CONCLUDING REMARKS

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> 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)

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1 Lynam, *British Maps and Map-Makers*, 8.

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.

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.

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).

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).

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

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

… 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.

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.

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.