "Burying Dead Projects," para. 34.

10 Miles and Bechhofer, "SKOS."

11 RDF Schema; see Brickley and Guha, "RDF Schema 1.1."

12 Web Ontology Language; see Motik, Patel-Schneider, and Parsia, "OWL 2 Web Ontology Language."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

vocabularies and authority files already in established use, projects can ensure that the data is compatible with others' data within the same field[13] and that attributes are decoupled from identifiers (that is, that attribute values and terms derived from them are not used as identifiers). By linking a project's data resources against other published data, it may enrich not only its data but also others'.

Whereas vocabularies define the terms that can be used to describe things, ontologies define what can be described, and the inferences that can be made from those descriptions. Common useful vocabularies within the heritage sector include *inter alia* the Getty Art & Architecture Thesaurus (AAT);[14] PeriodO[15] for spatio-temporal chronologies; sites and monuments types of thesauri, such as those at Heritage Data;[16] VIAF[17] for authors; and GeoNames[18] (and relevant national authorities) for places. Linking to generic and well-known meta-authorities such as Wikidata[19] is also useful. Common ontologies in use include the Dublin Core (DC)[20] minimal set of metadata attributes, the Friend-of-a-Friend (FOAF)[21] ontology for describing people and institutions, the CIDOC-CRM[22] conceptual reference model for heritage assets, and the Europeana Data Model (EDM)[23] used by the international cultural heritage aggregator Europeana.[24] In (increasingly rare) cases when a project or institution finds that its domain or terms are not covered by existing established vocabularies or ontologies, the project or institution may decide to create its own, or to augment an existing resource.

This is all very well in theory, but when implementing a linked data strategy there are practical considerations to bear in mind: not just things such as choice of ontology and vocabularies, but a change in mindset. Interoperability becomes a logical extension of linked infrastructures but policy, standards, and business models often determine interoperability more than the technology as such.[25] There is also a paradigm shift when describing items with RDF, from a focus on the item itself to its relationships or

13 Or, if choosing to publish a bespoke vocabulary or ontology, ensure that *it* allows comparison to others'.

14 See http://vocab.getty.edu (accessed May 11, 2021).

15 See https://perio.do (accessed May 11, 2021).

16 See https://heritagedata.org/live/schemes (accessed May 11, 2021).

17 See http://viaf.org (accessed May 11, 2021).

18 See www.geonames.org (accessed May 11, 2021).

19 See www.wikidata.org (accessed May 11, 2021).

20 See http://purl.org/dc/elements/1.1 and http://purl.org/dc/terms (both accessed May 11, 2021).

21 See http://xmlns.com/foaf/0.1 (accessed May 11, 2021).

22 See http://cidoc-crm.org/cidoc-crm (accessed May 11, 2021).

23 See www.europeana.eu/schemas/edm (accessed May 11, 2021).

24 See www.europeana.eu (accessed May 11, 2021).

25 Thylstrup, *The Politics of Mass Digitization*, 68.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

entities,[26] which can be helpful in investigating the data from new angles. By describing items in terms of not only their attributes but their relationships to other items (and the records describing them), they are placed within a wider context beyond a single dataset. It is also important to distinguish between the physical item itself and the digital document(s) that describe(s) it; often, in an application of RDF, both will need their own IRIs with their own attributes (e.g., "date created" will likely be different for each) and to be related to one another. To ensure that data are still returned when IRIs for physical objects are resolved, one can use redirects or IRI fragment identifiers.[27]

Sustainability

There is a paradox between the popular axiom that the Internet is forever and the reality that, if no one is paying and doing the upkeep, what has been put online will become unreadable or even unavailable.[28] The phenomenon of link rot—of previously valid URLs no longer resolving or generating an error—is one that is all too familiar to many, not least within academic citations of online work. Furthermore, the costs of producing, publishing, and maintaining access to digital resources—particularly LOD—are often not borne by those who benefit most from them. That is, it is not the owners of data who are in greatest need of the information being published in an open, accessible format, but their time and resources are needed to make it happen. Without adequate planning for permanent identifiers, ongoing management, platform migration, digital preservation, etc. the half-life of online digital resources can be short. In fact, long-term funding for the maintenance of projects is a contributing factor to digital work disappearing.[29]

Sustainability for a digital humanities project relies on a variety of circumstances that might not be immediately evident to a newcomer to digital humanities work. As linked open data are especially dependent on stable IRIs to facilitate future reuse, the long-term accessibility of an LOD project is one of the cornerstones everything else depends on. Every time URLs change, links are broken, and hours of work will be needed to restore access from the other pages on the web that link to that resource. What exactly that sustainability is will differ depending on project aims, so, given the short-term nature of project funding, ensuring long-term access to data can pose a challenge. Research institutions are often reluctant to commit to publishing data—much less maintaining a digital platform—for an indefinite period after a project has ended and funding has run out. Other options, such as depositing with an accredited digital archive,

26 Smith-Yoshimura, "Summarizing Project Passage Experiences."

27 See the httpRange-14 problem and its resolution: Fielding, "[httpRange-14] Resolved." The httpRange-14 problem refers to the question of how services should correctly respond when a client requests http IRIs for physical or otherwise non-digital things for which no electronic representation exists, and how the identifier for the thing itself relates to identifiers for digital documents describing the thing. See "TAG Issues List: httpRange-14."

28 See Chun, "The Enduring Ephemeral," 169.

29 Morreale, "Medieval Digital Humanities," 9.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

may have to be considered. Accredited digital archives for research-produced heritage data exist in a number of countries, such as Digital Antiquity[30] in the United States, the Archaeology Data Service (ADS)[31] in the United Kingdom, DANS[32] in the Netherlands, and the Swedish National Data Service (SND)[33] in Sweden. Accreditation is conferred by independent bodies, such as Core Trust Seal,[34] nestor,[35] and the Digital Preservation Coalition (DPC).[36]

Different Options

There is a difference between long-term access to data and a website (whether it is called platform, portal, resource, or something else) being created to present the digital project research output. If the goal is an up-and-running infrastructure, it will need dedicated resources in the form of maintenance and server costs. The bland word "maintenance" hides a lot of work: systems administration, updating code to eliminate security issues, optimizing search algorithms, and remaining compatible with contemporary hardware, software, and technical standards. The Internet of ten years ago was and looked very different from how it is today, and it will most likely change as much in the next ten years. An infrastructure, especially if it is intended to connect to other platforms or social media, will need to be prepared to work even harder to stay the "same" in the eyes of the users. Major changes will also in all probability require someone from the research side able to make overarching decisions for the resource, as updates might impact the functionality of the site or changes to the connecting platforms necessitate changes to the project site.[37]

There are different options for how to address sustainability. The Celtic Inscribed Stones Project (CISP) from University College London[38] is an example of a comparatively early (non-LOD) online digital heritage project. Published in 2001, it is a queryable database of early medieval Celtic epigraphic inscriptions. Although the interface appears dated by modern standards, the resource was still published under its original URL twenty years later (i.e., at the time of writing). The project creators planned for sustainability, however, and when it was completed the dataset was also deposited with the Archaeology Data Service[39] for long-term preservation. Consequently, when the

30 See www.digitalantiquity.org (accessed May 11, 2021).

31 See http://ads.ahds.ac.uk (accessed May 11, 2021).

32 See https://dans.knaw.nl (accessed May 11, 2021).

33 See https://snd.gu.se (accessed May 11, 2021).

34 See www.coretrustseal.org (accessed May 11, 2021).

35 See www.langzeitarchivierung.de (accessed May 11, 2021).

36 See www.dpconline.org (accessed May 11, 2021).

37 Morreale, "Medieval Digital Humanities," 8.

38 See https://dx.doi.org/10.5284/1000215 (accessed May 11, 2021).

39 See http://ads.ahds.ac.uk (accessed May 11, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

original platform inevitably stops working in the fullness of time, the dataset will still be available from the ADS archive via its DOI[40] (see "Technical Long-Term Availability/IRIs" section below for more on DOIs).[41]

If there is a way to reuse an existing platform it is often better than building a new one, as resources may be pooled for upkeep and more stakeholders can help preserve the platform. If the new project collaborates with an infrastructure already connected to a community, it might also get an inbuilt audience of users from the start, either a scholarly community or the general public. Building entirely upon an existing platform has the potential drawback, however, of reduced flexibility: it might be necessary to adjust the project's data model to fit that of the resource, and accept the limitations of not having the entities needed. If there is a good match between the existing model and a project's needs, though, it can be a preferable solution. Additionally, by putting the project output in someone else's hands there is also a risk of potentially losing control of what happens to it. This fear is often strong when it comes to open-source projects that anyone can edit, such as Wikidata,[42] especially for those not already part of the Wiki community. While it might not be advisable to save copies of project data only in a crowdsourced environment, the advantages of being part of a community working around the same data issues and for preservation are substantial.

A public infrastructure that anyone can edit is not the only valid reason not to choose Wikidata as a primary data deposit. In Project Passage, librarians from US institutions learned to create LOD without needing the technical know-how, in a Wikibase instance with a custom interface.[43] Wikibase[44] software powers Wikidata, but it can also be installed on a user's own machine to store and manage structured data. One of Project Passage's goals was to evaluate the software for librarians, but most relevant here were the reasons as to why this was not done directly in Wikidata; these considerations had to do with time, scope, and privacy. As the project planned to be experimenting with new property entities, these might not have been accepted for inclusion in the Wikidata data model in time for use during the project's limited time span. For that matter, the entities might not be notable enough—i.e., general and widely accepted—for inclusion in Wikidata.[45] As the data in the project's use cases could be experimental or provisional, privacy to try things out was also an important concern.[46]

Yet another approach was taken by the Ogi Ogham project and subsequent developments under the fellow program Freies Wissen,[47] for which a fully linked data

40 For example, CISP, https://dx.doi.org/10.5284/1000215 (accessed May 11, 2021).

41 See www.doi.org (accessed May 11, 2021).

42 See https://wikidata.org (accessed May 11, 2021).

43 Godby et al., *Creating Library Linked Data with Wikibase*.

44 See https://wikiba.se (accessed May 11, 2021).

45 Wikidata, "Wikidata:Notability."

46 Godby et al., *Creating Library Linked Data with Wikibase*, 11.

47 Thiery et al., "Ogi Ogham Project."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

platform for Celtic ogham inscriptions has been created, almost exclusively building upon existing open platforms and datasets. Data about the inscriptions, derived from a number of sources—including the aforementioned CISP database—are stored and structured according to a custom CIDOC-CRM-based ontology and published as linked open data with a SPARQL endpoint. The inscriptions are linked against corresponding entities in Wikidata, allowing the records to be further developed by the community, thereby augmenting the resource. The project is run on Wikiversity, and the code published on GitHub.[48] In this way the project makes the most of existing infrastructure and increases its reach and impact by embracing open methodologies.

When designing a project, it is important to have a clear idea of what the project's data could be used for, which will have a bearing on platform and sustainability decisions.

Personnel Requirements

In research environments, funding for projects is often short-term and tied to an individual or an institution, and only recently has there been a push from Swedish funding agencies to require sustainability plans. It shouldn't be forgotten that "length of a project's life cycle, from the first creative moments until it goes dark, relies as much on the personal circumstances of those needed to maintain the project"[49] as the technology used. Often there is an implied assumption of stable employment at one institution, preferably as a (tenured or the equivalent) professor, with the clout and resources to put in the time to keep the project up to date and available. Digital project creators with more precarious employment—short-term, early-career, or alt-ac—will often be expected to move for employment opportunities, leaving digital projects without a champion at their home institutions, and have very little power to dedicate work hours to keeping the resource alive. A model in which volunteering after-hours work to keep digital resources online is an inherently unsustainable, unstable, and unfair practice, impacting people with, for instance, small children or health issues disproportionally.[50]

Another issue for academics is that there is still no standard way for digital projects to be evaluated and peer-reviewed, making digital projects a career gamble. Especially when developing new technologies, this has a tendency to take up the majority of project time, at the cost of scholarship.[51] Depending on the field and the nature of the project, it may be possible for the digital project to be reviewed as a companion to print output, helping with the issue of career advancement.[52]

---

48 See www.wikiversity.org and https://github.com (both accessed May 6, 2021).

49 Morreale, "Medieval Digital Humanities," 9.

50 See Dombrowski, "The Directory Paradox"; and Rockwell, Day, Yu, and Engel, "Burying Dead Projects," para. 50.

51 Dombrowski, "What Ever Happened to Project Bamboo?," 327.

52 Rockwell, Day, Yu, and Engel, "Burying Dead Projects," para. 48.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Infrastructural Planning

It is easy to be seduced by the possibilities of digital projects to try to be everything to everyone, perhaps especially in the humanities, in which funding opportunities are limited and there is often a feeling that this might be the only chance. After all, adding another field in a database is trivial, but too many tangential add-ons will make the design and workflow messy and the digital resource unwieldy, just as it would for any other sort of project. The first thing to do is to identify a clearly defined research niche and resist the scope creep that will almost certainly beckon. Funding permitting, focusing on research questions and letting them drive the digital methods and tools that are used will also lead to better projects.

Digital humanities projects can often be collaborations between several institutions, but choosing a partner or a collection comes with some epistemic perils. The origins of many digital projects in the cultural heritage sector are either in national collections or at elite institutions, as these are often deemed important for national digitization programs or other funding. National collections, often founded in the nineteenth century to establish the national state, come with national taxonomies and epistemic frameworks, whereas elite institutions can reproduce a class-based bias.[53] A consequence of this selection can be exclusion of data from under-represented communities, or foreign-focused or other low-status collections that do not fit a nationalistic narrative, which are either left completely undigitized or under-described in terms of metadata. National borders can easily impede digital humanities projects but digital tools also have a great potential to cross them. An interesting example is the Swedish Caribbean Colonialism project, which studies the Swedish governmental archives from Saint Barthélemy, preserved in the French Colonial Archives.[54]

Applying existing linked data ontologies and vocabularies can come at a price if it means applying a model that is not an exact fit for the data, or is too abstract for the project's needs. Instead, the data model should be designed with the requirements of the project's research in mind, to be used within its own system. This bespoke model can then be mapped to a more generic and consumable LOD model using shared vocabularies and public ontologies for publication or aggregation.

Project Management Resources

For those who are new to digital humanities project planning, DevDH.org[55] has useful lectures on everything from conceptualizing the project to budgets, management, publicity campaigns, and more. One such aspect that might be new to digital humanities principal investigators is the need to manage bigger and more diverse teams due to the

53 Thylstrup, *The Politics of Mass Digitization*, 25, 52.

54 See www.digarv.se/en/participating-research-projects/svensk-karibisk-kolonialism-1784-1878 (accessed May 15, 2021).

55 Appleford and Guiliano, "DevDH."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

fact that programmers often do not have domain knowledge and scholars do not have programming skills.[56]

For documentation, both important internally and for potential users, Read the Docs is a free open option for documenting software that is especially useful if there are to be versions of the documentation, but it requires some technical expertise.[57] The Digital Documentation Process website offers a process through which digital humanities projects can create catalogue entries with persistent identifiers and a description of the project.[58] For simple deposits of papers or other material, Humanities Commons is also a non-profit option.[59]

Maintenance and Planning for End of Life

The best time to start planning for the end of a project is at the very beginning. Wrapping up a project is hard work and takes a lot of time, but doing it in a sustainable way that allows for future research should be seen as one of the most important outcomes. If possible, try to hold back funding to use after the project's research objectives are finished so as to have the space to deposit it properly.[60]

The most important question is to decide what makes sense to archive and deposit for the specific project. Examples of aspects to consider archiving are: content, code, process (research and encoding), user experience, project management documentation, deposit process documentation, and draft versions of all previous aspects. Even if user experience is documented, it doesn't mean it needs to be recreatable or emulated; screenshots and narrative descriptions are other valid approaches. Depositing every item on the above list would likely take almost as long to prepare as the project itself, and might be going overboard. Archiving the data with documentation should take priority. It is important to remember that some archiving is better than none if the task becomes too big. As long-term preservation is still more of an idea with unclear guidance, which we don't know the results of yet, it can be prudent to deposit at multiple (well-regarded and -established) repositories.[61]

Formats

The long-term preservation of digital data is an active rather than a passive process, requiring periodic integrity checks and interventions, not least among which is that

56 See also Dombrowski's syllabus, "DLCL 205/305: Project Management & Ethical Collaboration for Humanists."

57 See https://readthedocs.org (accessed May 7, 2021).

58 Fostano and Morreale, "The Digital Documentation Process."

59 See https://hcommons.org (accessed May 7, 2021).

60 Rockwell, Day, Yu, and Engel, "Burying Dead Projects," paras. 10, 22, 25, 31, 50.

61 Rockwell, Day, Yu, and Engel, "Burying Dead Projects," paras. 22, 37–41, 43, 46, 50.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

of format migration. File formats change over time: specs are updated, new versions released, new formats launched, and old formats fall out of common use. Often newer software cannot read older file formats. Thus, for all but the very simplest text-based formats, in order for the underlying data to remain accessible and readable, the format it is stored in will need to be periodically updated and the data migrated.

In order to ensure that the data is readable by a variety of software, not tied to any particular product or company, and to maximize the likelihood that it will still be readable in the future, it is strongly advised to store it (or, at least, to deposit it) using open formats. These are formats whose specifications are open (not proprietary) and can be freely implemented by any software developers. This is generally good practice in any case, but is particularly important in the context of digital archiving, and should be planned for in advance. Naturally, the types of the formats used and their contents should be documented as part of the project's metadata.

Sound general advice on choosing open data formats suitable for preservation may be found at the Library of Congress[62] and the Digital Preservation Coalition.[63] Specific advice on formats and metadata relevant for archaeological fieldwork is provided by the ADS/Digital Antiquity Guides to Good Practice.[64] Further useful resources and advice on ensuring open access to heritage data, choice of formats, and data harmonization may be found at the ARIADNEplus project.[65]

Licensing

Just as with formats, it's important at an early stage in a project's life cycle to consider the licence the data will be released under. This will become more significant as the project proceeds, and a lot of time and trouble can be saved later by planning ahead.

The issue of the explicit licensing of research outputs is one that academia has often chosen to ignore within the humanities, but, as data sharing becomes more and more commonplace, so too the importance of clearly establishing the terms under which others may access, reuse, transform, augment, and reshare data. Consider that this may require explicit permission if the project is to use copyrighted data produced by others; for example, if a photographer is hired to produce visual documentation, the question of licensing will need to be addressed in their contract.

To facilitate reuse and machine-readability, it is recommended to limit choice of licence/rights statements to well-known existing licences, referenced by their IRIs. For practical purposes, this means Creative Commons (CC)[66] licences for open works, and

62 Library of Congress, "Sustainability of Digital Formats" and "Library of Congress Recommended Formats Statement: 2020–2021."

63 Digital Preservation Coalition, "File Formats and Standards."

64 Archaeology Data Service/Digital Antiquity, "Guides to Good Practice."

65 See https://ariadne-infrastructure.eu (accessed May 11, 2021); see in particular Hollander et al., "PARTHENOS Guidelines."

66 See https://creativecommons.org (accessed May 11, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

RightsStatements.org[67] for more restricted works; in some cases Open Data Commons[68] licences may also be applicable.[69]

Resist the temptation to use more obscure licences or to invent a bespoke one. First, the chances are good that most needs are met by existing licences and that they are better written than the ones a non-expert could produce on their own. Second, by using well-known licences and rights statements, human and machine agents alike are more likely to already understand the applicable terms under which your material may be used; making a human read the terms of your bespoke licence adds friction to reuse by human agents, and presents a barrier to reuse by machine agents.

It is advisable to license metadata under the Creative Commons Zero (CC0) licence,[70] which for most practical purposes waives all copyright restrictions. The application of such a liberal licence for metadata greatly simplifies reuse. It is often desirable to use metadata in aggregate contexts in which citation of individual sources and rights holders would be onerous or prohibitive, such as when metadata from multiple sources are combined and transformed as mash-ups.

Open licences for the data themselves are also preferable, and, if a licence as liberal as CC0 (or a Public Domain mark) can also be applied there, then all the better. In practice, though, it is often necessary or desirable—particularly in academic contexts—to require source attribution of data if they are reused; in this case, a Creative Commons Attribution (CC BY) licence should be applied.[71] CC BY licences exist in a few different varieties imposing a few combinations of restrictions on reuse, such as forbidding derivative works (ND), or requiring that any derivative works be licensed under the same terms (SA; so-called "viral licensing"); it is advised that such additional restrictions be avoided in favour of the base CC BY licence when possible.

As though they were a swarm of bees, CC BY-NC-* variants[72] should be avoided, especially in academic contexts. These licences place a "non-commercial" restriction forbidding reuse involving monetary compensation. For some reason we have yet to fathom, researchers seem to be particularly enamoured of CC BY-NC-* licences, which is unfortunate, because the non-commercial restriction often has unintended consequences while delivering no clear benefit to the rights holder. NC licences are

67 See https://rightsstatements.org (accessed May 11, 2021).

68 Open Data Commons, "Open Data Commons Open Database License (ODbL) v1.0."

69 Please note that CC licences should not be used for software; there are plenty of good free or open-source licences expressly for that purpose. See, for instance, Choose A License, an online tool from GitHub intended to help in choosing an appropriate open licence for software: https://choosealicense.com (accessed May 11, 2021).

70 See http://creativecommons.org/publicdomain/zero/1.0 (accessed May 15, 2021); in cases in which the material being published is old enough that its copyright has already expired, it should be marked as Public Domain: http://creativecommons.org/publicdomain/mark/1.0 (accessed May 11, 2021).

71 See http://creativecommons.org/licenses/by/4.0 (accessed May 11, 2021).

72 See https://creativecommons.org/licenses (accessed May 11, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

problematic because what counts as "commercial" use is only vaguely defined;[73] it is generally legally safer to err on the side of caution, which in practice tends to exclude a number of academic contexts that researchers would often like to explicitly allow. The use of material in monographs, articles, and textbooks if said works are to be sold, and the use of material in courses for which a fee is charged, are just two examples that researchers generally wish to encourage but that NC licences prohibit in practice.

In some cases, it may not be possible for whatever reason to apply an open licence; in such cases, it is still important to apply a rights statement (e.g., all rights reserved) so that it is clear to users that they are *not* licensed to reproduce the data. No matter which licence is used, it is also vital to include the copyright holder as well—either names of authors or the project—so that it can be correctly cited.

Technical Long-Term Availability/IRIs

Permanent resolvable identifiers need not necessarily be IRIs, if the resource itself is not LOD. For publications or non-LOD datasets, a digital object identifier (DOI)[74] has quickly become the citation standard of choice for digital resources over the past two decades, combining a unique identifier with a resolver to ensure continuity even if the resource is moved or can be accessed as separate instances from multiple sources. Archives, research institutions, and national bodies are able to issue DOIs for digital resources.

These considerations of long-term availability are compounded by the requirements of linked data, in particular that of stable resolvable public identifiers. Can you be sure that your IRIs will survive possible future software migrations? If the data are stored using a domain tied to an institution, can you be sure that that institution's webmaster won't decide to reorganize the site structure in a few years and move the material, changing the IRIs? Can you even be sure that the institution and its domain will still exist? Sadly, there are no good solutions to this problem, only alternatives with different drawbacks. Decoupling IRIs from any particular institution and using an independent domain can be beneficial in the long term, and offer a degree of flexibility and control, especially for projects that are not strictly tied to a particular organization. The trade-off is that the project is then responsible for maintaining and renewing that domain.

If a third-party service is chosen to manage and maintain permanent IRIs, it can use redirects (which also have to be maintained, and may not be any more reliable than the research institution) or rely on non-dereferenceable identifiers such as URNs or DOIs (which work well for citations, but must be run through a transient resolver service in order to arrive at the digital resource they identify).[75]

---

73 The Creative Commons do provide a rough guide: https://creativecommons.org/faq/#does-my-use-violate-the-noncommercial-clause-of-the-licenses and https://wiki.creativecommons.org/wiki/NonCommercial_interpretation (both accessed May 11, 2021).

74 See www.doi.org (accessed May 11, 2021).

75 For more on planning for permanent identifiers, see Sauermann and Cyganiak, "Cool URIs for the Semantic Web"; and Farias Lóscio, Burle, and Calegari, "Data on the Web Best Practices."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Case Studies

This section delves into two Sweden-based projects, chosen as case studies on how work with or in relation to linked open data and sustainability has been carried out. Both are infrastructures, but Swedish Open Cultural Heritage (SOCH)[76] is planned as a long-term national aggregation platform that links to Europeana, while Norse World[77] is the result of a three-year project with a specific research profile.

SOCH[78]

Swedish Open Cultural Heritage (SOCH; "K-samsök" in Swedish) is an aggregation and search platform for Swedish cultural heritage data. The platform is administered by the Swedish National Heritage Board[79] on behalf of almost eighty participating cultural heritage institutions (data partners), which contribute metadata from their collections.

The SOCH platform harvests metadata records from these museums, archives, and historic environment registers, and publishes them as linked open data. The records are assigned persistent IRIs, mapped to a common RDF-based data model, indexed, and made queryable via a web API. At the time of writing SOCH harvests and indexes just under 9 million records from 174 different datasets. SOCH includes records covering both tangible and intangible heritage, including protected sites and monuments, historic buildings, artefacts and small finds, photographs and drawings, sound and video recordings, and documents and literature, as well as historic personages, events, and more. As an aggregator and publisher of linked data, it is not only the metadata records themselves that are significant but also the links describing how they relate to one another in a machine-readable manner.

The development of SOCH began in 2008, and the platform went live in 2010 as part of a mandate from the Swedish government, with earmarked funding until 2016; since that time it has been funded from the Swedish National Heritage Board's annual budget, and is now considered to be an in important part of furthering the agency's core goals of ensuring that cultural heritage is preserved, used, and developed.

All the metadata in SOCH are licensed under CC0, and records for media such as images must include rights statements for the media itself. As the Swedish national aggregator for Europeana, SOCH provides metadata further downstream to that international aggregator. SOCH also makes the records available via an open API, which makes the records searchable, can provide aggregated statistics, and makes it possible to easily find linked data relations

76 Swedish Open Cultural Heritage is operated by the Swedish National Heritage Board (Riksantikvarieämbetet); see the "K-samsök" search function at http://kulturarvsdata.se (accessed May 11, 2021).

77 Petrulevich et al., "Norse World." See also Petrulevich and Skovgaard Boeck, this volume.

78 For more in-depth coverage of SOCH in English, including an overview of its history, data model, strengths, weaknesses, and plans for future development, see Smith, "Linked Open Data and Aggregation Infrastructure."

79 See www.raa.se (accessed May 7, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

connecting records. For example, a photograph might "depict" an artefact that was "found at" an ancient monument, "documented by" a report that "shares an author with" another report … and so on. A separate but parallel index allows the creation of additional relations by human and machine users as user-generated content (UGC).

SOCH itself offers only a technical interface for machine agents: the web API takes queries as URL query strings and returns RDF/XML, JSON-LD, or "plain" XML depending on the nature of the request; dereferencing SOCH IRIs on kulturarvsdata.se returns either the record's RDF/XML or JSON-LD for machine agents, or a redirect to the record's source at the providing institution for human agents. The intention is to encourage third parties to develop applications using the SOCH data and API, which many have done.[80] Nevertheless, the Swedish National Heritage Board also provides a web interface to SOCH, Kringla,[81] which allows users to search, browse, and view records in SOCH and the links between them.

At the time SOCH was developed, few non-commercial linked data platforms were well proven, the principles of RDF were not widely understood in the Swedish cultural heritage sector, and linked data ontologies for heritage data had not been widely implemented. As a consequence, a number of design decisions were made when developing the platform and its data model that, with hindsight, would not be repeated if it were done today. Among these, and of particular note in the context of sustainability, are the fact that SOCH uses its own bespoke RDF data model, and how it mints persistent IRIs.

SOCH uses an RDF-based data model that was created for it specifically, including a variety of attributes and relation types for describing cultural heritage data, as well as vocabulary authorities for things such as item types, context types, etc. While some attributes and relations correspond to or directly use terms from well-known ontologies such as OWL, FOAF, Dublin Core, and CIDOC-CRM, the overwhelming majority were created from whole cloth when the platform was developed. This poses a problem for interoperability with other linked data resources, since the SOCH data model is not used other than in the SOCH platform; with the exception of the OWL/FOAF/DC-based attributes, clients not created explicitly with SOCH in mind aren't able to make sense of the data model's semantics.

In order to provide heritage data to Europeana as part of the platform's role as national aggregator for Sweden, however, data from SOCH must first be mapped to the Europeana Data Model (EDM). Although EDM is in some respects a less nuanced model than SOCH's, as a shared model for cultural heritage data across all Europeana's partner institutions it is more widely known and implemented, and even sees some use outside Europeana. This compensates somewhat for the limited interoperability of the SOCH data model, as the same data are also available from Europeana as EDM. With this in

80 See www.raa.se/hitta-information/k-samsok/att-anvanda-k-samsok/exempel-pa-anvandning-av-k-samsok (accessed May 15, 2021) for a short list of examples.

81 See www.kringla.nu (accessed May 15, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

mind, it is likely that a future version of the SOCH data model will move toward using simple EDM internally, complemented by support for CIDOC-CRM with archaeological extensions (CRMarchaeo)[82] to allow for more detailed metadata descriptions where necessary, and standard RDFS, OWL, DC, FOAF, etc. terms for lowest-common-denominator interoperability.

SOCH IRIs live on the kulturarvsdata.se domain, rather than something under the Swedish National Heritage Board's own domain, such as data.raa.se. This reinforces SOCH's function as a sector-wide aggregator, not serving just a single organization, but it also reflects the pragmatic truth that, as a government agency, the heritage board could theoretically at some future date be restructured or dissolved, or the mandate for SOCH assigned to another agency.

Data partners in SOCH mint IRIs for their records under the kulturarvsdata.se domain themselves when their data are harvested. The use of this domain rather than one under the Swedish National Heritage Board's raa.se is intended to decouple the IRIs from the organization and thus make them more stable in the long term. Nevertheless, the fact that partner institutions mint the IRIs themselves means that they are ultimately responsible for ensuring that they do not change. This is exacerbated by the unfortunate structure of SOCH IRIs' path component, which includes elements tying it to the providing institution, dataset, or system, and often the local identifier used by that institution or system. This means that, if an artefact changes hands, or—more likely—the institution changes database systems and local identifiers, those parts of the IRI may in fact *not* be permanent. It would have been preferable to avoid this by centrally assigning unique and opaque IRIs from SOCH, although this introduces the problem of tracking changes across harvests.

Latterly, an attempt has been made to mitigate the potential damage that may be caused by unstable IRIs. In addition to identity relations defined as `owl:sameAs`, SOCH now also supports relations describing changed IRIs such as `dcterms:replaces`. This allows data providers that, for whatever reason, deem changing their IRIs unavoidable to do so. SOCH will redirect requests for the old IRI to the new one that replaces it, and transitively treats relations that apply to one as if they also applied to the other. SOCH also now keeps track of IRIs that have appeared in its index, and, if an IRI is removed during a harvest and lacks a corresponding forwarding address, requests for that IRI now signal that it has been removed returning "410 Gone," flagging that the IRI is correct but no longer exists, rather than simply "404 Not Found."

Norse World[83]

Norse World is the web resource deliverable of the Norse Perception of the World project "for research on worldviews and spatiality in medieval literature from Sweden and Denmark."[84]

82 See www.cidoc-crm.org/crmarchaeo (accessed May 11, 2021).

83 This section is based on the poster presentation by Backman, "Mapping Foreign Place Names."

84 Petrulevich et al., "Norse World"; see also Petrulevich and Skovgaard Boeck, this volume.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

It seeks to make it possible to answer questions on how foreign lands were visualized in the Middle Ages by extracting foreign places names and other spatial information from literary medieval texts with an emphasis on spelling and name variants.

The resource consists of a Leaflet-powered map component connected to a bespoke MySQL database with a REST-API with JSON, including GeoJSON and JSON-LD compatibility, as well as a documentation website with term definitions and technical specifications.[85] Coordinates for the geo-referencing are taken from gazetteers such as GeoNames or the Deutsches Archäologisches Institut's iDai.gazetteer.[86] Although the resource is not linked open data as such, it provides open, structured data in the form of exportable CSV files. There is also a REST-API with machine-readable GeoJSON and JSON-LD links of original forms and standard forms.[87] Unfortunately, at the time of writing, these links do not produce valid JSON or JSON-LD, but it's actively being worked on as of spring 2023.

The project is funded by the Swedish Foundation for Humanities and Social Sciences, Riksbankens Jubileumsfond, originally for three years (2017–2020), but this has been extended into 2023. While the funding contract required the hosting institution, the Department of Scandinavian Languages at Uppsala University, Sweden, to guarantee the survival of the project past the funding period for an indeterminate time period, how this would be accomplished has been unclear from the beginning. The project is to be one of the first digital humanities infrastructure projects under Uppsala University's e-administration model for digital operational support, which was still under active development for the duration of the project.[88]

When the funding application was conceived and written in 2016, none of the participants—principal investigator Jonathan Adams, co-investigators Agnieszka Backman and Alexandra Petrulevich[89]—had heard of linked open data, and a relational database was chosen due to earlier experiences. After struggling with public procurement specifications it was instead decided to use a team from Uppsala University IT Services,[90] who had the relational database know-how necessary for the resource, with domain knowledge provided by the project group. By the time the project participants learned of linked open data as a concept it was too late to change the trajectory of the project, other than to make the resource compatible with LOD. One of the reasons a pivot was not possible was the steep learning curve that creating a linked open data resource

85 Petrulevich, "Infrastructure."

86 See www.geonames.org and https://gazetteer.dainst.org/app/#!/home (both accessed May 15, 2021).

87 Backman et al., "REST-API."

88 Ohlsson, "E-administration."

89 Co-investigator Simon Skovgaard Boeck joined the team at project start and additional data entry was carried out by project assistants Jessica Holmlund and Felix Marklund.

90 User experience (UX) designer Jorunn Hartmann, head of group Rasmus Ljungström, and systems developer Andreas Lecerof.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

would have entailed. Finding usable ontologies and having to develop an ontology for the onomastic aspects of the project were insurmountable obstacles, mainly because of the limited time available due to the project's three-year duration.

One difficulty had to do with the project's approach to the problem of spatiality in medieval Swedish and Danish texts. Investigating spatiality from a philological and onomastic perspective, the exact spelling of foreign place-names, their textual context and categorization were all intrinsic to the project. The different levels of place-name forms, original form, variant form, and lemma form,[91] which are essential for the project, had no obvious equivalent in the LOD ontologies the project participants had access to. For additional complexity, the project also includes non-names with spatial information, such as inhabitant designations and adjectives describing origin. In comparison, a comparable spatial resource, the Icelandic Saga Map,[92] has (so far) exclusively place-names from edited texts—that is, normalized place-names—comparable to Norse World's lemma form.

While Norse World is not linked open data, it follows many of the principles of LOD, open science, and open-source programming. The Leaflet library used for mapping is open-source. The data are published under a CC BY licence, allowing for sharing and adaptation. The data are available in (the open) CSV format. The live project data can be downloaded in different configurations: either the whole database or curated by use of search and/or filters. The open licence and providing the data in a non-proprietary, structured format online fulfills the three-star requirement in Berners-Lee's open data model. Additionally, the Norse World resource also uses open resources with stable URLs for the data it reuses, such as GeoNames and Libris.[93] The landing pages for detailed views of attestations, works, sources, variant forms, lemma forms, and standard forms are also stable and linkable. As mentioned above, the REST-API is also planned to be compatible with GeoJSON and JSON-LD. In other words, the resource has been made as open and reusable as was possible within the project parameters.

Conclusion

Linked open data provide an opportunity for digital humanities projects to open up their data for potential enrichment and reuse by others than the original stakeholders. This requires the use of standardized vocabularies and ontologies. Many different ontologies exist, from those covering general concepts to very specialized subject domains. Since they are rarely a perfect fit, mapping a project's concepts onto an existing model is preferable to making a bespoke one or trying to squeeze the project's research point of view into too broad or mismatched categories.

91 Petrulevich, Backman, and Adams, "Medieval Macrospace through GIS"; see also Petrulevich, this volume.

92 See http://sagamap.hi.is/is (accessed May 15, 2021).

93 See www.geonames.org (accessed May 14, 2021) and https://libris.kb.se (accessed May 15, 2021), the National Library of Sweden's catalogue of books in Swedish libraries.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

As digital humanities projects often consist of bigger teams than many humanities researchers might be used to, consisting of both domain experts and programmers, a project leader/principal investigator will need to learn about project management, as well as data formats and licences, to ensure optimal project outcomes and sustainability. The two case studies, SOCH and Norse World, showcase different aspects of the LOD spectrum and the sustainability efforts needed due to SOCH being a national aggregator while Norse World is more of a research project.

One of the main points of this chapter has been that not all digital humanities projects are the same, and they will have different needs and paths to sustainability—a concept that might itself have different meanings, depending on the project. In some instances, it might even be more fruitful to view the digital output of projects as ephemeral research results.[94] Other projects might fail, such as, for example, Project Bamboo, which wasn't able to deliver the digital humanities tools workbench it set out to create but still "brought together scholars, librarians, and technologists at a crucial moment for the emergence of digital humanities"[95] in the United States; there was value in the journey, even if the destination was not reached. Ideas, connections, and relationships were an intangible outcome of the project and show that success doesn't have to equal something tangible and sustainable.[96] There needs to be acceptance of both the ephemeral and incompleteness as a part of the digital humanities ecosystem, while still planning for permanence and transparent scholarship.

When planning for the long-term sustainable access of a project, it's important to stress that it's not necessary to guarantee that *everything* remains available in perpetuity, an entire technical platform frozen in amber just as it was created. Indeed, such a goal would be prohibitively costly and likely deliver diminishing returns. Technologies inevitably develop, are superseded, and then are no longer supported, and to attempt to hold back that tide is a fool's errand. The adage goes "Applications age like fish, data like wine," and this distinction happily also maps to ease of preservation: maintaining access to a usable dataset in the long term requires "only" secure and redundant data storage, regular integrity checks, and the occasional format migration, plus ongoing funding for hosting and systems administration. Yes, the word "only" bears a heavy load in that sentence, but compared to the exponential cost and difficulty of keeping a software-based service up and running in the long term—across component and system updates, protocol changes, components and systems inevitably going through the process of no longer being updated, end of life, deprecation, and ultimately no longer running on contemporary systems, necessitating emulation—maintaining access to a dataset is comparatively easy. In the majority of cases, users don't need the entire experience of using your system to be preserved; they just need to get access to the underlying data in a format they can use, with

94 "What if we were to advocate *ephemerality* of digital resources in those cases where that's a healthy approach that gets scholars where they want to go … ?" Nowviskie, "A Skunk in the Library."

95 Dombrowski, "What Ever Happened to Project Bamboo?," 335.

96 Dombrowski, "The Directory Paradox."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

its associated metadata. With that in mind, aim to arrange for long-term data preservation (including any identifiers associated with it, so that references to it will still make sense) but assume that any digital platform will have a finite life of no more than a decade or two, after which it will either be retired or replaced. If the data rely on having resolvable public identifiers such as IRIs, it may be worth decoupling these from the application itself if a more sustainable solution is available, so that they may be easily redirected in future.

Digital entropy is an inevitability; it cannot be avoided. Thus, it is important to plan for it from the start: how it will be managed, and how it will be mitigated. Having a project data management plan is essential. Consider how the digital resources the project produces, and the platforms that support them, will be maintained and updated, and for how long. What budget and resources will the project have in the future, and for how long? What is a realistic lifespan for the platform? And, when the platform is ultimately decommissioned, where will the data be archived and how? Will any associated persistent identifiers still resolve?

Glossary

AAT: Getty Art & Architecture Thesaurus; a structured linked data vocabulary for artistic terms, styles, periods, object types, etc. http://vocab.getty.edu (accessed May 11, 2021).

ADS: the Archaeology Data Service; an accredited digital repository for heritage data based at the University of York and operational since 1996. http://ads.ahds.ac.uk (accessed May 11, 2021).

API: Application Programming Interface; a technical interface that allows programs to interact with a code module, library, or service. A web API uses web technologies to do this.

ARIADNEplus: a continuation and expansion of the earlier ARIADNE project, focused on integrating and harmonizing European digital archaeological research data, and making it accessible and reusable. https://ariadne-infrastructure.eu (accessed May 11, 2021).

CIDOC-CRM: the CIDOC Conceptual Reference Model, an event-oriented ontology for cultural heritage with a focus on museum collections. http://cidoc-crm.org/cidoc-crm (accessed May 11, 2021).

CRMarchaeo: an extension to the CIDOC-CRM ontology covering concepts and attributes pertaining to archaeological methods, recording, and excavation. www.cidoc-crm.org/crmarchaeo (accessed May 11, 2021).

Creative Commons: a non-profit organization promoting free culture and a set of widely used open attribution-based licences for creative and cultural works. https://creativecommons.org (accessed May 11, 2021).

DOI: digital object identifier; an international standard for unique persistent identifiers for digital objects, or an instance of such an identifier. DOIs are not in themselves dereferenceable but, rather, must go through a resolver service. www.doi.org (accessed May 11, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Dublin Core: a set of fifteen fundamental metadata properties (later expanded) widely used and accepted as a baseline for metadata. http://purl.org/dc/elements/1.1; http://purl.org/dc/terms (both accessed May 11, 2021).

EDM: the Europeana Data Model, a data model for cultural heritage data used by the European cultural heritage aggregator Europeana. www.europeana.eu/schemas/edm (accessed May 11, 2021).

Europeana: a European digital cultural heritage aggregator operational since 2008 and with collections of data from more than 3,000 cultural heritage institutions, operated under the auspices of the European Commission. www.europeana.eu (accessed May 11, 2021).

FAIR: a set of principles for Findable, Accessible, Interoperable, and Reusable digital data, complementary to linked open data and movements such as Free Software, but with a focus on academia and scientific data. www.go-fair.org/fair-principles (accessed May 11, 2021).

FOAF: Friend-Of-A-Friend; a linked data schema for describing people, organizations, and social networks. One of the earliest linked data ontologies; it is in widespread use. http://xmlns.com/foaf/0.1 (accessed May 11, 2021).

GeoNames: an authority for geolocated place-names and geographical divisions (countries, provinces, cities, etc). www.geonames.org (accessed May 11, 2021).

GitHub: online platform for collaborative open software development, based on the *git* distributed version control system. https://github.com (accessed May 11, 2021).

Heritage Data: a set of linked data SKOS vocabularies and thesauri from UK heritage bodies, including monument-type thesauri. https://heritagedata.org/live/schemes (accessed May 11, 2021).

JSON-LD: a variant of the JavaScript Object Notation data format with support for linked data; a serialization format of RDF; see Kellogg et al.

Kringla: a web application built on SOCH allowing users to search, browse, and view records in SOCH, including associated media, links between records, and out to the broader web, etc. www.kringla.nu (accessed May 11, 2021).

Norse World: a research project and digital resource mapping exonyms found in the Old East Norse corpus in context. See Backman, "Mapping Foreign Place Names"; Petrulevich, Backman, and Adams, "Medieval Macrospace through GIS"; Petrulevich and Skovgaard Boeck, this volume; and Petrulevich, Backman, Adams, Skovgaard Boeck, Holmlund, Marklund, Hartmann, Lecerof, and Ljungström. www.uu.se/en/research/infrastructure/NorseWorld (accessed May 11, 2021).

Open Data Commons: an open licence for databases and structured datasets. https://opendatacommons.org/licenses/odbl/1-0 (accessed May 11, 2021).

OWL: Web Ontology Language; an RDF ontology for describing RDF ontologies; see Motik, Patel-Schneider, and Parsia, "OWL 2 Web Ontology Language."

PeriodO: a linked open data gazetteer for historical and archaeological chronological periods, bounded both temporally and geographically. https://perio.do (accessed May 11, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

RDF: Resource Description Framework, the meta-model for linked open data and the semantic web, comprised of three-part statements called triples; see Schreiber and Raimond, "RDF 1.1 Primer."

RDFS: RDF Schema, a set of RDF types and predicates for describing data schemas and vocabularies; see Brickley and Guha, "RDF Schema 1.1."

RightsStatements.org: a set of rights statements for describing commonly occurring non-open-rights situations—e.g., full copyright/all rights reserved, initiated by Europeana and the Digital Public Library of America, and now operated by a larger consortium of national bodies. https://rightsstatements.org (accessed May 11, 2021).

SKOS: Simple Knowledge Organization System; a set of RDF types and predicates for describing multi-hierarchical structured vocabularies as linked data; see Miles and Bechhofer, "SKOS."

SOCH: Swedish Open Cultural Heritage (Swedish: "K-samsök"); the Swedish national cultural heritage aggregator and linked open data platform, operated by the Swedish National Heritage Board. http://kulturarvsdata.se (accessed May 11, 2021).

SPARQL: SPARQL Protocol and RDF Query Language, an SQL-like query language for RDF data on the semantic web based around matching patterns of triples. In contrast to REST-based web APIs, which will vary from system to system, SPARQL is a common interface for querying any set of RDF data, and queries may be federated over multiple systems to combine datasets; see Harris, Seaborne, and Prud'hommeaux, "SPARQL 1.1 Query Language."

UGC Hub: SOCH's platform for user-generated content. https://ugc.kulturarvsdata.se (accessed May 11, 2021).

VIAF: Virtual International Authority File, a set of aggregated authorities for bibliographic entities such as authors, works, etc., collected from national libraries across the world. http://viaf.org (accessed May 11, 2021).

Wikidata: structured linked open data crowdsourced by Wikimedia. http://www.wikidata.org (accessed May 11, 2021).

Wikimedia Commons: open media crowdsourced by Wikimedia. https://commons.wikimedia.org (accessed May 11, 2021).

Wikipedia: open knowledge crowdsourced by Wikimedia. https://www.wikipedia.org (accessed May 11, 2021).

Bibliography

Appleford, Simon, and Jennifer Guiliano. "DevDH: Development for the Digital Humanities." DevDH.org, 2013. https://devdh.org/about (accessed May 11, 2021).

Archaeology Data Service. http://ads.ahds.ac.uk (accessed May 11, 2021).

Archaeology Data Service/Digital Antiquity. "Guides to Good Practice." 2009. https://guides.archaeologydataservice.ac.uk (accessed May 11, 2021).

Backman, Agnieszka. "Mapping Foreign Place Names in Medieval Swedish and Danish Texts." Humanities Commons, December 11, 2018. https://dx.doi.org/10.17613/48gz-5g45 (accessed May 11, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Backman, Agnieszka, Jorunn Hartmann, Andreas Lecerof, Rasmus Ljungström, and Alexandra Petrulevich. "REST-API." www.uu.se/en/research/infrastructure/norseworld/infrastructure/rest-api (accessed May 15, 2021).

Berners-Lee, Tim. "Linked Data." W3C, July 27, 2006. www.w3.org/DesignIssues/LinkedData.html (accessed May 11, 2021).

Berners-Lee, Tim, Roy T. Fielding, and Larry Masinter. "RFC 2396: Uniform Resource Identifiers (URI): Generic Syntax." RFC Editor, August 1998. http://tools.ietf.org/html/rfc2396 (accessed May 11, 2021).

Brickley, Dan, and Ramanathan V. Guha. "RDF Schema 1.1." W3C, February 25, 2014. www.w3.org/TR/rdf-schema (accessed May 11, 2021).

Celtic Inscribed Stones Project (CISP). https://dx.doi.org/10.5284/1000215 (accessed May 11, 2021).

Center for Open Science. www.cos.io (accessed May 15, 2021).

Chun, Wendy Hui Kyong. "The Enduring Ephemeral, or the Future Is a Memory." *Critical Inquiry* 35 (2008): 148–71.

Core Trust Seal. www.coretrustseal.org (accessed May 11, 2021).

Creative Commons. https://creativecommons.org (accessed May 11, 2021).

——. "About the Licenses." https://creativecommons.org/licenses (accessed May 11, 2021).

——. "Attribution 4.0 International (CC BY 4.0)." http://creativecommons.org/licenses/by/4.0 (accessed May 11, 2021).

——. "Frequently Asked Questions." https://creativecommons.org/faq/#does-my-use-violate-the-noncommercial-clause-of-the-licenses (accessed May 11, 2021).

——. "NonCommercial Interpretation." https://wiki.creativecommons.org/wiki/NonCommercial_interpretation (accessed May 11, 2021).

DANS (Data Archiving and Networked Services). https://dans.knaw.nl (accessed May 11, 2021).

DIGARV. "Swedish Caribbean Colonialism." www.digarv.se/en/participating-research-projects/svensk-karibisk-kolonialism-1784-1878 (accessed May 15, 2021).

Digital Antiquity. www.digitalantiquity.org (accessed May 11, 2021).

Digital Preservation Coalition. www.dpconline.org (accessed May 11, 2021).

——. "File Formats and Standards." 2015. www.dpconline.org/handbook/technical-solutions-and-tools/file-formats-and-standards (accessed May 11, 2021).

Dombrowski, Quinn. "The Directory Paradox." In *People, Practice, Power: Digital Humanities outside the Center*, edited by Anne B. McGrail, Angel David Nieves, and Siobhan Senier, 83–98. Minneapolis: University of Minnesota Press, 2021.

——. "DLCL 205/305: Project Management & Ethical Collaboration for Humanists." GitHub, 2020. https://github.com/quinnanya/dlcl205 (accessed May 11, 2021).

——. "What Ever Happened to Project Bamboo?" *Literary and Linguistic Computing* 29 (2014): 326–39.

Duerst, Martin, and Michel Suignard. "RFC 3987: Internationalized Resource Identifiers (IRIs)." RFC Editor, January 2005. http://tools.ietf.org/html/rfc3987 (accessed May 11, 2021).

European Commission. "Open Science." https://ec.europa.eu/info/research-and-innovation/strategy/goals-research-and-innovation-policy/open-science_en (accessed May 15, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Farias Lóscio, Bernadette, Caroline Burle, and Newton Calegari. "Data on the Web Best Practices." W3C, January 31, 2017. www.w3.org/TR/dwbp (accessed May 11, 2021).

Fielding, Roy T. "[httpRange-14] Resolved." W3C, June 18, 2005. https://lists.w3.org/Archives/Public/www-tag/2005Jun/0039.html (accessed May 11, 2021).

Fostano, Katherina, and Laura K. Morreale. "The Digital Documentation Process." Digital Documentation Process. January 31, 2019. https://digitalhumanitiesddp.com (accessed May 11, 2021).

GeoNames. www.geonames.org (accessed May 11, 2021).

GitHub. "Choose a License." https://choosealicense.com (accessed May 11, 2021).

Godby, Jean, Karen Smith-Yoshimura, Bruce Washburn, Kalan Davis, Karen Detling, Christine Fernsebner Eslao, Steven Folsom, et al. *Creating Library Linked Data with Wikibase: Lessons Learned from Project Passage*. Dublin, OH: OCLC Research, 2019.

Harris, Steve, Andy Seaborne, and Eric Prud'hommeaux. "SPARQL 1.1 Query Language." W3C, March 21, 2013. www.w3.org/TR/sparql11-query (accessed May 11, 2021).

Heritage Data. https://heritagedata.org/live/schemes (accessed May 11, 2021).

Hollander, Hella, Francesca Morselli, Frank Uiterwaal, Femmy Admiraal, Thorsten Trippel, and Sara Di Giorgio. Zenodo, August 12, 2019. "PARTHENOS Guidelines to FAIRify Data Management and Make Data Reusable," 2019. https://dx.doi.org/10.5281/zenodo.3368858 (accessed May 11, 2021).

Humanities Commons. https://hcommons.org (accessed May 11, 2021).

Icelandic Saga Map. http://sagamap.hi.is (accessed May 11, 2021).

iDai.gazetteer. https://gazetteer.dainst.org/app/#!/home (accessed May 15, 2021).

International DOI Foundation. "Digital Object Identifier System." www.doi.org (accessed May 11, 2021).

Internet Archaeology. https://intarch.ac.uk (accessed May 11, 2021).

Kellogg, Gregg, Pierre-Antoine Champin, Dave Longley, Manu Sporny, and Markus Lanthaler. "JSON-LD 1.1: A JSON-Based Serialization for Linked Data." W3C, July 16, 2020. www.w3.org/TR/json-ld (accessed May 11, 2021).

Kungliga biblioteket. "Libris." http://libris.kb.se (accessed May 11, 2021).

Library of Congress. "Library of Congress Recommended Formats Statement: 2020–2021." 2020. www.loc.gov/preservation/resources/rfs (accessed May 11, 2021).

——. "Sustainability of Digital Formats: Planning for Library of Congress Collections." 2019. www.loc.gov/preservation/digital/formats (accessed May 11, 2021).

Miles, Alistair, and Sean Bechhofer. "SKOS Simple Knowledge Organization System Reference." W3C, August 18, 2009. www.w3.org/TR/skos-reference (accessed May 11, 2021).

Morreale, Laura. "Medieval Digital Humanities and the Rite of Spring: Thoughts on Performance and Preservation." BodoArXiv, July 18, 2019. https://dx.doi.org/10.34055/osf.io/7p2t6 (accessed May 11, 2021).

Motik, Boris, Peter F. Patel-Schneider, and Bijan Parsia. "OWL 2 Web Ontology Language: Structural Specification and Functional-Style Syntax (Second Edition)." W3C, December 11, 2012. www.w3.org/TR/owl-syntax (accessed May 11, 2021).

Nestor. www.langzeitarchivierung.de (accessed May 11, 2021).

Nowviskie, Bethany. "A Skunk in the Library." Nowviskie.org, June 28, 2011. https://nowviskie.org/2011/a-skunk-in-the-library (accessed May 11, 2021).

Ohlsson, Annika. "E-administration." Staff Portal—Uppsala University, 2021. https://mp.uu.se/en/web/info/vart-uu/e-forvaltning (accessed May 11, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Open Data Commons. "Open Data Commons Open Database License (ODbL) v1.0." https://opendatacommons.org/licenses/odbl/1-0 (accessed May 11, 2021).

Petrulevich, Alexandra. "Infrastructure." www.uu.se/en/research/infrastructure/norseworld/infrastructure (accessed May 7, 2021).

Petrulevich, Alexandra, Agnieszka Backman, and Jonathan Adams. "Medieval Macrospace through GIS: The Norse World Project Approach." *The Cartographic Journal* 57 (2020): 18–27.

Petrulevich, Alexandra, Agnieszka Backman, Jonathan Adams, Simon Skovgaard Boeck, Jessica Holmlund, Felix Marklund, Jorunn Hartmann, Andreas Lecerof, and Rasmus Ljungström. "Norse World." www.uu.se/en/research/infrastructure/norseworld and https://norseworld.nordiska.uu.se (both accessed May 11, 2021).

Read the Docs. https://readthedocs.org (accessed May 11, 2021).

RightsStatements.org. https://rightsstatements.org (accessed May 11, 2021).

Riksantikvarieämbetet (Swedish National Heritage Board). www.raa.se (accessed May 7, 2021).

Rockwell, Geoffrey, Shawn Day, Joyce Yu, and Maureen Engel. "Burying Dead Projects: Depositing the Globalization Compendium." *Digital Humanities Quarterly* 8 (2014). www.digitalhumanities.org/dhq/vol/8/2/000179/000179.html (accessed May 15, 2021).

Sauermann, Leo, and Richard Cyganiak. "Cool URIs for the Semantic Web." W3C, December 3, 2008. www.w3.org/TR/cooluris (accessed May 11, 2021).

Schreiber, Guus, and Yves Raimond. "RDF 1.1 Primer." W3C, June 24, 2014. www.w3.org/TR/rdf11-primer (accessed May 11, 2021).

Smith, Marcus. "Linked Open Data and Aggregation Infrastructure in the Cultural Heritage Sector: A Case Study of SOCH, a Linked Data Aggregator for Swedish Open Cultural Heritage." In *Information and Knowledge Organisation in Digital Humanities: Global Perspectives*, edited by Koraljka Golub and Ying-Hsang Liu, 64–85. Abingdon: Routledge, 2022.

Smith-Yoshimura, Karen. "Summarizing Project Passage Experiences in Creating Library Linked Data in Wikibase (2 of 2)." Hanging Together, July 17, 2019. https://hangingtogether.org/?p=7398 (accessed May 11, 2021).

Svensk Nationell Datatjänst. https://snd.gu.se (accessed May 11, 2021).

Thiery, Florian, Sophie C. Schmidt, Timo Homburg, and Jakob Voß. "Ogi Ogham Project." 2020. http://ogham.link (accessed May 11, 2021).

Thylstrup, Nanna Bonde. *The Politics of Mass Digitization*. Cambridge, MA: MIT Press, 2018.

URI Planning Interest Group, W3C/IETF. "URIs, URLs, and URNs: Clarifications and Recommendations 1.0." W3C, September 21, 2001. www.w3.org/TR/uri-clarification (accessed May 11, 2021).

W3C. "TAG Issues List: httpRange-14: What Is the Range of the HTTP Dereference Function?" 2002. www.w3.org/2001/tag/issues.html#httpRange-14 (accessed May 11, 2021).

Wikibase. https://wikiba.se (accessed May 11, 2021).

Wikidata. https://www.wikidata.org (accessed May 15, 2021).

——. "Wikidata:Notability." www.wikidata.org/wiki/Wikidata:Notability (accessed May 11, 2021).

Wikiversity. www.wikiversity.org (accessed May 6, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Chapter 8

INTEGRATING TIME AND SPACE IN A DIGITAL-HISTORICAL ADMINISTRATIVE ATLAS

Peder Dam*

hoW CAN *TIME* be integrated into digital maps? Especially in the last decade, many researchers have been trying to answer this question, but these have mostly been focusing on point mapping over time, such as the movement of individuals, transport, or other point-located objects, or they have used the *time slice method*: making a separate map for each time slice of interest, such as one separate map for each day or each year.[1] In contrast, this chapter focuses on the polygon-based mapping of countrywide administrative divisions over a long time period, with data not collected as time slices but, rather, with time and space integrated into one dataset with time as an attribute parameter. Each type of administrative units had to be both *space filling*, in the sense that every place had to be covered by one and only one of these units at a one time, but also *time filling*, in the sense that every unique place had to be covered by one and only one of these units at all times.[2] Furthermore the data model presented had to handle both date-precise changes as well as imprecise data, owing to the character of the historical source from, mainly, before around 1800.

The DigDag project, short for "Digital Atlas of the Danish Historical-Administrative Geography," is by Danish standards a huge mapping project, for which the development of the method and the main data collection were completed between 2008 and 2012.[3] The goal was to establish a historical database that could tie all Danish administrative districts together geographically and historically from around 1660 up till the present day. This has provided a historical-administrative geographical information system

* Peder Dam is museum curator at Odense City Museums. He received a master's degree in geography and history from Roskilde University in 2004 and a PhD degree in history from Copenhagen University in 2008. He has been working with historical-geography, historical maps and data, GIS, landscape history, settlement history and agricultural history. Email: pda@odense.dk.

1 Perner, "Segregated behind the Walls"; Li et al., "The Spatial and Temporal Change of Cropland"; Doukas and Demoula, "Historical GIS (HGIS)"; Navickas, "Thirdspace?"; Lesger and van Leeuwen, "Residential Segregation from the Sixteenth to the Nineteenth Century."

2 See www.digdag.dk (accessed January 23, 2021).

3 The following institutions participated in the DigDag project: Danish State Archives, Danish National Survey and Cadastre, Copenhagen University, the National Museum of Denmark, the University of Southern Denmark, the Royal Danish Library, and the Heritage Agency of Denmark.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

platform for the digital humanities, allowing use of DigDag as an internet-based atlas,[4] as a vector map resource for GIS, and as a search engine for use in the service functions of archives, collections, and libraries. This chapter is not primarily about the possible use cases of DigDag's data nor about the project's technical aspects, however. The overall focus lies on the methods used for registering, mapping, and publishing administrative information. How have the data been generated, and what have been the challenges, advantages, and disadvantages in doing so?

The Administrative Divisions of Denmark

The administrative divisions of any country are an extremely complex matter intrinsically, and especially when the goal is to systematically register and map not just all types of units but every single unit, its time span, its geographical changes, and its relations to other units, at a very detailed scale in both time and space over more than 350 years. This has included the mapping of some seventy types of administrative units, such as parishes, shires, counties, and municipalities, comprising in total around 25,000 administrative units, of which some existed for a short period while others have been in existence through the entire period. This large data collection and mapping project has been possible only as a result of several fortunate circumstances in Denmark's administrative structure and the presence of many highly useful sources in the country's archives.

First, written as well as cartographical historical sources concerning administrative divisions are often plentiful and concentrated in the archives in Copenhagen, rather than being scattered across regional archives. In 1660 the Kingdom of Denmark lay in ruins economically, politically, and militarily after years of warfare with Sweden. This resulted in the introduction of a strongly absolutist form of government, which was one of the most centralized in Europe at that time. In the short run, the absolutism gave the state administration—desperately in need of revenue—the power to collect land taxes from every farm and landowner, through a detailed land register, which has given us early, accurate, nationwide, and standardized knowledge on the local and regional administration. In the long run, the strong absolutism was also one of the reasons for a continuous stream of information about, and regulation of, every level of administration making its way into the national archives in Copenhagen.[5] Centralized bureaucratic may be annoying for people, but it is worth its weight in gold for historians working on a project such as DigDag.

The second reason that DigDag was possible is the nature of "land units" or "village areas" in Denmark (Danish: *ejerlav*) and their relationship to the rest of the

4 Data can be used and downloaded freely at "Dataforsyningen," SDFE (Danish Agency for Data Supply and Infrastructure), https://dataforsyningen.dk/data.

5 Løgstrup, *Enevælden og enhedsriget*.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

administrative units. To understand how DigDag works it is essential to understand what land units are and how the project makes use of them. Before the land reforms that started around 1800, a land unit was the total area used for cultivation, grazing, and foresting more or less jointly for one village (an open-field system), although a land unit could also be the land under one manor farm, which typically had its own field system separate from the peasants. Single-located farms could have their own land units, or groups of single-located farms could form land units together. In all cases, land units before around 1800 constituted a geographical area that was either cultivated or used some other way more or less jointly by one or several settlements.[5] After the land reforms and enclosure, primarily between 1785 and 1810, the land units became meaningless in an agricultural sense, since production turned from the jointly operated open-field system to one based on individual farms with completely individual plots. In an administrative sense, however, the land unit continued to exist, as the basis for the land register for taxation purposes and as the basis for the central administration of landownership. There were, and still are, around 8,000 to 9,000 land units at any given time in Denmark.[7]

The land units were, and are, with few exceptions—such as with *birk* units, described below—not demarcated by parish boundaries or by the borders of any of the other larger administrative units. Each land unit was, at any one time, with only rare exceptions, completely under one parish, under one shire, under one municipality, etc. This means that we have been able to use the land units as "building blocks" for all the other seventy or so types of units, such as parishes and municipalities. Instead of drawing the same border seventy times, we can draw it once in GIS, and afterwards define the administrative relation of the other seventy types of administrative unit in a relational database. The method is described below, but here I would like to point out that the nature of the Danish land units has allowed us to save working time, and it has made it possible to reconstruct other geographical units on the basis partly of written sources and partly of the mapping of land units.

Figure 8.1 shows an overview map from 1836 of two land units near Grenå in Jutland based on older enclosure maps, where the enclosure in Villersø village[8] to the south took place in 1792 and in Dalstrup[9] in 1805. With the exception of some smallholders, all the farms remained in the village core and none of the larger farms were pulled down and erected anew away from the old village, as was common practice in many villages as a result of the enclosure process in Denmark. Together, the two land units formed a parish, and neither the borders of the land units nor the borders of the parish have changed from 1660 till today. Such continuity is not unusual for the

6 Dam and Jakobsen, *Historisk Geografisk Atlas*, 54–55, 98–103.

7 Korsgaard, *Kort som kilde*, 78–87.

8 Danish Geodata Agency, "01 Villersø."

9 Danish Geodata Agency, "Æ 09416."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

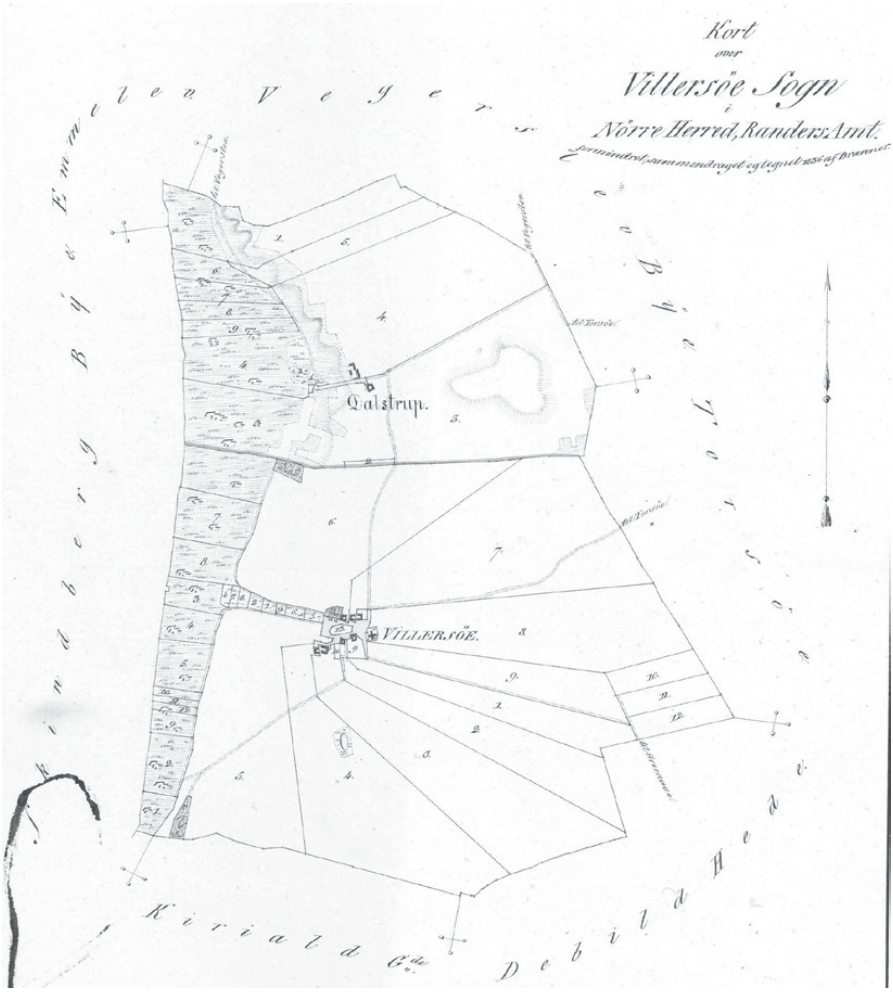


Figure 8.1. Overview map (1:20,000), 1836, based on enclosure maps and cadastral maps (1:4,000), ca. 1792–1816, showing each landowner's plot in the parish of Villersø in eastern Jutland. The parish consisted of two land units: Dalstrup land unit in the northern part and Villersø land unit in the south. A thick grey line shows the border between the land units. A parish in Denmark typically covered, and still covers, one to three land units. Copyright: Danish Geodata Agency.

smaller units, especially for the land units, and this is the third circumstance behind the success of the DigDag project. Fewer than a tenth of the land units changed their geography more than three times, making the land unit a relatively stable unit type over the period since 1660, and thereby a relatively easy unit to map over time; see Figure 8.2. Some land units were more dynamic and a few have as many as thirteen different areas in the period mapped.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

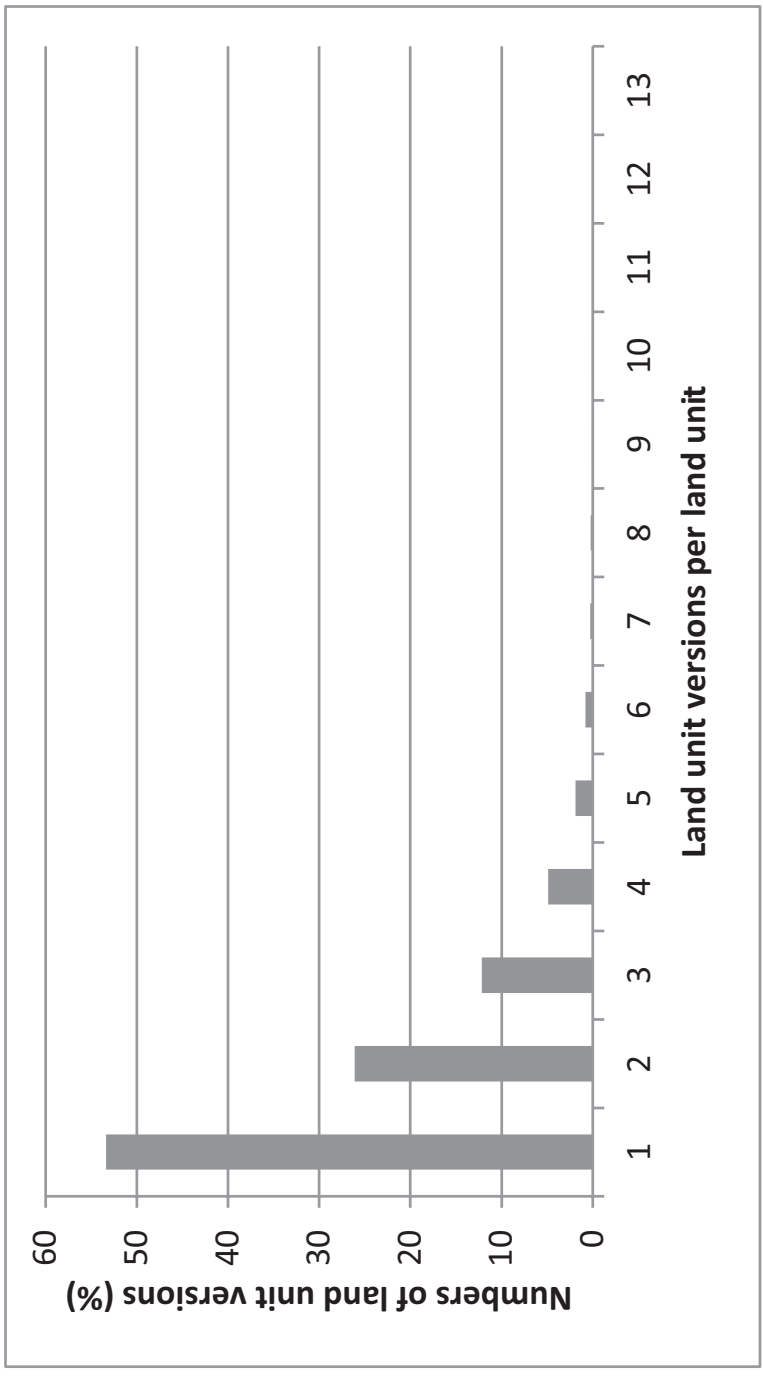


Figure 8.2. Land unit versions per land unit, 1660–2012. More than half the land units did not have any geographical changes at all, whereas the most dynamic land units covered thirteen different areas over the period. Image by Peder Dam.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Data Structure

In Figure 8.3, a generalized model of the relational GIS database is shown. Basically, the data are located in three domains. First, the "UNIT" domain can be seen as the core or the body of the database. This part of the relational database is where data concerning each administrative unit, its time span, its administrative classification, and similar information are stored. If the "UNIT" domain is the body of the database, the "GEO" domain must be seen as its legs that the "UNIT" rests on. Each administrative unit is, for a certain time span, defined geographically to cover a few or hundreds of land units. These land units are vector-mapped over time in the GIS part of the database. In a few cases, it has been necessary to use partial land units as well. Third, the "NAME" domain contains the names of administrative units and place-names in general.[10]

The dating of units, their geography, and their names constitute one of the most central pieces of information in DigDag. All the tabular data in the model in Figure 8.3 and all relations between them (illustrated with arrows) are dated. The dating methods of the data are described below.

This data structure and the overall method described above allow DigDag to reuse the borders of land unit (LU) polygons and thereby save working hours, enabling the project team to reconstruct administrative units on the basis of land unit mapping and written sources, as well as making it possible for users to retrieve information on geographical relations between different types of administrative unit (AU) at any given time, such as parishes and municipalities, since they are both defined geographically through land units. Hence, this data structure is exceptionally practical; furthermore, it enables the project team and the research community to make surveys not previously possible.

The first downside of the method, however, is its complexity. The description above is only a simplification of the data structure. The development process of the data model and its implementation and incorporation into the working routine have been time-consuming. The complexity also has a large impact on the visualization of the data; see "Viewing and Publishing the Data" section.

Second, there are cases when the land unit is not sufficient to map other administrative units. There are some exceptions to the general assumption that land units are not aligned with the borders of other units. In these exceptional cases, it is necessary to create extra polygons, called "partial land units." This issue is primarily associated with larger cities, where the final map ended up being complicated, with, typically, five to ten land unit versions, and double the number—or more—of partial land unit versions in the same area.

The third and final challenge is, in principle, insoluble: how to map what is, in theory, impossible to map? Some areas were, until the enclosure, shared between different administrative units without defined borders that can be drawn on a map. This is, for example, the case with some "common areas" (Danish: *fælles overdrev*)—that is,

10 Primary: *Danmarks Stednavne*, 1922–2006, and SDFE, "SNSOR Database."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

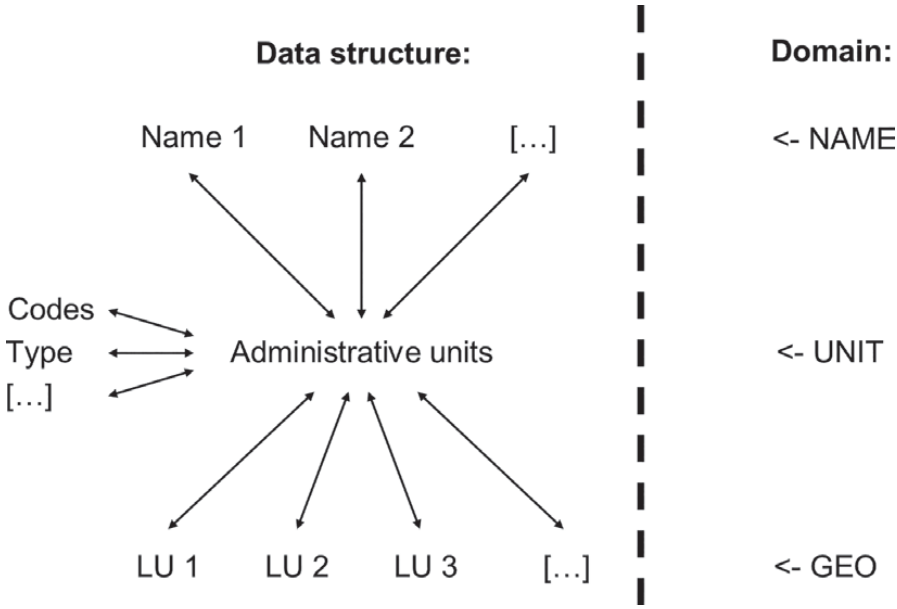


Figure 8.3. Simplified data model of the DigDag project. Text items such as "Administrative units" stand for tabular data. A range of information for these units, such as their types (parishes, municipalities, etc.) and codes, has been registered. Arrows stand for relations between tabular data. For instance, one administrative unit can have one or more name over time, and can be defined geographically over time by different land units, which are vector-mapped in the GIS database. Image by Peder Dam.

woodlands and grasslands where peasants from different parishes, or even different counties, had the right to let a number of their livestock graze, but without specifying in which part of the common area.[11] The common areas can with little difficulty be mapped as separate land units, but it is not possible to map the different parishes and counties without generalizing the situation. Luckily, there were very few such common areas split along parish, or other, lines in Denmark after 1660. A similar type of challenge is associated with the *birk* units, however. A *birk* is a juridical unit for tenants administered by their private or royal landowner.[12] In these cases, some farms in a village could belong to traditional juridical systems, whereas other farms in the same villages could belong to a privately administered juridical system. Before the enclosure, therefore, it is impossible to draw borders, since the land was mainly used jointly by all the farms, and the *birk* units covered a substantial part of the country in the seventeenth and eighteenth

11 Fritzbøger, *Det åbne lands kulturhistorie*, 64–67.

12 Frandsen, *Atlas*, 2:91–98.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

centuries—at times up to a quarter of the country.[13] To put it simply, the common areas and the *birk* units were all mapped through different types of coarse generalizations, which then were commented on and described in textnotes in the database. Even so, it must be emphasized that these generalizations cover only a very small part of the database: mainly units before about 1800.

Dating of Units

The dating of units in DigDag follows database standards already partly developed by the Danish National Archives.[14] For each unit there must be a "from-date," which states when the unit first appears, and a "till-date," stating when the unit ceases to exist. Similarly, each geographical version must have both a "from-date" and a "till-date" defining the time span for the unit having that extent.

There are three main dating types in the system. "Precise dating" is characterized by one exact date registered as "Day.Month.Year," such as "07.04.2011." For "interval dating," an exact date is not known, but a "minimum"—that is, a time when it is certain the change has not happened—and a "maximum"—that is, a time when it is certain the change has happened—are known. If a unit is dated as "from = 1670–1710" and "until = 08.02.1870–23.03.1870," the unit was founded some day between 1670 and 1710 (both years included) and ceased to exist some day between February 8 and March 23, 1870 (both dates included). Interval dating can thus consist of two years, two dates, two months, or any combination of these. In reality, a unit with a lifespan of one year represents itself an interval dating. If, according to historical sources, a unit is founded in 1660, the unit was imposed at some point between January 1, 1660, and December 31, 1660, both dates included.

Finally, "open-start" or "open-end dating" is a dating with an unknown starting date or an unknown ending date. In DigDag, this category includes units and unit versions that go back further than the mapping period, without exact knowledge of their date of establishment (typically "–1660" or "–1682"), or units and unit versions that existed 2012 and continue to exist ("2012–"). Dating of the type "from = –1660" and "until = 2012–" signifies a unit that has existed from 1660 or earlier and that still exists today. A unit characterized by "from = 1660" and "until = 2012" was founded some day in 1660 (precise date unknown) and ceased to exist some day in 2012 (precise date unknown). Examples of all three main dating types are shown in schematic form in Figure 8.4 and in tabular form in Figure 8.5.

Interval dating is the most problematic of the three methods, since it represents imprecise data for the project's period of interest, and the project team have of course tried to minimize the use of it. But having imprecise data for some of the unit entries is unavoidable, partly because of a lack of precise historical sources, especially for

13 Frandsen, *Atlas*, 1:118–33.

14 Jensen, *Dateringer i DigDag*.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

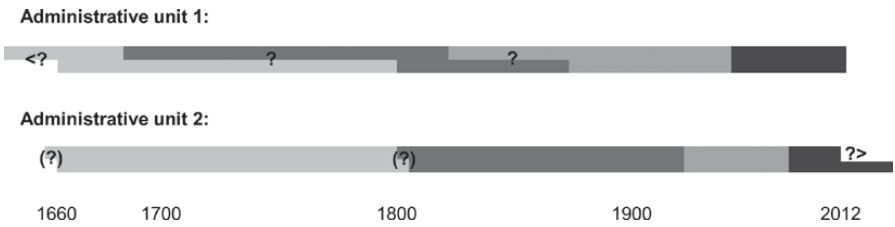


Figure 8.4. Graphical illustration of two administrative units and their four geographical versions, shown with different colours with both precise dating, interval dating (marked with two colour stripes and "?"), and "open-start"/"open-end" dating (marked with "<?" and "?>" respectively). Unit 2 is generally precisely dated; only the exact starting date in the year 1660 and the day in February 1800 when the geographical change between versions 1 and 2 occurred is unknown. Unit 1 is characterized by more imprecise dating. The starting date is known only to be before 1660, and the change between versions 1 and 2, as well as 2 and 3, is dated only as intervals (1688–1800 and 1820–July 27, 1870). See also Figure 8.5. Image by Peder Dam.

Unitversion	From (text)	Until (text)
AU 1, version 1	–1660	1688–1800
AU 1, version 2	1688–1800	1820–27.07.1870
AU 1, version 3	1820–27.07.1870	01.01.1955
AU 1, version 4	01.01.1955	01.01.2012
AU 2, version 1	1660	02.1800
AU 2, version 2	02.1800	01.01.1930
AU 2, version 3	01.01.1930	25.08.1987
AU 2, version 4	25.08.1987	2012–

Figure 8.5. Dating of administrative units and their versions shown in Figure 8.4. Precise dating has a white background, interval dating has a light grey background, and "open-start"/"open-end" dating has a dark grey background. Image by Peder Dam.

the oldest data, and partly because the project tried to avoid time-consuming work if that would result only in a relatively small data improvement. The latter reasoning is thereby a practical prioritization, and it is primarily accepted with land unit changes not involving other administrative units. Changes of the geographical extent of a land unit that do not involve changes in parishes or other larger units are often dated as an interval between two cadastre maps. The area affected by interval dating concerning parishes is below 0.5 percent before the enclosure, around 1800, and mostly below 0.05 percent after the enclosure; see Figure 8.6.

The dating methods described allow DigDag to register data in a very flexible way, such that the database can handle precise dates as well as imprecise ones. This has been

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

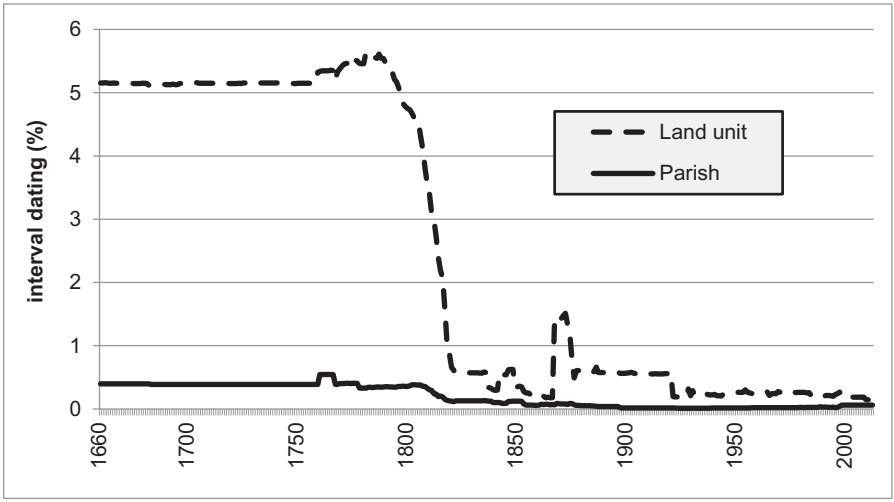


Figure 8.6. Percentages of areas affected by interval dating over time for land units (dashed line) and the parishes (solid line), 1660–2012. The graph shows the percentage of land where at a certain time it is unclear which unit the area belonged to. The use of interval dating for other unit types larger than a parish is, with a few exceptions, even more seldom than for parishes. Interval dating concerning coastal line changes, which often develop gradually and therefore are registered as intervals on the basis of the map material, are not included here. Image by Peder Dam.

a fundamental necessity for the project, since it has, on the one hand, been a goal to register the data as accurately as possible, preferably down to exact dates, but, on the other hand, the historical sources in some cases provided only imprecise dates.

These dating methods require some training to be used properly, however. Additionally, the challenges associated with dating include considerations with respect to how imprecise dating should be best visualized online as well as exact delimitations of starting and ending dates of interval dating. Mapping datasets with imprecise dating is discussed below. As for the latter issue, the *minimum* date for a change is set at a time when it is certain the change has not occurred, and the *maximum* date is set at a time when it is certain the change has occurred. In reality, the sources and our historical knowledge often indicate that a shorter interval is the most plausible option; for the sake of firm certainty, though, it is necessary to use longer intervals. For instance, Danish land units before around 1800 dated through interval dating (see Figure 8.6) are associated with time periods of more than 100 years. There are good nationwide geographical sources from 1682, such as land registers and reconstructed maps by Karl-Erik Frandsen,[15] and

15 Frandsen, *Atlas*, 1:6–47.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

again from around 1800, such as enclosure maps and cadastral maps.[16] In between these sources, however, there are very few cartographical or geographical data available. Many of the land unit changes can therefore be dated only to the period from around 1682 to around 1800. This long period is based on extant evidence, and thus the most certain; consequently, this is the information that has been registered in the database. It is my firm belief, however, that most of the interval-dated changes between 1682 and around 1800 happened as a result of Danish land reforms that began around 1770 but are mostly associated with the period from 1785 to 1810.[17]

Integration of Time into GIS Maps of Danish Land Units

Above it is clarified how dating was registered as the tabular data. In this section I focus on how this was implemented in GIS maps. In Figure 8.7, seven land units and their geographical changes over time are schematically shown as different colour blocks with the time scale on the vertical, Y, axis.

The traditional way to map such units is also illustrated in Figure 8.7. The mapper selects certain years, so called time slices, which are considered especially relevant for future studies, and/or certain years for which there are good and reliable historical sources to base a map on. This method was used in the latest paper atlas of Danish historical administrative divisions, published in 1984,[18] in which the historical land units were mapped around 1820 based on the oldest nationwide cadastral map series, as well as being reconstructed for around 1682 on the basis of the same maps combined with detailed written sources, such as *Christian V's Land Register* (Danish: *Christian V's matrikel*) from 1682 to 1688.

There are a number of problems associated with time slices, however. First and foremost, it is not possible to determine the exact time of any geographical changes, only that it has taken place between map X and map Y. The user of such an atlas will run into problems if the person is interested in a year between the two maps or the two time slices where there are changes in their area of interest. A GIS user wishing to do a nationwide thematic map will run into numerous problems unless the user is so fortunate to be mapping the same year as the one of the time slices. Second, this method, especially if there is a need for many time slices, can be time-consuming and unpractical. Since most Danish land units have been so stable, a mapping project with many time slices would show many units with completely identical areas for different years. The traditional time slice method would therefore result in unnecessary doubling of the same data; moreover, data correction in the event of errors or data from new sources would be tedious to implement.

16 Korsgaard, *Kort som kilde*, 70–83.

17 Fritzbøger, *Det åbne lands kulturhistorie*, 108–18.

18 Frandsen, *Atlas*, vol. 1.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

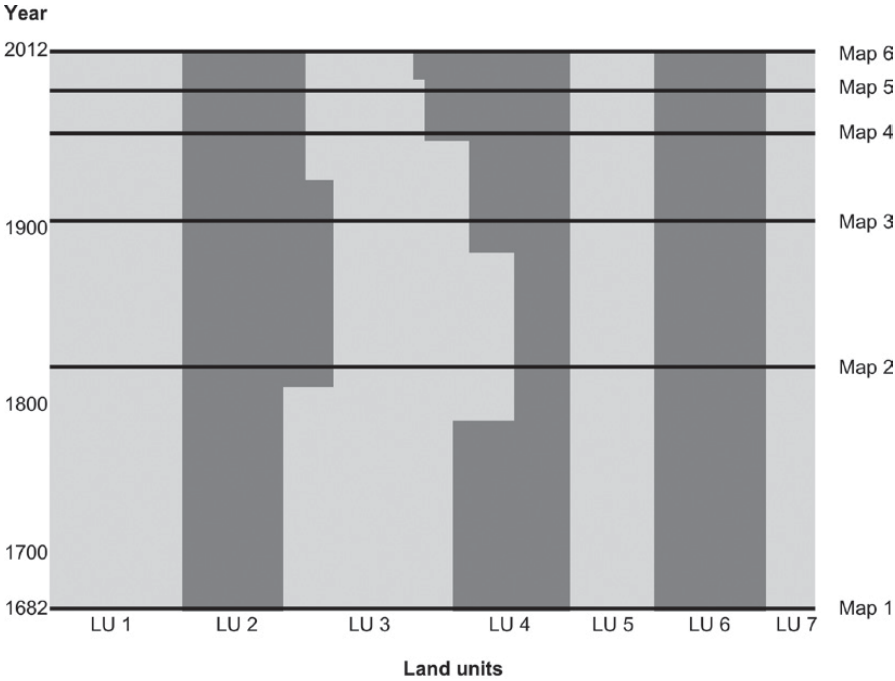


Figure 8.7. Schematic illustration of geographical changes in seven land units, 1682–2012. The figure should be read the following way: LU 1 does not change at all between 1682 and 2012; LU 2 has geographical changes in 1810 and 1930; LU 3 changes geography in 1800, 1810, 1890, 1930, 1960, and 2000; and LU 4 changes borders in 1800, 1890, 1960, and 2000. The last three land units (LUs 5 to 7) do not change during the period. The thick black lines illustrate six traditional mappings, so called time slices, in 1682, 1820, 1910, 1970, 1990, and 2012. Image by Peder Dam.

The method developed by DigDag seeks to register and map all changes, within the criteria stated, but without mapping the same unchanged area more than once. The method is based on multiple overlaying polygons with time span registration in the associated database; see Figure 8.8. If it can be found from the historical sources that land units such as LU 1, 5, 6, and 7 in the figure did not change in the period from 1682 till 2012, the modern-day polygons of the land units are simply classified as going "from = –1682" and "until = 2012–," and the polygons themselves are not changed. For such areas there is only one polygon, and thus only one land unit version in the digital vector map. For areas where the land units changed once or more, an equally new number of polygons and land unit versions were generated, covering the historical areas and the time spans of all land unit versions registered in the database; see Figure 8.9. The result is a vector map in which some areas have one polygon and some have several.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

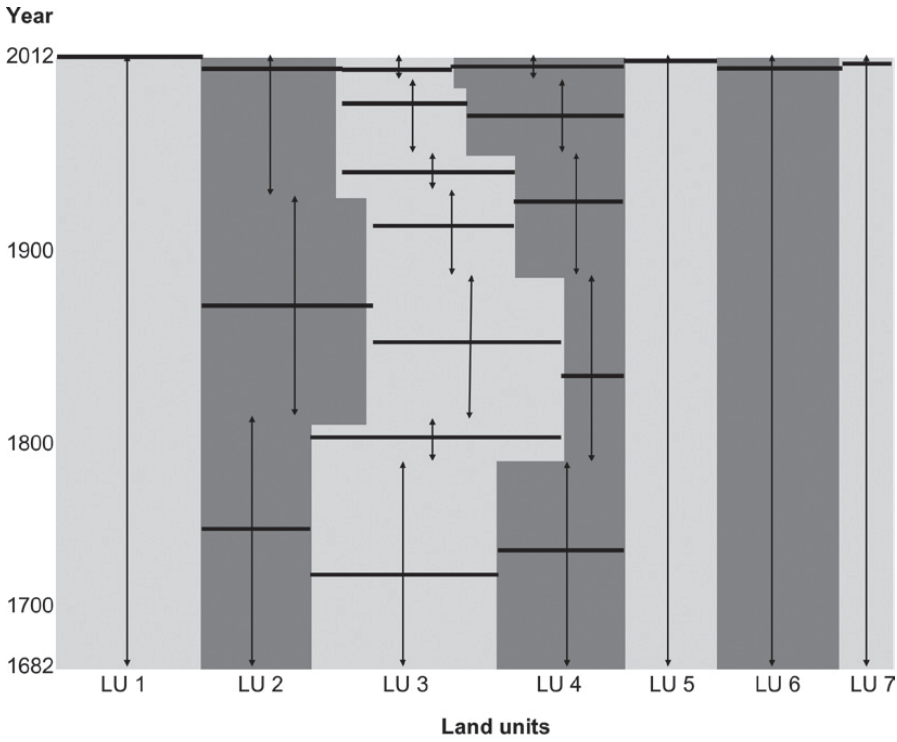


Figure 8.8. Schematic illustration of geographical changes in seven land units and the mapping method of the DigDag project, 1682–2012. One polygon (thick horizontal line) stands for each different version of each land unit with time span registration (thin vertical arrow) in the associated database. See also Figure 8.9. Image by Peder Dam.

In reality, the mapping process and the final data were all somewhat more complicated than illustrated here, but this is not of relevance for method development—with one exception. To get a more precise understanding of the method, however, it is necessary to discuss interval dating once again. Many land unit changes cannot be specified precisely. This is especially the case with changes before around 1800, when the oldest cadastral maps date from, and with border changes that involve only land units, but not parishes, municipalities, counties, or other larger administrative unit types. Changes that involved only land units are at times possible to get specified by archival studies at the National Survey and Cadastre, but it is very time-consuming and there are several thousand of such—typically minor—changes. Most of these changes are therefore only interval-dated and registered to be between two sets of historical maps.

Border changes that involve both land units and other administrative units are more relevant for a far greater number of future users. The changes are also much easier to get specified to an exact date, because of the richer and more easily accessible sources; most

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Land unit	From	Till
LU 1, version 1	–1682	2012–
LU 2, version 1	–1682	1810
LU 2, version 2	1810	1930
LU 2, version 3	1930	2012–
LU 3, version 1	–1682	1800
LU 3, version 2	1800	1810
LU 3, version 3	1810	1890
LU 3, version 4	1890	1930
LU 3, version 5	1930	1960
LU 3, version 6	1960	2000
LU 3, version 7	2000	2012–

Land unit	From	Till
LU 4, version 1	–1682	1800
LU 4, version 2	1800	1890
LU 4, version 3	1890	1960
LU 4, version 4	1960	2000
LU 4, version 5	2000	2012–
LU 5, version 1	–1682	2012–
LU 6, version 1	–1682	2012–
LU 7, version 1	–1682	2012–

Figure 8.9. Data underlying the DigDag mapping method in Figure 8.8, 1682–2012. Image by Peder Dam.

of these changes are therefore specified to an exact date, or at least a year. Even so, there are changes, especially in the seventeenth and the eighteenth centuries, for which it is impossible to find historical sources stating the precise date of the border change. For this reason, most types of administrative units have some instances of interval dating.

Interval dating is illustrated in Figures 8.10 and 8.11. The land unit versions are the same as in Figures 8.7 and 8.8, with one exception: the first border change between LU 3 and 4 cannot be specified more precisely than being sometime between 1700 and 1800. Although there is only one change that cannot be specified, this results in interval dating (1700–1800) in four land unit versions; the first and second versions of both LU 3 and 4.

The method described has allowed the project team to reach the goal and map every version of the land unit as far as the historical sources and present-day resources have made it possible; to map each version only once, thereby avoiding a doubling of data and the wasting of working time; and, finally, to integrate all the data into one database. The method has been proved to function successfully, at least for the described dataset.

The method is more complex than the traditional time slice method, however, with respect to both the mapping process and visualization. In some cases, sets of land units are interrelated in both space and time, which means that sets of interval dating and border changes become interrelated. If a land unit changes twice, whereby one of the changes is associated with another land unit to the west (dated 1800 to 1820) and the other with a third land unit to the east (dated 1810 to 1830), it is not possible to map their relationships unless the situation is generalized. This is due to the fact that it is not possible to establish whether the change to the west or to the east happened first or whether the changes happened at the same time. Both changes were therefore typically dated as 1800 to 1830.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

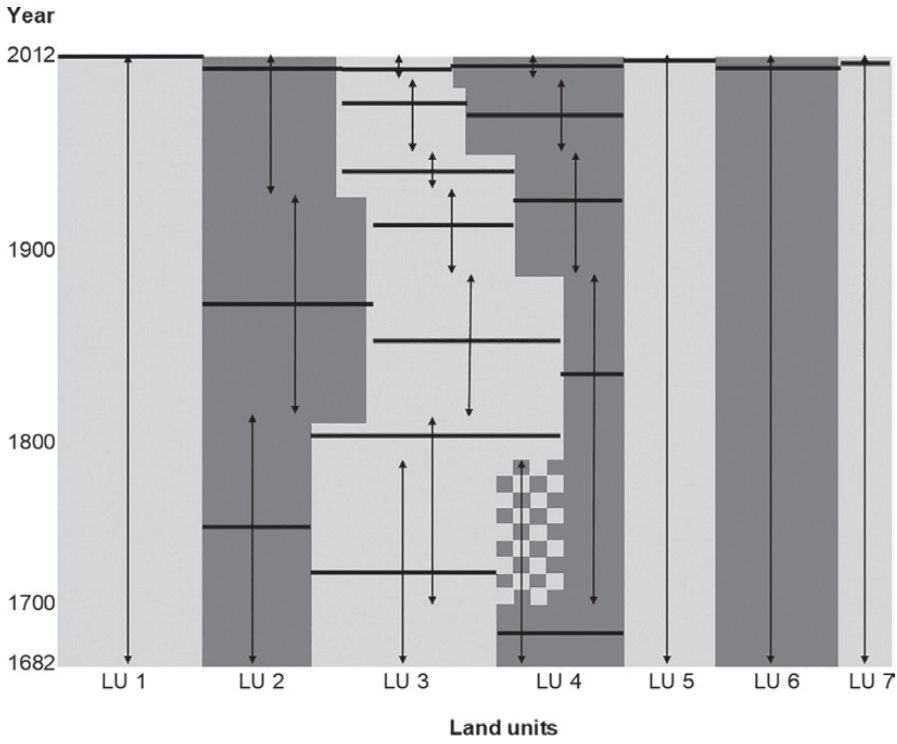


Figure 8.10. Schematic illustration of geographical changes in seven land units and the mapping method of the DigDag project, 1682–2012. One polygon (thick horizontal line) stands for each different version of each land unit and time span registration (thin vertical arrow) in the associated database. The dotted area between LUs 3 and 4 between 1700 and 1800 illustrates a change that occurred at some point in that period. See also Figure 8.11. Image by Peder Dam.

Land unit	From	Till
LU 3, version 1	–1682	1700–1800
LU 3, version 2	1700–1800	1810
LU 3, version 3	1810	1890
LU 3, version 4	1890	1930
LU 3, version 5	1930	1960
LU 3, version 6	1960	2000
LU 3, version 7	2000	2012–

Land unit	From	Till
LU 4, version 1	–1682	1700–1800
LU 4, version 2	1700–1800	1890
LU 4, version 3	1890	1960
LU 4, version 4	1960	2000
LU 4, version 5	2000	2012–

Figure 8.11. Data underlying the DigDag mapping method in Figure 8.10 for LUs 3 and 4. The other land units have the same dating as seen in Figure 8.9. Image by Peder Dam.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Viewing and Publishing the Data

As described, the main priorities of data collection have been precision and quality—that is, to register the data as precisely as possible and to allow for an equally good registration of the impression in the form of interval dating. In the publishing phase, however, the priorities were set somewhat differently, since the focus lay on providing high-quality data as well as communicating complex data in a comprehensible way for a very diverse group of users of the project's website. Most users have never used geographic information system technologies, and almost none have heard of interval dating.

The data collected in the production database, as described above, are not affected by the publishing choices described below. The production database is converted into a separate database for the online platform with download functions. This customized publishing database allows the platform to function more rapidly and more effectively by means of pre-calculated polygons as well as making it possible for the project team to generalize some of the data to make them more comprehensible and easier to communicate.

The publishing database (see Figures 8.12 to 8.14) can be described as a huge mash-up of the land unit polygons and a series of relationship links between larger units and land units. Sets of polygon versions are generated for each of the some 25,000 units within the seventy or so unit types in DigDag. Some units, such as many parishes, ended

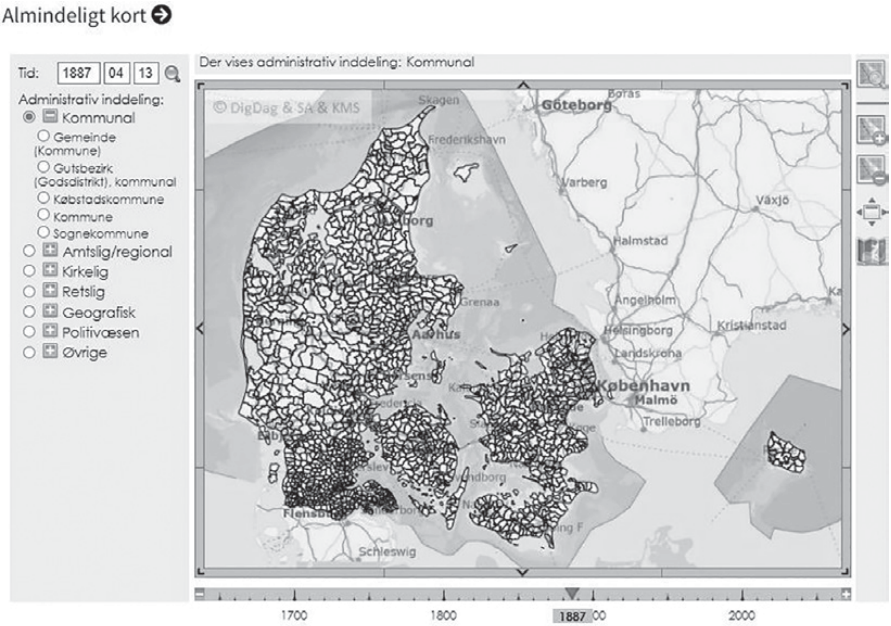


Figure 8.12. DigDag interface in which the municipalities ("Kommunal") filter has been selected and the date April 13, 1887, chosen in the bar to the left. A year can also be chosen by using the time slider bar below the map. Image by Peder Dam.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

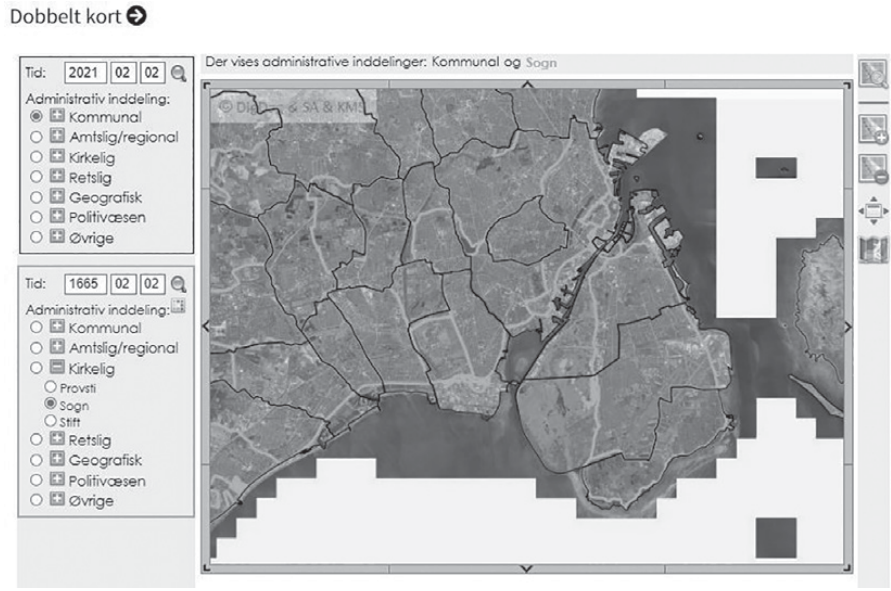


Figure 8.13. DigDag interface in which two types of administrative units in the Copenhagen area, the present-day municipalities (black lines) and the parishes, dated February 2, 1665 (dark grey lines), have been chosen. Note how many of the borders, often following smaller water streams, are identical in 1665 and 2021, whereas the coastlines have changed a lot in the period due to reclaimed land and the expanding city by the waterfront. Image by Peder Dam.

up with having only one polygon throughout the entire period from 1660 till today, whereas many of the more dynamic municipalities ended up with ten or more polygons, even though some have existed only for a couple of decades. In order to get one and only one polygon for each unit at a certain time, the publishing database operates with calculated average dates in the event of interval dating in the production database. A date of 1700–1800 in the production database is converted to "01.07.1750" in the publishing database and a date of 1850 is converted to "01.07.1850." This enables users to choose one date and one unit type to get a map in which each area in Denmark is covered by one and only one unit. Furthermore, in case of multiple names for one unit, just one name is chosen. The publishing database is thereby a generalization of the inaccuracies and complexities of the underlying data, while the original and non-generalized data are still accessible in the production database. The publishing database is freely accessible, but the production database is an internal tool for DigDag.

Conclusion

The methods described above work. The DigDag project has succeeded in collecting large quantities of historical data despite many different types of sources and despite the complexities of administrative divisions, as well as in integrating time and space into

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

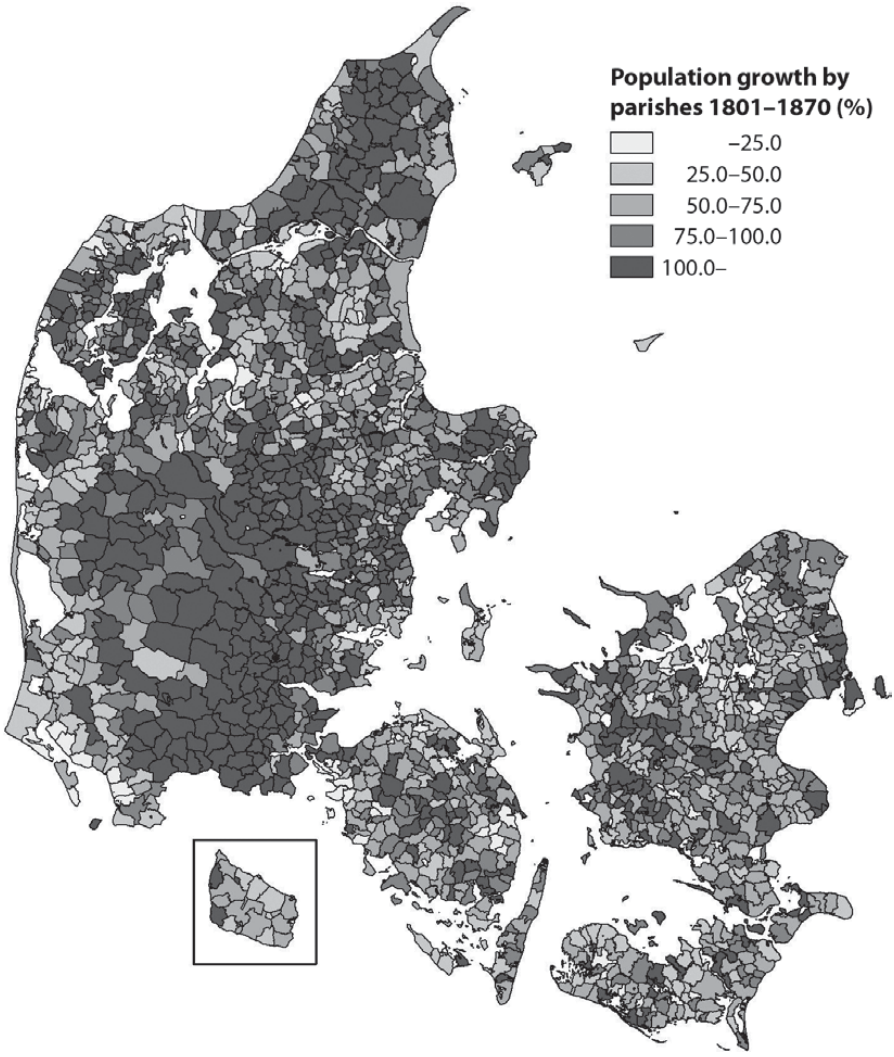


Figure 8.14. Map based on the combination of two parish maps from 1801 and 1870 showing population growth (%) per parish. DigDag data have many possibilities for the mapping of historical statistical data. Based on DigDag data and population data from Statistics Denmark. Image by Peder Dam.

one dataset. The database can handle precise and imprecise data alike, and the users of the online platform can easily access maps and datasets for both local inquiries for a given time and for countrywide mapping and analysis. The dataset has proved useful for historians, geographers, and a wide range of other scientists and administrators

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

working with historical administrative division. All of this would not have been possible had the methods described above not been used.

In my view, the largest disadvantage is the complexity of the methods. Since time, space, and relationships between administrative units are integrated into one dataset, one slip-up in the working process or one piece of incorrect information from historical sources can result in numerous errors in the final maps and make it difficult to locate the original error in the production database. Likewise, one error in one of the final maps can be a result of multiple inaccuracies in the original data, which then all have to be checked. This is further complicated by the diversity of source types incorporated in this project, including original cadastral maps, written sources from a 400-year period, and overview maps and registers of administrative divisions made by other historians. Each of these source types have their possible errors and problems. It has therefore been essential to have well-trained staff, and it has been necessary to run several quality controls, both visual and manual as well as automatic controls in GIS. Since time, space, and administrative relation are integrated and all data must fit in like a puzzle, there are several ways of finding errors automatically, after which these errors have to be interpreted and fixed manually.

Another challenge that the project team has worked on extensively is how much we, as researchers, should generalize complex data in order to be able to communicate the knowledge in as easily comprehensible a manner as possible to as large a group of users as possible. The distinction between the production database and the publishing database partly solved this problem. The complex production database allows research community to access both very accurate data and imprecise data, while the publishing database still allows the project team to communicate the data in a comprehensible way. Furthermore, this distinction allows for changes to and improvements of employed generalizations in the future. The original complex data have not been changed, only the use to which they are put.

Bibliography

Dam, Peder, and Johnny Jakobsen. *Historisk-Geografisk Atlas*. Copenhagen: Kongelige Danske Geografiske Selskab, 2008.

Danish Geodata Agency. "Æ 09416." https://apps.kortforsyningen.dk/arkivkort/viewImage.php?id=landoekonomiskekort/2107&titel=Dalstrup%20By&imageUrl=https://api.dataforsyningen.dk/rest/arkivkort/iiif/2/LzUxIC0gbWF0cmlrZWxrb3J0IHNhbXQgdGlsa255dHRlZGUvNTEtNTEgw6ZsZHN0ZSBvcmlnaW5hbCBvZyB1ZHNraWZ0bmluZ3Nrb3J0LzE1IFJhbmRlcnMvNTA4L2FlXzA5NDE2YS5qcGc= (accessed February 1, 2021).

——. "O1 Villersø." https://hkpn.gst.dk/mapviewer.aspx?type=o1k_oekort&id=6021&elav=0941652 (accessed February 1, 2021).

——. "Sognekort Villersø". https://hkpn.gst.dk/mapviewer.aspx?type=sognekort&id=2275&elav=null (accessed February 1, 2021).

DigDag. www.digdag.dk (accessed May 9, 2021).

Doukas, Ioannis Doukas, and Sofia Demoula. "Historical GIS (HGIS): An Amply Mature High-Tech Tool, to the Decisive and Effective Help in the Historical Research." In *Cartographies*

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

of Mind, Soul and Knowledge: Special Issue for Emeritus Professor Myron Myridis, edited by Apostolos Arvanitis, Socrates Basbas, Peristera Lafazani, Maria Papadopoulou, Ioannis Paraschakis and Dimitrios Rossikopulos, 791–812. Thessaloniki: Aristotle University of Thessaloniki, 2015.

Frandsen, Karl-Erik. *Atlas over Danmarks administrative inddeling efter 1660*, 2 vols. Copenhagen: Dansk Historisk Fællesforening, 1984.

Fritzbøger, Bo. *Det åbne lands kulturhistorie*. Copenhagen: Biofolia, 2004.

Jensen, Torben. *Dateringer i DigDag*, unpublished working paper. 2009.

Jørgensen, Bent, et al. *Danmarks Stednavne*, 26 vols. Copenhagen: Copenhagen University, 1922–2013.

Korsgaard, Peter. *Kort som kilde: En håndbog om historiske kort og deres anvendelse*. Copenhagen: Dansk Historisk Fællesråd, 2006.

Lesger, Clé, and Marco van Leeuwen. "Residential Segregation from the Sixteenth to the Nineteenth Century: Evidence from the Netherlands." *Journal of Interdisciplinary History* 42 (2012): 333–69.

Li, Bei-Bei, Ulf Jansson, Yu Ye, and Mats Widgren. "The Spatial and Temporal Change of Cropland in the Scandinavian Peninsula during 1875–1999." *Regional Environmental Change* 13 (2013): 1325–36.

Løgstrup, Birgit. "Enevælden og enhedsriget." Aarhus: Aarhus University, 2009. https://danmarkshistorien.dk/fileadmin/filer/E-boeger_-_pdf/5-Den-aeldre-enevaelde.pdf (accessed January 12, 2023).

Navickas, Katrina. "Thirdspace? Historians and the Spatial Turn, with a Case Study of Political Graffiti in Late Eighteenth- and Early Nineteenth-Century England." In *Spatial Cultures: Towards a New Social Morphology of Cities Past and Present*, ed. Sam Griffiths and Alexander von Lünen, 67–75. Abingdon: Routledge, 2016.

Perner, Mads Linnet. "Segregated behind the Walls: Residential Patterns in Pre-Industrial Copenhagen" *Social History* 44 (2019): 412–39.

SDFE. "SNSOR Database." 2011 [today *Danske Stednavne*]. https://sdfe.dk/data-om-danmark/vores-data/danske-stednavne (accessed February 1, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Chapter 9

A DIGITAL PERIEGESIS: IMPLEMENTING SPATIAL RESEARCH INFRASTRUCTURES FOR CLASSICAL HISTORY AND ARCHAEOLOGY

Anna Foka, Elton Barker, Kyriaki Konstantinidou, Nasrin Mostofian, Brady Kiesling, Linda Talatas, O. Cenk Demiroglu, and Kajsa Palm*

THE STUDY OF geographic space has a venerable tradition in historical research. The spatial representation of historical cultures dates from long before the spatial humanities became established as a discipline, most notably through cartography, the practice of drawing and studying maps. With the advent of digital technology, the spatial analysis of texts has been significantly enabled, not least by geographic information system (GIS) technologies.[1] Yet contemporary geographic information science and historical modes of describing space often appear to have disparate, even incompatible, viewpoints of the world.

Concerning ancient textual witnesses of geographic space in particular: manuscripts preserving Greek *periplous* (literally: sailing around) and Roman *itineraria* (itineraries) offer valuable spatial information regarding coastal ports and town infrastructures

* Anna Foka, Centre for Digital Humanities Uppsala, Department of ALM (Archival Science, Library and Information Science, Museum and Cultural Heritage Studies), Uppsala University, Sweden. Email: anna.foka@abm.uu.se.

Elton Barker, Department of Classical Studies, Faculty of Arts and Humanities, the Open University, United Kingdom.

Kyriaki Konstantinidou, affiliated researcher at the Swedish Institute in Athens, Greece.

Nasrin Mostofian, Centre for Digital Humanities Uppsala, Department of ALM (Archival Science, Library and Information Science, Museum and Cultural Heritage Studies), Uppsala University, Sweden.

Brady Kiesling, affiliated researcher at the Swedish Institute in Athens, Greece.

Linda Talatas, affiliated researcher at the Centre for Digital Humanities at Uppsala University, Department of Archives, Library, Museum Studies and Cultural Heritage, Paris 1, Panthéon-Sorbonne, France.

O. Cenk Demiroglu, Humlab, Umeå University, Sweden; Department of Geography, Umeå University, Sweden.

Kajsa Palm, Humlab, Humlab, Umeå University, Sweden.

1 Dunn, *A History of Place*; Bodenhamer, Corrigan, and Harris, *The Spatial Humanities*, 28; Foka et al., "Mapping Socio-Ecological Landscapes"; Foka et al., "Semantically Geo-Annotating."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

respectively.[2] *Periplous* narratives date back as far as the fifth century BCE, and present in catalogue form the ports on a sailing route, often accompanied by coastal description.[3] Similarly, the Roman *itineraria* are sparse texts, usually comprising a list of waypoints and the distances between them. These are route-based, or "hodological" (from the Greek *hodos*: "route"), narratives, which map out a traveller's journey, and may have been used for that purpose. Arguably, the most famous surviving "map" from antiquity, the Roman *Peutinger Table*, similarly represents space as stretched out along a series of routes, in a visual depiction of the Roman road network.[4] Therefore, describing place in antiquity shares a purpose: accessibility. Both Greek *periplous* and Roman *itineraria* texts serve the interests of users wanting to travel, with space conceived of from the ground, as a route. These hodological "maps" offer alternative and often disparate understandings of the world to the Cartesian bird's-eye view that has dominated modern cartography.

Ancient historiography further provides readers with highly idiosyncratic spatial information. Caesar's *Gallic Wars* reveals a comparable hodological perspective, manifested in his tendency to follow rivers. Herodotus's *Histories* uses spatial understanding as part of an explanatory framework of conflict. At the macro level, Persia's growing power structures the *Histories*, as Herodotus records peoples and their geography as and when they come under Persian attack or control;[5] at the micro level, in representing the different spatial horizons of his historical agents, Herodotus both captures their lived experience and reproduces a series of overlapping and increasingly complex networks[6] that challenge the notion of an abstract, mappable topography.[7] In this counter-cartographic text,[8] topological networks complicate and resist the centripetal drive to empire. These two ancient narratives, one Roman, one Greek, indicate that mapping pre-modern space is rarely a matter of documenting toponyms or establishing precise coordinates. Rather, they reveal space as place through interaction with historical agents[9] and the human footprint left on the ground in the form of monuments, religious sites, and other infrastructures.

Against this backdrop, this chapter examines the affordances and challenges in using contemporary digital spatial research infrastructures for the analysis of ancient narratives. Our case study is a well-known ancient narrative of space, namely Pausanias's *Periegesis Hellados* (*Description of Greece*), a ten-volume description of towns, villages,

2 Salway, "Travel, Itineraria and Tabellaria."

3 Janni, *La mappa e il periplo*.

4 Johnson, *Literary Territories*.

5 Rood, "Historiography Herodotus."

6 Barker et al., *New Worlds from Old Texts*.

7 Barker and Pelling, "Space-Travelling."

8 Purves, *Space and Time in Ancient Greek Narrative*.

9 De Certeau, *The Practice of Everyday Life*.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

monuments, art works, and their histories from Attica to Phocis, following a circuit around the Peloponnese. The "Digital Periegesis" project, funded by the Marcus and Amalia Wallenberg Foundation (MAW 2017.0057; 2018–2021) and the Swedish Research Council ("Time and People in Pausanias' Description of Greece", 2021-02799; 2022–2025), and comprising an interdisciplinary team of scholars, builds on existing digital spatial research infrastructures, using maps as visual portals into narratives, as a means to interrogate rather than merely illustrate spatial information.[10]

At the same time, the Digital Periegesis team investigates the possibilities of combining research infrastructures more generally, incorporating information about time and people, into a reflexive process to illuminate change and development as a way of understanding place fully.[11] From the outset the Digital Periegesis scholars have utilized an existing ecosystem of digital spatial research infrastructure and analysis, but also additional and customized infrastructures that are used more widely, beyond Pausanias. The overarching argument presented here is that using contemporary technologies for old texts is an equally complex technological and epistemological endeavour. Infiltrating an ancient text through contemporary spatial research infrastructures brings to the fore its counter-cartographic spatial logic: the centrality of temporal and prosopographical data in any spatial research inquiry, as space becomes place in certain time periods because of its human footprint. This chapter further elucidates the potentials and limitations of digital spatial research infrastructures as technologies that require additional information to produce truly groundbreaking results. In what follows, we discuss previous scholarly attempts to geo-visualize ancient narratives with digital technology, as well as the complexity of mining *Periegesis Hellados* for spatial data, our close reading of data-gathering methods, our semantic annotation strategy and tools, and the implementation support provided by existing digital spatial research infrastructures, including their necessary customization.

Pausanias and the Study of Space

Writing in Greek at the time of Roman hegemony in the Mediterranean, sometime in the second century CE, Pausanias describes a ten-chapter journey around the Greek mainland, from Attica to Phocis, via a clockwise tour of the Peloponnese, with the canon essentially spatially organized, meaning that each volume is a place or a region.[12] Each of the ten chapters is dedicated and named after a particular region, with the exception of Elis, the location of Olympia, which has two volumes dedicated to it; see Figure 9.1. Pausanias's spatial description of the towns, buildings, and monuments through which the reader moves, has been widely used as a guide for interpreting those sites and their

10 Bodenhamer, "Narrating Space and Place," 19.

11 Bodenhamer, "Narrating Space and Place," 20–21.

12 Fowler, "Pausanias's Description of Greece," 357.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Figure 9.1. A map of regions numbered as Pausanias's volumes of the Periegesis Hellados. Openly licensed from Harvard Library, CC BY, https://dash.harvard.edu/handle/1/40939994 (accessed May 21, 2021).

archaeology, notably those at Athens, Corinth, and Olympia.[13] In response to broader theoretical movements in the humanities, such as narratology, the spatial turn, and post-colonialism, scholarly interest in Pausanias's *Periegesis Hellados* has intensified. A by no means exhaustive list of recent critical scholarship would include readings based

13 Dyson, "The Relevance"; Dyson, *In Pursuit of Ancient Pasts*; Shanks, *Classical Archaeology of Greece*; Habicht, *Pausanias's Guide*; Stewart, " 'Most Worth Remembering.' "

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

on narratology;[14] topographical and cognitive mapping;[15] mythology;[16] identity and memory;[17] and ethnicity and religion.[18]

At one level, the text represents a way of viewing and travelling through space as a landscape in which the traveller is immersed by narration. This description is not exactly compatible with how we see the world today; the view from above is a more recent way of understanding space—the Cartesian "bird's-eye" manner of post-Enlightenment cartography. Instead, not only does Pausanias conceive of places as spaced out along a path,[19] but the very spatial structure of his narrative follows a series of routes, around the Greek mainland. At another level, the text's hodological flow is compromised by the fact that Pausanias often forgoes descriptions of natural landscapes and road networks through which one would have to travel to visit the sites. Instead, the author's cognitive maps are centripetal, complicating the text's perceived linearity following different roads in sequence as they emanate out from large urban centres.[20] The reader's route is interrupted and rerouted by other sorts of information relating different spaces to one another and extending a purported itinerary. These "hyperbatic" moments disrupt "the topographic flow of the text and takes the reader to a far off-place."[21] Thus, essentially, Pausanias's narration moves through time and space: places and objects in space are described at different historical moments, from the mythological and heroic to his present day.

Given the complexity of this time–space matrix—the Pausanian *chronotope*, in Bakhtinian terms[22]—Pausanias is frequently "mined" for disparate temporal, spatial, social, and cultural information; a critical examination of these disparate elements as they perform within the narrative, particularly with regard to gendered space and mobility focus, is yet to emerge.[23] As a narrative that has the potential to illuminate the time depth problem of the Greek East—that is, by providing ways of compartmentalizing, and marking these "different temporalities of the long-study of urbanism in the Mediterranean East"[24]—Pausanias's text is also bound up with issues of the material cultural record and broader questions relating to archaeological reception, Hellenic identity, and the geospatial interstices of East and West.[25] Critical to this impression of

14 Akujärvi, *Researcher*; Habicht, *Pausanias's Guide*; Pretzler, *Pausanias*.

15 Hutton, *Describing Greece.*

16 Hawes, "Of Myths and Maps."

17 Alcock, *Empires*; Arafat, *Pausanias's Greece*.

18 Konstan, "To Hellēnikon Ethnos."

19 Janni, *La mappa e il periplo.*

20 Hutton, *Describing Greece.*

21 Cundy, *Axion Theas*, 146.

22 Bakhtin, "Forms of Time."

23 Konstantinou, *Female Mobility and Gendered Space*.

24 Stewart, " 'Most Worth Remembering,' " 236.

25 Koundoura, *The Greek Idea*, 8; Carastathis, "Is Hellenism an Orientalism?"

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

space as place is the role of Pausanias's mythical-historical agents, who transform the space into meaningful places, whether it is a hero establishing a ritual at a certain site or a political figure whose statue provides an opportunity to explore their contribution to the idea of Greece.

Seen in these terms, text-based literary research raises fundamental epistemological and ontological complexities for digital spatial research infrastructures, as it were.[26] Standard map projections used in geographic information systems or other digital mapping applications impose a frame of reference for viewing space that reproduces the modern Cartesian frame and, through the accuracy of satellite technology, promotes an impression of reality that may not always be fitting for a premodern spatial narrative. Lacking in these digital map representations is the co-implication of space, time, and people. The Digital Periegesis to some extent responds to this challenge, by examining Pausanias as a prime example of a historical, non-Cartesian geography, "woven together out of ongoing stories" of place, periodization and prosopography, where place is understood "as a moment within power-geometries, as a particular constellation within the wider topographies of space, and as in process, as unfinished business."[27]

The capacity to identify and actually map place information in ancient textual documents requires thinking with pre-Cartesian modes of spatial thinking. A good example are the *Histories* of the fifth-century BCE writer Herodotus, which, over the course of nine books detailing how Greeks and barbarians came into conflict with each other, sketches out the places of the known world and uses spatial understanding to explain the conflict. Using a digital version of this text, Barker's HESTIA project[28] demonstrated the insufficiency of depicting places as dots on a map, in favour of focusing on the lived experience of those places as events unfolded in the narrative. This included developing the idea of "proxies"—the individuals, social groups, or even non-human agents that belong to the geographical imagination described by Herodotus and that, importantly, represent in some shape or form those locations. For example, Darius, the Persian king, frequently stands as a representative (or proxy) for Persia. Place-names alone fail to capture the full complexity of spatial entities depicted in Herodotus's *Histories*.[29]

Places and their proxies in Herodotus are then studied according to their relatedness—that is, how, in order to explain the conflict, Herodotus linked places from across his known world. The resulting network model challenges the notion of an abstract topography that can be mapped, to leave readers to grapple with the multidimensions of the space around them in the world of the text.[30] Nevertheless, while

26 Harris, Bergeron, and Rouse, "Humanities GIS."

27 Massey, "For Space," 130.

28 See https://hestia.open.ac.uk (accessed May 21, 2021).

29 Barker et al., *New Worlds from Old Texts.*

30 Barker and Pelling, "Space-Travelling."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

the counter-cartographic impulse is useful for drawing attention to the underlying place-boundedness of Herodotus's *Histories*,[31] its spatial organization and the role of people in the construction of space, it remains only a snapshot. There is little sense of how those relations evolve, break, run counter, etc. over the course of the narrative. Thus, the network models produced by HESTIA are time*less*, and do not provide ways of enabling the analysis of time and space together. In what follows we discuss and analyze how the very same and updated digital spatial research infrastructures needed to be often thought through and modified for the purposes of the Digital Periegesis project and how the team worked around with questions of temporal and prosopographical nature.

Digital Spatial Research Infrastructures for Classical Studies: The Importance of Linked Open Data and Existing Ecosystems

Digital and interactive editions of texts are only now being explored by scholars within a variety of data, settings, and platforms,[32] including the issue of completing or ending a digital publication. In creating digital and enriched editions there are additional and more general complexities that ought to be addressed, from both a technical and an epistemological perspective. Regarding technical complexity, although technology is by definition current, technological advances are not widely adopted in practice; for example, while semantic web technologies have been available for almost two decades, they are characterized by a lack of pioneering implementations.[33] Although there are incentives at an international level for FAIR (Findable, Accessible, Interoperable, and Reusable) principles for data, there is a general lack of tools and policies to aid the reuse of experimental interfaces such as digitally enriched editions of text with relevant metadata. Having interoperable research data means that, in semantic web environments, metadata are presented with standardized, documented, and accessible semantic descriptions, including vocabularies, terminologies, and specific and standardized ontologies. Epistemologically, data aggregation methods present additional complexities in terms of implementation. For example, crowdsourcing by subject specialists is often problematic, since academics lack technical skills to structure data or are unaware of concepts of interoperability. Another issue is that, while being aware of contemporary modes of organizing, thesauri and vocabularies for spatial descriptions, the project group chose the original vocabulary that Pausanias uses in the Greek language as far as possible, and generated a schema based on his description, rather than impose one from our own culture that would be culture-insensitive and even anachronistic.

31 Moretti, *Atlas of the European Novel*.

32 Barker, Foka, and Konstantinidou, "Coding for the Many."

33 Hyvönen, "Publishing and Using."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

A digital research publication should ultimately mean that we take into consideration how rapidly technology progresses and that the research data we collect should, ideally, be open and reusable for future projects. There should also be clear conditions for data usage, such as metadata that are associated with detailed provenance information and are structured and documented in accordance with applicable domain-relevant standards and formats.[34] Additionally, General Data Protection Regulation (GDPR) rules should be taken into consideration, especially with regard to copyright for editions and translations as well as gazetteer compilations and databases for spaces and places that have to be open and available.

In this context, the team had to think through digital research infrastructures for the identification, disambiguation, and analysis of ancient places. These digital spatial research infrastructures, particularly for the study of the ancient Mediterranean, have in the past five years reached a level of maturity. First, concerning spatial ancient world data, there is already an established gazetteer ecosystem. A digital gazetteer, in this particular research context and for the purposes of this chapter, comes to mean the standards for structured information about space: global authority files that provide structured data vocabulary for different communities researching historical places.[35] For example, the "Pleiades" project is, essentially, an ancient world gazetteer that curates and aggregates data about places in the ancient world.[36] In addition, advances have been made to link different global gazetteers together, including a platform for publishing, linking, discovering, and visualizing contributed records of attested historical places, as with the World Historical Gazetteer initiative.[37]

The second point is that, as already discussed, should data be open, available, and interoperable, there needs to be a linked open data method in place. The Pelagios infrastructure initiative has established a simple, lightweight semantic annotation method for linking online resources through their place references.[38] This uses stable identifiers provided by the interlinked global gazetteers, and a schema based on the W3C Web Annotation standard. Pelagios has recently become a formal association of equal and independent partners, dedicated to the production and use of LOD across humanities disciplines; it is thus a well-sustained technical environment supported both by financiers and by a community of scholars.

Another useful digital spatial research infrastructure in its own right is the ToposText project, a public engagement platform, essentially both an infrastructure and a gazetteer, comprising the most diverse set of ancient texts in English on the Web.[39] These are

34 See www.fairsfair.eu, www.go-fair.org, and https://ec.europa.eu/info/sites/info/files/turning_fair_into_reality_1.pdf (all accessed May 21, 2021).

35 Goodchild and Hill, "Introduction to Digital Gazetteer Research."

36 See https://pleiades.stoa.org (accessed May 21, 2021).

37 See http://whgazetteer.org (accessed May 21, 2021).

38 See https://pelagios.org (accessed May 21, 2021).

39 See https://topostext.org/the-project (accessed May 21, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

indexed to connect to primary sources for nearly any ancient place or personality as well as a highly detailed archaeological site map for Greece. This gazetteer is based on actual, granular, and accurate archaeological information for thousands of Greek historical sites, indexed to the ancient literary sources that mention them. It further allows users to freely download and to reuse them as compatible LOD files.

The Digital Periegesis research team uses the online Greek and English versions of Pausanias's ten volumes that are hosted by the Perseus Classical Library Scaife viewer,[40] which has been financed and sustained by a board of trustees since the end of the 1980s. Although there are several Greek editions and translations of Pausanias's *Description of Greece*, the Digital Periegesis's choice of text relates both to literary purposes as well as connecting to existing, open, and available classics-related digital research infrastructures more generally. The Digital Periegesis team decided to work directly with an already digital edition of the ten volumes of Pausanias's *Description of Greece*. The edition is canonical, and among the first complete critical (including scholia) editions of Pausanias's ten volumes, a text that has been compiled and collected by many different manuscripts from the late Byzantine era, including an old codex in Florence that is now lost.[41] This version is a standard edition used by the majority of the community besides the Loeb Classical Library edition, which appears to be behind a paywall. It was compiled by Spiro Friedrich in 1863 or 1864, and it has been further updated in the last decade under the supervision of experts, namely philologists Lisa Cerrato, William Merrill, Elli Mylonas, and David Smith.

Most importantly, the text is already digitized and ready for further use. The mission of Perseus is to provide up-to-date editions of classical literature. In doing so, the Perseus Scaife Digital library focuses on three categories of access that deem text versions canonical and critically enriched with additional data. These are: 1) human-readable information: digitized images of objects and texts; 2) machine-actionable knowledge, such as catalogue records, encyclopedia articles, lexicon entries, and other structured information sources that relate to the text (see Figure 9.2 for information pertaining to Pausanias text, lexicon entries, morphological information, and New Alexandra commentary); this feature helped Digital Periegesis's annotators to retrieve direct information about the digital text and consult with each other; and 3) machine-generated knowledge: this is a reading support feature that includes, for example, full-machine-translation morphological or syntactic analysis, or even named entity identification.[42] By working with a digital text retrieved via a long-standing and well-sustained classical world library infrastructure, the Digital Periegesis used a version of Pausanias's ten-volume *Description of Greece* that is already digitized, openly licensed in CC-BY, and free for reuse, provided by Tufts University. In doing so, the Digital

40 See https://scaife.perseus.org (accessed May 21, 2021).

41 Diller, "The Manuscripts of Pausanias."

42 See more at www.perseus.tufts.edu/hopper/research (accessed May 21, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

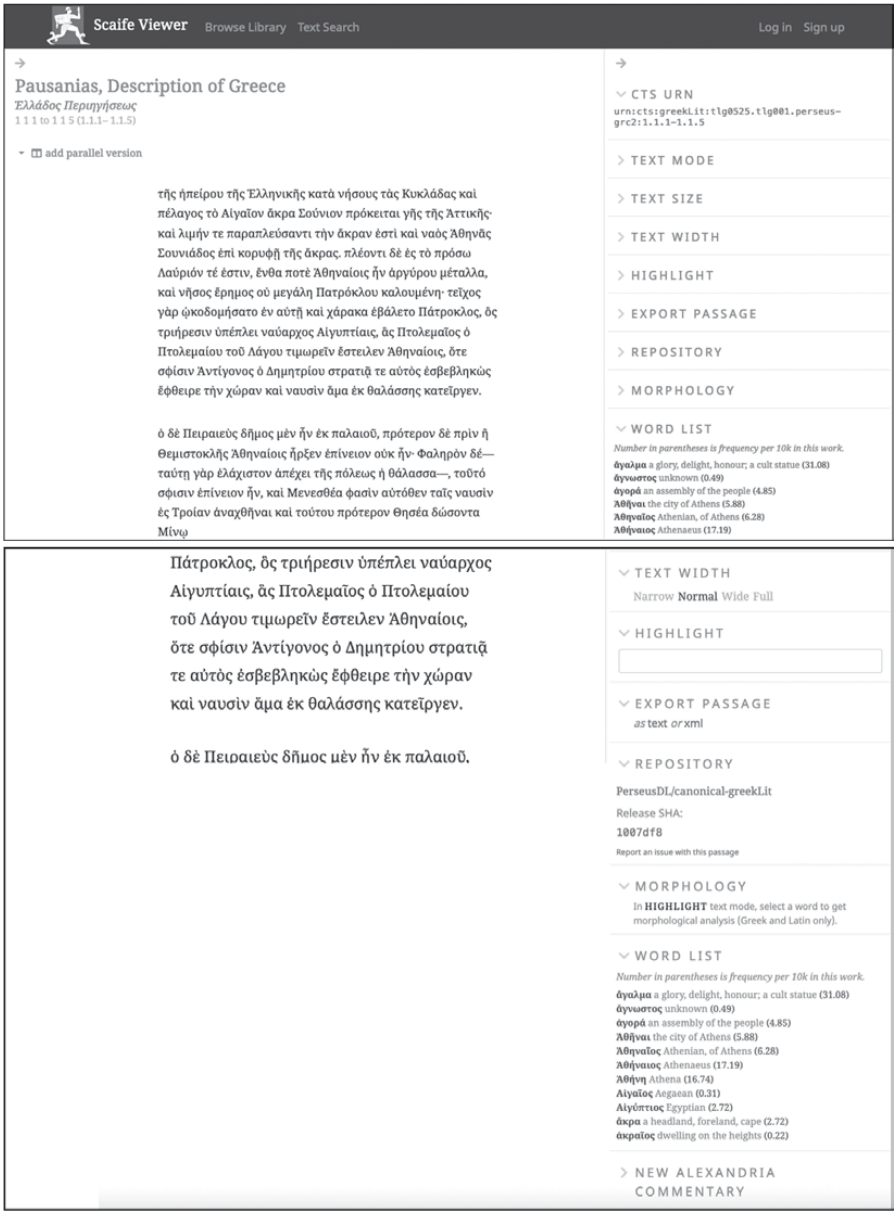


Figure 9.2 (a) and (b). Passages of Pausanias as they appear in the Scaife Digital Library Viewer Interface, including format options for exporting the passage, word list, morphology, and commentary. Openly licensed from Harvard Library, CC BY.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Periegesis team further does not violate any GDPR or edition and translation copyright rules. At the start of the project various forms of the text were used: its plain text format for the English translation (in txt format), and the TEI text for the Greek. To conclude, with its choice of a canonical text that is already digitally prepared for organizing and connecting information, the Perseus Classical Library Scaife viewer provides the possibility of exporting passages in txt or XML formats, which made it easiest to extract, upload, and annotate.

The platform used to annotate the text is Recogito.[43] This browser-based open-source software library was developed by Pelagios with funding from the Andrew W. Mellon Foundation; its range of functionality continues to be developed and sustained under the auspices of the Pelagios Network. Recogito enables the user to easily upload, mark up, and annotate the texts with additional information, focusing on spatial data but also offering, additionally, free-text options. In particular, Recogito was designed with spatial data as the primary entity for semantic annotation. Using a network of LOD global authorities on place information, a number of digital gazetteers, Recogito enables the user to identify a place-name, and to align that reference to an appropriate gazetteer, so that a user can, for example, disambiguate between two places and the marking up of named entities with identifiers from LOD vocabularies by the subject specialist, without need for coding skills.[44] Recogito provides a personal workspace for users to upload, collect, and organize source materials—texts, images, and tabular data—and collaborate in their annotation and interpretation. In addition, Recogito keeps track of version history and edit provenance, can be customized with different gazetteers for geo-resolution, and supports a range of import and export formats. It is being extended continually, so as to offer a growing number of integrating options with external sources and developing standards, such as IIIF, or TEI published through the CTS protocol.

Thus, the determining factors behind the production of an enriched edition of Pausanias's *Periegesis Hellados* are usability, sustainability, collaboration, and transparency. From the outset the project plan was to avoid the devotion of time and resources to build self-standing applications but to take a contrary approach; the emphasis in implementing Digital Periegesis was placed on the reuse and extension of data and tools that have already been produced, are sustained by larger institutions, trustees, and initiatives, and have a community of users around them. This meant primarily working together with other groups of scholars and developers, in order to benefit from the general landscape of digital (and spatial) research infrastructures available for the study of the Graeco-Roman world with computational methods and tools. In what follows we discuss the process of utilizing specific tools and platforms, and the platform's customization to fit the purposes of the Digital Periegesis project.

43 See https://recogito.pelagios.org (accessed May 21, 2021).

44 Simon et al., "Linked Data Annotation."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Structuring Data: Existing Gazetteer Ecosystems and Further Data Complexity

The manual process of digital semantic annotation is extensively described elsewhere, and so is only briefly presented here.[45] The method of semantic geo-annotation is twofold: 1) first, the researcher locates places in the uploaded online document, marks up the relevant word, and creates an annotation; 2) thereafter the researcher aligns annotations to a digital authority file (gazetteer) that provides the means to identify and disambiguate between different places, or even places with the same name. By aligning a place or a place-name record in a document to a global gazetteer, it is possible not only to disambiguate that place and map it but also to create linked open data, published according to the Web Annotation Data Model.[46] Aforementioned global gazetteer initiatives, such as the Pleiades Gazetteer of the Ancient World and the Digital Atlas of the Roman Empire, facilitate the alignment and disambiguation of ancient place information in documents in Recogito, but, though comprehensive, the spatial information is at times incomplete, relates to other time periods, or is not granular enough in a cartographic sense.

For example, Pleiades would, in theory, be sufficient when working on a text with place-names from the ancient world, as it covers the Roman Empire (and beyond, into Persia) over half a millennium (from 750BCE to 450 CE). Pausanias's *Description of Greece* presents a challenge, however, because his narrative takes place within settlements such as cities, towns, and villages. The challenge of analyzing spatial representation is the "thickness" of that description, whether Pausanias is taking the reader on a tour of a temple precinct while at the same time recalling the mythical stories associated with a simple-looking rock or reflecting upon the itinerary of a historical persona who, according to Pausanias, founded the nearest town. Although no tool will be able to solve automatically specific epistemological and ontological issues, Recogito enables the researcher to incorporate customized semantic modelling into the identification and analysis of spatial data that are both flexible and targeted, while robust and consistent.

Pausanias's descriptions include areas within a city (e.g., the Athenian agora, the Acropolis), usually buildings (e.g., temples) and objects (e.g., statues). Very few, if any, of these very granular places or *objects* have a record in the Pleiades Gazetteer of the Ancient World. To address this obvious omission the Digital Periegesis team hosted a local instance of Recogito at Umeå University, to which custom gazetteers could then be uploaded.[47]

To have more granular topographic and heritage data identifiers, the Digital Periegesis team imported three additional gazetteers. From ToposText.org, the comprehensive indexed collection of ancient texts and mapped places, the team took identifiers for ancient Greek sanctuaries and buildings that did not exist in the Pleiades Gazetteer of

45 Barker, Foka, and Konstantinidou, "Coding for the Many."

46 See www.w3.org/TR/annotation-model (accessed May 21, 2021).

47 See http://recogito.humlab.umu.se (accessed May 21, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

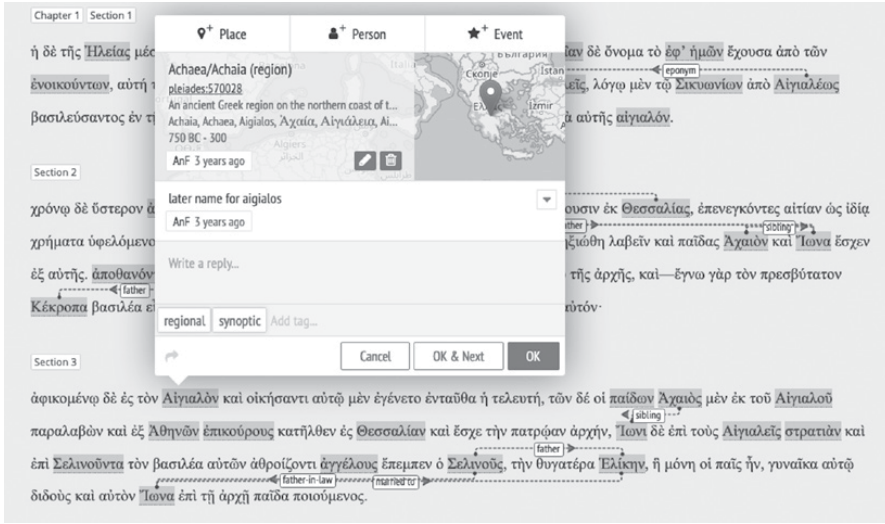


Figure 9.3. The Recogito user interface, including example of a regional name, its location on the map by Pleiades gazetteer alignment, and comment box. Image by Kyriaki Konstantinidou.

the Ancient World. For art historical artefacts and monuments in Athens, the Digital Periegesis team extrapolated coordinates from Judith Binder's *The Monuments and Sites of Athens: A Sourcebook*, as digitized by J. B. Kiesling for the Dipylon of the Society of Ancient Topography project.[48] Finally, the project utilizes a detailed database of ancient art objects mentioned by Pausanias, and included in the classical archaeological database Arachne of the Deutsches Archäologisches Institut, the German Archaeological Institute.[49] In turn, this helped the Digital Periegesis team to prepare the ground for future work in this area of intra-city gazetteer development. While this customization of our working platform is very useful, if no appropriate match can be found using any of these resources, by using the flagging option in Recogito and the comments box, details may be provided back to the relevant gazetteer developers to ensure that important new information is registered and utilized accordingly; see Figure 9.3.

Perhaps the most important point of annotation is that, for Digital Periegesis, the alignment of words to spatial information is entirely manual and completed by an interdisciplinary team of experts in the fields of classical philology, history, and archaeology. Although the Recogito platform further utilizes artificial intelligence algorithms to some extent, namely named entity recognition (NER), to enable the automatic alignment of place-names to selected gazetteer entries in a number of languages, the Digital Periegesis research team is focusing on the ancient Greek text,

48 See https://dipylon.org/en (accessed May 21, 2021).

49 See https://arachne.dainst.org (accessed May 21, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

which has no language specific plug-in interface, and therefore manual annotation is the only option. Recogito's intuitive interface makes annotating the text a matter of scholarly work and interpretation, not technical know-how; slows down reading; and brings to the fore concepts and cultural interpretive challenges that need to be teased out.

Far from being a passive setting for historical action, space and place are a significant medium for the development and understanding of the past as revealed through their interaction with two other entities: time and people. To complicate matters, historiographical texts such as Pausanias's are also *about time*, in that they represent events occurring in time and space; and these temporal representations sometimes align with narrative time (chronological sequence), and sometimes do not. Of greater complexity is the fact that temporal information of ancient texts fundamentally cannot be straightforwardly mapped on to our modern dating system.[50] People, or prosopographical data, also pose a challenge: space becomes "place" once it is the locus of human activity.[51]

Neither data about time nor data about people—temporal and prosopographical data—are directly connected to existing digital spatial research infrastructures for classical literature; thus there exist no comprehensive authority files for time or people. Attempts to structure temporal data include various US and European initiatives, each currently independent of each other. The PeriodO project, funded by the National Endowment for the Humanities, is building a "gazetteer" of scholarly definitions of historical periods.[52] Trismegistos is a gazetteer-calendar that has emerged from the attempt to catalogue and describe papyri records from Egypt (from 3500 BCE to 1000 CE).[53] The iDAI.chronontology is a web service that connects period terms to dating information.[54] Lastly, there is the open, collaborative, and multilingual database of Wikidata,[55] which provides structured data for the support of Wikipedia. There are currently no methods and tools that can help to link these different resources, and future sustainability constitutes a potential problem. Trismegistos has recently had to move to a subscription-based model as an attempt to continue to provide the service.

Attempts to structure information about people, or prosopographical data, are least advanced at a scholarly level. Some are familiar: Trismegistos again provides a database of names from its Egyptian papyri holdings, while Wikidata provides open and flexible resources, although they are not scientifically rigorous. Others are still in the print medium, such as the *Lexicon of Greek Personal Names* or the *Prosopographia Imperii Romani*, which is a series of printed books listing senators and other elites from the first three centuries of the Roman Empire. One attempt to apply a Pelagios approach

50 Feeney, *Caesar's Calendar*.

51 Tuan, *Space and Place*.

52 See https://perio.do/en (accessed May 21, 2021).

53 See www.trismegistos.org/index.php (accessed May 21, 2021).

54 See https://chronontology.dainst.org (accessed May 21, 2021).

55 See www.wikidata.org/wiki/Wikidata:Main_Page (accessed May 21, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

to annotate information about people has been made by the project "Standards for Networking Ancient Prosopographies: Data and Relations in Greco-Roman Names."[56] While not successful in gaining sustained funding, it has established baseline principles for using authoritative lists of person names to link information.

Finally, it is worth mentioning how the Digital Periegesis team actually annotates these two other features—time and people—beyond focusing on place information. Recogito's flexibility allows the team to mark up prosopographical and temporal data in addition to spatial data, albeit with an important limitation. Whereas marking place is a two-step process—identifying the place reference in the text, then aligning it to the gazetteer record—marking people or time involves only the initial step. This is because, at the time of writing, there is no global authority standard for recording people or time references in the same way as there is with places. Still, it seemed to the Digital Periegesis team that it was also important to mark both entities in Pausanias, not least because of their associations with place and their impact on how those places are viewed. Similarly to what Digital Periegesis has done with spatial data in terms of granularity, the team has developed lightweight, practical measures to disambiguate and authorize the prosopographical and temporal data as far as possible. For the former, this has meant manually aligning named persons in Pausanias to their Wikidata identifier, by which the team will be able to track the gods, heroes, artists, athletes, and politicians whose names recur throughout the narrative. For efficient workflow, the team annotates personal names in Recogito simply as "person" rather than align them individually. These annotated names are exported in Greek as batches, matched to their English/Latin forms, and aligned to Wikidata using Excel offline and outside the Recogito environment, as there is no Recogito support for this feature, and then reimported to the final annotation file, enriched with structured data extracted from Wikidata using OpenRefine—a Google tool for data cleaning.[57]

As for time, Pausanias's narrative moves rapidly back and forth in time, from the "golden age" of Greek myth to the wars of Hellenistic monarchs, to his own period of second-century CE. Capturing these varied chronological elements as one moves through the narrative is challenging. Even more difficult is rendering Pausanias's time descriptions as year dates. Again, there is a need to be sensitive and alert to the nuances of Pausanias's descriptions—the kind of discipline and period-specific terminology used in his narrative, as, say, in terms of an event such as "the Trojan War," or else through the figure of a mythical/historical person, such as "Ptolemy Soter." This is an important aspect to investigate, but such terms and their associated date ranges seldom map neatly to Pausanias's narrative, which tends to establish a working chronology by using known events, such as battles or Olympiads. Fortunately, Wikidata is rich in such items. It is therefore possible to annotate the 102nd Olympia mentioned by Pausanias with its Wikidata ID, Q57337793, and extract the year date as a temporal expression: "tx:372

56 See http://snapdrgn.net (accessed May 21, 2021).

57 See https://openrefine.org (accessed May 21, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

BCE." It is then possible to use relation annotations to link persons, places, and events in Pausanias's narrative to a year that can be placed on a visualization timeline.

Conclusions: The Future of the Past

The rich ecosystem of spatial data infrastructures for classical studies has facilitated the process of creating to a large extent a genuine Digital Periegesis: with a semantic annotation platform and generic gazetteers such as DARE and Pleiades available, a scholar with no specific computational skills can read deeply into the texts, and mine and align spatial data. For the Digital Periegesis project, though, the team had to be more flexible and creative in their implementation. Because of the material record on the ground being fraught with difficulty and the thickness of its description in the text, the team opted for specific solutions. To begin with, existing digital spatial research infrastructures such as the semantic annotation platform Recogito had to be customized with additional, case-study-specific digital research infrastructures in order to connect the ten volumes of Pausanias's rich *Description of Greece* to gazetteers with equally granular spatial information focusing on archaeological data. Furthermore, the complexity of Pausanias's spatial analysis and the centrality of prosopographical and temporal data throughout the text dictated that the team had to customize CSV files offline and outside the Recogito platform so as to account for and to include the prosopographical and temporal data in question.

While the customization of digital spatial research infrastructures gave way to more complex theoretical inquiry concerning spatial data in the text, the impact of the Digital Periegesis project was initially thought of as bringing global initiatives together through the study of a single case study: Pausanias's *Description of Greece*. Indeed, the idiosyncrasies of the text provided an ideal case study for the identification, disambiguation, and analysis of these other entities beyond place, precisely because of the importance of both time and people in Pausanias's spatial representation of Greece. In doing so, the Digital Periegesis team in fact implemented all digital spatial research infrastructures. Working in tandem with these different approaches to mapping place alongside the primary humanistic purpose of the project, connecting words that denote place with the archaeology on the ground, the team produced a critical review on feasibility of current spatial data infrastructures. This includes: 1) developing a baseline methodology, on the model of the Pelagios initiative, for producing linked open data describing time periods or people; 2) supporting the development of Recogito in order to facilitate the easy semantic annotation of these data types; 3) showing the value of semantically annotating space, time, and people together—and the intersections between them—for analyzing a historical text; and 4) documenting the process in order to establish best practice.

The long-term impact of the Digital Periegesis project is to establish a practice of creating enriched digital editions and of using LOD methods in teaching and research. Digital Periegesis's ambition is that the digital edition will become a significant component of digital education in classics, ancient history, archaeological studies,

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

and scientific visualization more generally. The critical digital edition will enable scholars to radically reorient humanities' text-based scholarship toward comparative visual, geospatial, and material-archaeological discourse analysis with the help of existing and customized digital spatial research infrastructures. Last, but certainly not least, there is the dual gain of the project, from both humanistic-epistemological and technological-ontological perspectives. The Digital Periegesis team found ways to compartmentalize concepts of space in a centuries'-old narrative, but also to critically assess the possibilities of implementing digital spatial research infrastructures that can be sustained for decades and are used by the classics and archaeology communities.

Bibliography

Akujärvi, Johanna. *Researcher, Traveller, Narrator: Studies in Pausanias's Periegesis*. Lund: Lund University Press, 2005.

Alcock, Susan. *Empires: Perspectives from Archaeology and History*. Cambridge: Cambridge University Press, 2001.

Arachne. https://arachne.dainst.org (accessed May 21, 2021).

Arafat, Karim W. *Pausanias's Greece: Ancient Artists and Roman Rulers*. Cambridge: Cambridge University Press, 1996.

Bakhtin, Mikhail. "Forms of Time and the Chronotope in the Novel: Notes toward a Historical Poetics." In *The Dialogic Imagination: Four Essays*, edited by Michael Holquist, 84–258. Austin: University of Texas Press, 1981.

Barker, Elton, Thomas Edward, Stefan Bouzarovski, Christopher Brendan, Reginald Pelling, and Leif Isaksen, eds. *New Worlds from Old Texts: Revisiting Ancient Space and Place*. Oxford: Oxford University Press, 2016.

Barker, Elton, Anna Foka, and Kyriaki Konstantinidou. "Coding for the Many, Transforming Knowledge for All: Annotating Digital Documents." *Publications of the Modern Language Association* 135 (2020): 195–202.

Barker, Elton, and Chris Pelling. "Space-Travelling in Herodotus 5." In *New Worlds from Old Texts: Revisiting Ancient Space and Place*, edited by Elton Barker, Thomas Edward, Stefan Bouzarovski, Christopher Brendan, Reginald Pelling, and Leif Isaksen, 225–51. Oxford: Oxford University Press, 2016.

Bodenhamer, David J. "Narrating Space and Place." In *Deep Maps and Spatial Narratives*, edited by David J. Bodenhamer, John Corrigan, and Trevor M. Harris, 7–27. Bloomington: Indiana University Press, 2015.

Bodenhamer, David J., John Corrigan, and Trevor M. Harris, eds. *The Spatial Humanities: GIS and the Future of Humanities Scholarship*. Bloomington: Indiana University Press, 2010.

Carastathis, Anna. "Is Hellenism an Orientalism? Reflections on the Boundaries of 'Europe' in an Age of Austerity." *Critical Race and Whiteness Studies* 10 (2014): 1–17.

Cundy, Jody Ellyn. *Axion Theas: Wonder, Space, and Place in Pausanias's Periegesis Hellados*. Toronto: Toronto University Press, 2016.

De Certeau, M. *The Practice of Everyday Life*. Berkeley: University of California Press, 1984.

Diller, Aubrey. "The Manuscripts of Pausanias." *Transactions and Proceedings of the American Philological Association* 88 (1957): 169–88.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Dunn, Stuart. *A History of Place in the Digital Age*. Abingdon: Routledge, 2019.

Dyson, Stephen L. *In Pursuit of Ancient Pasts: A History of Classical Archaeology in the Nineteenth and Twentieth Centuries*. New Haven: Yale University Press, 2006.

——. "The Relevance for Romanists of Recent Approaches to Archaeology in Greece." *Journal of Roman Archaeology* 1 (1988): 143–46.

European Commission. *Turning FAIR into Reality: Final Report and Action Plan from the European Commission Expert Group on FAIR Data*. Luxembourg: Publications Office of the European Union, 2018.

FAIRsFAIR. www.fairsfair.eu (accessed May 21, 2021).

Feeney, Dennis. *Caesar's Calendar: Ancient Time and the Beginnings of History*. Berkeley: University of California Press, 2007.

Foka, Anna, Elton Barker, Kyriaki Konstantinidou, Nasrin Mostofian, O. Cenk Demiroglu, Brady Kiesling, and Linda Talatas. "Semantically Geo-Annotating an Ancient Greek 'Travel Guide': Itineraries, Chronotopes, Networks, and Linked Data." In *GeoHumanities 2020: Proceedings of the 4th ACM SIGSPATIAL Workshop on Geospatial Humanities*, edited by Ludovic Moncla, Patricia Murrieta-Flores, and Carmen Brando, 1–9. New York: Association for Computing Machinery, 2020.

Foka, Anna, Coppélie Cocq, Phillip I. Buckland, and Stefan Gelfgren. "Mapping Socio-Ecological Landscapes: Geovisualization as Method." In *Routledge International Handbook of Research Methods in Digital Humanities*, edited by Kristen Schuster and Stuart Dunn, 203–17. Abingdon: Routledge, 2020.

Fowler, Helen N. "Pausanias's Description of Greece." *American Journal of Archaeology* 2 (1898): 357–66.

GO FAIR Initiative. www.go-fair.org (accessed May 21, 2021).

Goodchild, Michael Frank, and Lauren L. Hill. "Introduction to Digital Gazetteer Research." *International Journal of Geographical Information Science* 22 (2008): 1039–44.

Habicht, Christian. *Pausanias's Guide to Ancient Greece*. Berkeley: University of California Press, 1985.

Harris, Trevor, Susan Bergeron, and L. Jesse Rouse. "Humanities GIS: Place, Spatial Storytelling, and Immersive Visualization in the Humanities." In *GeoHumanities: Art, History, Text at the Edge of Place*, edited by Michael Dear, Jim Ketchum, Sarah Luria, and Doug Richardson, 226–40. Abingdon: Routledge, 2011.

Hawes, Greta. "Of Myths and Maps." In *Myths on the Map: The Storied Landscapes of Ancient Greece*, edited by Greta Hawes, 1–13. Oxford: Oxford University Press, 2017.

HESTIA. https://hestia.open.ac.uk (accessed May 21, 2021).

Hutton, William. *Describing Greece: Landscape and Literature in the Periegesis of Pausanias*. Cambridge: Cambridge University Press, 2005.

Hyvönen, Eero. "Publishing and Using Cultural Heritage Linked Data on the Semantic Web." *Synthesis Lectures on the Semantic Web: Theory and Technology* 2 (2012): 1–59.

Janni, Pietro. *La mappa e il periplo: Cartografia antica e spazio odologico*. Rome: Bretschneider, 1984.

Johnson, Scott Fitzgerald. *Literary Territories: Cartographical Thinking in Late Antiquity*. Oxford: Oxford University Press, 2015.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Konstan, David. "To Hellēnikon Ethnos: Ethnicity and the Construction of Ancient Greek Identity." In *Ancient Perceptions of Greek Ethnicity*, edited by Malkin Irad, 29–50. Cambridge, MA: Harvard University Press, 2001.

Konstantinou, Ariadne. *Female Mobility and Gendered Space in Ancient Greek Myth*. London: Bloomsbury, 2018.

Koundoura, Maria. *The Greek Idea: The Formation of National and Transnational Identities*. London: Bloomsbury, 2007.

Lexicon of Greek Personal Names. www.lgpn.ox.ac.uk (accessed May 21, 2021).

Moretti, Franco. *Atlas of the European Novel, 1800–1900*. New York: Verso, 1999.

Open Refine. https://openrefine.org (accessed May 21, 2021).

Pelagios. https://pelagios.org (accessed May 21, 2021).

Pleiades Gazetteer of the Ancient World. https://pleiades.stoa.org (accessed May 21, 2021).

Pretzler, Maria. *Pausanias: Travel Writing in Ancient Greece*. London: Bloomsbury, 2007.

Prosopographia Imperii Romani. www.bbaw.de/forschung/prosopographia-imperii-romani (accessed May 21, 2021).

Purves, Alex C. *Space and Time in Ancient Greek Narrative*. Cambridge: Cambridge University Press, 2010.

Recogito. https://recogito.pelagios.org (accessed May 21, 2021).

Recogito Humlab. http://recogito.humlab.umu.se (accessed May 21, 2021).

Rood, Tim. "Historiography Herodotus." In *Space in Ancient Greek Literature: Studies in Ancient Greek Narrative*, edited by Irene J. F. de Jong, 119–40. Leiden: Brill, 2012.

Salway, Benet. "Travel, Itineraria and Tabellaria." In *Travel and Geography in the Roman Empire*, edited by Colin Adams and Ray Laurence, 22–66. London: Routledge, 2001.

Scaife Viewer. https://scaife.perseus.org (accessed May 21, 2021).

Shanks, Michael. *Classical Archaeology of Greece: Experiences of the Discipline*. London: Routledge, 1996.

Simon, Rainer, Elton Barker, Leif Isaksen, and Pau de Soto Cañamares. "Linked Data Annotation without the Pointy Brackets: Introducing Recogito 2." *Journal of Map and Geography Libraries* 13 (2017): 111–32.

SNAP:DRGN. http://snapdrgn.net (accessed May 21, 2021).

Society for the Study of Ancient Topography. https://dipylon.org/en (accessed May 21, 2021).

Stewart, Daniel R. "'Most Worth Remembering': Pausanias, Analogy, and Classical Archaeology." *Hesperia: The Journal of the American School of Classical Studies at Athens* 82 (2013): 231–61.

Trismegistos. www.trismegistos.org/index.php (accessed May 21, 2021).

Tuan, Yi-Fu. *Space and Place: The Perspective of Experience*. London: Arnold, 1977.

Web Annotation Data Model. W3C. www.w3.org/TR/annotation-model (accessed May 21, 2021).

Wikidata. www.wikidata.org/wiki/Wikidata:Main_Page (accessed May 21, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

PART THREE

THE NORSE PERCEPTION OF THE WORLD: MEDIEVAL SPATIALITY IN THE DIGITAL AGE

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Chapter 10

FLORES TRAVELS TO BABYLON: *FLORES OCH BLANZEFLOR* IN ITS EUROPEAN CONTEXT

Sofia Lodén*

THE TALE ABOUT the two lovers Floire and Blancheflor crossed cultural, historical, and linguistic borders. Many scholars have argued that the tale has its roots in the East.[1] The earliest preserved source is the French verse romance *Le Conte de Floire et Blancheflor*, attributed to Robert d'Orbigny and considered an "idyllic romance."[2] The *Conte* was written around 1150 and is referred to as the "aristocratic version" of the tale. It should not to be confused with the second French version, the "popular version" or the *Roman de Floire et de Blancheflor*, written in the later part of the twelfth century and preserved in one manuscript.[3] The French texts were followed by translations and adaptations into other languages: Middle Dutch, Middle High German, Middle Low German, Old West Norse, Old Swedish, Old Danish, Italian, Spanish, Czech, Greek and Yiddish.[4] The different translations can be divided into different groups. The Middle English, Old West Norse, Old Swedish and Old Danish translations belong to the "insular tradition," together with the Anglo-Norman manuscript of the *Conte*, Biblioteca apostolica Vaticana, Pal. lat. 1971, referred to as *V* (the latter is preserved only as a fragment, containing 1,247 verses).[5] The insular tradition is opposed to the "continental tradition," which derives from other manuscripts of the *Conte*. To the continental tradition belong, for example, the French *Roman*, Konrad Fleck's Middle High German version, and Diedrick van Assenede's Middle Dutch adaptation.

* I have written this chapter as a Pro Futura Scientia fellow at the Swedish Collegium for Advanced Study in Uppsala and the Department of Romance Studies and Classics at Stockholm University, funded by Riksbankens Jubileumsfond. Email: sofia.loden@su.se.

1 See, e.g., Leclanche, "Introduction," xvi.

2 It is the German poet Konrad Fleck who refers to "Ruoprecht von Orbênt" in his version of the tale, *Floris and Blancheflour* (ca. 1200). See Leclanche, "Introduction," xv.

3 For a study of the different French texts and their manuscript contexts, see Obry, "Les versions françaises de Floire et Blancheflor".

4 Together with my colleague Vanessa Obry, I have co-edited an anthology that puts together extracts from the different European versions of the tale; see *Floire et Blancheflor en Europe: Anthologie*.

5 Leclanche, "Introduction," viii. I have compared these texts of the insular tradition in a previous study, which deals with the theme of childhood; see Lodén, *French Romance*, 85–117.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

It was not only the tale about Floire and Blancheflor that crossed various borders but also the lovers themselves, whose travels from the West to the East form an important part of the narrative. To sum up the content of the tale, the two protagonists fall in love with each other in the very beginning of the tale, when they are still children, which upsets their parents. Floire's father, a powerful king, decides that Blancheflor must be sent away, and she is thus taken to a harbour, where she is sold to merchants. These merchants take her to Babylon, where the emir is struck by her beauty and locks her up in a tower. When Floire learns that she has been sent away, he immediately sets out for her, and his journey becomes a new adventure.

As pointed out by Patricia Grieve, "Geography is a thorny issue in *Floire and Blancheflor* criticism."[6] While the geography of the *Conte* has been described as imaginary by some, Grieve argues that its complexity is, rather, due to previous sources. In contrast, she considers the geography of the Spanish version as mostly "logical and faithful to the topography of Spain."[7] I do not discuss the question of possible sources of the *Conte* here, but the difference that Grieve points to between the geography of the French and Spanish traditions—one more imaginary than the other—is interesting in this context. What can be said about the geography of the Old Swedish translation, *Flores och Blanzeflor*?

In this chapter I argue that the role of travel is crucial in order to understand *Flores och Blanzeflor* and its links to broader European culture, and I do so by exploring the male protagonist's journey to Babylon. I discuss the Old Swedish text in relation to the Old French *Le Conte de Floire et Blancheflor*, the Middle English *Floris and Blancheflour*, and the Old West Norse *Flóres saga ok Blankiflúr*. My starting point is some observations made in the Norse World resource, the infrastructure that uncovers the places abroad referred to in East Norse medieval fiction.[8] The Norse World makes it possible to compare the spatial references in the Swedish *Flores och Blanzeflor* to references in other texts; I draw parallels to *Hertig Fredrik av Normandie*, the second of the three *Eufemiavisor*. As we shall see, the geography of *Flores och Blanzeflor* highlights the limitations of a purely East Norse perspective in the study of translated romances.

The Middle English, Old West Norse, and Old Swedish Texts

The Middle English translation, written in verse as the *Conte*, was composed around 1250 and is preserved in four medieval manuscripts. It is considerably shorter than the Old French text, at only about a third of its length. The Old West Norse translation *Flóres saga ok Blankiflúr* was written in prose in the thirteenth century, when many French romances were translated into Old West Norse at the instigation of the Norwegian

6 Grieve, *Floire and Blancheflor*, 46.

7 Grieve, *Floire and Blancheflor*, 49.

8 I do not consider the Old Danish translation, since it is posterior to the Swedish text. For a study of the Danish version, see Richter, "La transmission de Floire et Blanchefleur au Danemark."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

court.[9] The saga is preserved in one Norwegian fragment, NRA 65, and in later Icelandic copies. The Swedish translation *Flores och Blanzeflor*, written in verse at the beginning of the fourteenth century, is the third of the co-called *Eufemiavisor*: three translations of foreign romances that were written at the behest of the Norwegian queen Eufemia (queen of Norway from 1299 to 1312), marking the beginnings of Swedish literature. *Flores och Blanzeflor* was likely translated from the Old West Norse saga.[10] Even though the two Nordic texts are generally close to each other, there are differences between them; the most obvious is that one of them is in prose and the other in verse. The Swedish text is interesting for a number of reasons. In previous research, scholars have emphasized its religious focus.[11] Virgile Reiter has drawn attention to the role of the Orient and the "Other" in the Swedish text.[12] He shows how the Swedish translator mainly gives a positive description of the Orient and its inhabitants, which, he argues, mirrors a certain anxiety on behalf of the aristocracy "towards a Saracen Other."[13]

The Norse World Resource

When looking at *Flores och Blanzeflor* in the Norse World resource, with specific filters that categorize the type of places, the work presents 155 attestations of place-names in total, a number that includes all the occurrences in the different manuscripts included in the database. Norse World makes a distinction between real and fictional place-names:

> Place names and non-names are sorted under real by default if they do not match the requirements for fictional. […] Place names and non-names are sorted under fictional when they are impossible to identify or if the actual context of the attestation contradicts the assumed identification of the spatial reference.[14]

In the case of *Flores och Blanzeflor*, 110 of the entries are to real places and forty-five to fictional ones. These numbers tell us little in themselves, but are interesting to relate to the second *Eufemiavisa*, *Hertig Fredrik av Normandie*.[15] In Table 10.1 I have listed the number of occurrences of the different types of locality referred to in the three Old Swedish manuscripts that contain both texts: Stockholm, Kungliga biblioteket, Cod. Holm. D 4 (dated to the first half of the fifteenth century); Stockholm, Kungliga

9 For an analysis of the saga, see Barnes, "Some Observations on *Flóres saga ok Blankiflúr*."

10 Even though the hypothesis of the Old West Norse source for the Swedish text is the most common, it has not been proved. Helle Degnbol has raised the possibility that the saga may have been written as a preparation for the Swedish text; see Degnbol, " 'Fair Words,' " 90.

11 See, for example, Bampi, "Translating Courtly Literature." In a previous study, I have also explored the theme of childhood in a European context; see Lodén, *French Romance*, 85–117.

12 Reiter, "Flores och Blanzeflor and the Orient."

13 Reiter, "Flores och Blanzeflor and the Orient," 35.

14 Norse World, "Editing Principles."

15 *Herr Ivan*, the first of the three *Eufemiavisor*, is not yet included in the database, which is why I have not looked at similar occurrences in it.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Table 10.1 Place-names in the three manuscripts that all contain *Hertig Fredrik av Normandie* and *Flores och Blanzeflor.*

Type of locality	*Hertig Fredrik av Normandie*			*Flores och Blanzeflor*		
	D 4a	D 3	D 4	D 4a	D 3	D 4
Castle	9	6	9	4	4	4
Church	–	–	–	1	–	1
City	3	3	3	13	9	13
Country	36	38	42	11	9	11
Forest	3	–	3	–	–	–
House	–	–	–	–	–	1
Mountain	–	–	–	1	1	1
Region	20	15	20	5	5	6
River	2	1	2	2	2	1
Strait	–	–	–	1	1	1
Tower	–	–	–	1	1	1
Volcano	1	1	1	–	–	–
Total	74	64	80	39	32	40

biblioteket, Cod. Holm. D 4a (dated to ca. 1448); and Stockholm, National Library, D 3 (dated to 1488).[16]

Each type of locality would need its own separate analysis. Nevertheless, there are some more general differences that deserve attention without going into a detailed study of each separate occurrence. First, *Hertig Fredrik av Normandie* undoubtedly contains more references to named geographical locations than *Flores och Blanzeflor*. Second, one can note that the two works are linked to different geographical contexts; see Figure 10.1.

While *Hertig Fredrik av Normandie* contains references to England, France, India, Ireland, Scotland, and Spain (as well as to "Foreign land" and "Other land"), *Flores och Blanzeflor* contains references to Babylonia, France, and the Roman Empire. Babylonia is treated as both a city and a country in the Norse World; I come back to its denotation below. In any case, *Flores och Blanzeflor* not only mentions fewer countries, it also brings in the Eastern context. Finally, even though there are generally more references to geographical places in *Hertig Fredrik av Normandie*, *Flores och Blanzeflor* contains a greater number of references to cities; only two cities are mentioned in *Hertig Fredrik av Normandie*, namely Rome and Verona, whereas eight names of cities, real as well as fictional, appear in *Flores och Blanzeflor*: Apolis

16 For a detailed presentation and discussion of these different manuscripts, see Lodén, *French Romance*, 17–27.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

Figure 10.1. Countries mentioned in *Hertig Fredrik av Normandie* and *Flores och Blanzeflor* in D 4a. Darker spots = *Hertig Fredrik av Normandie*. Lighter spots = *Flores och Blanzeflor*. Data and map from Norse World.

(fictional), Babylon, Bandaghha (Baghdad or Alexandria), Gisdon (fictional), Mundin (fictional), Paris, Troy, and Venice. Most of the references are to Babylon (five occurrences in D 4, five in D 4a, and two in D 3). The manuscript D 4a gives a representative picture of the balance between references to countries and cities in the two works; see Figures 10.1 and 10.2.

Why this interest in the city, and in Babylon in particular, in *Flores och Blanzeflor*? The denotation of Babylon is ambiguous. According to Andrew Scheil, "Babylon functions as a metonymic figure for 'the East' or 'the Orient' " in the romance tradition.[17] In medieval European literature, "Babylon" may refer to two distinct places: the ancient biblical Babylon of Mesopotamia or Egyptian Cairo.[18] In the early *chanson de geste*, the emir of Babylon represents the "Saracen power" and is clearly linked to Cairo.[19] This use of "Babylon" for Cairo found its way into many other medieval texts, such as *Floire et Blancheflor*.[20] The exact geographical denotation of Babylon is difficult to grasp in the medieval genre of romance, however:

> In fact, in the world of romance, where all places tend to have a blurry dream-like sense of unreality, one can see the synthesis at work whereby the two Babylons [Babylon

17 Scheil, *Babylon under Western Eyes*, 251.

18 Scheil, *Babylon under Western Eyes*, 258.

19 Scheil, *Babylon under Western Eyes*, 259.

20 Most scholars agree that "Babylon" in the European tradition of *Floire et Blancheflor* refers to Cairo. See, for example, Leclanche's edition of Robert d'Orbigny, *Le Conte*, 25n1. In a recent article, however, Gilles Polizzi argues that it should be interpreted as Baghdad. See Polizzi, "L'Arbre vermeil," 299.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Figure 10.2. Cities mentioned in *Hertig Fredrik av Normandie* and *Flores och Blanzeflor* in D 4a. Darker spots = *Hertig Fredrik av Normandie*. Lighter spots = *Flores och Blanzeflor*. Fictional locations, common in *Flores och Blanzeflor*, are not mapped. Data and map from Norse World.

> of Mesopotamia and Egyptian Cairo] slowly merge into one imaginative Babylon, a metonymic figure for the East …[21]

As shown by Scheil, the biblical Babylon also has coloured the interpretation of Babylon (Cairo) in *Floire et Blancheflor*, and the result is "a sublime 'Babylon', an exotic Babylon of the imagination and romance in which the distant East stands for the endless distant spaces of romance."[22]

Even though the Norse World resource notes that "Babylon" may in some medieval texts refer to Cairo, it states that "there is no sign this knowledge has been transferred to the Swedish *Flores och Blanzeflor*."[23] Thus, Norse World treats this spatial reference independently from the other European versions; even if "Babylon" in other versions of the same tale is linked to Cairo, the editors have chosen to consider the references in the Swedish version independently from the others: "The Standard form Babylonia is a compromise form chosen to represent both the East Norse attestations denoting Neo-Babylonian Empire and other instances where the denotation is not entirely clear."[24] Could it be that "Babylon" means different things in different language traditions?

21 Scheil, *Babylon under Western Eyes*, 261.

22 Scheil, *Babylon under Western Eyes*, 266.

23 Norse World, *"tha thu wardher babilonia war."*

24 Norse World, "Babylonia (Neo-Babylonian Empire)."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

We do not know for certain what the medieval Swedish translator implied when he used the name "Babylon," let alone how this place-name was understood by his audience. But can we understand the translator's interpretation without the larger European context? In the following, I discuss different foci, internal versus external, in the description of Floire's travel to Babylon, in order to gain a better understanding of the role of the city and the East in the Swedish text.

The External and Internal Journey

According to Fanny Moghaddassi, who has studied the theme of travel in Middle English literature, Floris's journey to Babylon in *Floris and Blancheflour* reflects a progressive transformation of his identity, marking the last part of his childhood. She believes that the theme of travel in medieval literature should more generally be understood as both external—i.e., as a concrete geographical movement—and as internal. She writes: "Parcourir le monde concret, c'est toujours parcourir le monde intérieur. Le miroir de l'âme reflète le monde, comme le miroir du monde reflète l'âme." ["To travel around the concrete world always implies travelling in the inner world. The mirror of the soul reflects the world, as the mirror of the world reflects the soul."][25] In most cases, she argues, the medieval literary travel is not about exile but about coming back to the point of departure: the traveller does not primarily lose his roots when he leaves but, rather, strikes deeper roots when he comes back.[26]

To some extent, this could be applied to the whole tradition of *Floire and Blancheflor*. Floire, on his journey to Babylon, does cross external as well as internal boundaries: he sets out on a search for his beloved Blancheflor and comes back as a man ready to rule a great realm. Nevertheless, depending on the version one looks at, his journey is described as more or less external or internal. While the French *Conte* does, indeed, open up for a reading at both levels, its different versions in other languages seem to change the balance between these two poles. As we shall see, this can be discerned in spatial and chronological references, as well as in meteorological descriptions. Let us look more closely at the different versions of the tale, starting when Floire learns that Blancheflor has been sold to merchants by his parents.

Leaving the City

At this point in the narrative, Floire immediately decides to set out for his beloved and bring her back. When he has said farewell to his parents, we read this in the French text:

> Es le vos hors de la cité
> o ses somiers bien arrouté.
> Il et li cambrelens consellent
> et lor jornees apparellent.

25 Moghaddassi, *Géographies du monde*, 394.

26 Moghaddassi, *Géographies du monde*, 395.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

> Au port voelent primes aler
> u Blanceflor entra en mer.[27]
>
> [He was now outside the city with his quick beasts of burden. He and the steward discussed and planned their travel route. First, they wanted to go to the port where Blancheflor went to sea.][28]

The Middle English translation is close to the French, but it does not keep the reference to the city that the young man leaves behind, which makes the border to the new scene less distinct.[29]

In addition, the Nordic texts omit the reference to the city, at the same time as they make Floire more authoritative; in these versions, the latter does not discuss his route with his counsellor but gives clear orders about it. The Old West Norse text says:

> Nú reið Flóres braut ok kallaði til sín herbergissvein þann, er faðir hans fekk honum, ok bað hann ætla dagleiðir þeira til strandar, þar sem Blankiflúr var seld.[30]
>
> [Now Flóres rode away and called for his groom of the chamber that his father had given him and said that he intended to travel that day to the coast, where Blankiflúr was sold.]

The Swedish text stays close to the saga, but uses direct speech, which is typical of the whole Swedish translation.[31] It also adds a chronological precision, namely how long it took to arrive at the destination:

> Han redh nu thaghar thædhan ij stadh;
> sin radhgifuara han kalla badh:
> ”Nu riidh fore til stranda,
> ther Blanzaflor foor fra lande!”
> Then fiærdha dagh the komo thære[32]
>
> [He immediately rode away and called for his counsellor: “Now ride to the coast, where Blanzaflor left the country!” The fourth day they arrived there.]

The chronological precision adds to the exactitude of the description of Flores’s journey and highlights its external rather than internal focus.

On a Ship to Babylon

After having been received by a man who had previously received Blancheflor on her way to Babylon, Floire finally embarks on his ship to Babylon. Verses 1366 to 1398 in the French text first describe how Floire went on board and how he and his crew parted.

---

27 Robert d’Orbigny, *Le Conte*, vv. 1227–32.

28 All translations into modern English in this chapter are my own.

29 See vv. 385–89 in *Floris and Blancheflour*, https://d.lib.rochester.edu/teams/text/kooper-sentimental-and-humorous-romances-floris-and-blancheflour (accessed June 1, 2021).

30 *Flóres saga ok Blankiflúr*, 31.

31 Bampi, “Translating Courtly Literature,” 6–7.

32 *Flores och Blanzeflor*, vv. 587–91.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

We then learn that Floire had heard that the emir of Babylon would hold a feast in a month's time and that Floire wished to turn up at this feast and sell merchandise. The narrator also tells us that weather conditions on the sea were good and that Floire and his crew could navigate with ease during eight days; thanks to the wind, they could hoist all their sails on high. Then, on the ninth day, they arrived in "Baudas la cité" (v. 1394), which is said to have been situated on the top of a cliff, from where one could see a hundred leagues on sea. "Baudas" is considered as the French form for "Baghdad," but, in this context, scholars have argued that it must refer to Alexandria, considering its geographical closeness to Babylon (Cairo), the fact that one could see far from there (which may allude to the Lighthouse of Alexandria), and, finally, the role of specific customs procedures (see "Arriving in 'Paradise'" section).[33] The use of the name "Baudas" could be seen as an example of the vague and ambiguous geography of the French text.[34]

The Middle English romance shortens the passage considerably, by omitting the verses about the feast held by the emir, the hissing of the sail, and the chronological references, as well as what is said about the visibility on the water:

> Amorewe, whan hit was dailight,
> He dide him in the salte flod,
> Wind and weder he hadde ful god.
> To the mariners he gaf largeliche
> That broughten him over bletheliche
> To the londe thar he wold lende,
> For thai founden him so hende.[35]
>
> [In the morning, when it was daylight, he set out in the salty sea. He had quite favourable wind and weather. He gave generously to the sailors, who brought him across happily to the land where he wanted to go, because they found him so gentle.]

The Old West Norse saga presents a more detailed translation than the Middle English one, which retains the reference to the emir's assembling and the number of days at sea:

> Þá fór hann til skips, ok þá bað hann stýrimann stefna þann veg til hafnar, sem skemstr væri til Babilónar, fyrir því, segir hann, "at á VIII mánaða fresti er mér sagt, at konungr af Babilón skal eiga stefnu við sína undirkonunga ok alla ríkismenn á sínu landi. En ef ek mætta þá þar koma, þá mundi minn varningr þar rífr vera, þvíat gjarna vil ek mitt fé til gefa." Stýrimaðr játar því. Síðan gerði enn bezta byr ok skírt veðr, ok sigldu ǫll skip or hǫfnum; var stýrimaðr ok allir hans menn á kosti Flóres. VII dœgr váru þeir í hafi, svá at þeir sá ekki land; en á átta dœgri kómu þeir til borgar einnar, er Beludátor hét.[36]
>
> [Then he went on the ship and asked the captain to take the direction to the harbour that was closest to Babylon, because, he said, "I am told that in eight months the king

33 See, for example, Leclanche's edition of Robert d'Orbigny, *Le Conte*, 69n1.

34 See Leclanche's edition of Robert d'Orbigny, *Le Conte*, 69n1.

35 *Floris and Blancheflour*, vv. 436–42.

36 *Flóres saga ok Blankiflúr*, 34–35.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

of Babylon had summoned a meeting with his tributary kings and all the nobility of his country. And if I were there at that moment, then my goods could be turned over because I would gladly give them away." The captain accepted. Then there was the best wind and clear weather, and they sailed the ship out of the harbour. The expenses for the captain and all his men were paid for by Flóres. They were at sea seven days and did not see land, but on the eighth day they came to a city, called Beludátor.]

The Swedish text is, once again, more detailed than the saga, containing a number of points made in the French *Conte* that are absent in the saga:

Tha til skipith komin var han,
han badh sik kallæ then styre man:
"Thu skal thet gøra iak bidher hæræ.
Styr til the hampn thu veet næst væra!
Iak hafuer forstandith sannelika,
at konunga ok andre herra rikæ,
vnder konungin ij Babilonia bo,
hafua thet alle lofuat a tro,
tha aatta mandha lidne æræ,
tha skulu alle saman kompne væra;
æn iak vilde gerna koma braat,
før æn the herra skilias aat,
ok mina værning ther at sælia,
slikt them lyster aff ath wælia.
Iak vil thik gifua goz ther til,
thet thu mik føre thiit iak vil."
"Jak wil gerna, æn jak maa,
idher føra, æn wi bør ffaa."
Gudh gaff them bør ok blidhan sio,
swo at the thørffto ekke ro.
Hwat the matte ij aatta dagha
vndan ga for vind ok vagha,
then nionda komo the for een vagh
fore een stadh, ther heet Bondagh.
Swa høght stadhin ouer vatnith la,
thet man gørla aff honum sa
vt ij hafuith margha mila,
huru skippin matte skridha.[37]

[When he had arrived at the ship, he summoned the captain: "You shall do what I ask you. Steer to the harbour that you know is the closest. I have understood that kings and other rich men who live under the king in Babylon have all promised on their honour that when eight months have passed they should get together. But I would like to arrive there soon, before these men separate and sell my goods there, as much as they would like to buy. I want to give you goods as well, so that you take me where I want." "I will gladly, if I may, lead you there, if we get tailwind." God gave them tailwind and a favourable sea, so that they did not need to row. During eight days they were exposed to wind and waves; the ninth day they arrived in a bay, outside a city that was called Bondag. The city was so high up over the water that one could see it clearly over the sea from many kilometres, where the ship travelled.]

37 *Flores och Blanzeflor*, vv. 661–88.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

The Old West Norse place-name "Beludátor" becomes "Bondag" in the Old Swedish text.[38] In the Norse World resource, "Bondag" is treated as a fictional place-name. Even though the presumed link to Baghdad in the French tradition is pointed out, the Swedish name is once again considered independently from the tale's larger European context.[39] One can also note that the time at sea is one day longer in the Swedish version. More interestingly, though, the Swedish translator adds a reference to the waves on the sea and the fact that they did not need to row, as well as the description of how the city is located high up—a description that we also find in the French text. Once again, the Swedish translator chooses to give more exact descriptions, which could be linked to an interest in the more external aspects of the journey.

Arriving in "Paradise"

When Floire gets off the boat, the French *Conte* describes how Floire pays his captain with twenty gold marks and twenty silver marks, which has been considered as an allusion to customs procedures in Alexandria.[40] He pays gladly, since it feels as though he has arrived in Paradise, having set foot in the same country as his beloved: "li fist doner joiousement, / car vis li est k'en Paradis."[41]

The Middle English translation transmits the reference to Paradise, which stresses the internal part of Floris's journey:

> Sone so Florice com to londe,
> Wel yerne he thankede Godes sonde
> To the lond ther his lemman is;
> Him thoughte he was in paradis.[42]
>
> [As soon as Floris came to land, he thanked God eagerly for sending him to the land where his sweetheart is. He thought he was in Paradise.]

There is no similar reference to Paradise in the corresponding passages in the Nordic texts. Instead, they focus on Flores's payment for the boat trip.[43]

Lenfer Becomes Fær

Three days later in the French *Conte*, Floire arrives in "Lenfer":

> Au tierç jor, devant l'avesprer,
> parvinrent a un braç de mer;
> Lenfer le noment el païs.
> De l'autre part fu Monfelis,

38 The name "Bondag" appears only in D 4.

39 Norse World, "Bandagha."

40 See Leclanche's edition of Robert d'Orbigny, *Le Conte*, 69n1.

41 Robert d'Orbigny, *Le Conte*, vv. 1410–11.

42 *Floris and Blancheflour*, vv. 443–46.

43 *Flóres saga ok Blankiflúr*, 35; *Flores och Blanzeflor*, vv. 695–98.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

castiaus rices u cil manoient
qui la gent outre conduisoient.
Il n'i avoit planke ne pont,
car trop erent li gué parfont,
mais au rivage un cor avoit
qui a un pel pendus estoit;
li venant a celui cornoient
qui le notonier apeloient.[44]

[On the third day, before the evening, they came to a sound, which was called Lenfer. On the other side was Monfelis, a rich castle people travelled to. There was no plank or bridge, because the ford was too deep. But, on the shore, there hung a horn on a stake. The boatman came to the person who blew in it.]

Scholars have previously discussed whether the name "Lenfer" should be considered as referring to a real place-name or whether it should, rather, be read as *L'enfer* ("the Hell").[45] Neither the reference to "Lenfer" nor that to "Monfelis" is present in the Middle English translation, while the Old Norse saga transmits an adapted form of "Monfelis":

Því næst kómu þeir at sundi einu; en ǫðru megin sundsins var fjall eitt, er Felis hét. Í fjallinu stendr einn ríkr kastali; en yfir sundit var engi brú, þvíat þat var djúpt ok svá streymt. Á strǫndinni hekk horn eitt, ok skyldu þeir, er yfir vildu, blása í hornit.[46]

[Next they arrived in a sound, and on the other side of the sound there was a mountain that was called Felis. On the mountain was a magnificent castle, and over the sound, which was deep and with a strong current, there was no bridge. On the shore there was a horn, in which those who desired to cross the water should blow.]

The Swedish text uses the same form as the Old West Norse translator and also presents an equivalent to "Lenfer":

Then thridhia dagh han komin ær
til eet sund, ther heter Fær.
Annan væghin la eet bergh heet Fælis,
ther a eet hus var bykt medh priis.
Thet vatn var diwp medh strøma swo,
at ther matte vara ængin bro.
A the strand ther stodh een steen,
ther var ij læst eet horn aff been,
at huar then ther vilde ouer fara,
han skulde thet blæsa ok føghiande vara.[47]

[The third day he arrived in a sound, which was called Fær. On the other side, there was a mountain called Fælis, on which a house was built with splendour. The water was so deep and had such currents that there could be no bridge. On the shore there stood a stone, onto which was locked a horn of bone, and the one who wanted to cross the water had to blow in it and then wait.]

---

44 Robert d'Orbigny, *Le Conte*, vv. 1509–20.

45 See Leclanche's edition of Robert d'Orbigny, *Le Conte*, 75n1.

46 *Flóres saga ok Blankiflúr*, 38.

47 *Flores och Blanzeflor*, vv. 745–54.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

In the Norse World resource, "Fær" and "Fælis" are considered as fictional place-names (one hydronym and one oronym), each one "located in the Middle East because the context of the text places it there."[48] The fact that the text contains both names, and not just one of them, as in the saga, highlights the importance of geographical references in the text, even though they are fictional. The external journey of the Swedish Flores takes place in a fictional East.

Conclusion

When comparing the descriptions of Floire's itinerary in the French, English, West Norse, and Swedish versions of *Floire et Blancheflor*, one can observe a dividing line between the English translation and the two Nordic texts. Whereas the English translation tends to omit precise spatial and chronological references, the Nordic texts mostly transmit them, and, in the case of the Swedish text, some new references are added as well.

As already noted, the English translation as a whole is a much-condensed form of the *Conte*. It is not only the spatial and chronological references that have been omitted but other parts as well. Nevertheless, the omission of precise spatial references shifts the focus of the travel to a more internal one: the narrator does not seem interested in the countries and cities through which Floris travels, but his focus is on the transformation that Floris undergoes as a character. The fact that the reference to "Paradise" is transmitted in the English translation while the more realistic ones are omitted is revealing.

The omission of "Paradise" in both Nordic versions, together with their transmission of the more geographical references, reflect the Nordic texts' stronger focus on the external travel than the internal one. By relating the Nordic translations to the Middle English version, the complexity of the French *Conte* stands out, in which Floire's itinerary is as much internal as external.

The ways in which the Nordic texts transmit the studied passages are typical of their general character: even though the saga remains relatively close to the French, the Swedish text contains a number of points absent in the saga. If the Swedish text was really translated from the Old West Norse, some of these additions could give a hint about what the original version of the saga looked like. It cannot be ruled out, however, that the Swedish translator had access to a French version as well.[49] When related to other Swedish translations of courtly literature, it seems likely that many additions were made by the Swedish translator, as a means to insist on certain aspects, such as the external journey and the inclusion of the East.[50]

48 Norse World, "Fær."

49 In my doctoral dissertation, I argue that the first of the three *Eufemiavisor*, *Herr Ivan*, goes back to two sources: one in Old French and one in Old Norse. See Lodén, "Le chevalier courtois."

50 For a study of several Swedish translations, see Lodén, *French Romance*.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

I have previously described the main function of the Old Swedish translations of courtly literature as a project of Europeanization: a means to bring European elements into Swedish literature, and thus connect to a larger cultural context.[51] The interest in travels and the East fits particularly well into this: the external world outside medieval Sweden was probably an important motivation behind these translations—rather than the exploration of the human mind and development. Even though the great number of references to countries and regions in *Hertig Fredrik av Normandie* reflects a high interest in the world beyond medieval Sweden, the central role of the city, fictional as well as real, in *Flores och Blanzeflor* is of a somewhat different kind. The geography of *Flores och Blanzeflor* brings its readers on a great adventure far away. The place-names that figure in the text are often difficult to trace back to real places. These names reinforce the change of scenery. The mix of real and fictional places reflects the exotic character of the Eastern setting in the eyes of the Swedish translator. Even though the names of the different cities contribute to the description of a concrete and external journey, this journey takes place in a distant and fictional East. The different place-names that the translator refers to may give us a hint about how little he probably knew about the "real" geography of the East.

The Old West Norse saga does not, as the Swedish text does, mark the beginning of a new literary tradition but, rather, belongs to an already existing literary tradition. Even though the saga, too, focuses more on the external journey than the internal, one could imagine that this emphasis was more important for the Swedish translator. At the same time, as the medieval literary travel would not be primarily about exile but, rather, about coming back as a more complete character (as argued by Moghaddassi; see above), we may also consider the description of the external journey as a means to construct a Swedish literary identity. By bringing in the Eastern context through Flores, who travels to Babylon, the translator includes a more global perspective in the *Eufemiavisor*—texts that were not only the result of a Europeanization process but also the beginning of a new literary tradition in Sweden.

The Norse World resource opens up new ways of studying East Norse medieval literature and casts new light on how Scandinavia viewed the outside world in the Middle Ages. The next step would be to link the East Norse texts to their foreign relatives—direct sources as well as related versions. The textual transmission of *Floire et Blancheflor* in medieval Europe was complex, and the different individual versions need to be understood in relation to one another.

Even though we cannot be certain of what the Swedish translator understood by "Babylon"—whether he considered it as the biblical city of Mesopotamia or Egyptian Cairo—the five occurrences of the place-name in D 4 and 4a are inevitably linked to a larger European context. Considering the focus on the external journey in the Swedish text, it seems unlikely that the Swedish translator was unaware that "Babylon" generally referred to Cairo in related foreign literature.

---

51 Lodén, *French Romance*.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

The importance of what "Babylon" actually refers to must not be exaggerated, however. Babylon is both fictional and real: a metonymic figure of the exotic East in medieval European culture. This is also how we must understand most spatial references in *Flores och Blanzeflor*. As noted in the introduction to Edward Said's famous work on orientalism, "The Orient was almost a European invention, and had been since antiquity a place of romance, exotic beings, haunting memories and landscapes, remarkable experiences."[52] The central position of Babylon and the East in *Floire et Blancheflor* might indeed have been an important motivation behind the choice to translate this specific text—and the result, *Flores och Blanzeflor*, can be seen as an early Swedish example of the interest in the "Orient," fictional and real at the same time.

Bibliography

Bampi, Massimiliano. "Translating Courtly Literature and Ideology in Medieval Sweden: *Flores och Blanzeflor*." *Viking and Medieval Scandinavia* 4 (2008): 1–14.

Barnes, Geraldine. "Some Observations on *Flóres saga ok Blankiflúr*". *Scandinavian Studies* 49 (1977): 48–66.

Degnbol, Helle. " 'Fair Words': The French Poem Floire et Blancheflor, the Old Norse Prose Narrative Flóress saga ok Blankiflúr, and the Swedish Poem Flores och Blanzaflor". In *Rittersagas: Übersetzung, Überlieferung, Transmission*, edited by Jürg Glauser and Susanne Kramarz-Bein, 71–95. Tübingen: Francke, 2014.

Floire et Blancheflor en Europe: Anthologie. Edited by Sofia Lodén and Vanessa Obry. Grenoble: UGA Éditions, 2022.

Flores och Blanzeflor. Edited by Emil Olson. Stockholm: Svenska fornskriftsällskapet, 1956.

Flóres saga ok Blankiflúr. Edited by Kölbing. Halle: Niemeyer, 1896.

Floris and Blancheflour. In *Sentimental and Humorous Romances*, edited by Erik Kooper, 1–52. Kalamazoo: Medieval Institute, 2005. Available at: https://d.lib.rochester.edu/teams/text/kooper-sentimental-and-humorous-romances-floris-and-blancheflour-introduction (accessed June 1, 2021).

Grieve, Patricia. *Floire and Blancheflor and the European Romance.* Cambridge: Cambridge University Press, 1997.

Leclanche, Jean-Luc. "Introduction." In Robert d'Orbigny, *Le Conte de Floire et Blanchefleur*, edited by Jean-Luc Leclanche, vii–xxviii. Paris: Champion, 2003.

Lodén, Sofia. *Le chevalier courtois à la rencontre de la Suède médiévale: Du Chevalier au lion à Herr Ivan*. Stockholm: Department of French, Italian and Classical Languages, Stockholm University, 2012.

——. *French Romance, Medieval Sweden and the Europeanisation of Culture*. Cambridge: D. S. Brewer, 2021.

Moghaddassi, Fanny. *Géographies du monde, géographies de l'âme: Le voyage dans la littérature anglaise de la fin du Moyen Age*. Paris: Champion, 2010.

Norse World. "Babylonia (Neo-Babylonian Empire)." https://norseworld.nordiska.uu.se/index.php?type=location&id=205 (accessed June 1, 2021).

52 Said, *Orientalism*, 1.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - BY-NC-ND

——. "Bandagha." https://norseworld.nordiska.uu.se/index.php?type=location&id=209 (accessed June 1, 2021).
——. "Editing Principles." www.uu.se/en/research/infrastructure/norseworld/editing-principles (accessed June 1, 2021).
——. "Fær." https://norseworld.nordiska.uu.se/index.php?type=location&id=129 (accessed June 1, 2021).
——. "tha thu wardher babilonia war." https://norseworld.nordiska.uu.se/index.php?type=attestation&id=879 (accessed June 1, 2021).
Obry, Vanessa. "Les versions françaises de *Floire et Blancheflor* en contexte manuscrit: lectures médiévales et infléchissements génériques." *Cahiers de recherches médiévales et humanistes* 38 (2019): 243–64.
Polizzi, Gilles. "L'Arbre vermeil: Bagdad et la genèse du jardin courtois dans l'invention et les réécritures de *Floire et Blanchefleur* (1150-1550)." *Cahiers de recherches médiévales et humanistes* 38 (2019): 299–317.
Reiter, Virgile. "Flores Och Blanzeflor and the Orient: Depicting the Other in Medieval Sweden". *Tijdschrift voor Skandinavistiek* 36 (2018): 22–37.
Richter, Anna Katharina. "La transmission de Floire et Blanchefleur au Danemark (XVIe–XVIIe siècles)." In *L'expérience des frontières et les littératures de l'Europe médiévale*, edited by Sofia Lodén and Vanessa Obry, 395–406. Paris: Champion, 2019.
Robert d'Orbigny. *Le Conte de Floire et Blanchefleur*. Edited by Jean-Luc Leclanche. Paris: Champion, 2003.
Said, Edward W. *Orientalism: Western Conceptions of the Orient*. London: Penguin, 1978.
Scheil, Andrew P. *Babylon under Western Eyes: A Study of Allusion and Myth*. Toronto: University of Toronto Press, 2016.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Chapter 11

PLACE-NAME VARIATION IN MEDIEVAL LITERATURE IN THE DIGITAL AGE

Alexandra Petrulevich*

PLACE-NAME DATA CONSTITUTE one of the foundational stones of present-day digital gazetteers, since a standard gazetteer structure requires at least one place-name attribute in addition to at least one representation of geographic location and at least one feature type. The approach can result in an overly simplistic representation of name material, however, when the model is applied to geocoded humanities data, such as place-name attestations in a medieval literary corpus. Place-names are bearing spatial elements in a medieval narrative affected by manuscript variation in ways large and small. By excluding place-name variation, the mainstream approach forbids the study of place-name transmission. Moreover, it can compromise research into spatiality in medieval texts and manuscripts if such study is limited to idealized cases in which a single place-name form from the best textual witness of a text replaces all other variants.

The focus of this chapter is twofold. First, it re-evaluates the current approach to text and the spatial information in it in the fields of spatial humanities and digital spatial infrastructure studies through the investigation of place-name representation in several digital spatial resources with pre-modern focus: Pleiades Gazetteer of the Ancient World (Pleiades)[1] and the associated Pelagios project;[2] the World Historical Gazetteer (WHG);[3] the Icelandic Saga Map (ISM);[4] and Norse World.[5] Second, it provides theoretically and methodologically informed alternatives to place-name data modelling in a historical digital gazetteer. Additionally, the chapter demonstrates the importance of including place-name variation in gazetteers and other spatial resources based on medieval literary material through a survey of similarities and dissimilarities in place-name use regarding the number of attestations and orthographic variation between texts, copies of texts, and different text redactions across the East Norse medieval literary corpus.

* Alexandra Petrulevich (PhD Uppsala 2016) is Associate Senior Lecturer/Assistant Professor in Scandinavian Languages at Uppsala University, Sweden. Email: alexandra.petrulevich@nordiska.uu.se; ORCID iD: https://orcid.org/0000-0002-8478-2040.

1 See https://pleiades.stoa.org (accessed January 14, 2021).

2 See https://pelagios.org (accessed January 14, 2021).

3 See http://whgazetteer.org (accessed January 14, 2021).

4 See http://sagamap.hi.is/is (accessed January 14, 2021).

5 Petrulevich et al., "Norse World."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

Places, Place-Names, and Texts in the Digital Age

The total dominance of geographic information system technologies in digital approaches to humanities spatial data has brought about the major challenge of adjusting the data to the tabular format of a relational database system. In general terms, this means that ambiguities of meaning in verbal descriptions of places' whereabouts and place-names' referents have been replaced by precise GIS constants, feature coordinates, and feature types.[6] The current mainstream spatial data model represents geographical locations as a combination of places defined through coordinates and types—that is, points, lines, or polygons—and place-names stored as attribute tables.

In a recent publication, Stuart Dunn has elaborated on this "core methodological concern," stemming from the discrepancies between humanities approaches to place and place-making and the core premise of a digital gazetteer, postulating that places can be abstracted to standard geodetic systems such as WGS84.[7] Nevertheless, the standard structure of a gazetteer, developed through the work of the International Organization for Standardization, the Open Geospatial Consortium, and other actors, has become popularized through governmental, national, and international digital gazetteer infrastructures and privately owned products such as Unxos GmbH's widely used GeoNames geographical database,[8] as well as an ever-growing number of gazetteer-based services and crowdsourced contributions to digitally available geographical information.[9] Despite the concerns raised and general awareness of these issues in the field of humanities, the gazetteer model currently underlies manual geo-referencing of any type of material in almost any spatial humanities project, be it text annotation or extraction of spatial references, as well as implementation of automated geoparsing and georesolution tools in the rapidly growing named entity recognition (NER) field.[10]

There are obvious advantages of uniform, albeit somewhat inflexible, approaches to geocoded humanities data management, which evidently amplify projects' scientific values such as reliability, reproducibility, replicability, and reusability of the results. The possibility of data quantification and development of quantitative methods in otherwise qualitative fields is another direct benefit of the database approach. These positive effects cannot remedy the fact, however, that the mainstream database mindset and

6 For more details, see Gammeltoft, this volume, and Petrulevich, Backman, and Adams, "Medieval Macrospace through GIS."

7 The World Geodetic System eighty-four grid (WGS84) is a reference coordinate system developed and maintained by the United States' National Geospatial-Intelligence Agency; Dunn, *A History of Place*, 61–63. The issues have been discussed previously as well, such as in Petrulevich, Backman, and Adams, "Medieval Macrospace through GIS."

8 See www.geonames.org (accessed May 9, 2021).

9 Dunn, *A History of Place*, chap. 7; Goodchild and Hill, "Introduction to Digital Gazetteer Research"; Turner, *Introduction to Neogeography*.

10 See Dunn, *A History of Place*, 67; Won, Murrieta-Flores, and Martins, "Ensemble Named Entity Recognition (NER)."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

practices oversimplify, refine, and in some cases redefine raw data in order to make it database- and thus GIS-compatible. These issues become apparent at every intersection of humanities spatial data and a gazetteer structure, most importantly regarding aspects of naming and aspects of representation of places as geographical locations. Nevertheless, humanities scholarship on the subject has been mostly preoccupied with the latter.[11]

Instead, in this chapter, I focus on place-naming—more precisely, naming as a part of a living language tradition, be it oral or written, characterized by extensive variation. The examples drawn upon come from pre-modern literary contexts, which further complicates the already complex situation outlined above: how to combine oversimplified notions of preferably one name and one place—that is, one feature type and one set of two-dimensional coordinates—with the ambiguities regarding identification of named places and their referents in medieval literary corpora? At the same time, it is important to consider that these issues pertaining to identification and geo-referencing of named places in texts form only a subset of more general methodological concerns regarding most suitable approaches to spatial analyses of pre-modern narratives. For instance, place-names are considered to be bearing spatial elements in medieval literature, but place-names are not the only verbal spatial element at play. Languages tend to provide comprehensive linguistic resources to express spatial information and spatial relations. Place-name materials should be complemented with other spatial references, such as inhabitant designations, when a manuscript's or a textual work's spatial profiles are brought forward and analyzed.[12]

Ultimately, place-names and other types of spatial references come from living languages that humans use to interact and communicate spatial and other types of information. In analogue environments preceding the age of place-name generators, language users have coined names. Cultural and social diversity in language users coining names naturally affects produced place-name stocks. One place can have multiple official and unofficial place-names; moreover, the place-names in question can in reality denote multiple slightly different locations eventually abstracted to a single set of coordinates. These aspects of name giving briefly outlined here lead to enormous amounts of variation on multiple levels regarding, for instance, orthography and the formation of place-names. Most non-urban place-names and place descriptions go back to traditions preceding current standardized language norms, since standardization of language is a relatively recent phenomenon. For this reason, historical sources showcase considerable diversity in place-name representation. The gazetteer approach to place-name variation almost exclusively considers variation with respect to officially authorized naming. For instance, the Swedish town of Junosuando in Pajala Municipality has three official names, *Junosuando* in Swedish, *Junosuanto* in Meänkieli, and

11 To mention just a few: Dunn, *A History of Place*; Murrieta-Flores and Howell, "Towards the Spatial Analysis"; Travis, *Abstract Machine*; Tally Jr., *Literary Cartographies*.

12 For examples, see, for instance, Barker et al., "Mapping an Ancient Historian"; and Petrulevich, "The Multi-Layered Spatiality."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Čunusavvon in North Sámi. The Text Encoding Initiative (TEI) Consortium implements a somewhat more liberal approach to place-name variation and accommodates various place-name forms assigned specific temporal frames. For instance, the historical name of London, *Londinium*, is encoded as used between AD 43 and AD 1066.[13] Variation in place-names is much more than official naming in multilingual regions or a collection of name variants corresponding to specific time periods, however. In other words, there is a need for a more nuanced examination of both empirical materials and available theories and methodologies in order to define the place-name variants there are in a material, the variants there is a need for in a particular research infrastructure project, and how the variation should be processed and made available to the infrastructure's users.

Text and its possible definitions constitute a core concept to consider when pursuing a nuanced rendering of place-name variation in pre-modern literature. In spatial humanities scholarship, considerable attention is paid to treating places in texts;[14] the text itself is almost never defined, however. In this respect, recent developments in the field of philology regarding disambiguation of text as a set of different textual levels can become an invaluable contribution to the ongoing "spatialization" of vastly diverse text-based materials in the rest of the humanities.[15] The mainstream point of departure of spatial text annotation or geo-referencing a piece of literature in the tradition of literary cartography is the authoritative edition of a pre-modern text or the authoritative text. In the tradition of textual criticism, mapping an authoritative critical edition would entail mapping an abstraction that has not existed before the edition in question saw the light of day. In spatial humanities and in digital spatial infrastructure studies, the materiality of a text as a multi-level entity has not been considered, let alone operationalized—that is, given precise definitions and material representations in a database structure. Luckily, there are alternative approaches that can take a spatial project with a pre-modern focus several steps closer to relevant traditions of text production, dissemination, and consumption.

This chapter re-evaluates the ways texts and place-name variation have been theorized in spatial humanities. My ambition is not to offer an alternative database structure[16] but to showcase that it is possible to do more regarding processing of textual layers and place-names in them within the existing mainstream gazetteer framework. The basic argument for including variation as an essential characteristic of a living language can be expanded on in many ways. For instance, variation is critical to take into account in studies of textual transmission and textual criticism, genre affiliations of texts, and language change. Additionally, I believe the arguments and examples drawn upon in

13 Dunn, *A History of Place*, 62.

14 For instance, Dunn, *A History of Place*, chap. 4; Murrieta-Flores and Howell, "Towards the Spatial Analysis"; Travis, *Abstract Machine*; Lethbridge, "Digital Mapping"; Tally Jr., *Literary Cartographies*.

15 See, for instance, Bäckvall, "Description and Reconstruction"; *Skriva fel och läsa rätt?*; Backman, *Handskriftens Materialitet*; Georgieva Eriksen, *Writing and Reading in Medieval Manuscript Culture*; Wendt, "En text är en text är en text?"; "Eddan och texttermerna."

16 Nevertheless, see Gammeltoft, this volume.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

the chapter will be of use in the newly established fields such as NER, mentioned above. Non-standardized orthographies of older language varieties pose a major challenge for automated geoparsing methods.[17] Further studies on orthographic and other forms of name variation, as well as practical attempts to produce and implement adequate name data models, can facilitate development toward geoparsing without prior normalization of language varieties or place-names.

Place-Names and Place-Name Variation in Humanities Digital Spatial Infrastructures for Research

Geo-referencing medieval literary corpora for further spatial analyses requires a gazetteer or a gazetteer-like spatial research infrastructure, preferably of comparable geographical and temporal scope, such as a gazetteer of medieval Europe. Unfortunately, no such gazetteer exists today. Moreover, medieval spatial narrative is multi-layered and often alludes to sources or retells stories pertaining to other geographical areas and temporal frames; for instance, the biblical chronotope is incorporated into the medieval Old Swedish compilation *Själens tröst* (*Consolation of the Soul*). If the manuscript transmission of a textual work is considered, it becomes apparent that spatial profiles of different manuscripts or other versions of the same textual work can differ considerably from one another, both with respect to narrative structures and, thus, inclusion and omission of place-names and other spatial references, as well as place-name variation. The Old Danish version of *Consolation of the Soul*, *Sjælens Trøst*, is, for instance, a fragment that lacks references to the biblical chronotope and thus has a spatial profile different from that of its Old Swedish counterpart.[18] Accordingly, it is, by definition, almost impossible to find a perfect gazetteer match to accommodate all possible distinctive features of medieval literary works and their multiple versions.

A reasonable solution is of course to combine already available gazetteers or humanities spatial research infrastructures to cover relevant areas of a specific spatial literary project. At the same time, it is important to consider the ways in which the standard gazetteer structure discussed in the previous section has been adapted to fit in with characteristic features of pre-modern literary material. Ideally, these gazetteers would provide possibilities to account for differences in transmission of manuscript versions of a single text—in other words, a theoretically and methodologically informed way of handling place-name variation. In this section, I provide a brief overview of four infrastructure resources with a pre-modern focus that provide spatial information about named places. This overview is, of course, not comprehensive, but the resources chosen are established sources for spatial information in their respective fields of study. Moreover, at least two of them have been specifically designed and built for spatial analyses of medieval literature.

17 See, e.g., Kogkitsidou and Gambette, "Normalisation of the 16th and 17th Century Texts."

18 For detailed discussion and visualization, see Petrulevich, "The Multi-Layered Spatiality."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

The most widely used and technically mature gazetteer initiative with a pre-modern focus is the community-sustained Pleiades Gazetteer of the Ancient World, as well as the associated Pelagios project for cross-searching and linking disparate gazetteer resources.[19] The primary aim of both projects is to make it possible to create, use, and reuse historical digital geographic information through contributions from scholarly and non-scholarly communities. Pleiades, launched in the 2010s, currently contains more than 37,000 places and 34,000 place-names. Although the project's approach to gazetteer structure has been labelled as "an un-GIS for ancient geography,"[20] it still is centred on the three basic components of a standard gazetteer model: coordinates, feature types, and place-names stored as attributes. Information about variation or any other characteristics of name material can be added as alternative forms in additional tables or as notes, for instance when texts and spatial references in them are annotated with the Recogito annotation tool.[21] At the moment, however, it is unclear how this variation data from different sources can be retrieved, let alone qualitatively and quantitatively analyzed across individual sub-datasets.

The World Historical Gazetteer (WHG), launched in 2020, is a relatively recent addition to the family of historical gazetteers available on the Web. WHG is a Pelagios partner project and, for instance, includes data about more than 20,000 settlements, archaeological sites, rivers, and mountains from the Pleiades Gazetteer.[22] Consequently, the WHG guide highlights the project's awareness and appreciation of place-name variation; for example, the WHG dataset contains 133 modern and historical name variants for the contemporary city of Beijing. In standard gazetteer fashion, the alternative forms are stored in additional attribute tables and displayed as a list of variants when the dataset is manually browsed. In other words, the information on name data structure, possible hierarchies of place-name forms, and possibilities of variant quantification is missing.

The Icelandic Saga Map (ISM) platform, launched in 2014, is an infrastructure built to facilitate linear and non-linear spatial readings of medieval sagas of Icelanders as well as other works of Old Norse literature.[23] Place-name attestations in the texts available online have been geo-referenced, quantified, and mapped onto, primarily, the map of Iceland.[24] According to the project's technical description, a gazetteer-inspired tabular approach to spatial and name attribute data has been used. Additionally, the multimodal ISM resource links edited saga texts to the map and other information, such as images of

19 Barker et al., "The Pleiades Gazetteer."

20 See Dunn, *A History of Place*, 119, with further references.

21 For a presentation of Recogito, see Simon et al., "Linking Early Geospatial Documents"; and Foka et al., this volume.

22 See http://whgazetteer.org/tutorials/guide (accessed January 14, 2021).

23 For a detailed description and some case studies, see Lethbridge, "Digital Mapping"; and Lethbridge, this volume.

24 See http://sagamap.hi.is/5-technical (accessed January 14, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

places mentioned in the sagas. Any complementary information about places and place-names is included in the resource if it is available in source texts. Since philological aspects have not been a focal point of the project, however, the ISM does not provide any comprehensive overview of place-name variation on manuscript or other levels, or any discussion of theoretical or methodological tools to approach name variation in spatial research infrastructures in the digital age. In a recent publication,[25] the project leader, Emily Lethbridge, indicates an interest in incorporating place-name variation in the ISM data in the future.

Norse World is an interactive spatial-temporal resource for research on spatiality and worldviews in medieval literature from Sweden and Denmark. The resource provides access to a large corpus of geocoded spatial attestations, both place-names and other non-proprial location-based data from medieval East Norse texts. The data can be filtered by fifteen filters applied separately or in combination, such as by date, source, work, type of place-name, or language. The filtered dataset can then be downloaded in CSV format.[26] As expected, the platform also uses the standard relational database structure centred on spatial data and linguistic data stored in corresponding attribute tables. Norse World has been designed to handle place-name variation in medieval literary tradition within the frame of the mainstream gazetteer approach, however. The theory and methods behind the resource's original, variant, lemma, and standard forms are explained in the following section. The Norse World platform was launched 2018, but the project is still ongoing. More data are being constantly added; moreover, several minor improvements to the name data model are planned for the coming years.

The Norse World Approach to Place-Name Variation

The focus on place-name variation across textual witnesses of medieval Swedish and Danish texts has been one of the cornerstones of the general framework of the Norse Perception of the World project[27] since its inception in 2016. The main reason behind the choices of theory and methodologies in approaching place-name material in the Norse World platform presented in the previous section has to do with the significance of intra-, inter-, and cross-textual variation for the discussion of relationships between textual witnesses of one work or different works (see "Place-Name Variation and Textual Criticism" section below), genre (see "Place-Name Variation and Genre" section), and language variation and change (see "Place-Name Variation and Language Change" section). Moreover, Norse World was conceived as an interactive resource for a wide interdisciplinary audience with the aim of promoting the study of spatiality and

25 Lethbridge, "Digital Mapping."

26 For presentations of the resource and its approaches to data, data reuse, and interoperability, see Petrulevich and Skovgaard Boeck, this volume; Petrulevich, Backman, and Adams, "Medieval Macrospace through GIS"; and Backman and Smith, this volume.

27 IN16-0093:1; funded by the Swedish Foundation for Humanities and Social Sciences, Riksbankens Jubileumsfond, from 2017 to 2022; see Petrulevich and Skovgaard Boeck, this volume.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

worldviews in the East Norse literary corpus in a broader sense. I am convinced that any interdisciplinary endeavour stemming from the analysis of pre-modern textual material has to take into account and interpret the empirical foundation of such a study deeply rooted in variation.

The Norse Perception of the World project has chosen a dynamic, contextual definition of place-names in accordance with its ambition to acknowledge the meaning-making function of each instantiation of spatial references in a text across a spectrum of contexts (textual, historical, social, etc.) and to ensure that the material can be used as the gateway to analyses of how spatiality and worldviews are constructed, perceived, and imagined in the East Norse literary corpus. Place-names, their referents, and their geographical whereabouts are thus identified contextually through close reading of textual witnesses in a text bearer or edition.[28] For instance, in the Old Swedish *Konung Alexander* (*The Romance of Alexander the Great*), two cities under the command of the inhabitants of the city of Tyre in Lebanon, "Cecilia" and "Rodis," are mentioned. The episode has a parallel in the Orosius recension of the *Incipit liber Alexandri Magni regis Macedoniae de preliis* by the Neapolitan Archpresbyter Leo;[29] the Latin text refers to the islands of Sicily and Rhodes in the corresponding passage, however. In accordance with the principle outlined above, the Norse World resource uses the information in the vernacular source as the point of departure for categorizing and visualizing the material. Consequently, the fictive cities "Cecilia" and "Rodis" are visualized as being located in Lebanon.[30]

At the planning stage of the project, three priority areas regarding the project's data and their presentation were identified. The Norse World platform is to provide textual context for spatial references (both place-names and non-names), an overview of orthographic variation in the material, and normative lemma forms to further epitomize place-name attestations. The first priority emphasizes the importance of textual context in many fields, such as philology, linguistics, and history, where direct access to primary sources is a prerequisite of almost any study. The second priority of the project builds upon an idea that an overview of orthographic variants of place-names and their frequencies in one or more texts, languages, genres, or particular time periods has the potential to elucidate scribal practices and genre conventions as well as to trace possible cases of language change. It is hard to gain an insight into orthographic variation in a large place-name dataset without an adequate tool. In addition, gaining quick access to variation in spelling is not simply a matter of representation or user interface design, since the ambition requires a set of normalization principles and an analysis and editorial processing of each attestation. Finally, the project's third priority aims to fill the gap in lemmatization and normalization of East Norse vocabulary, since East Norse

28 Petrulevich et al., "Editing Principles."

29 Leo, *Die Historia*, 63b.

30 Petrulevich, "Cecilia"; "Rodis." See Petrulevich and Skovgaard Boeck, this volume, for more information about visualization principles.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

place-name material has never been lemmatized in its entirety. Although the influential dictionaries of Old Swedish and Old Danish, by Söderwall[31] and Gammeldansk Ordbog[32] respectively, contain some lemma forms of place-names, the Norse Perception of the World project has in most cases done pioneering work by coining normalized lemmata of foreign place-names attested in East Norse manuscripts.[33]

In accordance with the considerations above, the representation of vernacular place-names in the Norse World infrastructure builds upon a tripartite model of manifestation levels in ascending order in terms of abstraction that distinguishes between an original form, a variant form, and a lemma form of a name; see Figure 11.1 and the project's editing principles.[34] The three manifestation levels of place-names are ultimately linked to spatial data via the so-called standard form—that is, the most commonly used form of the place-name in the English language (in some cases Old Swedish and Old Danish forms are used as standard forms);[35] the standard form metadata thus include information about coordinates and type of locality.

Original forms of place-names constitute the project's "raw" data and represent name attestations in their immediate textual context transcribed diplomatically with abbreviations expanded in italics. In other words, this level of manifestation is the closest to actual iterations of spatial references in the project's sources. Unfortunately, the availability of electronic editions of East Norse manuscripts is still scant; in those few cases where such material is available, it is often offered in a form or format incompatible with the ambition to link spatial references in the edition to the Norse World dataset. Original forms are thus typed manually into the database. Accordingly, the amount and detail of the context provided vary, but they always include a prepositional phrase if a name is a part of such a phrase or the information on the type of locality if such information is provided in the textual witness; for instance, *Ridh til pariis* ("Ride to Paris"), where *pariis* is an attestation of Paris, and *beesæther slottin wyborgh och oloffs borgh* ("provides the castles Vyborg and Olofsborg with a garrison"), where *wyborgh* and *oloffs borgh* refer to the medieval Swedish castles of Vyborg and Olofsborg respectively.

Original forms lie at the core of the Norse World infrastructure, since they provide the basis for the metadata, including two-step normalization, represented by variant forms and lemma forms. Variants are abstractions grounded in one or more similar place-name attestations that appear in one or more textual witnesses of one or more texts. These are thus slightly normalized: they always appear in the nominative case, start with a capitalized letter, and are written as one word in the case of compounds. The primary function of this manifestation level is to provide an overview of spelling

31 Söderwall, *Ordbok öfver svenska medeltids-språket*.

32 See https://gammeldanskordbog.dk (accessed January 15, 2021).

33 As well as some non-names overlooked by the dictionaries, such as Old Swedish *beiare* ("Bavarian").

34 Petrulevich et al., "Editing Principles."

35 Petrulevich, Backman, and Adams, "Data and Metadata."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

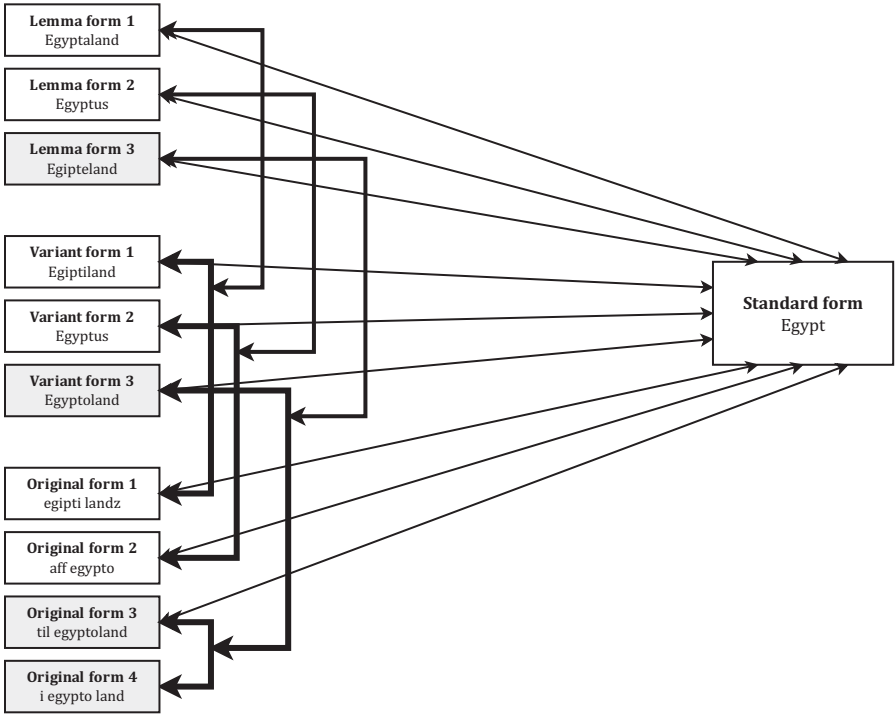


Figure 11.1. The place-name data structure employed by the Norse World infrastructure. Original, variant, and lemma forms in Old Swedish are marked by diagonal lines, while the corresponding material in Old Danish is marked by dots. Different line sizes are used to represent links between the different forms; thin lines link original and variant forms, medium-thickness lines link variant and lemma forms, and thick lines link original, variant, and lemma forms with the corresponding standard form. Image by Alexandra Petrulevich.

variation in the material in accordance with the assumed needs of target user groups outlined above; see, for instance, some of the twenty-six Old Danish variant forms associated with the standard form "France"; *Franckærigæ*, *Franckærighe*, *Franckærygæ*, *Franckærigi*, and *Franckerigæ*.

A place-name lemma is defined as a normalized form constructed on the basis of the collected variants and corresponding original forms, as well as place-name attestations found in sources not covered by the project. According to the project's main principle, a new place-name formation gives a new lemma form.[36] For instance, Old Danish *Egipteland* and *Egipterike* represent different name formations (see the two different generics: *-land* ["land"] and *-rike* ["kingdom"] respectively), and thus form separate

36 Petrulevich et al., "Editing Principles."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

lemmata linked to the standard form "Egypt." Orthographic variation that results in possible reinterpretations of place-names is usually analyzed as a new name formation, and thus gives a new lemma form. For example, *drakensell*, lemmatized as *Drakanselder*,[37] refers to the castle Drachenfels in the Old Swedish version of *Didrik av Bern* (*Didrik of Bern*) in the manuscript Stockholm, National Archives, E 9013, folio 100v; this form can be seen as a possible scribal error that nevertheless results in reinterpretation of the form *Drekafils* attested in the same manuscript on folio 61v.[38] Isolated forms that we consider scribal errors without further consequences regarding re-interpretation are not provided with separate lemma forms. It is necessary to point out that no difference is made between assumed deliberate changes and unconscious spelling mistakes resulting in re-interpretation since such distinction is in the end impossible to uphold.[39]

The distinctions regarding the manifestation levels of place-names made in the Norse World infrastructure are a further development of the model used to describe variation in a West Norse name dataset, namely Wendish place-names attested in the manuscripts of *Knýtliga saga*.[40] The major difference between the two instantiations of the model based on similar principles concerns the definition of the highest level of abstraction. Under the original conditions, the most abstract level corresponds to that of a name defined etymologically. Consequently, this implies that variation regarding name formation is accounted for at the variant level, such as the West Norse variants *Kotskogaborg* and *Kotskogur* representing two different name formations that denote the same Slavic fortification in the vicinity of the town of Gützkow in Mecklenburg-Vorpommern, Germany. The model is thus robust enough to be adjusted to the needs of a variety of projects with an interest in place-name variation that nonetheless differ regarding priorities and set-ups.

In general, the model offers a useful theoretical and methodological approach to place-name variation in pre-modern written sources. The distinction made between different manifestation levels of a name helps researchers to explicate their reasoning about any underlying normative standpoints regarding their data as well as (scribal) errors in it. It is a sad fact that name datasets are almost never considered when philologists define and discuss textual errors of different kinds.[41] At the same time, the etymologically defined name level traditionally represents the only significant manifestation of a name in place-name studies. Variation in place-name material can become the subject of an etymological analysis provided that the "scribal error," or otherwise etymologically secondary form, increases in frequency—and in some cases

37 The appellative meaning of the name can be rendered as "dragon's fire."

38 Marklund, "han kom till et slot"; and "then vij^{e} dag kom han till en skog"; see Petrulevich, Backman, Skovgaard Boeck, Adams, and Marklund, "Editing Principles," for further details on the normalization of lemma forms.

39 See Wakelin, *Scribal Correction and Literary Craft*, 53–63.

40 For definitions and more information, see Petrulevich, *Ortnamnsanpassning som process*.

41 Petrulevich, *Ortnamnsanpassning som process*, 71; "Med ortnamnsvarianten i centrum," with references. There are much-appreciated exceptions, however; see, e.g., Hjorth, *Filologiske studier*; and McDonald Werronen, *Popular Romance in Iceland*.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

even outcompetes—the original form in speech or writing. For studies specifically targeting name variation, the distinction between the three manifestation levels is a necessity that makes the whole research enterprise possible. What variants can be found in the material? Does the variation affect only orthography, or possibly even name formation? How can the variation be explained? For instance, in an earlier study I was able to differentiate between scribal errors and adaptations in writing in place-name material collated from multiple early modern Icelandic copies of the same work through an analysis of place-name attestations according to the model's principles.[42] The initial classification of attestations into variants and etymological names or name lemmata showcases the analytical potential of the model, since it requires that researchers pre-define these categories in accordance with the posed research questions and/or assumed user groups' needs.

Ultimately, the model has been inspired by Bo Wendt's work[43] on manifestations of a text, or a set of so-called textual levels, that has influenced much of the recent scholarship produced under the label of "new" philology—that is, descriptive or material philology—in Scandinavia, and especially Sweden.[44] The posed association with "new" philology is not a coincidence, since the approaches to medieval text, its production, consumption, and use that belong to this philological umbrella celebrate variance as the essence of medieval literature, an outlook that shines through in both the terminology employed and the editing practices used. In other words, the never-ending quest for the "ideal" lost copy of a text or the archetype gives way to analyses and appreciation of every iteration of the text in its own right.

Wendt argues for a differentiation between three principal textual levels—work, witness, bearer—arranged in descending order in terms of abstraction. In other words, the work as the highest level of abstraction is grounded in one or more textual witnesses, while a textual witness is in its turn grounded in the only empirically attested manifestation of a text—that is, the text bearer, a manuscript, or another physical artefact.[45] The tripartite model is an attempt to facilitate analytical thinking about the term "text" as researchers use it, to pinpoint the most significant differences in the term's meanings and offer robust terminology to account for those differences. Consequently, the model allows us to distinguish between and examine variation affecting different textual levels as well as to choose adequate descriptive tools and explanations to analyze observed variants.

The principal criterion underlying the hierarchical division between place-name attestation, variant, and a place-name lemma or an etymological place-name is the level

42 Petrulevich, *Ortnamnsanpassning som process*, 68–72.

43 Wendt, "En text är en text är en text?"; "Eddan och texttermerna."

44 Williams, "Förnyad filologi," 282–91; Haugen, "Tekstkritikk og tekstfilologi," 82–88; Bäckvall, *Skriva fel och läsa rätt?*, 44–52; "Description and Reconstruction"; Georgieva Eriksen, *Writing and Reading in Medieval Manuscript Culture*, 7–10; Backman, *Handskriftens Materialitet*, 18–22.

45 For a more in-depth discussion and examples, see Wendt, "En text är en text är en text?," 258–63; and Bäckvall, *Skriva fel och läsa rätt?*, 37–39; "Description and Reconstruction," 21–22.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

of abstraction and normalization, which corresponds to the prerequisites of Wendt's model. The manifestation levels of the name are based on formal characteristics of the analyzed data items and their normalizations, however, and are not anchored in assumed needs or perceptions of name users. According to Maja Bäckvall,[46] text users and their hypothesized perceptions of a text at the different levels play a major role in the distinction between work, witness, and bearer outlined above, since, for instance, a textual witness cannot exist independently of its reader. Additionally, the manifestation levels of place-names are arranged in ascending order in terms of abstraction so as to underline the importance of the empirical foundation of the model—that is, place-name attestations.

Place-Name Variation and Textual Criticism

Handbooks of philology and textual criticism rarely include chapters that provide an in-depth discussion of the significance of names and name variation in editorial practice or other applications of textual criticism methods.[47] Scholarly literature provides many cases of philological arguments either making use of propria to strengthen their rationale or based on name variation alone, however.[48] Two basic aspects of name use are of importance here: inclusion or omission of a name or set of names in a particular context; and choices of name variants or name lemmata to identify specific locations. According to the principal assumption that underlies analyses of name variation in textual criticism, there is a direct connection between choices of names and/or name forms, on the one hand, and transmission histories of texts, on the other. As Sheryl McDonald Werronen[49] puts it, examination of name use across a corpus can serve as a diagnostic tool to gain an overview of manuscript transmission and potential groupings of witnesses of a text.

To take one example, heated debates concerning the relationship between three medieval texts—the West Norse *Knýtlinga saga* (1253–1259), Saxo Grammaticus' *Gesta Danorum* (1190–1208), and Helmold's *Chronica Slavorum* (1163–1172)—frequently draw on name evidence to build or deepen the argument.[50] The saga includes in many cases much more detailed information on where the events take place and who partakes, the evidence omitted in the closest related, older text, *Gesta Danorum*. *Knýtlinga saga*, for instance, explicitly names the fortification, Urk, where the Danes fought a battle against the Obodrites and killed their leader. Since the only other source that includes the name of the site is Helmold's chronicle, the occurrence of the place-name "Urk" becomes one

46 Bäckvall, *Skriva fel och läsa rätt?*, 39; Bäckvall, "Description and Reconstruction," 22.

47 See, e.g., West, *Textual Criticism*; and Kondrup, *Editionsfilologi*; although Haugen, *Handbok*, contains a chapter on names, etymological—rather than philological—aspects are considered there.

48 Hjorth, *Filologiske studier*, 153–54; Pálsson, "Reflections," 208, 212; McDonald Werronen, *Popular Romance in Iceland*, chap. 1, 48–51.

49 McDonald Werronen, *Popular Romance in Iceland*, 31, 48–51.

50 Weibull, *Saxo*; Albeck, *Knytlinga*; Weibull, "Knytlingasagan och Saxo"; Halldórsson, "Um Danakonunga Sögur"; Bjarni Guðnason, *Danakonunga Sǫgur*.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

of the major pieces of evidence for *Knýtlinga saga* making use of *Chronica Slavorum*.[51] This example shows that an overview of name use in texts, copies of texts, and different text redactions in a comparative perspective is an important area of application of any humanities spatial research infrastructure.

The place-name variant *Frankaríki* ("France") used in the manuscript London, the British Library, Add. 4860 fol., is discussed at length in McDonald Werronen's monography on the Old Icelandic *Nítíða saga*. The form itself appears unusual, since the other witnesses of the saga make use of the more frequent lemma, *Frakkland*, to denote France. According to the author's hypothesis, *Frankaríki* is best analyzed as an unusual Icelandic reinterpretation of the Latin *Francia*. The place-name form *Frankaríki* thus becomes an important piece of evidence revealing either the "old medieval roots" of this version of the saga or "a conscious desire to present the text as archaic."[52]

In cases such as this, overviews of place-name variation in humanities spatial or other types of research infrastructures become invaluable resources. The Dictionary of Old Norse Prose lists eight attestations of *Frankaríki* excerpted from several Icelandic sources,[53] though the structure of the resource does not provide immediate access to all the lemmata denoting France and their frequencies in the West Norse corpus.[54] In the East Norse material, *Frankarike* in Old Swedish and *Frankerike* in Old Danish are the most common lemma forms associated with France.[55] Based on this evidence, I would instead suggest that *Frankaríki* is an original native construction containing the inhabitant designation "Frank" in genitive plural in the specific: *franker* and *frakki*[56] ("Frank") in East Norse and West Norse respectively. There are multiple examples of comparable name formations, such as *Egyptarike*, *Romararike*, *Iudhaland*, *Vilkinaland*, etc., in both East and West Norse. If this interpretation is accepted, the place-name lemma *Frankaríki* cannot be used as evidence for possible "old medieval roots" or archaization tendencies if the roots or tendencies in question indicate Latin textual tradition.

Place-Name Variation and Genre

In recent years the discussion of generic characteristics and generic affiliations of literary works—or, rather, their instantiations in surviving manuscript tradition—has become predominant in the field of medieval literature, especially its West Norse and East Norse subfields. Many of the now mainstream views regarding genre are inspired by the influential

51 Weibull, *Saxo*, 218–33; Albeck, *Knytlinga*, 256–58; Bjarni Guðnason, *Danakonunga Sǫgur*, 176.

52 McDonald Werronen, *Popular Romance in Iceland*, 49.

53 See https://onp.ku.dk/onp/onp.php?o23578 (accessed January 15, 2021); see also Metzenthin, *Die Länder- und Völkernamen*, 28.

54 ISM cannot be used for this type of query either; see discussion of the resource above.

55 Forty-seven and thirty-seven attestations respectively. The Old Swedish dataset comprises sixty attestations of France, while the Old Danish counterpart includes forty-two attestations; both were downloaded on February 1, 2021.

56 Without the assimilation of the nasal in the *-nk-* cluster when used as the specific.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

work of the Romanist Hans Robert Jauss, who advocates a descriptive approach to genres best understood "as *groups* or *historical families*."[57] This descriptive stance has driven the scholarly community toward a more theorized work with actual empirical evidence that acknowledges and brings to the fore genre dynamics, be it cross-genre influences across a literary corpus or genre hybridities within the binders of a multi-text manuscript.

However fruitful the study of genre as a dynamic concept might be, the more traditional, static genre definitions have preserved their relevance—albeit contested—as classification tools for disclosing macrostructures in large literary corpora. Dynamic genre definitions easily become impracticable when, for instance, used to assign category to seventy East Norse works preserved in nearly two hundred manuscripts. This is the main rationale behind the Norse Perception of the World project's decision to employ a traditional genre taxonomy as the base for the genre filter of its interactive platform. This genre classification stems from major editions and commentaries of East Norse literary works, such as the principal edition series of Old Danish and Old Swedish texts published by Samfund til Udgivelse af Gammel Nordisk Litteratur, the Universitets-Jubilæets danske Samfund, and Svenska fornskriftsällskapet respectively.

Analysis of place-name variation can become a relevant complement in both traditional and more nuanced descriptive genre discussions. For instance, there seem to be a bias toward three-syllable name forms in versed works, especially romances, compared to the rest of the East Norse corpus or other relevant sources. The manuscript Stockholm, National Library of Sweden, K 4, contains four attestations associated with the standard form "England"; these correspond to two lemma forms, *Ængland* and *Ængeland*. The two-syllable variant is preserved in the prose work *Stenbog* (*Lapidary*), while the three-syllable form is attested in the verse romance *Ivan Løveridder* (*Yvain, the Knight of the Lion*). A quick look at the rest of the Old Danish sources at present available in the Norse World resource shows that the two- and three-syllable variant forms are evenly distributed.[58] The verse romances clearly favour the three-syllable variant. The distribution of variants in the different versions of *Rimkrøniken* (*The Rhymed Chronicle*) is more complex; the two-syllable form is preferred in two of three manuscript witnesses.

The suggested preference of three-syllable variants in versed works might partially explain the unexpected distribution of variants of the standard form "Norway" in the oldest rhymed chronicle in Old Swedish, *Erikskrönikan* (*The Chronicle of Duke Erik*). The empirical evidence of medieval Norwegian charters suggests that the etymologically original *Noregr* yielding three-syllable forms when declined in oblique cases such as *Noregi* and *Noregis* gave way to the contracted form *Norge* due to East Norse influence.[59] The contracted variants first appeared as early as the fourteenth century, increased in

57 Jauss, "Theory of Genres and Medieval Literature," 131.

58 Thirty-nine attestations each; the dataset, comprising seventy-eight attestations in total, was downloaded on February 1, 2021.

59 Sandnes and Stemshaug, *Norsk stadnamnleksikon.*

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

popularity in the fifteenth century, and finally outrivalled *Noreg*(*r*) in the century that followed. The Old Swedish manuscripts of the chronicles stemming from the fifteenth and the sixteenth centuries demonstrate a clear preference for the conservative lemma form *Noreg*, however, attested 105 times.[60] These examples show that name evidence opens a new dimension for descriptive, dynamic approaches to genre.

Place-Name Variation and Language Change

Historical linguistics can become another exciting area of application of general surveys of place-name variation provided by humanities digital spatial research infrastructures. Although etymological analyses of names have played a significant role in the field since its establishment, the empirical validity of name datasets in studies of language change has been downplayed or neglected.[61] Names are unpopular in linguistics, as they are infrequent elements of language to which some ascribe peculiarities in development, unlike the rest of the lexicon.[62] The focus on etymology of single names and a clear tendency to eliminate "insignificant" variants in traditional onomastics is another considerable obstacle on the way toward a more inclusive approach to language change based on all the available empirical data.

Variance in name datasets can become an important complement in discussion of ongoing language change.[63] To illustrate my point, I analyze one major observation made in the Norse World data: orthographic place-name variation in Old Danish expressed in raw numbers is greater than that in Old Swedish. Measuring variation in language can easily become controversial, because language data are not normally distributed;[64] for this reason, no inferential statistics is employed here.[65] An overview of the five most frequent place-names in both languages shows that the standard form "Norway" is associated with ten variants in Old Swedish and twelve variants in Old Danish; "Jerusalem" with seven and eight; "Egypt" with eleven and sixteen; "Rome" with five and seven; and, finally, "France" with twelve and twenty-six variants respectively. The differences are, admittedly, quite insignificant, but they are still worth investigation

60 Eighteen attestations of the lemma form *Norge*. The dataset, comprising 123 attestations, was downloaded on February 1, 2021.

61 Most handbooks in historical linguistics do not include chapters on onomastics; see, e.g., Ringe and Eska, *Historical Linguistics*. Most studies do not specifically include name data, with few exceptions: e.g., Wetås, *Kasusbortfallet i mellomnorsk*.

62 See discussion in Coates, "Names and Historical Linguistics."

63 See the examination of morphological change in Wetås based on both onomastic and non-onomastic material: Wetås, *Kasusbortfallet i mellomnorsk*.

64 Kelih and Mačutek, "Quantitative Methods in Linguistics"; Kretzschmar, *Language and Complex Systems*, chap. 7.

65 Note, however, Petrulevich, "Med ortnamnsvarianten i centrum."

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Table 11.1 Overview of Old Swedish and Old Danish variant forms associated with the standard form "France" from the most frequent to the least in the Norse World resource. The datasets were downloaded on February 1, 2021.

Old Swedish variant form	Number of attestations	Old Danish variant form	Number of attestations
Frankarike	35	Franckerigy	6
Franz	10	Frankarige	6
Frankeriike	3	Frankærygæ	3
Frankerike	3	Frankerige	3
Frankarikæ	2	Frankærighe	2
Frankerik	1	Franckerigi	2
Frankariike	1	Frankærigæ	1
Frankarik	1	Frankeryghe	1
Frankariik	1	Galiæ	1
Frankærika	1	Franckerige	1
Walskalandh	1	Frankerighe	1
Frandz	1	Frankæriighæ	1
		Franckærygæ	1
		Franckerigæ	1
		Franckærigæ	1
		Frantzen	1
		Frantz	1
		Frans	1
		Frandsz	1
		Franckerigh	1
		Franckerig	1
		Frankerigy	1
		Franckærigi	1
		Frankerigi	1
		Franckerighy	1
		Fran	1

given the fact that the Old Swedish part of the corpus consists of 4,050 attestations of spatial references, almost twice as many as its Danish counterpart.[66]

The most striking example, that of France, deserves a closer look. Variant forms associated with this standard form in Old Swedish and Old Danish presented in Table 11.1 can be divided into three categories: a) probable scribal errors, such as *Fran*; b) spelling

66 There were 2,490 attestations of spatial references in Old Danish. The dataset was downloaded on February 1, 2021.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

variants of less frequent lemma forms, such as *Walskalandh*; and c) spelling variants of lemma forms that the majority of the attestations belong to. In Old Swedish, there are nine spelling variants of the most frequent lemma, *Frankarike*, among which *Frankarike* is the most frequent.[67] The situation in Old Danish is rather different, because there does not seem to be any conventional, most popular spelling of the most frequent lemma, *Frankerike*. On the contrary, the two most frequent variants, *Franckerigy* and *Frankarige* respectively, are attested only six times each; the majority of other spellings appear in the corpus only once.[68]

The abundance of variants of the lemma form *Frankerike* in Old Danish manuscripts requires an explanation. Of course, pure orthographic conventions have affected the spelling situation, such as the doubling of letters to indicate long vowels (e.g. *Frankæriighæ*) or the interchangeable use of the letters ⟨i⟩ and ⟨y⟩ to indicate the high front vowel (e.g. *Frankeryghe*).[69] The orthographic heterogeneity in this case has its roots in the ongoing phonological language changes in the Danish language of the period, however, namely a reduction in unstressed syllables and the introduction of the schwa sound, as well as the so-called weakening of stops and its subsequent developments.

Weakening of unstressed vowels in Danish is attested early, from about 1100.[70] Attestations of *Frankerike* reflect the uncertainties regarding the spelling of the new vowel, written both as ⟨æ⟩ and ⟨e⟩ in the centuries that followed. Interestingly, this material complements the description of the development in reference literature; the vowel /i/ is stated to be preserved when it follows a velar consonant as in the word *riki* ("kingdom"), at least in the early medieval period.[71] The final vowel of the compound name is most often spelled with a schwa,[72] however, if it is not omitted altogether, as in *Franckerigh*.[73] The interchangeable use of ⟨g⟩ and ⟨gh⟩ in the material reflects the spirantization of the voiced stop to [ɣ], a subsequent change that followed the voicing of the original /k/.[74]

---

67 Thirty-five out of sixty attestations. The variant form *Franz*, with ten attestations, is the second most frequent variant form. The dataset was downloaded on February 1, 2021.

68 Twenty out of twenty-six variant forms in a dataset of forty-two attestations appear only once. The dataset was downloaded on February 1, 2021.

69 It has been suggested in literature that this variation could reflect the rounding of /i/; the spelling conventions provide a more likely explanation, however; see Karker, "123. Phonological Developments," 1098.

70 Riad, "102. The Phonological Systems," 896, 899.

71 Riad, "102. The Phonological Systems," 899; see also Karker, "123. Phonological Developments," 1098.

72 The final vowel in the lemma form *Frankerike*, attested eighteen times, is spelled six times as ⟨æ⟩ and six times as ⟨e⟩, as well as three times as ⟨i⟩ and three times as ⟨y⟩.

73 See Karker, "123. Phonological Developments," 1098.

74 Riad, "102. The Phonological Systems," 904–5.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Final Remarks

In this chapter I have argued that the standard structure of a digital gazetteer has informed much of the recent digital spatial infrastructural work in the humanities; the approach in question ultimately collapses the complex aspects of place-name data and its transmission into, preferably, one place-name attribute per location scheme. Although humanities scholars have been well aware of the methodological concerns associated with the introduction of GIS technologies and tabular relational database systems into humanities data management and analyses, place and space have been—and still are—the main area of interest for critical discussion in spatial humanities. This chapter has instead dealt with aspects of place-name data modelling, a facet of humanities digital spatial research infrastructures that has been overlooked previously. As the survey of place-name representation in digital spatial resources with pre-modern focus, such as the Pleiades Gazetteer of the Ancient World and others, has shown, place-name variation is often not a focal point of the projects; even if alternative or variant forms are included, these are seldom categorized in a methodologically meaningful way in order to enable further qualitative and quantitative analyses.

I see variation as an essential feature of a living language that has to be accounted for irrespective of the area of application of language data. The chapter's survey of the relevance of place-name variation relies heavily on philological and linguistic arguments and applications of variation data and analysis tools available at the Norse World platform. I am convinced, however, that a comprehensive survey of variation at different textual levels will benefit any humanities study based on pre-modern texts as empirical data. The Norse World platform has operationalized and consequently implemented variant and lemma forms to process the raw attestation data in order to meet the needs of its users. As I have shown, the suggested model is robust enough to be adjusted to the requirements of projects with both similar and different focuses by fine-tuning the definitions and operationalizations in accordance with the project's needs and set-up. The most important after-effect of employing the place-name data model is that the project team is forced to approach their textually coded spatial data and research questions critically to establish the textual levels, and thus types of variation, that are of importance.

It is impossible to approach variation in textual material without theorizing and operationalizing the concept text. Spatial humanities has not paid that much attention to the materiality of text as a complex entity; there are always choices to be made with respect to textual level and amount of detail that inevitably influence the achieved results. This chapter re-evaluates the current approach and offers a theoretically and methodologically informed alternative. I have shown that it is clearly possible to do more regarding variation in language data within the frame of the traditional gazetteer approach. There is, in other words, no need to rely on the authoritative text alone. I do not mean that the place-name data model presented in the chapter is the only possible way to solve this task, though. On the contrary, I think that there are other possible ways of approaching place-name data yet to be explored.[75] I hope, however, that I have placed

75 See Gammeltoft, this volume.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

the materiality of text and the spatial data in it, place-names included, higher up on the spatial humanities agenda.

Bibliography

Albeck, Gustav. *Knytlinga: Sagaerne om Danmarks konger: Studier i ældre nordisk litteratur*. Copenhagen: Nyt nordisk forlag, 1946.

Backman, Agnieszka. *Handskriftens materialitet: Studier i den fornsvenska samlingshandskriften Fru Elins Bok (Codex Holmiensis D 3)*. Uppsala: Institutionen för nordiska språk, Uppsala University, 2017.

Bäckvall, Maja. "Description and Reconstruction: An Alternative Categorization of Philological Approaches." In *Philology Matters! Essays on the Art of Reading Slowly*, edited by Harry Lönnroth, 21–34. Leiden: Brill, 2017.

——. *Skriva fel och läsa rätt? Eddiska dikter i Uppsalaeddan ur ett avsändar- och mottagarperspektiv*. Uppsala: Institutionen för nordiska språk, Uppsala University, 2013.

Barker, Elton, Stefan Bouzarovski, Christopher Pelling, and Leif Isaksen. "Mapping an Ancient Historian in a Digital Age: The Herodotus Encoded Space-Text-Image Archive (HESTIA)." *Leeds International Classical Studies* 9 (2010): 1–36.

Barker, Elton, Pau de Soto Cañamares, Leif Isaksen, and Rainer Simon. "The Pleiades Gazetteer and the Pelagios Project." In *Placing Names: Enriching and Integrating Gazetteers*, edited by Merrick Lex Berman, Ruth Mostern, and Humphrey Southall, 97–109. Bloomington: Indiana University Press, 2016.

Bjarni Guðnason. *Danakonunga Sǫgur*. Reykjavík: Hid islenzka fornritafelag, 1982.

Coates, Richard. "Names and Historical Linguistics." In *The Oxford Handbook of Names and Naming*, edited by Carole Hough, 525–39. Oxford: Oxford University Press, 2016.

Dictionary of Old Norse Prose. https://onp.ku.dk/onp/onp.php?o23578 (accessed January 15, 2021).

Dunn, Stuart. *A History of Place in the Digital Age*. Abingdon: Routledge, 2019.

Gammeldansk Ordbog. https://gammeldanskordbog.dk (accessed January 15, 2021).

GeoNames. www.geonames.org (accessed May 9, 2021).

Georgieva Eriksen, Stefka. *Writing and Reading in Medieval Manuscript Culture: The Translation and Transmission of the Story of Elye in Old French and Old Norse Literary Contexts*. Turnhout: Brepols, 2013.

Goodchild, Michael Frank, and Lauren L. Hill. "Introduction to Digital Gazetteer Research." *International Journal of Geographical Information Science* 22 (2008): 1039–44.

Halldórsson, Ólafur. "Um Danakonunga Sögur." *Gripla* 7 (1990): 73–102.

Haugen, Odd Einar, ed. *Handbok i norrøn filologi*. Bergen: Fagbokforlaget, 2013.

——. "Tekstkritikk og tekstfilologi." In *Handbok i norrøn filologi*, edited by Odd Einar Haugen, 2nd edn., 76–126. Bergen: Fagbokforlaget, 2013.

Hjorth, Poul Lindegård. *Filologiske studier over Karl Magnus' krønike*. Copenhagen: Schultz, 1965.

Icelandic Sagamap. http://sagamap.hi.is/is (accessed January 14, 2021).

——. "Technical Information." http://sagamap.hi.is/5-technical (accessed January 14, 2021).

Jauss, Hans Robert. "Theory of Genres and Medieval Literature." In *Modern Genre Theory*, edited by David Duff. London: Pearson Education, 2000.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Karker, Allan. "123. Phonological Developments from Old Nordic to Early Modern Nordic II: Danish." In *The Nordic Languages. An International Handbook of the History of the North Germanic Languages*, vol. 2, edited by Oskar Bandle, Kurt Braunmüller, Ernst Håkon Jahr, Allan Karker, Hans Peter Naumann, Ulf Teleman, Lennart Elmevik, and Gun Widmark, 1097–1102. Berlin: De Gruyter Mouton, 2005.

Kelih, Emmerich, and Ján Mačutek. "Quantitative Methods in Linguistics." *Journal of Quantitative Linguistics* 17 (2010): 74–79.

Kogkitsidou, Eleni, and Philippe Gambette. "Normalisation of the 16th and 17th Century Texts in French and Geographical Named Entity Recognition." In *GeoHumanities 2020: Proceedings of the 4th ACM SIGSPATIAL Workshop on Geospatial Humanities*, edited by Ludovic Moncla, Patricia Murrieta-Flores, and Carmen Brando, 28–34. New York: Association for Computing Machinery, 2020.

Kondrup, Johnny. *Editionsfilologi*. Copenhagen: Museum Tusculanum, 2011.

Kretzschmar, William A. *Language and Complex Systems*. Cambridge: Cambridge University Press, 2015.

Leo. *Die Historia de preliis Alexandri Magni (Der lateinische Alexanderroman des Mittelalters): Synoptische Edition der Rezensionen des Leo Archipresbyter und der interpolierten Fassungen J1, J2, J3*, 2 vols. Edited by Hermann-Josef Bergmeister. Meisenheim am Glan: Hain, 1975.

Lethbridge, Emily. "Digital Mapping and the Narrative Stratigraphy of Iceland." In *Historical Geography, GIScience and Textual Analysis. Landscapes of Time and Place*, edited by Charles Travis, Francis Ludlow, and Ferenc Gyuris, 19–32. Cham: Springer, 2020.

McDonald Werronen, Sheryl. *Popular Romance in Iceland: The Women, Worldviews, and Manuscript Witnesses of Nítíða Saga*. Amsterdam: Amsterdam University Press, 2016.

Marklund, Felix. "han kom till et slot. som **drakensell** het." https://norseworld.nordiska.uu.se/index.php?type=attestation&id=11455 (accessed January 15, 2021).

——. "then vij^{e} dag kom han till en skog. som kallas ossyen ther lag et slot nær som **drekafils** het / thet slot atte en konung. drocian het / han war tha død." https://norseworld.nordiska.uu.se/index.php?type=attestation&id=10933 (accessed January 15, 2021).

Metzenthin, Esther Marie. *Die Länder- und Völkernamen im altisländischen Schrifttum*. Bryn Mawr: Bryn Mawr College, 1941.

Murrieta-Flores, Patricia, and Naomi Howell. "Towards the Spatial Analysis of Vague and Imaginary Place and Space: Evolving the Spatial Humanities through Medieval Romance." *Journal of Map & Geography Libraries* 13 (2017): 29–57.

Pálsson, Heimir. "Reflections on the Creation of Snorri Sturluson's Prose Edda." *Scripta Islandica: Isländska Sällskapets Årsbok* 68 (2017): 189–232.

Pelagios. https://pelagios.org (accessed May 21, 2021).

Petrulevich, Alexandra. "Cecilia." https://norseworld.nordiska.uu.se/index.php?type=location&id=2001 (accessed January 14, 2021).

——. "Med ortnamnsvarianten i centrum: Presentation av ett teoretiskt och metodologiskt verktyg för att analysera namn i skrift." *Meijerbergs arkiv för svensk ordforskning* 44 (2020): 289–306.

——. "The Multi-Layered Spatiality of the Global North: Spatial References and Spatial Constructions in Medieval East Norse Literature." In *The Global North: Spaces, Connections, and Networks before 1600*, edited by Carol Symes, 91–114. Leeds: Arc Humanities, 2021.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

——. *Ortnamnsanpassning som process: En undersökning av vendiska ortnamn och ortnamnsvarianter i Knýtlinga Saga*. Uppsala: Institutionen för nordiska språk, Uppsala University, 2016.

——. "Rodis." https://norseworld.nordiska.uu.se/index.php?type=location&id=2003 (accessed January 14, 2021).

Petrulevich, Alexandra, Agnieszka Backman, and Jonathan Adams. "Data and Metadata." www.uu.se/en/research/infrastructure/norseworld/infrastructure/data-and-metadata (accessed January 15, 2021).

——. "Medieval Macrospace through GIS: The Norse World Project Approach." *The Cartographic Journal* 57 (2020): 18–27.

Petrulevich, Alexandra, Agnieszka Backman, Simon Skovgaard Boeck, Jonathan Adams, and Felix Marklund. "Editing Principles." www.uu.se/en/research/infrastructure/norseworld/editing-principles (accessed January 15, 2021).

Petrulevich, Alexandra, Agnieszka Backman, Jonathan Adams, Simon Skovgaard Boeck, Jessica Holmlund, Felix Marklund, Jorunn Hartmann, Andreas Lecerof, and Rasmus Ljungström. "Norse World." www.uu.se/en/research/infrastructure/norseworld and https://norseworld.nordiska.uu.se (both accessed January 14, 2021).

Pelagios. https://pelagios.org (accessed January 14, 2021).

Pleiades Gazetteer of the Ancient World. https://pleiades.stoa.org (accessed January 14, 2021).

Riad, Tomas. "102. The Phonological Systems of Old Nordic II: Old Swedish and Old Danish." In *The Nordic Languages: An International Handbook of the History of the North Germanic Languages*, vol. 1, edited by Oskar Bandle, Kurt Braunmüller, Ernst Håkon Jahr, Allan Karker, Hans Peter Naumann, Ulf Teleman, Lennart Elmevik, and Gun Widmark, 896–911. Berlin: De Gruyter Mouton, 2002.

Ringe, Don, and Joseph F. Eska. *Historical Linguistics: Toward a Twenty-First Century Reintegration*. Cambridge: Cambridge University Press, 2013.

Sandnes, Jørn, and Ola Stemshaug, eds. *Norsk stadnamnleksikon*, 4th edn. Oslo: Oslo Samlaget, 2007.

Simon, Rainer, Elton Barker, Leif Isaksen, and Pau de Soto Cañamares. "Linking Early Geospatial Documents, One Place at a Time: Annotation of Geographic Documents with Recogito." *E-Perimetron* 10 (2015): 49–59.

Söderwall, Knut F. *Ordbok öfver svenska medeltids-språket*. Lund: Berlingska boktryckeri- och stilgjuteri-aktiebolaget, 1900. http://runeberg.org/svmtsprk (accessed January 15, 2021).

Tally Jr., Robert T., ed. *Literary Cartographies: Spatiality, Representation, and Narrative*. New York: Palgrave Macmillan, 2014.

Travis, Charles B. *Abstract Machine: Humanities GIS*. Redlands: Esri, 2015.

Turner, Andrew. *Introduction to Neogeography*. Sebastopol: O'Reilly Media, 2006.

Wakelin, Daniel. *Scribal Correction and Literary Craft: English Manuscripts 1375–1510*. Cambridge: Cambridge University Press, 2014.

Weibull, Curt. "Knytlingasagan och Saxo: en källkritisk undersökning." *Scandia* 42 (1976): 5–31.

——. *Saxo: Kritiska undersökningar i Danmarks historia från Sven Estridsens död till Knut VI*. Lund: Berlingska boktryckeriet, 1915.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Wendt, Bo-A. “Eddan och texttermerna. Kort terminologiskt genmäle till Henrik Williams.” *Scripta Islandica* 59 (2008): 177–79.

——. “En text är en text är en text? Om en terminologisk tredelning av textbegreppet.” *Arkiv för nordisk filologi* 121 (2006): 253–74.

West, Martin L. *Textual Criticism and Editorial Technique Applicable to Greek and Latin Texts*. Stuttgart: Teubner, 1973.

Wetås, Åse. *Kasusbortfallet i mellomnorsk: Ein komparativ studie av proprialt og appellativisk materiale*. Oslo: Oslo University, 2008.

Williams, Henrik. “Förnyad filologi: Filologins rötter.” In *Omodernt: Människor och tankar i förmodern tid*, edited by Mohammad Fazlhashemi and Eva Österberg, 276–92. Lund: Nordic Academic, 2009.

Won, Miguel, Patricia Murrieta-Flores, and Bruno Martins. “Ensemble Named Entity Recognition (NER): Evaluating NER Tools in the Identification of Place Names in Historical Corpora.” *Frontiers in Digital Humanities* 5 (2018). DOI: 10.3389/fdigh.2018.00002 (accessed May 9, 2021).

World Historical Gazetteer. http://whgazetteer.org (accessed January 14, 2021).

——. “Guide.” http://whgazetteer.org/tutorials/guide (accessed January 14, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Chapter 12

NAMELESS PLACES

Simon Skovgaard Boeck*

pLaCe-nAMES ARE prot otypi CaL spatial markers, and, as they are quite easy to detect in texts, place-names play an important part in spatial literary studies.[1] But the study of textual spatiality is not a subfield of literary onomastics, as spatiality is made up of other kinds of linguistic material than merely toponyms: common nouns, directional adverbs, adjectives describing origin and direction, and prepositions are among the many ways in which texts construct spaces and the spatial frames of narratives.[2] Apart from the title, the first spatial references in the *General Prologue* of the *Canterbury Tales*, for instance, are not place-names but the mythological name of the western wind, "*Zephirus*," and, in the following verse, "every *holt* and *heeth*" ("every copse and heath"). These references situate the text in an uncertain, generalized space that evolves with the mentioning of other spatial references:

1) Thanne longen folk to *goon on pilgrymages*
   And *Palmeres* for to seeken *straunge strondes*
   To fernę halwes, kouthe in *sondry londes*
   [Then longen folk to go on pilgrimages, / And palmers yearn to seek out foreign strands / And distant shrines well known in sundry lands].

Then—in verse 16—the first place-names, **Engelond** and **Caunterbury**, are mentioned, and the text is hereby located in a specific English environment.[3]

Similar spatial dynamics can of course be found in other texts. And, in this chapter, I look at how a special kind of spatial reference—descriptive noun phrases—is used in some texts to create a sense of location without naming it.

---

* Simon Skovgaard Boeck (PhD Copenhagen 2009) is Senior Editor at the Society for Danish Language and Literature. Email: ss@dsl.dk; ORCID iD: https://orcid.org/0000-0001-5334-7241.

1 See, e.g., the section "Literary Onomastics" (part IV) in *The Oxford Handbook of Names and Naming*.

2 See also Petrulevich, "The Multi-Layered Spatiality."

3 Citations and translations from *CantApp: The General Prologue*, vv. 5–6, 12–14, 16. In citations here and throughout this chapter, spatial references are graphically emphasized. Place-names are rendered in bold, other references in italics (therefore, the marking of abbreviations in the text is rendered tacitly).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

The question of why places occur in medieval literary and religious texts is crucial. The answer partly depends on genre: some texts thematize places as they report on wars, crusades, and travels. The East Norse chronicles refer to places quite numerously, in particular from the Baltic area, where kings conquered new territory. But other texts are occupied with more exotic places, less known to medieval Danes and Swedes, and, in some of these, singular exotic place-names are used as purely stylistic elements to signal an otherness, or for the sake of a rhyme. So, for instance, in the Old Danish epos *Hertug Frederik af Normandi* (*Duke Frederick of Normandy*), a person is mentioned:

2) ther kam jen grewe *aff* **askomyn**
   han war alt jen herræ fyn
   [there came a count from Gascony / he was a fine gentleman][4]

The count is an extra character in the text, who serves only to demonstrate the grandeur of a wedding he is attending, and similarly the place-name—which was probably non-intelligible to medieval Danes—adds an element of otherness, while at the same time it serves as a rhyme.

In addition, the religious narratives are often situated in an exotic macrospace, unfamiliar to the medieval Danes and Swedes, but here place-names are not used as stylistic devices.[5] Instead, places help to show the universal validity of the religious rites and the omnipresence of the deity. Therefore, quite often, religious texts simply lack place-names, other than the common biblical places that have become places of memory.

This lack of place-names is, of course, not unique to medieval religious texts. Quite a lot of other narratives function very well without verbally coded spatial orientation, but in contrast to medical or lyrical texts, for instance, religious texts often reflect locations that, without being linguistically marked, could carry a name but often do not. Churches, monasteries, and cities, as well as natural features, are examples of such entities that often remain unnamed in a religious narrative.

Moreover, when locations are named, it is often done so by the use of parenthetical relative clauses, signalling that the naming per se is less relevant to the text than the named feature itself:

3) eeth *beflutit land* som kalladhis **skariot** [a seagirt land that is called Skariot];
4) een *stadh* som kallas **solena** [a city that is called Solena];
5) thy *landzskap* som heter **thyro** [the landscape that is called Thyro];
6) een *stadh* ther kallas **tuscia** [a city that is called Tuscia];[6]

4 *Hertug Frederik*, 145v. See also Skovgaard Boeck, "Der er en verden uden for Bern." Unless otherwise mentioned, all translations are mine.

5 See Petrulevich, Backman, and Adams, "Medieval Macrospace through GIS," on the concept of macrospace.

6 *Siælinna thröst*, 65, 90, 186, 364.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

7) en *stadh* som hetir **nazareth** [a city that is called Nazareth];
8) thet *land* som hetir **sydon** [the country that is called Sydon];
9) en *stadh* som hetir **naym** [a city that is called Naym].[7]

This use of relative clauses is not restricted to religious prose. Indeed, the use is quite frequent in many other texts as well, pointing to a more general unawareness or lack of interest in (exotic) place-names.

Few others than philologists excerpting place-names for a gazetteer of medieval literature such as Norse World[8] would probably reflect on the lack of place-names in religious texts. Quite often, however, places that could have been named are not; why is that? One possibility of course is that naming was never intended.

Genre probably plays a role in this, as some genres generally are more spatially orientated than others, and hence more apt to include place-names.[9] Nevertheless, as I return to below, even genres focused on places, such as travel itineraries, show examples of place-name omission.

Textual criticism can help understand whether the omission of a place-name is intended or not, at least when a text survives in more than one manuscript, or when its sources are known. Unfortunately, most East Norse religious texts survive only in one manuscript, and sometimes the Latin or Middle Low German sources are not known. In other cases, however, it is possible to show that place-names are omitted as part of the textual transmission. I return to these examples at the end of the chapter. First, denotation without naming is discussed. This intriguing practice is found extensively in the short Old Danish itinerary *Vejleder for Pilgrimme* (*Pilgrims' Guide to the Holy Land*).

Denotation without Naming

As touched upon in the introduction, textual spatiality has many guises. The mentioning of a common noun such as "church," "city," "country," etc. is a vague localization, but, since the use of parenthetical relative clauses with a name was rather frequent in East Norse literature, this option often lies in the back of the reader's mind as a potential, yet untapped, way of localization. Why, then, does the writer simply settle for *en kirkje*, *en stath*, *et land*? Perhaps the lack of name bestows a universal validity to the text that, especially in religious treatises, is desirable. A miracle on the strength of belief is more

7 *Sermones sacri Svecice*, 106, 346, 376.

8 Petrulevich, Backman, Adams, Skovgaard Boeck, Holmlund, Marklund, Hartmann, Lecerof, and Ljungström, "Norse World"; see also Petrulevich and Skovgaard Boeck, Backman and Smith, and Petrulevich, all this volume.

9 Definitions of genre are legion, and I therefor refer only to two articles that discuss spatiality and genre: Falck-Kjällquist, "Genre-Based Approaches," and Petrulevich, "The Multi-Layered Spatiality," both with further references.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

persuasive when it is not bound to a specific location, as in this example from an Old Swedish compilation of Saints' Lives (*Fornsvenska legendariet*):

10) Siþan en dagh talar han tel hænna/ ok biþar hana skyt sitia .a. hæst/ ok riþa mæþ sik *langa læt* ensamna: vndra hon hans buþ/ ok gør giærna som han biþar ¶ þøn huila sik *en staþ .a. væghenom nær enne kirkio*: frun gar ensamen *in ii kirkiona*/ ok biþar sina bøna firi varra fru bilætte tel hon somnar [One day he speaks to her and asks her to quickly sit on a horse and ride with him a long way alone. She is surprised by his command but willingly does as he asks. They rest on the way in a place near a church. The wife goes into the church alone, and says her prayers in front of an icon of Our Lady until she falls asleep].[10]

What is relevant here is not whether Old Swedish *staþ*, which can mean both "place" and "city," is used in one or the other sense but that the church is undefined, and in fact the whole miracle tale—in which a knight is tempted by the devil but saved by Our Lady—is without any precise spatial features. This implies an unexpressed notion of universality; it could happen to you!

On the other hand—as the "*pilgrymages*" and "*fernę halwes*" of the General Prologue cited above show—medieval piety is to a high degree tied to specific places and characterized by spatial movement between them. Pilgrimages and crusades were both signs of dynamic and spatial worship, which implied that certain geographical entities became part of the common worldview and religious awareness: Jerusalem, Rome, Santiago de Compostella, and Cologne. Similarly, sites of miracles could become famous, as is the case with the so-called Tanzwunder ("dance wonder," a bout of unstoppable dancing) in the German town Kölbigk, an event that also found its way into an Old Swedish religious treatise:

11) Thet skedhe j the *lladzskap* ther **sassen** hetir j eno *thorpe* som kallas **holt beke** [It happened in the country that is called Saxony, in a village that is called Holtbeke].[11]

Whereas the unnamed and unlocalized wife of the knight demonstrated exemplary faith, in this case the concrete localization of the Tanzwunder rends the story credibility. And this is all the more important as this exemplum is not used as a model for religious behaviour but, rather, as an example of divine intervention. This is also the case in the *Fornsvenska legendariet*, wherein the Tanzwunder is relocated to Orkney and the church of St. Magnus.[12] The relocation and extension of the legend as an example of domestication of common cultural material calls for a spatial analysis, and *Fornsvenska*

10 *Fornsvenska legendariet*, 2:39–40.

11 *Siælinna thrøst*, 105; for more information on identification of the place-name, see Norse World, "Thet skedhe j the lladzskap." On the Tanzwunder in Swedish texts, see Strömbäck, "Den underbara årsdansen."

12 *Fornsvenska legendariet*, 3:568–76.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

legendariet probably offers fruitful material for further research; even more so, since—as mentioned—this compilation also shows examples of nameless legends.

The two trends in medieval religious texts—the wish for universal, exemplary models and the need to secure trustworthiness via authentic, spatial settings—can be said to be in conflict. This might explain why a group of localities are described and periphrased instead of named, as is particularly the case in the Old Danish itinerary *Vejleder for Pilgrimme*. This itinerary focuses on Jerusalem, and here periphrasis is often chosen over naming.

Vejleder is a short Old Danish text that, like many other Old Danish texts, lacks a proper title in the manuscript; instead, it has a descriptive caption on its first page:

12) Thettæ æræ the *stædhe*, som *peregrime* skule *søghe* for af løsn af theræ synder j **thet helliæ land** [These are the places that pilgrims ought to visit for absolution of their sins in the Holy Land].[13]

The explicit mentioning of places as the core subject of the treatise is reflected in the text itself. Strikingly often, though, the author chooses not to name the locations, and instead describes what makes them special. This is the case with, for instance:

13) fremdeles ær [a] **Syons biergh** ogh een *kyrkæ*, ogh then *kyrkæ* ær then *stædh*, som war fruæ giordhe sin[æ] bøner, som hwn hwer dau *søktæ* the føræ scrifnæ *stedhe a* **Syons biergh** [further on Mount Zion there is a church, and that church is the place where Our Lady made her prayers, as she each day visited the mentioned places on Mount Zion].
14) ther ær een *kyrkæ*, i hwilken then steen ær høwe altar, som *ower* war hærras graf laa; han ær otte fødher longer, fem fødher breedh ogh half annen fod thiøk [there is a church in which the stone that lay on the grave of Our Lord is the high altar. It is eight feet long, five feet wide, and a foot and a half thick].
15) Thet *temple*, som *ower* then helliæ graf ær, thet ær circhils trijnt, ogh *owerst* a ær thet obet [The church that is above the Holy Sepulchre is circular and open at the top].
16) *inwortes i closteret* ær een *capelle*, som sanctus Ieronimus *ligher i* [inside the monastery there is chapel in which Saint Jerome lies].[14]

Some of these are easily recognizable, while others demand scholarly scrutiny. Number 13) might be the Abbey Church of St. Mary of Mount Zion (Abbey of the Dormition). 14) probably reflects a medieval tradition placing the gravestone of Christ as the altar of the Church of St. Saviour on Mount Zion.[15] 15) is undoubtedly the Church of the Holy

13 *Vejleder*, 209.

14 *Vejleder*, 215 *bis*, 217, 221, 222.

15 Pringle, *The Churches*, 3:367.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Sepulchre, and 16) is the chapel of Saint Jerome underneath the Church of the Nativity in Bethlehem.[16] Whereas 13) is rather vaguely situated, to a modern reader, it seems as if the author of the treatise could just as well have used names to denote the locations in 14) to 16): ***Frælserekirkjen**, ***Gravkirkjen**, and ***Hieronymuskapellen**; none of these names, however, are known in Old Danish.

Sixty-two of the 209 precise spatial references in *Vejleder* have the form of an unnamed denotatum with a supplemented description—in particular, a biblical reference. With 30 percent of the attestations belonging to this category, *Vejleder* is extraordinary compared to other East Norse texts. Indeed, similar forms are found in other texts also, such as in the Danish version of *The Travels of Sir John Mandeville*, partly denoting the same places in the Holy Land as the ones referred to in *Vejleder*. But Mandeville has a broader perspective that brings its protagonist all the way to the Great Khan of China, and, as a consequence, the localities in and around Jerusalem make up only a smaller part of the toponymic references in this text. The occurrences in *Vejleder* and *Mandevilles Rejse* raise the question whether the periphrastic forms are characteristic of itineraries as a genre. No other East Norse travel description survives, but a West Norse geographical treatise, called *Leiðarvísir* (*Guide*), contains a few examples that might illuminate this question:

17) Þar er *kirkia* su, er gröf drottins er i, ok *stadr* sa, er cross drottins stod, þar ser glögt blod Christz á steini, sem ny-blętt sé ... hon heitir **Pulkro kirkia**, hon er opin ofan yfir grofinni [There is the church in which the grave of Our Lord is and the place where his cross stood, there clearly is seen the blood of Christ on the stone, as if it was newly bled ... it is called Church of the Sepulchre, and it is open above the grave].[17]

What this example demonstrates, however, is that, contrary to *Vejleder*, place-names play a significant part in *Leiðarvísir*.

This is also the case in the following example, in which the West Norse name of the Mount of Temptation reflects the Latin *Mons Quarantania*:

18) **Querencium fiallz**, þar fastadi gud, ok þar freistadi diofull hans [Mount Quarantania, there God fasted, and there he was tempted by the devil].[18]

The same mountain is mentioned in *Vejleder*, but without the name:

19) Ther ær thet *bierg*, pa hwilket war herræ fastedhe i firæ tiuæ dawæ ogh fyra tiua natter [There is the mountain on which Our Lord fasted for forty days and forty nights].[19]

16 Pringle, *The Churches*, 1:142.

17 *Alfræði Íslenzk*, 1:22.

18 *Alfræði Íslenzk*, 1:22. The mountain (Arabic: *Jabal al-Quruntul*) is traditionally held to be a limestone peak in the vicinity of Jericho.

19 *Vejleder*, 225.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Thus, the use of periphrastic forms instead of—or as a supplement to—place-names can be seen as a peculiarity of itineraries. They are used to describe exotic places that have no established endemic name in the vernacular of the text. In fact, the assignment of standardized place-names to foreign places is a process running through the medieval and post-medieval centuries. Many Nordic names have etymologically evolved from non-proprial noun phrases in a process that involves the fixation of a lexical unit in a standardized form. As the medieval and later material shows, this fixation is often hypothetical, as a large amount of orthographical variation is involved.[20] Even more important than the variation of name *forms* is the lacking of a unified *name* for a given location. Places—and perhaps especially the foreign places mapped in Norse World—are given different names by different users, at different times, and in different circumstances. In the medieval material there can be different textual reasons for this, as Petrulevich points out.[21] But the use of periphrases to denote a foreign location should be seen in this context, that—from a medieval perspective—it is normal for a place to have a number of names.

When, then, did the church where Jesus was buried become *Gravkirken* in Danish? The answer to this question is not simple, as there does not exist a comprehensive dictionary of Danish exonyms, but the near-homonym common noun *gravkirke* is first known from the nineteenth century.[22]

Attempts at fixation of foreign places with specific names are known from around 1700, when the Danish lexicographer Matthias Moth included place-names in his encyclopaedic dictionary. As his names differ considerably from modern versions, however, it is clear that the principles guiding the formation of exonyms have changed since then.

Abstraction

Not just the vocabulary of names but also that of common nouns changed considerably during the Middle Ages. And, in numerous medieval texts, periphrasis is used as an alternative to compounding; for instance: "oli af oliuæ" ("olive oil"), "oli af rosæ" ("oil from rose"), and "plasther aff mercke" ("plaster of water parsnip").[23]

The Danish philologist Peter Skautrup in his history of the Danish language found that some compound common nouns are first attested in the post-medieval period. In his account these are listed alongside examples of abstract appellations that also were new to the sixteenth century. It is not certain that Skautrup thought that the use of compound nouns was the result of an increase in abstract thinking, however.[24] One of

20 See Gammeltoft, and Petrulevich, both this volume, on name variation.

21 See Petrulevich, this volume.

22 *Ordbog over det Danske Sprog*, s.v. *gravkirke*; note similar late occurrences in *Svenska Akademiens Ordbok*, s.v. *gravkyrka.*

23 *Harpestræng*, 25, 45; *Lægebøger*, 164. See also Skovgaard Boeck, "Word Formation," 117–19.

24 Skautrup, *Det Danske Sprogs Historie*, 2:245.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

Skautrup's examples is directly comparable with the situation in *Vejleder*: the medieval periphrastic form "then fingær thær ær næst" ("the finger that is next [to the thumb]") is superseded by "pegefingeren" ("index finger") in the early sixteenth century.

In the sense that proper names such as *Peter* and **Church of the Pater Noster** denote specific individuals or concrete places in Saussurean *la langue*, they can be said to have a more abstract essence than determinated common nouns and periphrastic forms, which can denote specific individuals and places in *la parole*: "that man," or "een *kyrki*, som Cristus kændhæ apostolæ at bedhe och læsa pater noster" [a church in which Christ taught the apostles to pray and read paternoster].[25]

Translation Aspects

The sources of *Vejleder* are not known, and until further research is available it is thus unknown if the periphrastic forms are simply borrowed from these. Most probably the text draws on one or more German sources, as some formulations in the text suggest. A supplementary Latin source is also highly probable, but so is—also—the possibility that the text is based partly on the Danish author's own visit to Jerusalem. German influence is visible in, for instance, this place-name with the Middle Low German preposition *to*:

20) I **Galilea** er then *brøøn*, som hedher **brøøn to Samaritanæ** [In Galilea there is the well, which is called the Well of the Samaritans].

Almost all East Norse literary texts are translations from Latin, Middle Low German, Old Norse, or French. Like all medieval translations, these are often the result of elaborate revision, and, for instance, the Old Swedish *Siælinna thrøst* (*Consolation of the Soul*) adds and subtracts parts of its Middle Low German source, *Seelentrost*, as well as incorporating material from other sources. According to Ivar Thorén, compared to *Seelentrost* the Old Swedish version expands noun phrases with attributives, adds adverbial phrases, and extends simple verbal phrases to more complex forms.[26] Do place-name phrases change in similar ways in the transmission from Middle Low German to Swedish? Apparently, place-names in the Middle Low German version are normally kept in the Old Swedish translation with only minor alterations.[27] The mentioned **Holtbeke** reflects a form found in a Middle Low German variant manuscript,[28] contrary to the **Kolbeke** of the manuscript K, on which the modern best-manuscript edition of *Seelentrost* is based. Overall, the rendering and omission of place-names in *Siælinna thrøst* can be explained by taking into consideration Middle Low German variant manuscripts. Thus, a few

25 Christensen and Sørensen, *Stednavneforskning*, 11–12.

26 Thorén, *Studier*, 119–22.

27 For further discussions of place-name variation, see Petrulevich, this volume.

28 Manuscript O; see *Siælinna thrøst*, 408. This variant is not mentioned in Schmitt's apparatus.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

place-names that occur in Margarete Schmitt's edition of *Seelentrost* but are omitted in the Swedish version also lack in some variant manuscripts, showing that the Swedish version draws on a special textual tradition. This is the case here, where the Old Swedish text shows considerable variation with regard to the Middle Low German K manuscript, but less so compared to other Middle Low German versions. This part of the treatise is devoted to the fourth commandment, and this passage explicitly deals with the Lord's Prayer:

21) Du schalt ok dat weten, do vnse leue here dat Pater noster lerede, he ne lerede des nicht to *latine*, alse yd de prestere *ouer* deme altare singen. He lerdet an der sprake, de man dar sprak *in deme lande*, dar he do was. He was do *in deme yodeschen lande*. Darumme so lerde he dat in der *yodeschen* tunghen. Hedde he *to dudesschem lande* wesen, he heddet *dudesch* geleret. Hedde he *to Ruslande* gewesen, he heddet *ruschen* geleret. He heddet yo also geleret, dat yd de lude hedden vorstan [You should also know that when Our Lord taught the Our Father, he did not teach it in Latin, as it is sung by the priests over the altar. He taught it in the language that they spoke in the country, where he was then. He was then in the Jewish country. Therefore he taught it in the Jewish language. Had he been on German soil, he had taught in German. Had he been in Russia, he had taught in Russian. He had thus always taught so that the people could understand].[29]
22) Thu skal ok vita at war h*e*rra lærdhe ekke sinom discipulis Pater noster oppa *latino* / Vtan oppa thz maal som folkit taladhe oc forstodh *j thy landeno* som han tha war stadder / Oc thz war *j iudha lande* / Oc thy lærdhe han thøm pater noster oppa thera maal / Thy ær thz mit radh at thu læs pater noster som thu hona best forstaar [You should also know, that Our Lord did not teach his disciples the Our Father in Latin, but in the language that the people used and understood in that country where he was placed. And that was in the country of the Jews. Therefore he taught them the Our Father in their language. Hence it is my advice that you read the Our Father as you best understand it].[30]

The omission of *yodeschen* (Jewish) might be caused by a wish to make stylistic variation, and the mentioning of Latin in the Middle Low German version might have been seen as an implicit critique of the clerisy. Overall, this citation has a proto-reformation notion to it. Most striking, however, is the omission of the hypothetical idea of Jesus being born in Germany or Russia. This passage is missing in eleven Middle Low German textual witnesses (MSS O, A, B, S, G, Dvt, H 1, H 3, as well as the incunabula a, c, d in the edition). It is noteworthy that three other Middle Low German manuscripts (MSS So, H 4, and C in the edition) point at **denemarken** and **swedenrike**,[31] reflecting that these manuscripts

29 *Seelentrost*, 157.

30 *Siælinna thrøst*, 237.

31 *Seelentrost*, 157.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

have a Scandinavian affinity. The omissions in *Siælinna thrøst* most probably reveal that the Swedish text is based on a manuscript related to one of the eleven, however.

A similar omission in three Middle Low German manuscripts (MSS B, S, and So of the edition) probably explains why *Siælinna thrøst* omits the name of a river in this exemplum relating to the corpse of Pilate that, first, was thrown in the Tiber:

23) Do bant men eme eynen molen steyn to deme halse vnde warp ene in de **Tibere**. Dar dreuen de ouelen geiste so grot vnstur, dat se en wedder vt wunnen vnde worpen en in eyn water, dat heit **Rodanus** [Then men tied a millstone to his neck and threw him in the **Tiber**. There the evil spirits behaved so wildly, that they [the men] drew him up again and threw him in a stream that was called Rodanus].[32]
24) Tha bundo the een qwarnsten widh hans hals / oc kastadho han j **tibris** Æn diæflane drifwo ther swa mykla ostyro mz honom / at the matto *føra* han *thædhan* / oc *bort J* eeth annat watn [Then they tied a millstone to his neck and threw him in the Tiber. But the devils made so much impetuosity with him that they had to lead him from there and off in another stream].[33]

Other German manuscripts point to the river Jordan, and the omission in the Swedish version probably reflects that a manuscript that did not mention either the Jordan or the Rhône was the source for the Swedish translator. But the question remains why in some cases the river was named, in others not. Perhaps the name "Rodanus" was not recognized, or perhaps, conversely, a geographically erudite copyist saw a difficulty in first lowering a corpse in the Tiber and later in the Jordan or Rhône.

The text-critical conclusion to these examples from *Seelentrost* is that, although three Middle Low German manuscripts probably were written in Denmark or Sweden (or for a Nordic audience), these belong to another string in the textual transmission, as does the Swedish *Siælinna thrøst*.

In the case of the Old Danish chronicle of Charlemagne (*Karl Magnus' Krønike*), the alteration of proper names has been used by philologists in textual criticism discussions of this text whose ultimate origin is a corresponding French *chanson de geste*. The Danish version shows certain added place-names not found in the West Norse or French sources. In other cases place-names are omitted, and, in the opinion of Poul Lindegård Hjorth, the Danish translator shows notably little interest in precise localizations.[34] The omission of the names of two important female characters in the East Norse tradition of the Charlemagne biography has recently been seen as characteristic of a gendered transmission of literary texts.[35] Omissions of foreign place-names cannot, of course, be seen as a similar result of a "monologic masculinity" that disregards non-masculine

32 *Seelentrost*, 182.

33 *Siælinna thrøst*, 268.

34 Hjorth, *Filologiske studier*, 65.

35 Brandenburg, *Karl der Große*, 108–24.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

figures in the texts. But many East Norse texts reflect the highly Eurocentric worldview of the writer as well as reader. This easily leads to omissions of foreign places, or—as is the case in *Vejleder*—to the mentioning of places without actual naming them. Obviously, the author of *Vejleder* deemed the names of the locations in the Holy Land irrelevant to his readers, and, indeed, the events that took place in these locations are of more importance than the names themselves. This choice is at odds with modern guidebooks, and—as shown—also with at least one contemporary itinerary (*Leiðarvísir*).

Concluding Remarks

As I have shown, there are many possible reasons why texts contain nameless places: some genres are more suited to including place-names than others, but the presence and absence of spatial information in different parts of *Fornsvenska legendariet* call for a caveat against seeing genre as a determinant of spatiality in texts. Instead, texts should be viewed individually. Some names are lost in the transmissions of texts, and exotic place-names in some cases do not capture the attention of the Eurocentric copyists. But, instead of asking why texts contain nameless places, it is more feasible to ask how. First of all, then, it is clear that a number of items remain unnamed, in particular in *Vejleder*: churches, chapels, and houses, but also natural features such as deserts and mountains are referred to in this manner. Most prominent, however, is the phrase "*thæn stath*" ("the place") without a description of the kind of place to which reference is being made. This vagueness can perhaps be seen as an indirect witness against the idea that the Danish author had himself been to Jerusalem. The places pointed out in this way, presumably, had some kind of marking that would make them identifiable to pilgrims—as, for instance, in:

25) *wden stadhen* wel so *lanct* som *eet armbørst scud* ær *then stedh*, som Maria Magdalena com om mood war herræ [outside the city, perhaps as far as the range of a crossbow, is the place where Maria Magdalena met Our Lord].[36]

This is pure speculation, but, on the other hand, the Danish author might have known the kind of marking that marked this spot, but considered the exact kind to be irrelevant to his Danish audience. Even though there probably is some kind of affinity between spatiality and genre, in the end the author/translator/copyist makes individual choices for dealing with spatiality and naming in the specific text.

Bibliography

Alfræði Íslenzk: Islandsk encyklopædisk Litteratur. Edited by Kristian Kålund. 3 vols. Copenhagen: STUAGNL, 1908–1918.

Brandenburg, Elena. *Karl der Große im Norden: Rezeption französischer Heldenepik in den altostnordischen Handschriften*. Tübingen: Narr Francke Attempto, 2019.

36 *Vejleder*, 225.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

CantApp: The General Prologue. An Edition in an App. Edited by Richard North, Barbara Bordalejo, Terry Jones, and Peter Robinson. Saskatoon: Scholarly Digital Editions, 2020. www.sd-editions.com/CantApp/GP (accessed June 2, 2021).

Christensen, Vibeke, and John Kousgård Sørensen. *Stednavneforskning 1: Afgrænsning–Terminologi–Metode–Datering*. Copenhagen: Universitetsforlaget, 1972.

Der grosse Seelentrost: Ein niederdeutsches Erbauungsbuch des vierzehnten Jahrhunderts. Edited by Margarete Schmitt. Cologne: Böhlau, 1959.

Falck-Kjällquist, Birgit. "Genre-Based Approaches to Names in Literature." In *The Oxford Handbook of Names and Naming*, edited by Carole Hough, 330–43. Oxford: Oxford University Press, 2016.

Fornsvenska legendariet. Edited by Per-Axel Wiktorsson. 4 vols. Uppsala: Svenska fornskriftsällskapet, 2020.

Harpestræng: Gamle danske urtebøger, stenbøger og kogebøger. Edited by Marius Kristensen. Copenhagen: Thiele, 1908–1920.

Hertug Frederik af Normandi. Edited by Marita Akhøj Nielsen. https://tekstnet.dk/hertug-frederik-af-normandi/metadata (accessed June 2, 2021).

Hjorth, Poul Lindegård. *Filologiske studier over Karl Magnus' Krønike*. Copenhagen: Schultz, 1965.

Lægebøger–Bondepraktika–Griseldis. Edited by Mette Nordentoft et al. Copenhagen: Danske Sprog- og Litteraturselskab, 1970.

Mandevilles Rejse i gammeldansk oversættelse tillige med en Vejleder for Pilgrimme. Edited by Marcus Lorenzen. Copenhagen: STUAGNL, 1882.

Norse World. "Thet skedhe j the lladzskap ther sassen hetir j eno thorpe som kallas holt beke." https://norseworld.nordiska.uu.se/index.php?type=attestation&id=1639 (accessed June 2, 2021).

Petrulevich, Alexandra. "The Multi-Layered Spatiality of the Global North: Spatial References and Spatial Constructions in Medieval East Norse Literature." In *The Global North: Spaces, Connections, and Networks before 1600*, edited by Carol Symes, 91–114. Leeds: Arc Humanities, 2021.

Petrulevich, Alexandra, Agnieszka Backman, and Jonathan Adams. "Medieval Macrospace through GIS: The Norse World Project Approach." *The Cartographic Journal* 57 (2020): 18–27.

Petrulevich, Alexandra, Agnieszka Backman, Jonathan Adams, Simon Skovgaard Boeck, Jessica Holmlund, Felix Marklund, Jorunn Hartmann, Andreas Lecerof, and Rasmus Ljungström. "Norse World." www.uu.se/en/research/infrastructure/norseworld and https://norseworld.nordiska.uu.se (both accessed June 2, 2021).

Pringle, Denys. *The Churches of the Crusader Kingdom of Jerusalem: A Corpus*. 4 vols. Cambridge: Cambridge University Press, 1993–2009.

Sermones sacri Svecice: The Sermon Collection in Cod. AM 787 4o. Edited by Roger Andersson. Uppsala: Svenska fornskriftsällskapet, 2006.

Siælinna thrøst. Edited by Samuel Henning. Uppsala: Svenska fornskriftsällskapet, 1954.

Skautrup, Peter. *Det Danske Sprogs Historie*. 5 vols. Copenhagen: Gyldendal, 1944–1970.

Skovgaard Boeck, Simon. "Der er en verden uden for Bern: Stednavne og spatiale referenter i K 47." In *The Eufemiaviser and the Reception of Courtly Culture in Late Medieval Denmark*,

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

edited by Anna-Katharina Richter and Massimiliano Bampi, 199–207. Tübingen: Narr Francke Attempto, 2021.

——. "Word Formation, Syntax, and Style in Old Danish Medical Texts." In *Beyond the Piraeus Lion: East Norse Studies from Venice*, edited by Jonathan Adams and Massimiliano Bampi, 107–22. Copenhagen: Selskab for Østnordisk Filologi, 2017.

Strömbäck, Dag. "Den underbara årsdansen." In *Festskrift till Jöran Sahlgren*, edited by Karl Gustav Ljungren et al., 431–46. Lund: Gleerups, 1944.

Thorén, Ivar. *Studier över Själens tröst: Bidrag till kännedomen om den litterära verksamheten i 1400-talets Vadstena*. Stockholm: Gebers, 1942.

Vejleder; see *Mandevilles Rejse*.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

CONCLUDING REMARKS

Stuart Dunn*

> As often happened in later times, the first really English cartographers were inspired by an historian.
>
> *Edward Lynam, 1947*[1]

The Critical study of space and place in the humanities, and by implication the study of space and place *as a subject* of the humanities, is an emerging and maturing field with its own literature. It is over a decade since the term "spatial humanities" appeared in the title of a major publication, *The Spatial Humanities: GIS and the Future of Humanities Scholarship*, edited by David Bodenhamer, John Corrigan, and Trevor Harris (2010). This was followed by *Toward Spatial Humanities: Historical GIS and Spatial History* (2014), edited by Ian Gregory and Alistair Geddes, and various special issues and collections, including *Deep Mapping* (2016), a collection of essays with concerns across the humanities, edited by Les Roberts. More domain-specific collections have emerged as well. In the field of digital literary studies, for example, we can look to David Cooper, Christopher Donaldson, and Patricia Murrieta-Flores's *Literary Mapping in the Digital Age* (also 2016). Numerous further examples have appeared over the last few years, of which these are merely representative samples.

These collections reflect a growing interest within the field of digital humanities in space and place. There are many different aspects to this, reflecting the breadth and depth of digital humanities itself. Geospatial information presents a particular type of challenge for analytical, computational, and visualization methods and technology—and for research infrastructures. The reduction of place into a form that a computer can recognize, whether through digital mapping, the creation of digital gazetteers, or the digitization of spatial material, has interpretive challenges that are distinct from (say) the digitization of text into machine-readable form, such as XML mark-up. A distinct set of skills and knowledge beyond "the digital" is required for the digital abstraction of place. With this in mind, the collections of essays cited above (and others besides)

* Stuart Dunn is Professor of Spatial Humanities at King's College London, where he also served as head of the Department of Digital Humanities. He has published extensively on the themes of digital place and digital cultural heritage, and on the intersections between Internet geography and the humanities. He recently co-edited the *Routledge International Handbook of Research Methods in Digital Humanities* (2020), and his most recent monograph is *A History of Place in the Digital Age* (2019), also published by Routledge. Email: stuart.dunn@kcl.ac.uk; ORCID Id: https://orcid.org/0000-0002-6052-7037.

1 Lynam, *British Maps and Map-Makers*, 8.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

have in common a stated desire to draw upon this specialized skill and knowledge to approach *place* and *space* in the human record both digitally and critically. What is gained through processing historic geospatial material digitally, what is lost, what new questions can be asked with the analytical power of geographic information systems, and the ontological structures of linked open data? What, in other words, do spatial data infrastructures (SDIs) bring to this debate?

This is an increasingly important question, not just for the humanities (or the spatial humanities) but for contemporary society and culture. We are increasingly immersed in spatial data, facilitated, filtered, and manipulated by a commercial-industrial complex of SDIs, such as Google Maps and other online mapping platforms. These facilitate our daily interaction with the world by aiding navigation in real time, providing us with access to geo-referenced information and services, and using the affordances of locative media to enable social connection, interaction, and economic flow. This glut of geodata and associated geo-services is so capacious that it is beginning to shape the digital world itself: as Tim Cresswell has observed, "the world of the virtual has become place oriented."[2] There is an often quoted, but possibly apocryphal, statistic that some 80 percent of all online data is geo-referenced, either formally or informally.[3] Many societies, in other words, have come to operate inside SDIs.

The most visible form of SDI to the contemporary eye is "place" in forms that the Internet and the Web can recognize: points, lines, and polygons, represented in binary digital form as X, Y, latitude, and longitude. As is pointed out in several places in the present volume, this is a form of geospatial information that is fixed into the Cartesian frame, immutably quantitative and seductive for the user in the certainty it implies. This form of digital place has to be set in the context of social construction, though. In theorizing the idea of "DigiPlace," Mark Graham and Matthew Zook state that "there remain distinct hard-coded influences on DigiPlaces and people's consequent perceptions of, and interactions with, place."[4] The spatial humanities deal with similar issues of perception and interaction, but these are not—as envisioned in DigiPlace—units of place captured from the present world in real time using locative digital devices; rather, they are mediated from the past using a variety of humanistic sources. The works cited above, characterizing the nascent emergence of the spatial humanities serve to focus this discussion, dealing with the role of technology, and technological practice, in that process of critical understanding from a *humanistic* standpoint.

As importantly, however, they all engage at one level or another with the relationships involved in spatial humanities research. These include relationships between the human record (broadly defined beyond the traditional parameters of "history" in "historical GIS"), practitioners, scholars, infrastructure, practice, and the technology itself. The spatial humanities constitute a discursive and collaborative

2 Cresswell, *Place: An Introduction*, 144.

3 See Dempsey, "Where Is the Phrase?"

4 Zook and Graham "Mapping DigiPlace," 480.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

process: a conversation between the theory and practice of spatial technology and relevant domain scholarship. As David Cooper, Christopher Donaldson, and Patricia Murrieta-Flores state in their introduction, their collection reflects "a common interest both in how digital technologies create new ways of conceptualizing and practicing literary map-making and, furthermore, how such map-making in turn changes the way we use and think about digital technologies."[5] A recurring theme of the present volume is, similarly, how infrastructures—and the technological tools, content, platforms, and software that constitute them—can be framed and contextualized by humanities approaches.

The preceding twelve chapters present a range of applications of SDIs either developed for, or deployed in the service of, the (spatial) humanities. Drawing inspiration and source material mainly from computational and humanities scholarship in the Nordic countries, they present the reader with practices, methodologies, source types, and, most importantly, infrastructures that enable these critical approaches to space and place. Throughout the volume, "infrastructure" is by necessity broadly defined. Indeed, the first lesson of this volume is that the development of a SDI is never *just* a technical process, whatever the tangible result at the end. Zook and Graham hint at this in their concept of "DigiPlace" when they describe it as a "way to conceptualize the scales of everyday life, and simultaneously to imagine the differences and interdependencies of places"[6]. The SDIs for the humanities described here take this a stage further, however: into the realms of humanist critique. While these SDIs involve software development and analysis, they differ from conventional IT projects in what they produce, in the kinds of collaborations behind them, and in what their users expect. Like humanist knowledge itself, they have intellectual value that cannot always be easily (or, indeed, desirably) measured. As Agnieszka Backman and Marcus Smith remark (Chapter 7), the value of many infrastructures developed in the spatial humanities (or, in fact, the digital humanities more broadly) lies as much in the "ephemeral research results" they produce—the ideas, the connections, the collaborations, the new insights—rather than any concrete services or products that result. These may not always be easy to assess in terms of normal success standards, or, indeed, be through the normal channels of peer review and scholarly recognition. I return to this point in my conclusion.

This humanities-informed view of infrastructure(s) runs, naturally enough, through the volume; and reflects the broad interests of the humanities more generally. There is much discussion of the requirements and source materials that are drawn on in the design of a SDI for the humanities. For example, the Norse World platform described by Alexandra Petrulevich and Simon Skovgaard Boeck in Chapter 1, and revisited by Petrulevich in her broader discussion in Chapter 11, "maps literary places rather than actual historical or archaeological locations." "Actual" location, which can be

5 Cooper, Donaldson, and Murrieta-Flores, "Introduction: Rethinking Literary Mapping," 1.

6 Zook and Graham "Mapping DigiPlace," 468.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

easily represented by a latitude and longitude, is a mainstay of digital geodata, but "literary place" is defined not just by a footprint on the Earth's surface but also by linguistic, textual, onomastic, and philological meaning. A spatial infrastructure that accommodates *only* the geographical angle will not reflect these complexities, or this meaning. In Chapter 11, Petrulevich weaves this into an argument for the central ingredient of most online gazetteers, the place-name, to be seen not through the lens of what she calls the "mainstream database mindset," which serves to relate, structure and objectify, but, rather, as a set of linguistic entities that appear through a series of formal variations. Such patterns are well known to onomasticians and linguists, but they have only relatively recently begun to inform the thinking of those involved in the design of the digital gazetteers that the kind of research this project describes routinely draw upon.

Digital gazetteers are a particular "flavour" of SDIs. Handily defined by Olof Karsvall in Chapter 4 as "lists, registers or authority files of different types of geographical elements (places, lakes, roads, etc.)," they are formal structures of place identifiers, usually place-names, that can also reflect administrative hierarchies, container relationships, and categorizations of places. Definitions of all of these rest on the application of spatial ontologies, shared understandings of what constitutes a "place" as represented by such entities, and what those entities mean.[7] Often in the spatial humanities, this will involve aligning understandings of place across different types of source data, as Sara Ellis Nilsson, Terese Zachrisson, Anders Fröjmark, Lena Liepe, and Johan Åhlfeldt explain in Chapter 2. The Mapping Lived Religion project they describe draws its spatial references from both material culture and literary sources—as they put it, "combining digital and traditional scholarship … while it critically analysing sources such as texts and material culture."

The two main requirements of a gazetteer in the context of the spatial humanities, therefore, are that it must be able to connect across different sources, and different types of material, while at the same time not oversimplifying the geospatial data it is describing. Key projects such as the Pleiades Gazetteer,[8] whose application is discussed in Chapters 1, 9, and 11 of this volume, the related Pelagios initiative,[9] which provides protocols for federating online gazetteers together (Chapters 1, 2, 4, 9, and 11), and the World Historical Gazetteer[10] (Chapters 2 and 11) are all examples of SDIs that navigate these requirements. At several points in the volume the design principles of Pleiades are discussed, most notably the concept of detaching "actual location" from the place in question, and representing it as an abstract Uniform Resource Identifier (URI). Nevertheless, the scholarly requirements outlined in this volume highlight the importance of editorial and critical intervention in the creation of digital gazetteer

7 Cacquard, "Cartography I," 136.

8 See https://pleiades.stoa.org (accessed June 10, 2021).

9 See https://pelagios.org (accessed June 10, 2021).

10 See http://whgazetteer.org (accessed June 10, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

content. Other, generic gazetteers have also been developed that adopt the principle of separating names from place by using URIs, but they do not reflect the kinds of editorial standards or interpretive complexity that humanities SDIs require. The GeoNames gazetteer,[11] for example, is mentioned in several places. GeoNames is a "hub" resource of some 25 million place-names reflecting modern toponyms and administrative systems, and it has been used in several contexts as a flexible, open, and user-friendly source of LOD for the present-day world. Its inconsistent coverage of heritage and historical sites has led some academic users to reject it, however. For example, Ellis Nilsson, Zachrisson, Fröjmark, Liepe, and Åhlfeldt, in Chapter 2, explicitly state that they avoided using GeoNames because it lacked coverage of the entities they are interested in; and Karlsvall (Chapter 4) highlights that, in some cases, "historical GIS" information beyond that available in GeoNames is needed in certain research contexts.

The perspectives bought by Chapters 1, 7, and 11 highlight the relational nature of the digital gazetteer (deriving as it does from the concept of the relational database), which, in many contexts, is rigid and positivist. This emphasizes the epistemological distinction between place as perceived from a subjective human perspective, and a perspective that is objective, "certain," and fixed into Cartesian space.

Another issue that several chapters dwell on is the importance of mobility and capturing the lived experience of past landscapes. Mobility, dynamism and change over time are key elements of post-processual thinking in domains such as archaeology, and they present an important challenge for those involved in spatial humanities thinking. An intriguing insight that the volume brings is that integrating information relating to "lived time" into a formal data structure, such as a gazetteer, entails the same kind of reductive challenges of integrating "lived place." Peder Dam addresses this directly (Chapter 8), with his discussion of the DigDag project, a major infrastructure that ties Danish historical administrative units from ca. 1660 to the present day together, adopting a database-oriented approach that handles both precise and imprecise descriptions of land usage change. Once again, however, a tension is evident between those forms of mobility and narrative change that are mapped and observed—that is, those derived from documentary sources such as land records—and narratives of mobility that are implicit in the human record. Ellis Nilsson, Zachrisson, Fröjmark, Liepe, and Åhlfeldt address the latter type in their discussion of the Mapping Lived Religion project, which approaches religious practice as "part of what people do rather than what they confess to believe"—a statement that itself neatly summarizes the tension between the observed and official, and therefore mappable, record and the unofficial, phenomenological one. The case study of miraculous pilgrimages elaborated by Ellis Nilsson, Zachrisson, Fröjmark, Liepe, and Åhlfeldt illustrates the importance of movement through the landscape in the medieval mindset as an intensely personal experience.

This is a theme further developed by Sofia Lodén in Chapter 10, in which she discusses the journey of the lovers Floire and Blancheflor to Babylon. In the process, they cross a

11 See www.geonames.org (accessed June 10, 2021).

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

combination of cultural, historical, and linguistic borders. Developing her discussion of the French verse romance *Le Conte de Floire et Blancheflor* (ca. 1150), Lodén draws a distinction between travel in the literal/extrinsic sense and travel in the intrinsic sense. It can be argued that the former of these is more closely aligned with the positivist and structural character of the gazetteer, with the latter aligning more closely with the literary and onomastic visions of place outlined by Petrulevich in Chapter 11, and by Simon Skovgaard Boeck in Chapter 12. Lodén shows this by highlighting the omission of references to "Paradise" in Nordic versions of the text, and the inclusion of real-world places—emplacing, literally, the presence of an outward-facing real worldview in the (Nordic) past. The challenges of adequately reflecting mobility in an SDI are also addressed by Anna Foka, Elton Barker, Kyriaki Konstantinidou, Nasrin Mostofian, Brady Kiesling, Linda Talatas, O. Cenk Demiroglu, and Kajsa Palm (Chapter 9), who present a discussion of the digital treatment of sources related to Pausanias's *Description of Greece*, the Digital Periegesis. In this discussion, which employs the Recogito annotation tool developed by the Pelagios project, the authors highlight the paucity of primary material, which describes the process of movement—the *hodological pathway*. "Pausanias," they say, "eschews describing the natural landscape or road networks through which one would have to travel to visit the sites … he follows different roads in sequence as they emanate out from a large urban centre like spokes from a wheel." This privileging of "the site" as a place of action, and consequent lessening of emphasis on the journey to get there, is a gap the spatial humanities seek to fill.

Foka, Konstantinidou, Mostofian, Barker, Cenk Demiroglu, Kiesling, Talatas, and Palm highlight another issue with SDIs that the spatial humanities seek to address, which is that the mainstream SDIs that are so familiar in daily life—Google Maps, Bing Maps, OpenStreetMap, to name some of the more obvious examples—were not designed for the humanities, yet these are the digital frameworks, standards, and platforms within which many spatial data reside. As the authors point out, standard map projections, represented most visibly by the World Geodetic System eighty-four grid (WGS84) system, are merely one of a great number of ways in which the world can be modelled. If used critically and matched to a source on which its use makes sense, as descried by Karsvall in Chapter 4, WGS84 can be a useful reference system. It further lends itself to instant, easy, fast retrieval and searching of data over a large area with a correspondingly "thin" layer of data. This is what standard, commercial SDIs are good at. The Mercator projection, which the WGS84 incorporates, and which most such SDIs are thus based on, is amenable to plotting long-distance travel, due to the fact that it preserves angles, which matter for such purposes, but not surface areas, which do not. But, while humanists are frequently interested in large areas—and, as Lodén's chapter, discussed above, shows, in the medieval context this often highlights deeper spatial questions about the extrinsic and literal versus intrinsic and psychological nature of long-distance travel—many are interested in small areas, in the "lived" world rather than the "mapped" one. To address this, Foka, Konstantinidou, Mostofian, Barker, Cenk Demiroglu, Kiesling, Talatas, and Palm describe incorporating

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

a city-level gazetteer, ToposText, alongside the regional Pleiades gazetteer. This allows the querying of larger-scale data, data of the lived and traversed space of the site/city that contemporary populations would have seen and experienced, rather than the conceptualized regional space of the cartographer. Like many of the SDIs described in this book therefore, what we see is a *thick* layer of data over a relatively *small* surface area. The tension between this and the type of spatial infrastructure that serves contemporary culture and society (large areas, thin data layers) informs much of the critical and theoretical work of the spatial humanities.

A key message of this volume is that SDIs must always be tied to sources. This is implicit in some of the chapters, but three of the contributions in particular address the digitization of historical maps and other source material. A consideration of these three chapters as a collective unit, even though they cross the first and second sections of the volume, bears some discussion. Three chapters that sit astride the first two sections address this. Olof Karsvall (Chapter 4) describes TORA, a project set in the field of historical GIS (HGIS) as it is generally defined in the literature. Built around an index of historical geographic names, TORA seeks to geo-reference records of historic settlement units in Sweden, and link them to primary sources, not necessarily to reflect the original hierarchies of the data themselves. Importantly, historical expertise is called upon to estimate the location of the coordinate points where arable land is concerned, a process derived from manual map reading. Digitization in this case is therefore as much an issue of interpretation as of capture. The interpretive and epistemological tension that exists between digital structures and non-digital ones, which have often evolved across centuries, is also described in the following chapter (Chapter 5), by Björn Karlsson, Elin Pihl, and Kristina Neumüller. In describing the digitization of Sweden's Institute for Language and Folklore's place-name collection, an archive of some 3.7 million index cards, they explicitly note that the development of the database was "compromised by an analogue way of thinking," and had to be "cut loose." This further reflects the point elaborated by Backman and Smith in Chapter 7, where they describe the experience of the Swedish Open Cultural Heritage (SOCH) project in mapping national heritage collections to supranational ones such as Europeana. They state that ontology design decisions would have been different had the participants known what they had learned during the project at the start of the project. In his more general discussion of the structures of place-name collections, Peder Gammeltoft (Chapter 6) argues that some of these design problems can be predicted by directly introducing principles of onomastic scholarship into the design of spatial data infrastructures. In particular, he proposes the formal decoupling of names from locations. This is, in effect, to undo the assumption underlying many (historical) GIS applications, which automatically associate one definitive, Cartesian location with one place-name. The complexity, and the necessity of human expertise and human reading of spatial sources that these chapters highlight, recalls Trevor Harris's repudiation of the term "shallow map" as an antonym of "deep map": "intentionally or otherwise, [shallow map] implies a meaning of superficiality and inconsequentiality

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

… these maps and their map content have formed the backbone of GIS and national spatial infrastructures and have proven invaluable."[12]

Harris's quotation points to one of the key takeaway points of this volume overall: that the successful design and implementation of a successful SDI for (or by) the humanities depends on the critical treatment of geospatial source material in its conversion to a form that can exist in the digital world—a process I have described elsewhere as "the digitization of place." The volume highlights contrasts between the digitization of place from old maps, from historic land records, from (originally) analogue archives of place-names and their etymologies, from sagas, from Romantic tracts, from historical accounts of travel, and from literary sources. Sometimes this involves the estimation of coordinate points for a piece of land whose actual location is approximate. Sometimes it will involve providing estimated locations for named places. Other times it may involve identifying events that are described as occurring in places without names (as described by Skovgaard Boeck in Chapter 12). Other situations will call for location to be derived from material culture. And others will call for the treatment of place-names as literary and linguistic variations. All these processes involve different forms of expertise, and different forms of technology. The works presented in this volume, when placed side by side, highlight the need for a more structured and method-focused typology of the different kinds of humanistic source that, with proper expert processing, can be transformed into meaningful and valuable geodata.

Given the fundamental interdisciplinarity of this challenge, it is unsurprising that one thing all chapters have in common is the emphasis on collaboration within project teams, and the blending of expertise. All these projects depend not just on developers and computer science experts implementing infrastructure requirements but on informed conversation between technical experts and experts in literature, language, material culture, and other types of source material. In this, critically informed use of SDIs, or the spatial humanities, is little different from the digital humanities more generally. As Petrulevich points out in Chapter 11: "[T]he gazetteer model currently underlies manual geo-referencing of any type of material in almost any spatial humanities project, be it text annotation or extraction of spatial references, as well as implementation of automated geoparsing and georesolution tools in the rapidly growing named entity recognition (NER) field." Human expertise, human interpretation, and human communication are fundamental to the development of any SDI. Backman and Smith highlight what they call the "epistemic perils" of collaborative frameworks, however, which are dominated by national collections, elite institutions, and those who already have the power to shape humanistic narratives. Such situations, they argue, can further exclude marginalized voices and communities.

As noted at the start of this concluding chapter, much of the work in this volume is drawn from scholarship in the Scandinavian and Nordic spheres. Given the topic

12 Harris, "Deep Geography," 30–31.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

of the volume, it is perhaps worth spending a moment reflecting on this. The field of digital humanities in the region has surged in recent years, with the establishment of a Centre for Digital Humanities at Gothenburg in 2015 and, in 2021, at the University of Uppsala. This is in addition to long traditions of support for digitally enabled work in the humanities at Humlab in Umeå, at Bergen, and in Copenhagen. There are other examples as well. It is tempting to ascribe at least part of the field's strength in Scandinavia to the landscape itself, and the hold that the region—the mountains, forests, fjords, and snowscapes—exerts on the imagination. It does not seem fanciful, least of all in a volume about the spatial humanities and SDIs, to argue that such a regionally specific inspiration exists for much of this work. After all, many of the sources in this volume draw on literature, records, or maps that are in turn inspired by, or reflect, or record the Nordic/Scandinavian landscape. Ellis Nilsson, Zachrisson, Fröjmark, Liepe, and Åhlfeldt's chapter reflects on religion lived in the landscape, and its discussion of pilgrimages through the landscape has already been discussed; and Emily Lethbridge (Chapter 3), in discussing her work on the Icelandic Saga Map, a resource that provides a geo-referenced overview of some forty Icelandic sagas, makes this explicit. In an evocative phrase, Lethbridge (who travelled round the island herself to research saga topography) says: "When the sagas were first put down in writing, their narrative contours were shaped in various ways by the landscapes in which their events take place." As we might think of Arthur Ransome's Lake District, Sir Arthur Conan Doyle's or Charles Dickens's London, Dylan Thomas's Wales or John Steinbeck's Dust Bowl, the "narrative contours" of the Nordic landscape come through in many of the SDIs described. It does not seem unreasonable to suppose that part of the evident strength of the spatial humanities in this region is, at least partly, a result of its distinctive landscapes.

To conclude: collectively, the twelve chapters in this volume invite us to rethink what the spatial humanities are as a field, and what they are for. I would suggest that the common factors that emerge, despite the very great diversity and the subjects, methods, and source material, is an emphasis on *practice*. Whether the chapters are discussing the treatment of primary source material with a view to making it available via an SDI, or using digital tools to annotate sources, or whether the discussion is about converting spatial references in text into a formal geospatial structure, all of them are concerned with *doing*. It is my view, therefore, that the spatial humanities should be seen as a form of critical digital practice, rather than a purely theoretical field of enquiry, or even as a sub-branch of the field of digital humanities. This definition allows space, so to say, for the kinds of collaborative endeavours described. It also defines, in the context of the literature of the emergent phases of the spatial humanities that I describe above, how SDIs and the idea of critical infrastructure can expand and enrich the spatial humanities. It also opens up further possibilities to link the lessons learned and the knowledge created by the projects described here with efforts to better understand spatial infrastructures in the contemporary world, and to promote critical questioning and understanding of the role of corporate SDIs in society. Never, in other words, have the spatial humanities felt more relevant.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Bibliography

Bodenhamer, David, John Corrigan, and Trevor M. Harris, eds. *The Spatial Humanities: GIS and the Future of Humanities Scholarship*. Bloomington: Indiana University Press, 2010.

Caquard, Sébastien. "Cartography I: Mapping Narrative Cartography." *Progress in Human Geography* 37 (2013): 135–44.

Cooper, David, Christopher Donaldson, and Patricia Murrieta-Flores. "Introduction: Rethinking Literary Mapping." In *Literary Mapping in the Digital Age*, edited by David Cooper, Christopher Donaldson, and Patricia Murrieta-Flores, 1–21. London: Routledge, 2016.

Cresswell, Tim. *Place: An Introduction*. Chichester: Wiley, 2014.

Dempsey, Caitlin. "Where Is the Phrase '80% of Data Is Geographic' From?" GISLounge, October 28, 2012. www.gislounge.com/80-percent-data-is-geographic (accessed June 10, 2021).

GeoNames. www.geonames.org (accessed June 10, 2021).

Gregory, Ian N., and Alistair Geddes, eds. *Toward Spatial Humanities: Historical GIS and Spatial History*. Bloomington: Indiana University Press, 2014.

Harris, Trevor M. "Deep Geography–Deep Mapping: Spatial Storytelling and a Sense of Place." In *Deep Maps and Spatial Narratives*, edited by David J. Bodenhamer, John Corrigan, and Trevor M. Harris, 28–53. Bloomington: Indiana University Press, 2015.

Lynam, Edward. *British Maps and Map-Makers*. London: Collins, 1947.

Pelagios. https://pelagios.org (accessed June 10, 2021).

Pleiades Gazetteer of the Ancient World. https://pleiades.stoa.org (accessed June 10, 2021).

Roberts, Les, ed. *Deep Mapping*. Basel: MDPI, 2016.

World Historical Gazetteer. http://whgazetteer.org (accessed June 10, 2021).

Zook, Matthew A., and Mark Graham. "Mapping DigiPlace: Geocoded Internet Data and the Representation of Place." *Environment and Planning B: Planning and Design* 34 (2007): 466–82.

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

INDEX

Bibliographic references and entries are not included in the index.

AAT *see* Art & Architecture Thesaurus
accuracy, coordinates, 104–5, 109, 112
Allerslev, Denmark, 140
alphabet, Swedish dialect *see* Landsmålsalfabetet
Andsjøen, Norway, 140, 142
Ånnevika, Norway, 149–54
Ånnevikholmen, 151–53
API *see* application programming interface
applications, web, 6, 9, 91, 108, 120, 122, 128–31, 133, 179
application programming interface (API), 17, 40, 68, 94, 110–11, 122, 129–31, 133, 161, 172–73, 175–76, 178, 180
archives, 9, 94, 116, 164, 167, 172, 186, 288; *see also* sustainability
arkivposter *see* posts
Art & Architecture Thesaurus (AAT), 39, 45, 162, 178
aspect, temporal, 144, 153
Athens, Greece, 208, 217
attestation, place-name, 20, 175–76, 243, 248, 250–52, 254
attribute, ID, 148

Babylon, 8, 29, 228, 230–36, 240–41, 285
BeBR *see* Bebyggelseregistret
Bebyggelseregistret (Swedish Database of Built Heritage), 38–42
belägg *see* records, written
Berners-Lee, Tim, 107, 160–61, 176
biskupasögur, 61
Blåvandshuk, Denmark, 140–42
change *see* language change
character recognition, optical (OCR), 68–69, 132
Chişcăreni, Moldova, 144
Chronicle of Charlemagne *see* *Karl Magnus' Krønike*
chronontology, iDai, 218
chronotope, 209, 247
churches, 24, 35–37, 39–41, 44, 47, 49, 52, 81, 96, 105, 123, 152–54, 230, 268–74, 277
CIDOC-CRM, 71, 162, 166, 173–74, 178
collection, place-name, 66–67, 115–17, 121–23, 131, 133–34, 137, 287
concept *see* unique place-name concept
Consolation of the Soul *see* Seelentrost; Själens tröst; Siælinna thrøst
Conte de Floire et de Blancheflor, 227–28, 237, 286
Corinth, Greece, 208
Creative Commons *see* licences, open
criticism *see* textual criticism
crowd contribution, 134, 244, 248
crowdsourcing, 43, 94, 133–34, 165, 180, 211, 244
crusades, 268, 270

DARE *see* Digital Atlas of the Roman Empire
Darius I, 210
data, cultural heritage, 34, 37–38, 172–73, 179
data, geographical *see* data, spatial
data, linked open (LOD), 1, 5–7, 9, 27, 34, 36–42, 85, 91, 107, 109, 133, 159–61, 163–67, 171–72, 175–77, 179–80, 211–13, 215–16, 220, 282, 285; *see also* data, open

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

data, open, 68, 93–94, 111, 160–61, 169–70, 176, 179; *see also* formats; licences, open; data, linked open
data, spatial, 1–4, 33–35, 37, 39–40, 51, 59, 69, 74–75, 78, 85, 92, 94, 99, 111, 137, 148, 195, 207, 215–16, 219–20, 244–45, 249, 251, 261–62, 282, 284, 286–87
  coordinates, 4, 15, 20–21, 28–29, 38–39, 42, 44, 61, 65, 68, 70, 79, 81–82, 91–92, 94, 99, 101–7, 109–12, 119, 122, 131–33, 139–41, 143, 148, 175, 206, 217, 244–45, 248, 251
  polygons, 7, 28, 42, 92–93, 101, 104, 119, 131, 133, 139–41, 185, 190, 196–97, 199–201, 244, 282
data model, 20, 37, 108–9, 140, 144, 153, 155, 162, 165, 167, 172–74, 176, 179, 185, 190–91, 216, 244
  place-name data model, 139, 147, 155, 243, 247, 249, 261
dataARC project, 61
database, 2, 7, 9, 15–20, 22–24, 26, 28–30, 34–36, 38–47, 49–51, 53–54, 61, 64, 66–68, 70–71, 74, 85, 91, 105–8, 111, 115, 118–19, 122, 125–26, 129–31, 134, 137, 139, 144, 146–47, 149, 151, 153, 155, 164, 166–67, 170, 174–76, 179, 185, 187, 190–93, 195–203, 212, 217–18, 229, 244–46, 249, 251, 261, 284–85, 287
dating, interval, 192–94, 197–98, 200–1
DigDag *see* Digital Atlas of the Historical and Administrative Geography of Denmark
Digital Atlas of the Historical and Administrative Geography of Denmark (DigDag), 2, 7, 185–203, 285
Digital Atlas of the Roman Empire, 20–21, 37, 216, 220
Digital Periegesis, 7, 43, 205, 207, 210–11, 213, 215–17, 219–21, 286
digitization, 2, 6, 8, 36, 53, 106–7, 115–16, 131, 137, 144, 159, 167, 281, 287–88
Dipylon, 217
division, administrative, 7, 92–93, 112, 116, 185–86, 195, 201, 203
DOIs, 165, 171, 178; *see also* IRIs
domain, public *see* licences, open
Dublin Core, 108, 162, 173, 179

EDM *see* Europeana Data Model
Eiríks saga rauða, 65
ejerlav *see* unit, land
Elasticsearch, 122, 125–26, 129, 131–32
Eufemia, Queen of Norway, 229
Eufemiavisorna, 228–29, 239–40
Europeana, 162, 172–73, 179, 287
Europeana data model (EDM), 162, 173–74, 179; *see also* Europeana
Europeanization, 240
exonyms, 179, 273

Færeyinga saga, 61
FAIR, 1, 161, 179, 211
Finland, medieval, 33, 35, 41–42
Floire et Blancheflor, 7, 227–28, 231–32, 239–41, 286
Flores och Blanzeflor, 228–32, 234, 236–38, 240–41
Flóres saga ok Blankiflúr, 228–29, 234–35, 237, 238
Floris and Blancheflour, 18–19, 29, 227–28, 233–35, 237
FOAF, 162, 173–74, 179
form, lemma *see* lemma
form, original *see* attestation
form, variant *see* variant
formats, 92, 111, 129, 161, 168–69, 177, 212, 215
Fornsök *see* Swedish Open Cultural Heritage
Fornsvenska legendariet, 270, 277
Frøya, Norway, 149–54
  Frøya kyrkje, 151–54
  Frøyadalen, 151–52
  Frøyagrunnene, 151–52
  Frøyaskjera, 151–52
  Frøya-Skorpeflua, 151–52
  Frøynes, 151–52
  Frøysjøen, 151–52

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

Gallic Wars, 206
gazetteer, digital, 2, 6–7, 9, 15–16, 28, 212, 215, 243–44, 261, 281, 284–85
GDPR *see* General Data Protection Regulation
General Data Protection Regulation (GDPR), 212, 215
genre, 8, 18, 25, 61, 63, 231, 246, 249–50, 256–58, 268–69, 272, 277
geographic information systems (GIS), 3, 9, 42, 59, 65, 68, 70, 85, 91–94, 98–99, 101, 103–6, 110–12, 139, 185–87, 190–91, 195, 203, 205, 244–45, 248, 261, 281–82, 285, 287–88
  historical (HGIS), 65, 91–94, 98–99, 101–2, 104–6, 108, 111–12, 281–82, 285, 287
geography, historical, 99, 185
geolocation, 137, 139–40, 142–44, 155
GeoNames, 28, 40, 61, 93, 144, 162, 175–76, 179, 244, 285
geo-referencing, 61, 70, 72, 91–92, 99, 103, 107, 111–12, 248, 282, 287, 289
geo-visualization, 207
Getty AAT *see* Art & Architecture Thesaurus
GIS *see* Geographical Information Systems
Greece, 7, 206–7, 210, 213, 216, 220, 286
Grettir Ásmundarson, 65, 69–73, 76, 78–84
Grettis saga Ásmundarsonar, 69–78, 80–85
Grieve, Patricia, 55, 228
Grænlendinga saga, 65

Handrit.is, 62, 74
Hellas *see* Greece
heritage, cultural, 2, 9, 33–34, 36–39, 42, 53, 59–60, 91, 93–94, 133, 159, 162, 164, 167, 169, 172–74, 178–80, 216, 281, 285, 287
Herodotus, 35, 206, 210–11
Hertig Fredrik av Normandie, 228–32, 240
Hertug Frederik af Normandi, 268
HGIS *see* geographic information systems: historical
Hið íslenzka fornleifafélagið (Icelandic Archaeological Society), 66
HTR *see* text recognition, handwritten
humanities
  computational, 138, 155
  digital, 4, 8–9, 16, 23, 25–28, 30, 34, 37, 94, 139, 159–60, 163, 167–68, 175–77, 186, 205, 281, 283, 288–89
  spatial, 2–4, 8–9, 26, 34, 51, 138, 144, 205, 243–44, 246, 261–62, 281–89

Iceland, 21, 59–85
Icelandic Saga Map, 1, 6, 20–21, 43, 59–85, 176, 243, 248–49, 256, 289
Iconclass, 39
ID, expression specific, 148
identifier, unique, 7, 38, 125, 130, 133, 137, 149–50, 160, 171
Ikonografiska registret (Iconographic Index), 36, 38
infrastructure, 1–5, 7–10, 15–16, 27, 30, 33–35, 37, 53, 61, 66, 68, 108, 139, 144, 147, 155, 159, 162, 164–67, 172, 175, 205–7, 212–13, 228, 244, 246–48, 251–53, 282–85, 287–89
  research infrastructure (RI), 3–5, 7–9, 19, 34–35, 37, 54, 108, 213, 215, 220, 246, 256, 281
  spatial data infrastructure (SDI), 4, 33, 37, 155, 220, 282–89
  spatial research infrastructure (SRI), 1–9, 16–17, 20, 30, 33, 51, 139, 205–7, 210–12, 215, 218, 220–21, 247, 249, 256, 258, 261
Institute for Language and Folklore, 6, 91, 115, 287
integration, data, 94, 138–39, 155, 195
Io, Norway, 145, 147
IRIs, 160–61, 163, 169, 171–74, 178, 285
Íslendingasögur, 60–62, 65, 74, 84
ISM *see* Icelandic Saga Map
ISOF *see* Institute for Language and Folklore
itinerary, 205–6, 209, 216, 239, 269, 271–73, 277

Jerusalem, 24, 258, 270–72, 274, 277
Julius Caesar, 206

Kaakkurinlampi, Norway, 142
Karl Magnus' Krønike (Chronicle of Charlemagne), 276

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -

kärnåker *see* land
Kersantin Mikkeli, 142
Kersantti *see* Andsjøen
Kiruna, Sweden, 140
Kishkaren' / Kishkareni / Kishkareny / Kishkaryany / Kishkereni *see* Chişcăreni
Kjartanssteinn, 63–64
Kölbigk, Tanzwunder of, 270
Kråkvasstinden, Norway, 142
K-samsök *see* Swedish Open Cultural Heritage

land, core arable, 40, 102, 104
Landmælingar Íslands (National Land Survey of Iceland), 61, 67–69, 71
Landnámabók, 61
Landsmålsalfabetet (Swedish dialect alphabet), 116
land surveyors, 95–98, 101–3, 105, 111; *see also* surveying, land
language change, 144, 246, 249–50, 258, 260
language variation, 8, 61, 145, 243, 245–46, 249–53, 258, 261, 273, 284, 288
Laxdæla saga, 63
Lazo / Лазо *see* Chişcăreni
Leiðarvísir, 272, 277
lemma, place-name, 19–20, 24, 176, 249–58, 260–61
licences, open, 17, 68, 94, 159, 161, 169–71, 176, 178–79; *see also* FAIR; data, open
litteraturhänvisning *see* references
localization, 19, 23, 29, 137, 140, 147, 269–70, 276
  ambiguous, 140
  vague, 22–23, 269, 277
location, 3–4, 18, 21–24, 28–29, 34–35, 37, 41–42, 44–46, 48, 51–52, 54, 63–65, 68, 75, 77, 79, 83, 85, 91, 93–94, 98–99, 101–5, 107, 111–12, 116, 119, 122, 132, 137, 139–41, 143–51, 153, 155, 160, 207, 210, 217, 230, 232, 243–45, 249, 255, 261, 267–68, 270–73, 277, 283–84, 287–88
  direct location, 137, 139–41, 143, 146–47, 151, 153–54
  indirect location, 138–41, 143, 146–47, 151–54
  see also geolocation
LOD *see* data, linked open
Lomtjernet *see* Kaakkurinlampi

maintenance
  digital, 27, 30, 128, 131–32, 160, 163–64, 168
  data, 1, 130, 151, 178, 244, 261
management, project, 16, 25–28, 30, 163, 167–68, 177–78
manifestation
  cult, 37–38, 42–48, 50–54
  temporal, 144, 146, 153
mapping, 6–7, 16, 21, 33–37, 40, 43, 51, 53, 59, 61, 65, 83–85, 95–97, 102, 110–11, 116, 147, 149, 151, 176, 185–87, 190, 192, 194–99, 202, 206, 209–10, 220, 246, 281, 287
  deep mapping, 139, 281
  spatio-temporal mapping, 137–55, 185–203
Mapping Saints, 1, 33–54, 284–85
maps, cadastral *see* maps, large-scale
maps, geometrical *see* maps, large-scale
maps, historical, 91–94, 97, 99, 101–7, 110–11, 185, 197, 287
maps, large-scale, 1, 6, 40, 91, 94–100, 103–6, 111–12, 188, 195, 197, 203
MariaDB, 122, 125, 129, 131
MB *see* Medeltidens bildvärld
Medeltidens bildvärld (Medieval Picture World), 36, 38, 52
Mediterranean, 19, 207, 209, 212
metonymy, 149
Mikkeli *see* Andsjøen
model *see* data model
Moghaddassi, Fanny, 233, 240
mono-referentiality, 139, 142
Moth, Matthias, 273
movement, 43, 47, 71, 185, 208, 233, 270, 285–86
multi-referentiality, 144

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

Nafnið.is, 1, 6, 59, 66–67, 69, 78–83, 85
names, homonymous, 19, 119–20
naming, 109, 142, 245–46, 267–69, 271, 277
NER *see* recognition, named entity
Norse World, 1, 6–8, 15–30, 43, 60, 85, 172, 174–77, 179, 228–32, 237, 239–40, 243, 249–53, 257–59, 261, 269, 273, 283
noun phrases, non-proprial, 22, 267, 273–74

OCR *see* character recognition, optical
onomastics, literary, 267
ontology, 9, 37, 61, 71, 108, 159, 161–62, 166–67, 173, 176, 178–79, 210–11, 216, 218, 221, 282, 284, 287
Open Data Commons, 170, 179; *see also* licences, open
Øpso, Norway, 147–48, 150
orientalism, 241
Orkneyinga saga, 61
Örnefnastofnun Íslands, 66–67
ortnamn *see* place-name
Ortnamnsarkivet (Swedish Place-Name Archive), 115–34
Ortnamnsregistret (Swedish Place-Name Register), 120, 126
Overgård, Denmark, 145
OWL, 161, 173–74, 179

Pausanias, 7, 205–21, 286
Pelagios: Enable Linked Ancient Geodata In Open System, 2, 20, 37, 43, 94, 212, 215, 218, 220, 243, 248, 284, 286
Periegesis Hellados, 7, 206–8, 215
PeriodO, 162, 179, 218
periphrasis, 271, 273
Peripleo, 43
Periplous, 206
Perseus Digital Library, 213, 215
Persia, 206, 210, 216
pilgrimage, 45, 47–52, 267, 270, 285, 289
Pilgrims' Guide to the Holy Land *see* Vejleder for pilgrimme,
place, type of, 37–38, 71, 229
places
  medieval cult buildings, 39, 41
  medieval holy sites, 36–37, 39–41, 44–45, 52
  medieval parishes, 39, 41
  see also churches
placeholder, 148–50
place-name, 1–9, 15, 18–25, 30, 40–41, 43, 60–63, 65–74, 78–84, 99, 101, 105, 107, 112, 115–34, 137–53, 155, 176, 179, 190, 210, 215–17, 229–30, 233, 237–38, 240, 243–58, 261–62, 267–70, 272–77, 284–85, 287–88
  endemic place-name, 273
  exotic place-name, 268–69, 277
  official place-name, 101, 117, 122, 126, 138, 142–44, 148, 245–46
  standardized place-name, 117, 119, 138, 273
  see also attestation, place-name; collection, place-name; exonyms; unique place-name concept
PlaceNameEdit, 123, 125, 129–32
PlaceNamePublic, 126, 128–29, 131, 133
PlaceNameService, 126, 129–33
Place-Name Register *see* Ortnamnsregistret
planning, project end of life, 168
Pleiades Gazetteer of the Ancient World, 20–21, 212, 216–17, 220, 243, 248, 261, 284, 287
polyonymy, 149
posts, archive, 117–29, 131, 134
province, medieval ecclesiastical, 35, 52
Ptolemy Soter, 219

Recogito, 2, 215–20, 248, 286
recognition, named entity (NER), 19, 105, 138, 144, 217, 244, 247, 288
records
  oral, 117, 121, 124, 127–28
  written, 117–18, 121, 124, 127–28
reference, 8, 15–25, 27, 29–30, 39, 41, 43, 52, 61, 70, 72, 78, 80–81, 91–92, 99, 102–4, 107, 109, 111–12, 127, 137–41, 144–46, 151, 160, 162, 169, 178, 210, 212, 215, 219, 228–35, 237–41, 244–45, 247–48, 250–51, 259, 267, 272, 277, 282, 284, 286–89
references (to secondary literature), 6, 9, 40, 78, 101, 104–5, 112, 118–19, 121, 124, 127–28, 131, 133, 160, 253, 260, 269

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

relation, parent-child, 37, 50
religion, lived, 6, 21, 33–54, 284–85
research, toponymic *see* toponymy
REST *see* application programming interface
RDF, 108–11, 160–63, 172–73, 179, 180
RDFS, 109, 161, 174, 180
RI *see* infrastructure, research
RightsStatements.org, 170, 180
  see also licenses, open
Riksarkivet (Swedish National Archives), 2, 6, 40, 42, 91, 99, 107–8, 111, 132
Robert d'Obigny, 227, 231, 234–35, 237–38
romance, 18, 29, 227–29, 231–32, 235, 241, 250, 257, 286

Said, Edward, 241
saints, 21, 33, 35–36, 38, 42–44, 46–48, 50–51, 270
  cult of saints, 6, 33–38, 41, 44, 48, 51, 53
Sandåhøa *see* Kråkvasstinden
Scanian Place-Name Database *see* Skånsk ortnamnsdatabas
SDI *see* infrastructure: spatial data infrastructure
Seelentrost (Consolation of the Soul), 274–76
seventeenth century, 6, 35, 40, 74, 91, 94–97, 99–101, 103–8, 111–12, 144–45, 191, 198
Siælinna thrøst, Själens tröst (Consolation of the Soul), 18–19, 21, 25, 247, 274, 276
Sjælens Trøst (Consolation of the Soul), 18, 247
settlements, 6, 22–23, 65, 67, 71, 91, 93–97, 99, 101–8, 110–12, 117, 119–20, 123, 127, 132, 140, 142, 147–52, 154, 185, 187, 216, 248
  abandoned farms, 98, 101
  farms, 66–67, 69, 71, 78, 82, 91, 94, 96–97, 99, 101–2, 105, 107, 111, 187, 191
  farmsteads, 76, 97–98, 101–2, 105
  hamlets, 91, 93, 95, 98–99, 101–7, 111
  holdings, 93, 95–96, 99, 105
  rural settlements, 94, 96, 99, 101–2, 111
  villages, 93, 99, 101–2, 111, 187, 191, 206, 216
  see also unit, historical settlement
Skånsk ortnamnsdatabas (Scanian place-name database), 131
Skorpeflua, Norway, 152
  Botne-Skorpeflua, 151–52
  Frøya-Skorpeflua, 152
SKOS, 108, 161, 179–80
SOCH *see* Swedish open cultural heritage
SPARQL, 110–11, 161, 166, 180
specification, OpenAPI, 129
SRI *see* infrastructure: spatial research infrastructure
statements, rights, 169–70, 172, 180
  see also licences, open
Stofnun Árna Magnússonar í íslenskum fræðum (Árni Magnússon Institute for Icelandic Studies), 59, 67
Stranda, Norway, 149–51
structure, hierarchical, 46, 50, 119, 126, 155, 180, 254
structure, place-name data *see* model, place-name data
studies, retrogressive, 99
Sturlunga saga, 61
surveying, land, 66, 94–95
  geometrical method, 94–99, 105–6
sustainability, 144, 159–78
Swagger, 129, 131–32
Sweden, medieval, 42, 240
Swedish Digital Place-Name Register, 115–134
Swedish Open Cultural Heritage (SOCH), 2, 34, 38–42, 44, 53, 159, 172–74, 177, 179–80, 287
Swedish Place-Name Archives *see* Ortnamnsarkivet

table, history, 124–25
TEI *see* Text Encoding Initiative
terms, catch-all, 120, 128
Text Encoding Initiative (TEI), 104, 107, 215, 246
text recognition, handwritten, 132
textual criticism, 8, 228, 246, 249, 255, 269, 276
Þjóðminjasafn Íslands, 66, 80–81
time slice method, 185, 195–96, 198

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - (cc) BY-NC-ND

Topographical Register at the Swedish National Archives (TORA), 1–2, 6, 40–42, 91–112, 133, 287
topography, 40, 42, 60, 63, 71, 74, 80, 84, 91, 143, 206, 209–10, 216–17, 228, 289
toponyms, 21–22, 24, 62–63, 65, 67–68, 72–74, 79–80, 83–84, 138, 150–53, 155, 206, 267, 272, 285
toponymy, 138, 142, 153
ToposText, 212, 216, 287
TORA *see* Topographical Register at the Swedish National Archives
translation, 7, 18, 38, 212–13, 215, 227–29, 234–35, 237–40, 274
travel, 7–8, 22, 43, 60, 63, 65, 71, 75, 97, 206, 209, 227–28, 233–34, 238–40, 268, 286, 289
travel books, 18, 61, 63, 206, 269, 272, 288
triangulation *see* surveying, land: geometrical method
Trismegistos, 218
Trojan War, 219
turn, spatial, 1, 9, 53, 137, 208

UID *see* identifier, unique
unique place-name concept, 7, 119–20, 122, 128, 137, 141, 149–50, 155
unit, historical settlement, 40–42, 91, 101–3, 105–11, 287
unit, land, 186–91, 193–200; *see also* settlements
URIs, 38, 40, 42, 94, 108, 110, 112, 160, 285
URNs, 171

variant, place-name, 8, 20, 24, 143–46, 148, 175–76, 243–62, 274
variation *see* language variation
Vejleder for Pilgrimme (Pilgrims' Guide to the Holy Land), 18, 24–25, 269, 271–72, 274, 277
VIAF, 162, 180
Victoria, Australia, 138
visualization(s), 9, 20, 23, 28–30, 35–36, 43–44, 47, 51, 53, 70, 75, 92, 190, 198, 220–21, 247, 250, 281
  of historical space, 15, 28–30, 35, 175
  of networks, 9, 46, 49, 206, 210, 282
  of time, 34, 194, 220
  of travel, 47, 51–52, 206
vocabularies, 34, 39, 45, 108, 110, 161–62, 167, 173, 176, 178–80, 211–12, 215

web, semantic, 107, 144, 155, 160–61, 180, 211; *see also* data, linked open
WHG *see* World Historical Gazetteer
Wikidata, 40, 94, 162, 165–66, 180, 218–19
World Historical Gazetteer (WHG), 37, 43, 212, 243, 248, 284

Ypso *see* Øpso, Norway

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access - CC BY-NC-ND

https://doi.org/10.17302/CDH-9781802700794 https://www.inlibra.com/de/page/agb - Open Access -