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Visualizing a Spatial Archive: GIS, Digital Humanities, and Relational Space

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Introduction: A Spatial Approach to the Digital Humanities

Geography matters! In any reading of literature or history, paper or digital, our imaginations are often invoked through a spatial sense. In a country where the importance of *dinnseanchas*, or "place lore," remains a significant contemporary component, a reading of place regularly features across the multiple strands of Irish Studies.[1] From Heaney's poetry to the novels of Sebastian Barry, place and a sense of place are ever-present in how stories and literary ideas are presented, received, and interpreted.[2] History too, in its archives and methods of study, has always happened some*where* and in that sense has always been explicitly emplaced. Given the broad theme of this issue—querying whether Digital Humanities offers better ways of realizing traditional Humanities goals or has the capacity to change understandings of Humanities goals altogether—it is useful to consider this question empirically against the increase in new digital forms of spatial information.[3]

We come to this question as a historian and a culturally-inclined historical geographer who have

a shared interest in the use of Geographical Information Systems (GIS) and what can even be termed “GI thinking”- that is, using geospatial databases as a structural foundation—to explore aspects of history for the period 1850-1932.[4] Our subject setting therefore is in the area of history, but draws from a wider multidisciplinary perspective. Our recent research on, respectively, the digital mapping of landed estate culture and society, and relational geographies of wartime auxiliary hospitals, uses GIS with a range of different digitized Humanities sources. Drawing from this research, we take the opportunity presented by the special issue to illustrate a number of methodological issues in relation to spatially-tagged information and to outline the potential for a geospatial vision to deepen Digital Humanities research. We intend to raise as many questions as we answer in the light of that exploration, but we do feel the time is right for a greater spatial presence(ing) in digital approaches to Irish Studies and feel an online platform is an especially apposite vehicle for these ideas.

At the heart of this exploration is a concern for the relational nature of geospatial information and how this can act as a valuable guide for other Digital Humanities work. Theoretically the idea draws from a relational geography within which the *where* is never just static or related solely to a fixed point on the earth’s surface but acts as a node in a wider set of physical and imaginative connections which are open, mobile, productive, and constantly enacted.[5] For contemporary critical human geographers, such understanding of the relationships between space (as container) and place (as locale and locus for lived lives), as well as that of the ongoing multi-scalar role for both the local and the global, are well-established ideas in the production of place as a “story-so-far.”[6] These ideas correspond in broad terms with relational discussions within Digital Humanities research, where texts are also conceived of as being in a process of constantly becoming.[7] More pertinently, the enhanced connective capacities of a Digital Humanities approach have significant potential. Harry Beck’s famous and much-copied London Underground map is a classic example of a relational geography, where topological elements such as connectivity and direction are more important than precise geographical location and scale.[8] Within this topological representation, the fundamental locational structures of the tube network become stretched and re-visioned but never entirely break or disconnect from their spatial base or lose their basic explanatory function.[9] In extending this idea into historical research, we note that some versions of history remain focused on single locations, individuals, events, and texts. It would be very disingenuous to suggest that these elements are not framed against wider political, social, and economic contexts, yet we would suggest there can still be a “siloed”- or in Digital Humanities terms, an “ecosystem” - vision of how they stand in relation to one another, especially in spatial terms. We feel that a topological

spatial approach, and a better articulation of the relational nature of history, geography, and even literature, can become a means to tie the archive together and provide a new cross-disciplinary perspective and depth of knowledge and understanding.

Literature Review: How Digital Sources Become Relational.

The convergence of two key movements within the Humanities — the emergence of Digital Humanities as a field, and the "spatial turn"— mean that the time is right for a greater spatial presence in the Humanities in general, and in Irish Studies in particular. Many studies draw on the subject of place and space across literature, history, and art, yet few consider it explicitly in terms of Digital Humanities, or bring those different strands together.[10] We consider that Humanities GIS may be an appropriate platform for this. While GIS has traditionally been perceived as a very quantitative tool, various scholars within the subject itself have, over the years, sought to make it more qualitative, even human.[11] More usefully, there has been a developing literature in application to Humanities subjects which we will discuss below, including ways in which digital maps and texts are brought together. In considering the spatial turn in relation to the Humanities, we also ground that discussion in a long-established critical geographical literature tradition within which key concepts like place, space, scale, and landscape have been extensively theorized.[12] At the end of this section, the potential of a relational approach that combines these strands is identified and critically discussed. These literatures are complex and contested, and we wish to draw from them areas of potential agreement alongside a realistic assessment of where conflicts and practical difficulties may arise.

Digital Humanities

While Digital Humanities may prove problematic to describe, it is possible to identify some defining characteristics. Most would agree that the focus of Digital Humanities lies in the use of digital tools and techniques to do any or all of the following: research, create, analyze, visualize, present, and preserve Humanities research. Some also suggest the Digital Humanities encourage new ways of working; typically projects can be interdisciplinary (not just within the Humanities but in conjunction with other schools such as computer science), inter-institutional, and collaborative. Openness and transparency of data is generally encouraged, which enables

other scholars to build on existing work. While Humanities “computing” alludes to analysis, calculation, and the hardware itself, “Digital Humanities” is broader in scope, referring to the whole research lifecycle and to multiple platforms (for example, smart phones, consoles, laptops, and tablets), tools, and software, including network analysis, 3D scanning, stylistic analysis, and visualization, to name just a few. Often methods, tools, and software can be shared or adapted across disciplines. Such approaches can enrich academic scholarship, as they embrace multiple interpretations and perspectives.

The use of computational tools and analysis in the Humanities is not a new phenomenon. One of the first humanists to harness the powers of computers for scholarly research, Father Roberto Busa, approached IBM as early as the 1940s to develop a concordance program that would assist in creating a lemmatization of the works of St. Thomas Aquinas. It is from the field of literary and linguistic studies that “Humanities computing” emerged, though each discipline has its own history of computing. Within History, for example, the benefits of computational analysis were demonstrated through pioneering work on economic and demographic history during the 1960s and beyond. Around the same time, geographical information systems were first developed in North America in order to manage land resources and census records.[13] As both subject and method, GIS has traditionally had a very strong quantitative and scientific base and is particularly associated with physical environmental, social scientific, and infrastructural applications. However, there has been a parallel Humanities application of GIS, particularly within History and Archaeology. Although historical GIS is still a relatively new field, partly because of the complexities of modelling changes both in space and time, it has a growing number of exponents both in Ireland and internationally. There is a small but significant corpus of literature relating to historical GIS, and this has been influential with respect to our own projects.[14] In essence, the real potential for GIS Humanities comes from the convergence of the spatial turn and the Digital Humanities.

Spatial Turns

Most areas of the Humanities have experienced what has been termed “the spatial turn,” which regards space as important “not for the trivial and self-evident reason that everything occurs in space, but because where events unfold is integral to how they take shape.”[15] In other words, space is no longer considered a backdrop but is a player in its own right, shaping both the people and cultures that interact with it, with the relational vision of Massey and others a key

component of that thinking. The position of geography as a subject is an interesting one, spanning as it does everything from hard science to geographies of art. Yet geography can also be seen as the ultimate cuckoo subject, drawing ideas from other subjects and recasting them with a spatial vision. In a sense, there is a sort of mutual attraction occurring, with geographers bringing the spatial to the text and Irish studies scholars moving the text towards space.[16] In describing an increasing number of examples of this coalescence, we see a relational take as potentially making these literatures more fully analytical, mobile, and active, with an additional shift from sometimes fixed visual connections to a fuller sense of process and motion. We recognize that the Digital Humanities are well positioned to do this but wish to draw attention to methods that may enhance a more dynamic interaction.

Digital Humanities scholars can draw on a variety of tools to create, visualize, analyze, and display spatial research—from Google Maps, through to Omeka's Neatline plugin which combines maps and timelines, and on to more complex GIS software such as ArcGIS and its open source counterpart, QGIS. GIS links spatial-feature data (maps and coordinates) with attribute data (information about those places), but is distinct from other spatial tools in that, when used to its full potential, it enables users to analyze, query, and model the data themselves - as in the Overland Trade project—rather than being presented with single one-off visualisations.[17] Some of the most innovative projects demonstrate a move towards "deep mapping," described by David J. Bodenhamer as "a subtle and multilayered view of a small area of the earth," which "in its methods[…]conflates oral testimony, anthology, memoir, biography, natural history and everything you might want to say about a place."[18] Hypercities combines maps with 3D images and data extracted from both historical and modern sources. An example is Digital Harlem which "presents information, drawn from legal records, newspapers and other archival and published sources, about everyday life in New York City's Harlem neighborhood in the years 1915-1930" via a map interface.[19]

Specifically within the Irish Studies sphere, maps and spatial data are being incorporated more frequently into Digital Humanities projects. Generally the spatial element is situated within precise geographic locations, as in the *Mapping Death* project which pinpoints the location of burials and burial sites in Ireland between the first and eighth centuries A.D. However, in the Humanities, space may not always be literal; instead it may refer to imagined or metaphorical locations. In the field of cultural and literary studies, one is beginning to see an explicit tagging of "place" into readings of texts and into discourse analysis in general, with the idea of geocriticism being one relevant example.[20] Increasingly art and critical theory are having a

"spatial turn" of their own, and new readings of the spatial are now becoming much more evident in those arenas.[21] Embedded landscape writing, with a particular development around those more embodied place-encounters, is evident in the "walking writings" of Tim Robinson, Robert McFarlane, and Rebecca Solnit, and in the psycho-geography of poets like Alice Oswald.[22] It is no coincidence that subject areas such as psycho-geographies and geocriticism have emerged, or that poets and novelists are increasingly analyzed using those terms. Jon Anderson, in his spatial manifesto, notes that humans are inherently both social and spatial beings and frame their encounters with the world within those parameters.[23] Joyce Walks takes a partially psycho-geographical approach, generating walking maps based on routes from James Joyce's *Ulysses*.[24]

Perhaps the real value of such spatial approaches lies in the linking of spatial data both within and between projects. This is where a truły relational potential emerges. The Digital Humanities have provided new ways of representing space. For instance, text encoding can incorporate the marking-up of places, as seen in the The Diary of Mary Martin, a digital scholarly edition of an Irishwoman's diary written during the first six months of 1916. The diary is marked up according to TEI (Text Encoding Initiative) guidelines and tags three kinds of information: people, places, and organizations. The CULTURA project uses natural language processing software to extract entities (including place) from historical documents, such as the 1641 depositions, and these are then connected to reflect relationships within (and ultimately between) collections. The entities can be visualized in either "wheel" or "octopus" format, or as points on a map (Figure 1 below).

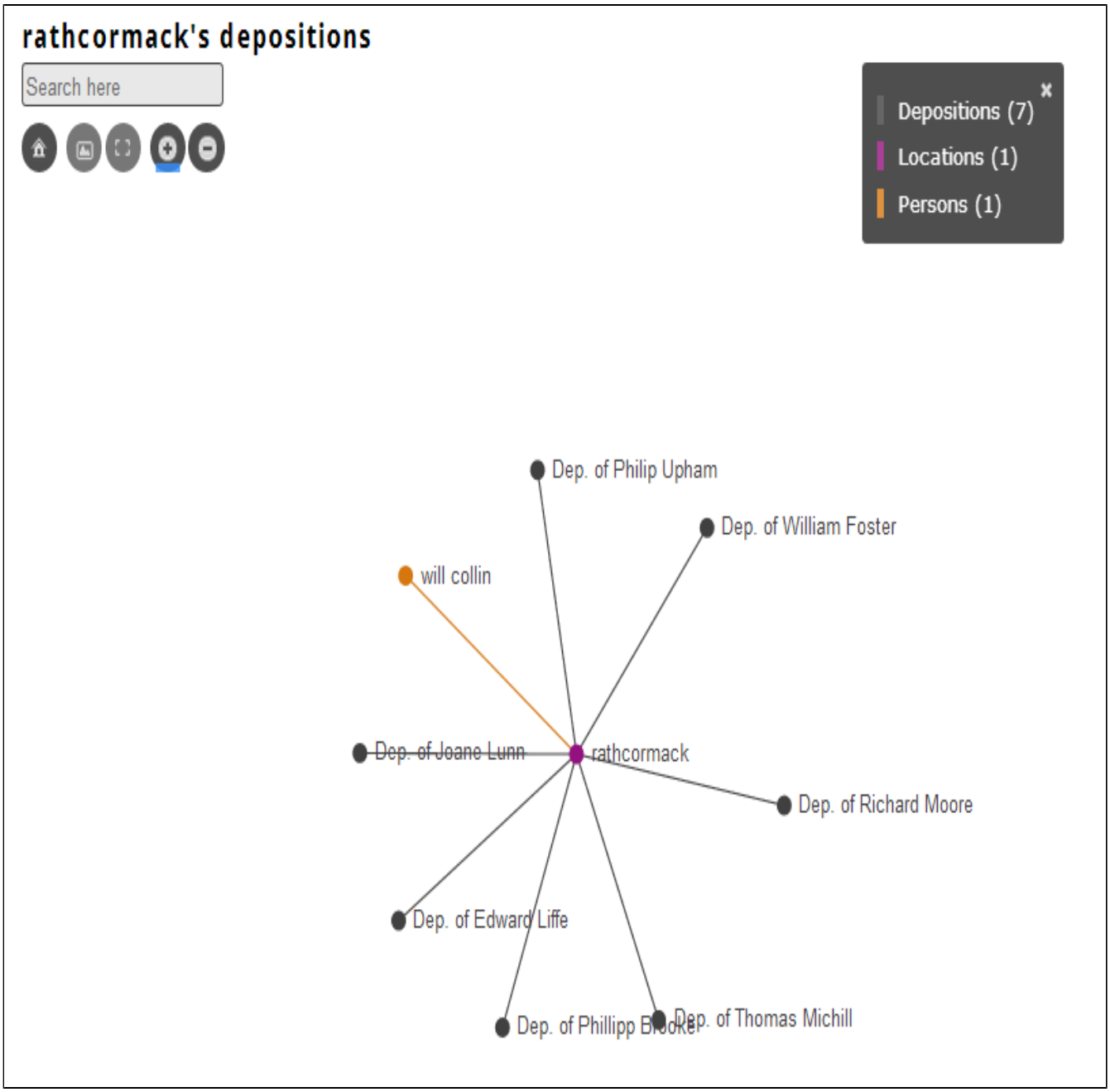


Figure 1. Visualization of depositions relating to Rathcormack, taken from Cultura Project's 1641 Depositions Collection.[25]

Dúchas.ie is a project to digitize the National Folklore Collection of Ireland.[26] The records are being digitally imaged and information about them added to a database. Users will be able to search on both people and places, and a map will be created to assist in searches by location. In the case of the Schools' Collection, the images are tagged according to the townland in which the school was situated. This is then linked to the townland as it appears in logainm.ie, the place-names database of Ireland, thus providing a spatial context to the record. Whilst not a GIS

in the fullest sense, the project is connecting spatial information from different sources. The Down Survey project takes advantage of some of the benefits of GIS, linking maps to other datasets, while the Digital Atlas of Derry-Londonderry uses GIS to show urban development over time by layering historical maps from the medieval period through to the nineteenth century, providing attribute data on key buildings over time, and publishing contemporary and present day images of the city. However, the data cannot be downloaded or queried, so the analytic capabilities of GIS are not being fully used. Some government organizations such as the Heritage Council and the National Monuments Service[27] are the first to combine cultural data with GIS, allowing the information to be queried, measured, analyzed, and downloaded.[28]

In bringing these strands together, our intention is to suggest the development of a more geospatially informed Digital Humanities, where spatial connections are visibly tagged and that such a tagging play a key role in the design of such research. ~~That~~ Such spatial tagging is at the heart, both methodologically and conceptually, of a relational geography that emphasizes how different places and groups of people can be understood in relation to one another. In addition, the use of topological terminology like nodes and networks also sets out a structure for analysis into which more Humanities-based forms can deepen the relational map. We also suggest in this relational “deep map” a place for memory, imagery, imaginative accounts, and more formally collected public information gathered as part of a wider conceptual model.[29] Finally, we would suggest that a GIS-based approach also marks a shift from visualization to an ability to interrogate and analyze spatial information, so that the users of this information are presented with a much deeper and richer experience.[30]

In the following section we provide specific examples from our own research to show how geographical information is both made digital and has its analysis enhanced through that digital form. We demonstrate how a spatial tagging of archival information and its analysis and visualization within a GIS environment speaks to the idea of a relational mapping in our chosen subject areas. In doing so, however, we are not blind adherents to this particular method and approach. The collection and use of geospatial information can be, quite frankly, complicated, boring, and frustrating. It is also technically difficult, and the hardware and software requirements can be expensive, despite an increasing FOSS (free or open-source software) environment for both digital maps and spatial data. The development of national digital historical atlases, for example, has taken researchers several decades with the ambition often outweighing the resources and energies of those involved.[31] That risk shadows our own work

as well and remains part of our own research tensions.

Empirical Examples: Relational Historical Geographies

The following section identifies, through two empirical studies, ways in which to develop a geospatial archive. In so doing, we illustrate the potential for a spatially-formed digital focus within the Digital Humanities. The material is based on two specific pieces of research, one taken from a doctoral study which includes the geospatial analysis of a landed estate in county Wexford, Ireland, and the second, a research project on a spatial visualization of the medical networks of World War I.

A Geospatial Analysis of a Landed Estate: Courtown, Co. Wexford

The Courtown Estate project seeks to provide a detailed understanding of the relationship between space, place, and community within an Irish landed estate, drawing on a variety of sources ranging from the government-created census returns and valuation records through to private correspondence and diaries. The project's emphasis is on historical analysis, but it finds itself located at an intersection of historical and geographical studies, and also references other elements of Irish Studies such as folklore and material culture. This digital manifestation of PhD research centers on a website that provides contextual information about the estate and its people, which includes an embedded map of the estate. While the website is not yet live, select locations on the estate have been mapped down to the field level within a GIS, this spatial data being linked to attribute data (such as occupier and images) by means of a relational database. Though this is not yet "deep mapping" as envisaged by Bodenhamer,[32] the project draws together sources from multiple archives into one place and represents at least some of the forces that are at play in a given location and a given point in time.

It was decided that a GIS would be the ideal way of presenting the data, since it can hold both spatial and attribute data in a relational database structure, allowing for complex analysis as well as data visualization. The first step in creating the GIS was to define the spatial extent of the Estate at the start of the period under review. This resulted in a list of townlands that fell either entirely or partly within the estate. In the absence of suitable estate maps, the Ordnance Survey First Edition six-inch maps and the revised versions from 1906 were used to provide the spatial data since they map land down to the individual field level. Using the townlands list, the

required map sheets were identified. Next, the key sources (valuation office records, estate records, and census returns) were reviewed and, using a technique known as data decomposition, were broken down into their constituent parts and reorganized into logical groupings. These groupings fed into the design of the relational database, each group becoming a table within the database. The next stage was to digitize the information. In the case of the spatial data, the paper maps need to be uploaded, georeferenced (in other words, given real-world coordinates, in this case according to the Irish Transverse Mercator coordinate system which references the WGS84 ellipsoid) and then digitized to provide five layers: estate boundary, parish boundaries, townlands boundaries, fields, and buildings. The spatial and attribute data is stored in a geodatabase, which holds information extracted from disparate sources and enables these to be queried, spatially analyzed, and visualized.

A key benefit of a GIS approach is that it enables the researcher to identify spatial patterns within data which ma~~n~~y otherwise be unapparent. Figure 2 is a screen grab of an animation from the Courtown project.[33] It maps particular fields on the home farm between 1915 and 1928, in order to understand the extent to which social, economic, and legislative change impacted ~~on~~ land usage. Some fields (highlighted in brown) were kept “in hand” and sown with crops, while others (highlighted in green) were let in annual grass auctions. In some years, fields could not be let—notably in 1922, the year the Irish Civil War commenced, when the grass auction was boycotted—and these fields are depicted in grey. Finally, in 1928, untenanted land was transferred to the Land Commission for redistribution under the 1923 Land Act. Such land is shown in purple. The land-use information is derived from farm books ~~which~~ that provide information on a field-by-field basis, making it difficult to achieve a sense of the whole.[34] By visualizing the data spatially, is has been easier to discern patterns. For instance, the animation shows that, with one striking exception in 1922, land usage was fairly stable from 1915 through to 1927, with around ten fields being in hand in any given year and the remainder generally being let. Thus it seems that the implementation of the 1923 Land Act (which required compulsory purchase) may have had a stabilizing effect, despite the untenanted land at Courtown not actually being transferred until 1928. Indeed, it is only in 1927, when the Land Commission required clear possession of land, that the animation shows an increase in unlet land. Finally, the animation clearly shows that by 1928 a large portion of the home farm has been transferred into Land Commission hands.

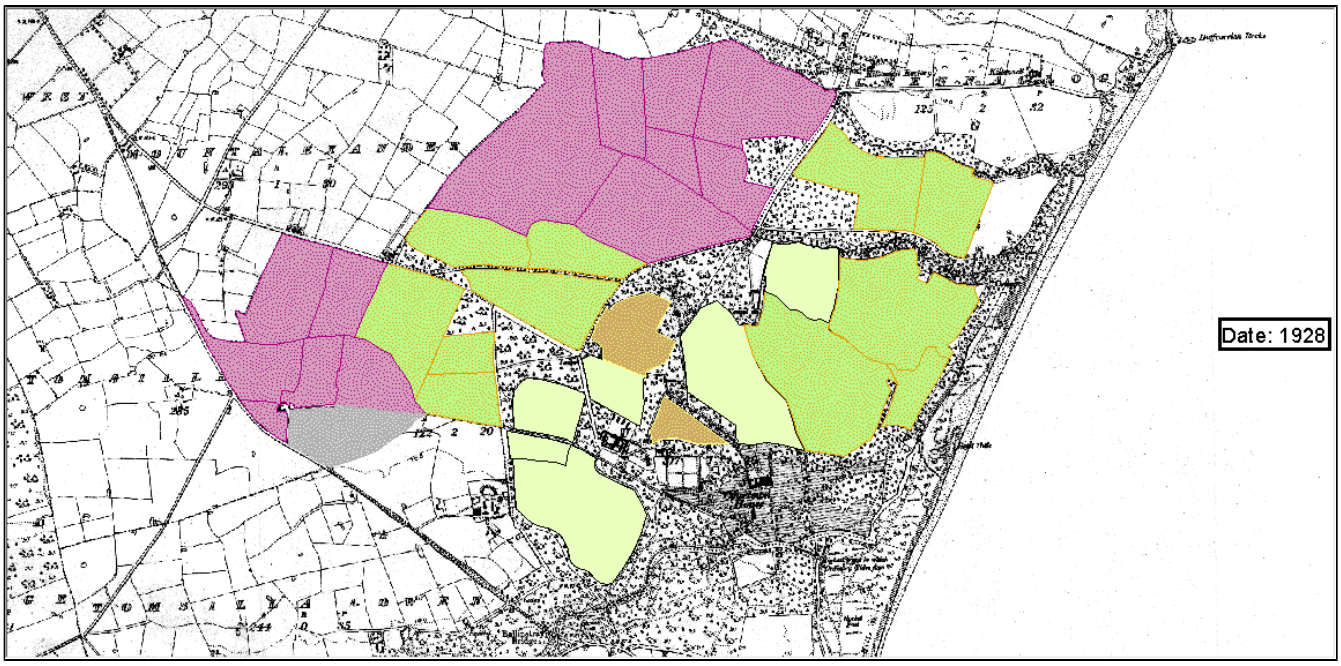


Figure 2. Still taken from animation showing land use on the Courtown Home Farm, 1915-1928

While the potential of GIS to Humanities scholars is vast, creating such a digital project is complex and not without its issues. In the first place, learning to use a tool such as ArcGIS or QGIS can be a time-consuming process and, if it is to accurately and precisely reflect spatial locations, requires at least a basic understanding of some geographic and cartographic concepts such as projections, coordinate systems, and generalization. Likewise, when using GIS for statistical analysis, an awareness of issues such as the modifiable areal unit problem[35] is required. One issue that is particularly relevant to the Courtown project is the representation of change over time in GIS, which is not easily managed. Representing fields and buildings over time is problematic; boundaries change, buildings are created and destroyed. Even after such issues have been grappled with, some very practical issues need to be considered—for instance, where best to host a project that draws on data from multiple archives, or how to ensure the completed website is adequately preserved and curated. In addition to data ownership, access and dissemination issues will also affect the production of such sites, and these issues remain barriers to fuller Digital Humanities work, both within GIS as well as within wider digital spatial settings.

Mapping the Auxiliary Hospital Networks of World War I

The second example is drawn from some research on the relational geographies of the Auxiliary Hospital network in World War I. The main focus of the research is to specifically map the operation of what might be termed “borrowed” medical spaces as emergency hospitals in order to deal with the flow of wartime military casualties. Some famous literary and cinematic examples include the hydropathic institution of Craiglockhart in Edinburgh, where Siegfried Sassoon and Wilfred Owen met, and which was the setting for Pat Barker’s *Regeneration* Trilogy.[36] Stately country homes were also common settings, as was the case for the model for television’s *Downton Abbey*, Highclere House in Berkshire.[37] As part of the process, a specific “relational map” was produced to show the nodes and networks whereby wounded bodies were moved from the Front Line to Auxiliary Hospital settings back home to places across the British Isles, including places like Dublin Castle. Putting the material together in a digital form involved a three part process, which included additional classification and routing components.

The first stage identified the names and locations of the various nodes on the network. This involved a variety of archival work drawing from online lists, military networks, archives, and key reports, as well as newspaper sources.[38] Once the list was drawn up, it was entered into a digital database with codes to identify each service type and, crucially, a geographical coordinate reference for each. Indeed, the location of the Casualty Clearing Stations (CCS) and Base Hospitals were identified from that useful though sometime vilified source, Wikipedia,[39] but ground-truthed (verified) against an open-source topographic base map. One of the issues was that the available archival online lists sometimes provided named locations that were not spatially precise enough, ~~but~~ yet, using the same digital archive, it was possible to cross-check and produce a more definitive list. The locations were recorded in geographic rather than projected form as the base map used was an online base map that was displayable within a GIS program~~me~~. While fully aware of the political implications of projections within historical mapping, especially in relation to specific combatant “views” of the Front, it was decided that a contemporary and as-neutral-as-possible map base—a World Topographic Map scalable to approximately 1:4,000—would be used.[40] In mapping a network that ran from the South of Ireland to the River Rhine, it was necessary to choose a coordinate system that superseded national grids, and, in the end, a GCS_TM75 Projection was used to finalize the geo-referencing.

The second stage involved converting the raw textual data into digital format and, using a range of geo-referencing methods, loading it up as a set of layers into a GIS environment. A number of

additional data preparation tasks were needed. The first of these was to translate the geographic coordinates into the correct format, which involved a batch conversion from degrees/minutes/seconds format to a decimal version. This was necessary to allow them to be geo-referenced into a GIS format, using a fairly standard “add XY points” command. Such a command typically converts an external database or spreadsheet into a digital point layer, provided there are two columns in that external file that contains recognizable X and Y coordinates. The final result was a map of the locations of CCS and Base Hospitals on the Western Front between 1914 and 1919 (Figure 3).

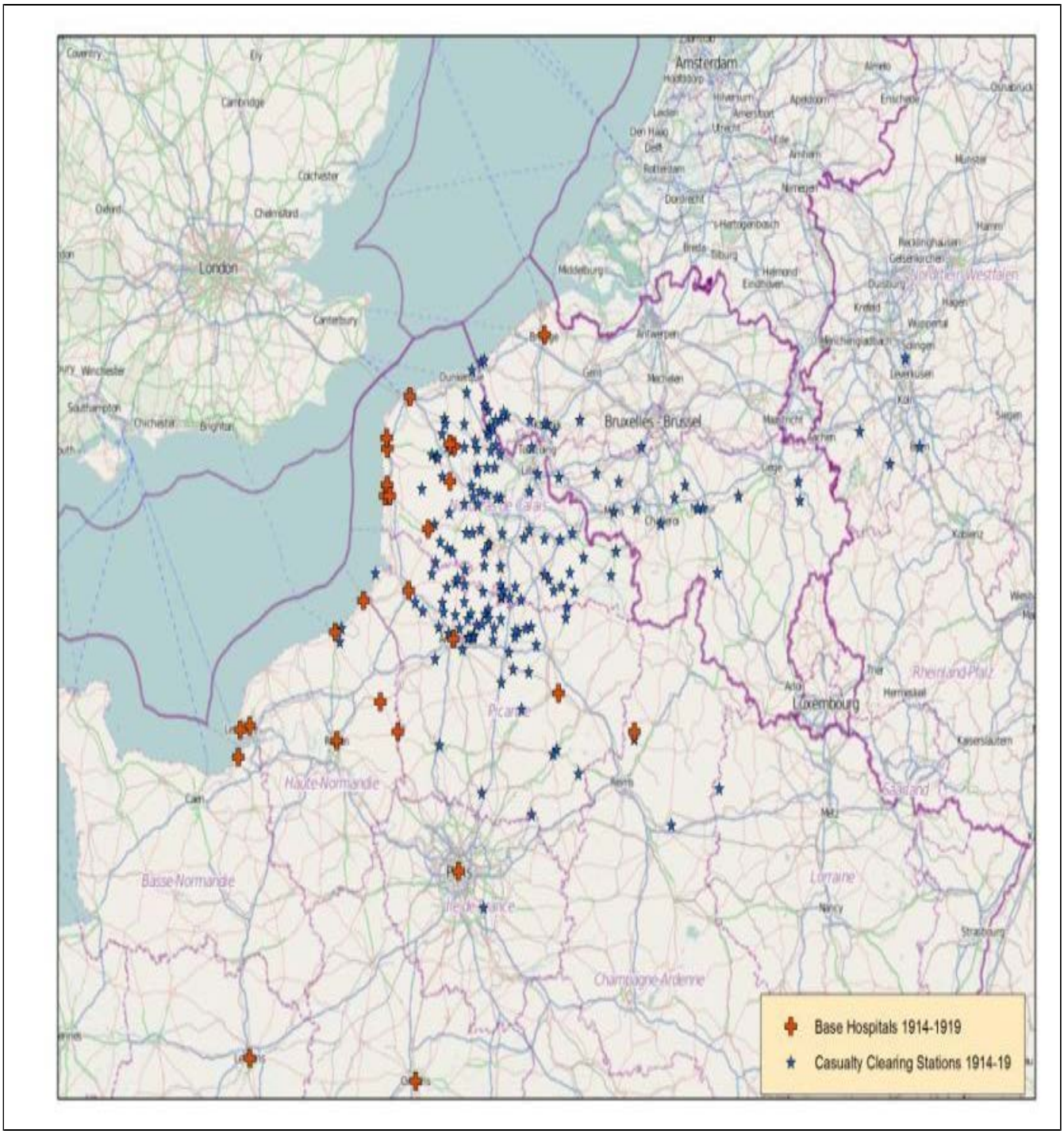


Figure 3. Location Map of CCS and Base Hospitals, Western Front 1915-1919.[41]

As a third step, some of the CCS points were then set up for display in a time animation, a key aspect of the research aim to capture a more evident and realistic time-space model of auxiliary medical spaces during wartime. CCS moved around a lot during the war and, in a sense, tracked the geography of the front. As a new visualization and as an example of the potential of a Digital Humanities archive, the database for the hospitals was modified to produce multiple

records for each CCS with the different records recording the different location of the stations at different time periods. This was achieved within the database by recording multiple records for each CCS (typically given a numeric code such as CCS 9) and by adding two new attribute fields for the start and end date for each location. Running the time animation option in GIS involved setting up attributes around the display, timing, and speed of the animation, and an example was developed of the movement of a sub-set of CCS.

Finally to take advantage of the digital nature of this journal, we illustrate some of the research processes discussed above. The first of these is the third in a series of a number of YouTube tutorials providing methodological support for historians working with historic maps. The clip (http://youtu.be/XM3ZfJihc9A) takes users through the technical process of digitizing new layers from digital base maps (others in the series include how to upload and georeference a scanned manuscript map, how to join data from a spreadsheet to an existing attribute table, and how to display this online and in print). The second example is a saved film clip drawn from the animation referred to in the previous paragraph. The animation (http://www.youtube.com/watch?v=D945_CriHyg&feature=youtu.be) provides a visualization of the shifting geographies of representative Casualty Clearing Stations (CCS) which were the first line of fixed structures providing medical care directly behind the front. As the animation shows, the CCS network essentially followed the line of the front so that, in animating its geography, one can not only track the progress of the war but also identify a topology of medical networks which shift, stretch, and contract as the war progresses. Here we can begin to visualize an explicitly relational geography, which might not be so apparent within a more static graphic form, but becomes more evident and literally alive when converted into a digital spatial format.

In being reflexive about both pieces of research, they are works in the process of completion that could carry on for a very long time. They have functional endpoints—the completion of a doctoral study and a monograph—but the spatial framing of the work also offers it up as a nice example of the open-ended, extensible, and updatable vision of the Digital Humanities framework envisaged by scholars.[42] Starting with Courtown, one could expand the research to other landed estates in Wexford and beyond. An over-concentration on the Western Front ignores many of the other theaters of war in Eastern Europe, the Dolomites, Africa, or Mesopotamia where similar topologies of medical treatment applied. As an example of potential additional Humanities content, the paintings of Henry Lamb and Stanley Spenser pay testament to those networks in their exquisite paintings of wounded soldier transports in Palestine and Macedonia respectively.[43] These too could be connected via hyperlinking to specific locations

on the map to give us image, location, context, and narrative in a single glance. The research has been a hard grind, exposing our own developing technical knowledge, working with sometimes unfamiliar methods to match our own visions of what a relational deep map might look like. The technical nature of geospatial formats and their restrictive structures sometimes frustrated that vision. It might have seemed hard, for example, to map the feelings of an indebted agricultural labourer or wounded soldier onto the map but the new developments of TEI through diaries, via hyperlinking, make this eminently possible. What may remain hidden is that fuller set of subaltern voices, though initiatives such as the Europeana project and the recent opening up of digital archives from the Imperial War Museum and the Irish Military Pensions Archive make these voices increasingly audible. Perhaps the learning in the projects is also as much about learning how the "spatial text/archive" can be made digital as it is about producing definitive outcomes. Yet we would also argue that a relational vision is the first step in connecting up the archive to enhance the possibilities of analysis and new understandings as well.

Discussion: A More-Than Digital Spatial Humanities

We suggest in this paper the potential for making the Digital Humanities spatially relational. In doing so, we advocate a hybrid approach that extends existing static work and makes it more dynamic. Google Earth, for example, has brought the spatial more fully into many people's lives and has begun to introduce geospatial concepts like overlay and visualization into Humanities research. Yet it lacks the relational and connective analytical possibilities of a GIS. Initiatives like the overlays of Flickr images and even StreetView, while they have genuine dynamic possibilities, remain limited base-maps for more detailed and rewarding relational work, and do not take full advantage of potential spatial tagging from within the digital archive. Technically, the role of the relational database in using spatial joins to link features together—or, indeed, using the geographical feature (which could be a place, a person, a building, or an archival record) as a key relational node—can be expanded to institutional, even global, scales. In the same way that new Digital Humanities corpuses of knowledge try to pull together full collections of text, images, or sound, it is also undeniable that geography plays a role. An increasingly common feature within Digital Humanities databases are buttons or drop-down lists which allow users to query collections and holdings online via a place-specific query—in other words, "find me all available information in online sources on place 'x'?" Such approaches have been developed, as noted above, within Irish Studies, yet a fuller connective thread, linking history

(time), geography (place), and literature (imaginative time-place connections), seems to us ripe for enhanced development.

In returning to the initial premise of the special issue and the debate around whether the Digital Humanities is just about replacing the “analogue” in digital form—or whether new possibilities and goals can genuinely emerge—we would suggest (using geospatial data as an example) that it can be a mix of enhancement, replacement, and new development. In doing so, we invoke the work of Hayden Lorimer, from the theoretical arena of non-representational theory, whose work reflects debates found in the Digital Humanities.[44] In trying to replace the analytical excesses of representational work with a greater concern for the enacted, experiential, and emotional aspects of living, Lorimer suggests that one is not necessarily obviating the importance–social and political—of what representational theory offers. Instead, he calls for a “more-than” representational view, one that makes a place for both, but excludes neither. One instinct might be to think about new geospatial data approaches as representative of the first argument above, in providing a more sophisticated relational way of traditional mapping and cross-referencing of the spatial archive. Yet one might also argue for the latter in terms of seeing geospatial data sets as developing new and genuinely complementary—in the “more-than” sense—insights that move beyond new methods and carry with them the possibilities of new ways of thinking on a subject as active, mobile, relational. This, in turn, captures a more effectively complex assemblage of connections between people, place, and time. At heart, using GIS in historical research contains within it the core Humanities research aims of new insights, knowledges, and perspectives, and we feel that this is where the “more-than” approach, both complementary and deepening, can best serve the subject in relation to Irish Studies and beyond.

In moving a little beyond the data and methodologies associated with GIS—though they remain interesting in and of themselves—we would additionally note they can be reframed in terms of their potential value to Digital Humanities research and wider critical theory. In doing so, we identify several areas that may have critical value.

In thinking about the spatial in its relational form, one can provide new forms of visualization for primary and secondary material across a range of Irish Studies subjects. Through developing an array of methodological/technical knowledge, we can allow for the reconfiguration of archival data in new forms, which are then fed back visually to end-users to set off new trains of thought. For instance, Location LODer combines Linked Logainm data (the linked data version of the Irish placenames database) and a Google Maps interface with a range of digital resources relating to locations across Ireland, enabling users to view sources from a variety of collections

that relate to a single area. Additionally, the open and layered framework of GIS, especially online GIS, can allow for improved spatial tagging from within the system. Examples include the hyperlinking of mapped feature objects to web sites, images, documents and statistical data, given there is a slow but steady development of online mapping overlays using Google map layers (Figure 4). One example would be the Digital Literary Atlas of Dublin, 1922-1947, which maps a range of Irish writers' biographical and imaginative geographies across time and space. Such overlays however are still relatively static and do not take advantage of the fuller relational and interactive potential of GIS environments.



Figure 4: Location of Blendecques Casualty Clearing Station.[45]

In extending relational thinking to the text, we would also suggest a deepening of attention to the nascent practices of "spatial tagging" more generally in Irish Studies. Learning from our own experience, the lack of recording of associated spatial information—something as simple as a building, townland, or village name—is often overlooked in the compilation of archival material. In addition to the actual data, online metadata, which include fuller spatial references, would also be of key importance going forward. This process is already common practice among information scientists, and, with the development of online networking, it should become easier to link things together via metadata also using assorted transferable coding like GML, GMZ, and XML.[46] Yet, as we hope we have demonstrated above, there is a sort of multiplier effect in taking raw spatial data and transforming it within a GIS, something that also improves data quality and interpretation. Omitting that spatial tag, however, limits those possibilities. That attention to the spatial tag can be extended to more imaginative studies as well. Knowing something about the setting of a poem and its place or its specific and precise location in other digital mapped forms also opens up a wider understanding of the relationships between the map and the text. Examples include studies which record Patrick Kavanagh's poetry into its native townlands and provide a 3D visualization of the view from Inniskeen, for one.[47] In terms of the recording of local oral history and the bringing alive of local oral historical knowledge, websites like the Cork Memory Map, produced by the Northside Folklore Project, provide a very specific tagging of voice/*dinnseanchas* to a precise place on an online map. It is increasingly possible to take the spatial knowledge inherent in original census returns and tag this for the purposes of linking to a cartographic base. This in turn opens up possibilities for the tagging and "joining" of previously unconsidered archival and personal records, such as postcards, photos, posters, film, and other ephemera to place within a Digital Humanities framework—the "deep-mapping" referred to previously.

Finally we would return to the idea of the relational and topological and consider how such a concept can be developed to enrich Digital Humanities research in Irish Studies. While we have noted some of the components of topology that create spatial networks, nodes, arcs, connectivities, and directions of movement, it is also possible to use the idea of a topology of ideas within Digital Humanities archives.[48] Here the nature of the network to fold and stretch in order to reveal those connections is not just cartographic (like Beck's London Underground Map) but is also applicable to a range of textual, statistical, and oral materials as well. Indeed, a neat, associated example is the graphic map of the same network produced during World War I by Macdonald Gill, whose "Wonderground Map" visualized beautifully a "deeper map" of the city, where place reputation, activities, and a lived city were brought to life in two-dimensional

form.[49] Such a rich representation could be readily developed within an online GIS—if perhaps in less artistic form. The introduction of a digital spatial perspective can stretch and enhance a critical reading of the text but does not necessarily need to replace or disconnect it. This more-than complementary analysis adds to a multi-layered interpretation of both archival and imaginative material in opening new spaces of interpretation yet also leaves room for difference and multiple understandings of the same texts. Both case studies discussed here share an interest in deep mapping. The estate work might be characterized as more *vertical* in terms of an overlay of GIS layers within a specific topographic area of reference, while the war medicine research can be seen as *horizontal* via a node-arc topological focus; yet together they provide a ~~sort of~~ mobile, active, 3D representation of historical geography that provides a space for a deeper connection with a multi-disciplinary Irish Studies.

In conclusion, and based on our own experience of developing Digital Humanities material within a GIS framework, we would still fully recognise that the quality of the input data and source material remains paramount. We also reiterate the technical difficulties associated with linking together spatial data and the wider constraints related to data access, conversion from paper to digital form, data matching, and publication/dissemination issues. Yet considering the shifts from fixed hardware to increasingly mobile platforms and from large data storage facilities to Cloud GIS, we would argue that the structures of geospatial knowledge are increasingly abandoning the standalone for a more completely relational vision. GIS remains a tool for seeing geographical information in new ways, and we feel the depth of Digital Humanities work would be considerably enhanced by a renewed attention to the geospatial. The idea of interpolation remains important here. Just as the literary critic uses partial clues (from letters, diaries, drafts), or the historian pieces together snippets of information from similar archival sources, in order to tell a story, that story usually contains gaps. The capacity to fill those gaps and meaningfully estimate the “spaces” in between is the business of interpolation, a common spatial modelling method used in GIS. Such a method may sit less well in history—where the primacy of the source remains central—yet by linking the data together we may reduce the size of the gaps. As with all subjects, the better the quality of the raw material, in volume, provenance, and scale/detail, the better the critical end result of any interpolation will be. As a core aspect of relational-geographies thinking, and evidenced in our ongoing empirical work in the Digital Humanities, we present these ideas to encourage the potential of place-based knowledge and its fuller articulation and utilization within Irish Studies research.

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[1] Nessa Cronin, Sean Crosson, and John Eastlake, *Anáil an Bhéil Bheo: Orality and Modern Irish Culture* (Newcastle Upon Tyne: Cambridge Scholars Publishing, 2009).

[2] Sonia Howell, "'No Text […] is Ever One Thing': Utilizing Digital Technology in Literary Research," *Scholarly and Research Communication* 3, no. 3 (2012): 1-9.

[3] The routine, everyday use of Google Earth, GPS, SatNav and online mapping make this, according to Mike Goodchild, a new "invisible technology" in societal terms (pers. comm.).

[4] A GIS may be defined as "an organized collection of computer hardware, software, geographic data, and personnel designed to effectively capture, store, update, manipulate, analyze, and display all forms of geographically referenced information." See "Geographic Information Services at INHS," Illinois Natural History Survey, accessed September 18, 2015, http://wwx.inhs.illinois.edu/resources/gis/.

[5] Tim Cresswell, *Geographical Thought: A Critical Introduction* (London: Wiley-Blackwell, 2012); Manuel Castells "Grassrooting the Space of Flows," *Urban Geography* 20, no. 4 (1999): 294-302.

[6] These ideas are best expressed in the works of Doreen Massey, wherein some of the core ideas of a geographical understanding of the world that crosses boundaries and scales lay the foundation for relational thinking about space; see Massey, *For Space* (London: Sage, 1997).

[7] Though this remains a much-contested debate. See, for example, Matthew Wilkens, "Canons, Close Reading, and the Evolution of Method," in *Debates in the Digital Humanities*, ed. Matthew Gold (Minneapolis: University of Minnesota Press, 2011), 249-258; and Stanley Fish, "The Digital Humanities and the Transcending of Mortality," *The New York Times*, January 9th, 2012.

[8] For an example of Beck's illustration, see the "Standard Tube Map," Transport For London website, last accessed September 18, 2015, https://tfl.gov.uk/cdn/static/cms/documents/standard-tube-map.pdf.

[9] Cresswell, *Geographic Thought*, 218-238.

[10] Ian Gregory and David Cooper, "The Interdisciplinary Mapping of the Past: Geographical Technologies, History and Texts," *Journal of Victorian Culture* 18, no. 2 (2013): 265-272; Marc Silberman, Karen E. Till, and Janet Ward, *Walls, Borders, Boundaries: Spatial and Cultural*

Practices in Europe (New York and Oxford: Berghahn, 2012).

[11] Helen Couclelis, "Ontologies of Geographic Information," *International Journal of Geographical Information Science* 24, no. 12 (2012): 1785-1809; Sarah Elwood, "Thinking Outside the Box: Engaging Critical Geographic Information Systems Theory, Practice and Politics in Human Geography," *Geography Compass* 4, no.1 (2010): 45-60; and *GeoHumanities: Art, History, Text at the Edge of Place*, ed. Michael Dear, Jim Ketchum, Sarah Luria, and Douglas Richardson (Abingdon: Routledge, 2011). Of this final text, see especially Section 4 on Spatial Histories.

[12] For a succinct discussion of this critical literature, see John Wylie, *Landscape* (Abingdon: Routledge, 2007).

[13] The Canada Geographic Information System, and the DIME program (Dual Independent Map Encoding) respectively, as cited in Paul Longley, Michael Goodchild, David J. Maguire and David Rhind, eds*., Geographic Information Systems and Science* (London: Wiley, 2010): 17.

[14] Key works include: Ian Gregory and Paul Ell, *Historical GIS: Technologies, Methodologies and Scholarship* (Cambridge: Cambridge University Press, 2007); Anne K. Knowles, *Placing History: How Maps, Spatial Data, and GIS are Changing Historical Scholarship* (Redlands: ESRI Press, 2008); Alexander von Lünen and Charles Travis, *History and GIS: Epistemologies Considerations and Reflections* (New York: Springer, 2012); and Ian N. Gregory and Alistair Geddes, *Toward Spatial Humanities: Historical GIS & Spatial History* (Indiana University Press, 2014).

[15] For more, see David J. Bodenhamer, "The Potential of Spatial Humanities" in *The Spatial Humanities, GIS and the Future of Humanities Scholarship,* ed. David J. Bodenhamer, John Corrigan, and Trevor M. Harris (Bloomington: Indiana UP, 2010); and Barney Warf and Santa Arias, eds., *The Spatial Turn: Interdisciplinary Perspectives (*London: Routledge, 2008).

[16] This is not restricted to text but also includes a range of other formats such as image and sound files.

[17] See Sebastian Caquard and Benjamin Wright, "Challenging the Continuity System of the Technological Map: A Cinematographic Perspective," in *Cartography and Art,* ed. William Cartwright, Georg Gardner, and Antje Lehn (Berlin: Springer, 2009): 193-206.

[18] Bodenhamer, "The Potential of Spatial Humanities."

[19] See “Welcome,” Digital Harlem, last accessed September 19, 2015, http://digitalharlem.org/.

[20] Nessa Cronin, “Lived and Learned Landscapes: Literary Geographies and the Irish Topographical Tradition,” in *Irish Contemporary Landscapes in Literature and the Arts*, ed. Marie Mianowski (Hampshire: Palgrave Macmillan, 2011), 106-118; see also the foundational work of Bertrand Westphal and his concept of *géocritique,* discussed in Robert T. Tally, ed., *Geocritical Explorations: Space, Place, and Mapping in Literary and Cultural Studies* (New York: Palgrave Macmillan, 2011).

[21] Karen E. Till, “Artistic and Activist Memory-Work: Approaching Place-Based Practice,” *Memory Studies* 1, no.1 (2008): 99-113; and Merlin Coverley, *Psychogeography* (London: Pocket Essentials, 2006).

[22] See, for example, Rebecca Solnit, *A Field Guide to Getting Lost* (New York: Penguin, 2006); Robert McFarlane, *The Old Ways: A Journey on Foot* (New York: Viking, 2012); Tim Robinson, *Connemara: The Last Pool of Darkness* (Dublin: Penguin Ireland, 2008); and Alice Oswald, *Dart* (London: Faber and Faber, 2002).

[23] Jon Anderson, “A Spatial Manifesto,” accessed September 19, 2015, http://www.spatialmanifesto.com/.

[24] This particular walk, for example, covers locations visited on Bloomsday.

[25] See “1641 Depositions,” Cultura Project, accessed September 19, 2015, http://cultura-project.eu/1641/.

[26] A collaborative project involving the National Folklore Collection, University College Dublin; Fiontar, Dublin City University; and the Department of Arts Heritage and Gaeltacht, with the Digital Repository of Ireland acting as an advisor.

[27] See, for example, Heritage Council’s “Heritage Maps” website, accessed September 19, 2015, http://www.heritagecouncil.ie/maps/welcome-to-heritage-maps/; and National Monuments Service’s “Archaeological Survey of Ireland,” accessed September 19, 2015, http://webgis.archaeology.ie/NationalMonuments/FlexViewer/.

[28] An incentive for the development of easier public access to available spatial information was driven by the EU INSPIRE directive of 2007.

[29] The idea of the “deep map” is drawn from topographical descriptions of place that pick up notions of multiple layers and narratives connected within and from that place—a relational of ideas, representations, images, imaginations, discourses, and physical information. For examples, see Common Ground.

[30] Note the interesting take on the future of geography computing and linked, open data via the Pleiades project, provided by Tom Elliott and Sam Gillies, “Digital Geography and Classics,” *Digital Humanities Quarterly* 3, no. 1 (2009),

http://digitalHumanities.org/dhq/vol/3/1/000031/000031.html.

[31] Humphrey Southall, “Historical Geography and Digital Data,” in *International Encyclopedia of Human Geography*, ed. Rob Kitchin and Nigel Thrift (Amsterdam: Elsevier, 2010); see also the Great Britain Historical Geographical Information System (GBHGIS), accessed September 19, 2015, http://www.port.ac.uk/research/gbhgis/.

[32] Bodenhamer, “The Potential of Spatial Humanities.”

[33] The full animation can be viewed at “Land usage on the Courtown home farm 1915-1928,” accessed September 19, 2015, http://youtu.be/pBm63OsRb9o.

[34] Survey of Courtown farm with maps showing use of individual fields 1914-32, MS 11183 V197, Trinity College Dublin Library.

[35] The modifiable areal unit problem (MAUP) refers to the different results one would get by varying the spatial scale and zonal geography of raw point data when aggregating it up to bigger spatial units.

[36] Pat Barker, *Regeneration* (London: Viking, 1996).

[37] Countess of Carnarvon, *Lady Alminia and the Real Downton Abbey: The Lost Legacy of Highclere Abbey* (London: Hodder and Stoughton, 2011).

[38] Including “Reports by the Joint War Committee and the Joint War Finance Committee of the British Red Cross Society and The Order of St. John of Jerusalem in England on Voluntary Aid rendered to the Sick and Wounded at Home and Abroad and to British Prisoners of War, 1921,” reprinted by the Naval and Military Press and the Imperial War Museum; and “Princess Patricia Hospital Bray,” *The Irish Times*, August 4th, 1915, 7.

[39] Within a sample Wikipedia place entry for Abbeville, the geographic coordinates are typically listed on the top-right hand part of the page as a hyperlink. The hyperlink in turn links to a geo-hacking site with sound additional provenance and metadata.

[40] See J. Brian Harley, "Deconstructing the Map," *Cartographica* 26, no.2 (1989), 1-20.

[41] Map drawn by author over a World Topographic Map made available online via Arcgis.com

[42] Matthew Gold, ed., *Debates in the Digital Humanities* (Minneapolis: University of Minnesota Press, 2011).

[43] See Henry Lamb, *Irish Troops in the Judean Hills Surprised by a Turkish Bombardment*, (1919); and Stanley Spencer, *Travoys with Wounded Soldiers Arriving at a Dressing Station at Smol, Macedonia, in September 1916*, (1919).

[44] Non-representational theory is essentially posited as a response to the representational focus within textual analysis and proposes replacing this with a more alive, enacted, and living take on the world in which things like movement, affect, and momentary responses better reflect the ways of "being-in-the-world." See also Nigel Thrift, *Non-Representational Theory* (London: Routledge 2007), and Hayden Lorimer, "Cultural Geography: The Busyness of Being 'More-Than-Representational,'" *Progress in Human Geography* 29, no.1 (2005): 83–94.

[45] Last access January 7th, 2014, http://throughtheselines.com.au/research/1-ACCS#blendecques, overlaid with image extracted from Google Earth.

[46] See for example, Lancaster University's Mapping the Lakes: A Literary GIS, in which literary cartographies of the work of Thomas Gray and Samuel Coleridge are directly linked to GMZ formats that automatically load in Google Maps.

[47] Charles Travis, "Abstract Machine – Geographical Information Systems (GIS) For Literary and Cultural Studies: 'Mapping Kavanagh,'" *International Journal of Humanities and Arts Computing* 4, nos.1-2 (2010): 17–37.

[48] Examples include social and historical networking analysis projects that use specific visualization software such as Gephi. See also the very sophisticated animation work of the Stanford Spatial Humanities Lab, in particular their visualizations of the Holocaust, last accessed on January 13th, 2014.

[49] See Emma Jane Kirby, "The Map that Saved the Underground," *BBC News*, January 10,

2014, http://www.bbc.co.uk/news/magazine-25551751.

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