Anchoring digital maps as rough guides:

a practice-orientated digital sociology of map use

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Abstract

This thesis provides a theoretical contribution towards understanding how, and to what extent, people's engagements with digital maps feature in the constitution of their social practices. Existing theory tends not to focus on people as active interpreters that engage with digital maps across a variety of contexts, or on the influence of their map use on wider sets of social practices. Addressing this, the thesis draws on practice theory, media studies, and internet studies to develop a conceptual framework, applying it to empirical findings to address three research questions: (1) *How do people engage with digital maps*; (2) *How do people engage with the web-based affordances of digital maps*, such as those for collaboration, sharing, and end-user amendment/generation of content; and (3) *What influence does people's engagement with digital maps have on the way they perform wider sets of social practices*? The research provides insights from three contexts, each operating at a different temporal scale: *home choice* covers longer-term processes of selecting and viewing properties before buying or renting; *countryside leisure-walking* covers mid-term processes of route-planning and assessment; *University orientation* covers shorter-term processes of navigation and gaining orientation around campus. Those insights are gathered through: a scoping survey (N=260) to identify relevant contexts; 32 semi-structured interviews to initiate data analysis; and 3 focus groups to gather participant feedback (member validation) on the emerging analysis. The approach to data analysis borrows heavily from constructivist grounded theory (albeit sensitised by practice theory ontology) to generate seven concepts. Together, the concepts constitute a practice-theory oriented digital sociology of map use. Overall, this thesis argues that digital maps are engaged with as mundane technologies that partially anchor people's senses of place and security (physical and ontological), their performance of practices and social positions, and more broadly, the movement and distribution of bodies in space.

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By way of dedication, this thesis is for Kelly 'K-Bird' (aka Kell-Kell) Hanchard, the greatest and most graceful parson's russell terrier that ever lived. You may no longer be here, but your tenacity and audacity are things I carry with me, always.

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Acronyms

ACM	Association of Computer Machinery
AJAX	Asynchronous Javascript and XML
ANT	Actor-Network Theory
API	Application Programming Interface
BNG	OS British National Grid (coordinate referencing system)
GeoJSON	A pared-down subset of JSON specific to geographic data
GIS	Geographic Information Systems
GISci	Geographic Information Science
GISers	GIS practitioners (users of GIS)
GPS	Global Positioning System
GT	Grounded Theory
GUI	Graphical User Interface (pronounced 'gooey')
HCI	Human-Computer Interaction
HTML	HyperText Markup Language
HTTP	HyperText Transfer Protocol
ICT	Information and Communication Technology
JSON	Javascript Object Notation
MCM	Map-Communication Model
NRT	Non-Representational Theory
OS	Ordnance Survey
OSM	OpenStreetMap
PGIS/PPGIS	Participatory GIS/Publicly participatory GIS
QDAS	Qualitative Data Analysis Software

SatNav   Satellite Navigation System

SEO   Search Engine Optimisation

STS   Science and Technology Studies

TCP   Transmission Control Protocol

TCP/IP   TCP and Internet Protocol (IP)

UCD   User-Centred Design

UGC   User-Generated Content

URI/URL   Uniform Resource Indicator/ Uniform Resource Locator

UX   User Experience

VGI   Volunteered Geographic Information

XML   Extensible Markup Language

1. Introduction

This thesis explores engagement with digital maps and their influence on everyday life. It argues that people tend to engage with digital maps as resources that anchor various senses of security and senses of place[1]. Also, that digital maps are engaged with as rough guides that only partially inform. Digital maps provide affordances[2] which – when engaged – influence the constitution of various social practices, including the way place is understood, how sites and routes are selected, and the way relationships and social positions are performed. However, within theoretical literatures surrounding cartography there has been relatively little exploration from a sociological perspective about *how* digital maps are engaged with, or how such engagement relates to wider sets of social practices. To address this, this thesis develops a practice-orientated digital sociology of maps.

The thesis addresses a central query on how digital maps are engaged, both by individuals, and collectively by groups amidst shared activities (such as organised group walks). By extension, it also addresses a query on what influence (if any) engagement with digital maps has on people's wider sets of social practices. The central thesis research question asks: To what extent, and in what ways does engagement with digital maps feature in the constitution of social practices? Rather than starting from the a priori assumption that digital maps *do* influence social practices, the thesis remains sensitive to exploring the extent to which they do (if it all). The thesis addresses this central research question through three subsidiary questions: (1) How do people engage with digital maps*?* That is, how do individuals go about using a digital map, and with what degree of knowledgeability. Likewise, what is it they gain from engaging with digital maps? (2) How do people engage with the web-based affordances of digital maps? Chapter 2 explains that digital maps provide opportunities for users to generate, amend, and recombine content in ways that previous map formats could not. They also provide new opportunities for sharing and distributing map content. To that end, it is important to understand how those affordances are engaged. (3) To what extent, and in what ways does engagement with digital maps feature in the constitution of social practices? For example, does

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[1] A digital map can be ready-to-hand (as an application on a smartphone) and not actively used. However, its potential to be used can anchor senses of security in not getting lost, i.e. people can engage with digital maps as latent resources (see 2.1 for differentiation of 'use' and 'engagement').
[2] Here affordances are *"…broadly described as possibilities for action…"* (Evans et al, 2017, p. 36) that a technology provides, e.g. opportunities for practices. See 5.3.1 for further detail.

engagement with a digital map affect the practices involved with buying a house, planning a countryside walk, or gaining orientation to a place – if so, how, and to what extent?

The thesis structure is as follows: Chapter 2 provides a contextual background to digital maps, charting their technical development as web-based technology. It argues they can best be understood as emergent media that users draw on both as central points of foci for combining and accessing other resources, and for the various visual perspectives of place ('views') they offer. I argue these 'views' constitute a unique property that differentiates digital maps from paper-based maps and other geo-locative media.

Chapter 3 provides further contextual background, charting the development of cartographic thought. It highlights a relatively underexplored avenue at the intersection of cartographic theory and sociological theory; a dearth of theory that takes map-users' wider social practices directly into account or considers *how* digital maps are engaged as resources embedded within everyday routines. The chapter argues that existing theory tends to treat map-users as either unreflexive and passive recipients of information, or as actants that work alongside maps in their construction or maintenance of a local culture of map use. While both tendencies provide useful insights, neither directly connects digital map use to any wider sociological concern for the ways in which digital technologies intersect with, and influence, the multitude of social practices that constitute everyday life.

Chapter 4 introduces a conceptual framework, developed specifically to address the research questions. It describes how the conceptual framework was refined throughout the course of my studies (and not forced onto the data). It then integrates concepts from structuration theory, practice theory, media studies, and sociologies of the internet literatures into a practice-orientated conceptual framework. The chapter also situates the conceptual framework within a wider discussion in digital sociology about the social implications of digital technologies in everyday life.

Chapter 5 sets out the research methodology. It provides transparency on the research undertaken, making it easier for future researchers to build on this thesis. First, the chapter outlines the philosophical underpinnings of the research, and their relationship to grounded theory. It then moves on to outline the overall research design, before detailing the approaches taken towards data gathering and analysis –

including the rationale for choosing specific methods and the ethical considerations each involved.

Chapter 6 addresses the first research questions: how do people engage with digital maps? It applies the conceptual framework to empirical findings, arguing that digital maps are engaged as mundane, taken for granted, and ready-to-hand resources. They are integrated into ongoing practices as new materials and engaged primarily for the views of place they offer. After being integrated within a practice, specific digital maps are established and maintained as the default for a specific context through recursive performances of a practice; they are routinised. The chapter also argues that digital map views anchor various practices by informing users' selection of routes and sites, alongside their senses of place and security. Overall, the chapter opens a theory of digital map engagement ready for later chapters to extend.

Chapter 7 addresses the second research question: how do people engage with the web-based affordances of digital maps? First, it examines users' engagement with affordances to generate and amend content. To do so, the chapter considers sociality and social positions rather than understanding engagement to be solely individualised. Second, it describes *how* digital maps are collectively engaged, and how they are distributed as shared resources (e.g. collaboration through digital map use). Third, it explains how digital maps are strategically amended by some users in order to inform or persuade others (9.2.7). Fourth, it introduces the concept of knowledgeable 'deferral' (9.2.3) to describes a process where people articulate an awareness that they defer to a specific digital map, rather than being critical or considerate in their selection. It argues this form of deferral is often towards either a map vendor established as the shared 'default' within a social practice (i.e. the Ordnance Survey map shared amongst British leisure-walkers), or the digital map pre-set (scripted) by another medium (e.g., the digital map application pre-installed on an individual's smartphone). The chapter argues that knowledgeable deferral presents an opportunity for inequality, allowing some users to 'curate' the digital map content draw on and trusted by others.

Chapter 8 addresses the third research question: What impact does people's engagement with digital maps have on the way they perform wider sets of social practices? First, it examines what (if anything) engagement with digital maps anchors. It argues that engagement with digital maps anchors various practices ranging from choices of route to choices of site. Also, that it anchors various senses

of place and senses of security, alongside the performance of various practices and social positions. The chapter also explains that engagement with digital maps can anchor ontological securities that extend beyond the immediate moment of use. Second, the chapter addresses how engagement with digital maps anchors practices. It argues that people engage with, trust, and act upon digital map content despite being aware of errors; they treat digital maps as 'rough guides' (9.8). That is, they cross-reference the information digital maps provide with other media resources and the situated experience of 'being there'. Third, the chapter addresses the extent to which engagement with digital maps anchors wider sets of social practices. While the thesis up to this point argues that engagement with digital maps does anchor practices, the third part of chapter 8 argues that it is a relational anchorage; digital maps only partially anchor social practices. To that end, the chapter argues that engagement with digital maps influences but does not fully structure the way everyday social practices are performed, the way people and things circulate in space, and the way social positions are performed.

Chapter 9 expands on the three findings chapters (6-8) through a discussion of the seven concepts generated through the research. While the findings chapters each draw on the seven concepts to address substantive research questions, this chapter addresses the overarching central research question. In doing so, it shifts the thesis from a descriptive argument to an analytical one. To do so, it compares the seven concepts developed through the research with literatures discussed in both contextual background chapters (2 and 3) and the conceptual framework (chapter 4), drawing on the findings chapters (6-8) where necessary. The discussion of each concept accumulates in a practice-orientated digital sociology of maps, which I present as the primary contribution of this thesis. After discussing the findings and setting out a theory of engagement with digital maps, the chapter concludes by laying out the limitations of this thesis and by suggesting potential avenues for future research.

Overall, this thesis stems from personal academic and practical experience in observing how people engage with digital maps. For my master's degree (obtained 2008), I focussed on Google StreetView and the homogenisation of place through car-centric representations (Hanchard, 2009). At that time, Google's StreetView was a relatively new technology, following a UK public release in 2007 (Plantin, 2018, p. 492). Throughout my master's degree, and for several years afterwards (2008-2013),

I worked as a policy officer for a social housing provider in South East London. There, I witnessed property surveyors using the Satellite View feature of Bing Maps (owing to its integration of Ordnance Survey British National Grid (BNG) coordinate references) in combination with Google StreetView (for photorealist imagery of the site) to make decisions on property boundaries. I also saw housing officers make decisions (often in collaboration with other parties) by drawing on digital maps as a central reference point. This ranged from assessing whether a specific tree could be felled or not (in protected tree zones), through to deciding where to position CCTV cameras on a housing scheme as part of a MAPPA/MARAC[3] strategy. I was fascinated that my colleagues often chose (and trusted) the information presented on digital maps in place of formally ratified (state-legitimated) documents or information sources e.g. Ordnance Survey or Land Registry maps. Especially since the digital maps they used were hosted by private vendors and could be amended by any member of the public with the competence and will to do so. Since 2013, I have worked in IT, railway infrastructure maintenance planning, and higher education (teaching and research). In each environment, I have continued to witness colleagues engage with digital maps when planning travel routes or choosing hotels, to locate and communicate various 'access points' on secluded railway tracks, or to gain an 'overall feel' of a place before visiting it. Likewise, in my daily life outside work, I have held several discussions with friends, family members, and strangers about their use of digital maps. To date, I have often found their range of experiences to match both my own, and the accounts of participants in this research.

To stoke my intellectual curiosity, in 2011 I decided to embark on the research project this thesis documents through a part-time PhD course - to explore digital map engagement critically and in more depth. I began from an assumption that my analysis might draw on concepts from either media studies (perhaps framing analysis) or the sociology of space (following my master's thesis) but found both to lack a suitable range of concepts. As Chapter 3 explains, I found a similar limitation within a wide range of literature surrounding maps. Even cartographic theory, a body

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[3] *"Multi-agency public protection arrangements* [MAPPAs] *are in place to ensure the successful management of violent and sexual offenders"* (Ministry of Justice, 2014). Multi-Agency Risk Assessment Conferences (MARACs) are *"…meetings where statutory and voluntary agency representatives share information about high-risk victims of domestic abuse in order to produce a coordinated action plan to increase victim safety"* (Steel et al., 2011, p.i). Both involve liaison between multiple stakeholders, e.g. social services, schools, social housing providers, assorted local authority departments, MPs, the local police, specialised crime units, the probation service, amongst other stakeholders.

of literature which explicitly theorises maps, tends only to cover production and the process of mapping – at the expense of a direct focus on the practical aspects of map use, or on how it might relate to wider sets of social practices. In short, there is a limited range of sociological theory on how digital maps are engaged with, and on what influence such engagement might have on the constitution of everyday life. Thus, this project and my motivation for undertaking it are both tied to a core aim of addressing this underexplored avenue of thought, and stem from an underlying frustration at the lack of critical engagement with digital map use – both in public sector practice and within academic debate surrounding digital maps. In turn, this thesis provides an extension to cartographic thought that branches into digital sociology in its capacity to improve our understanding of how a widely-engaged form of digital technology might contribute towards a set of changes in the ways that everyday practices and social positions are performed (ranging from restaurant choice to landed capital acquisition) and on the way places are perceived. As such, the practice-orientated digital sociology of maps this thesis presents is an original and important contribution to current knowledge that may be further extended by other researchers and policy-makers in the future.

2. The constitution of digital maps: from HTML to emergent media

2.1. Introduction

This thesis argues that digital maps are engaged with as mundane resources, and that they anchor various social practices and sense of place and security. While the argument is grounded in a theoretically-informed analysis of empirical findings, its credibility requires a robust definition of what digital maps are, i.e. how they are composed, and how they are conceptualised. This chapter provides this definition by charting the technical development of digital maps and the affordances they offer. It does not include a detailed history of cartography or review technical literature on digital maps. Instead, it provides a basic orientation to the subject matter suitable for human geographers, digital sociologists, and non-experts alike. Throughout, this thesis refers to digital map 'engagement' rather than 'use'. This is because digital maps are often drawn on as latent resources that are ready-to-hand and only actively 'used' when needed (9.2). At other times, digital maps can be collectively rejected as part of a shared practice carried out by a social group, with group membership requiring an engagement in the form of a knowledgeable and purposeful non-use (6.2.1). In that sense, 'engagement' is a more encompassing term than 'use'.

This chapter starts by introducing the technologies that underpin digital maps (the internet and web), including an overview of associated spatial and mobile technologies. It provides a contextual background of how each advanced, revealing a set of cultural politics at play throughout their development. In turn, the chapter raises the notion that digital map engagement has social and cultural, as well as technological considerations. Next, it provides a detailed account of how digital maps developed, alongside a discussion of the shifting conceptualisations of what they are, and the affordances that various technical developments have brought to each. The chapter ends by defining digital maps as emergent (constantly brought into being) and spreadable media (both in terms of ease of distribution between people and in their easy transferral from one medium to another) that are engaged as centring resources (9.6).[4]

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[4] In section 9.6 I argue that while digital maps are often 'used' (e.g., draw on directly to plan or to navigate space), they are engaged with in ways that the term 'use' cannot fully encompass, e.g. purposeful non-use, or when a digital map lays dormant as ready-at-hand resource that may used.

2.2. The forming of the internet: the technology that underpins the web

This section explains how the internet was developed – providing insight on a technology that underpins both the web and web-based technologies (such as digital maps). Rather than presenting a linear techno-centric chronology, the section draws out collaborations and opposing conceptualisations of the internet that shaped its early development. It also describes the intrinsic cultural politics that shaped the internet, and which remains at play in the development of digital maps today. The extended timescale (starting in the post-World War II period) mirrors Chapter 3, making it easy to compare the technological development of digital maps with extant theory about them. First, it discusses the key institutions and events that led to the formation of an internet (2.2.1). Next, it problematises that narrative by detailing how alternative visions of the internet were realised (2.2.2).

2.2.1. A network of internauts: the emergence of ARPANET

Shortly after World War II (amidst the burgeoning Cold War), the British and US governments increased investment in nuclear physics research and computing. The latter was directed towards the secure transfer of information between computers (Leiner et al., 2009, p.23, footnote 6). For the US Government this was manifest in the 1958 founding of DARPA (2017) who initially focussed on packet switching, publishing their first paper and book on the topic in 1961 and 1964 respectively (Kleinrock, 1961, 1978, 2007 [1964]). However, their focus was not unique: ARPA, the RAND corporation, and the UK-based National Physical laboratory (NPL) had unwittingly been working in *"…parallel without any of the researchers knowing about the other*[s] *work"* (Leiner et al., 2009, p.23). After the three teams presented complementary papers at the Association for Computer Machinery (ACM) conference in Gatlinburg in 1967 (Ibid.), they formed a small collaborative community which resulted in several innovations (Roberts, 1978, pp. 1307–1308) leading towards the development of ARPANET as *the "…first large-scale packet switching network…"* (Wessels, 2010, p. 17).

In September 1969, UCLA sent the first ARPANET message to Stanford Research Institute (Castells, 2010, p. 10), after which:

…two more nodes were added… UC Santa Barbara and University of Utah… by the end of 1969, four host computers were connected together into the initial ARPANET, and the budding Internet was off the ground.

(Leiner et al, 2009, pp. 23–24)

With an infrastructure in place for the internet, researchers began to deal with more complex communications (e.g., image and sound), and the opportunities and challenges posed by the expansion of the internet. For example, while ARPANET provided a backbone for computer networking, it used the Network Control Protocol (NCP), which rested on *"…end-to-end reliability… [If]… packets were lost, the protocol (and presumably any applications it supported) would come to a grinding halt"* (Leiner et al., 2009, p.23). To address the lack of error control, Robert Kahn (ARPA) and Vint Cerf (SRI) collaborated to produce a uniform Transmission Control Protocol (TCP), later splitting it into TCP and Internet Protocol (IP). Their TCP/IP allowed for packet loss (Castells, 2003, p. 11),[5] leading it to *"…became the standard for computer communication in the US by 1980"* (Castells, 2010, p. 47), with ARPANET moving from NCP to TCP/IP in January 1983 (Leiner et al., 2009, p. 26).

Alongside the success of ARPANET, developments in local area network (LAN) and ethernet technologies prompted widespread implementation of networks in businesses, institutions, and homes throughout the 1980s (Ceruzzi, 2003, chap. 1), and with it - a vast increase in internet traffic (Leiner et al., 2009, p. 26). In part, this was encouraged by US government financing of *"…computer manufacturers to include TCP/IP in their protocols…"* (Castells, 2003, p. 12). Addressing how to manage this increased traffic became a central concern for internet researchers (Leiner et al., 2009, p. 26). In resolution, Paul Mockapetris[6] developed a Domain Name System (DNS)[7] as a *"…scalable distributed mechanism for resolving*

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[5] Where information is sent over a network, it is grouped into packets of information. When several packets are sent at the same time, a queue can form, leading to 'congestion'. If this exceeds the recipient's ability to buffer (temporarily store queued packets), the packets can be become 'lost', leading to incomplete information being received (Kurose and Ross, 2013, p. 25).
[6] For a history of DNS, see Mockapetris and Dunlap (1988).
[7] DNS converts host names into a structured system. For example, it converts the website name www. ncl.ac.uk to the four-bit hierarchical IP address 128.240.225.38, making traffic manageable and read-able for both machines and humans (Kurose and Ross, 2013, pp. 130–131).

hierarchical host names…" (Leiner et al., 2009, p. 26). This enabled a wider internet proliferation just as a new market for 'personal computing' was beginning to emerge (Pfaffenberger, 1988, p. 41). However, it also brought a degree of homogeneity; an emerging consensus between different participants on which protocols to adopt, alongside a singular DNS system began to define the early internet as a technology moving towards collectively shared (and pre-set) standards.

2.2.2. Expanding the internet: input from grassroots collaborations

While the internet initially developed from a military-state project to become a public project shaped by government backed marketisation, contributions from outside ARPANET were equally important for its development. Often these contributions stemmed from alternative conceptualisations of the internet, bearing an ethos of distributed (grassroots) public participation (Castells, 2003, pp. 12–13). This in turn, redefined the internet as a heterogeneous technology, increasing agency for all participants to self-define it whilst referencing the same set of standards. For example, when MODEM, BBS and FIDONET were publicly released, they were distributed as open technologies (amendable by end-users) and were free to use (Castells, 2003, pp.12). MODEM, developed by Ward Christensen and Randy Seuss in 1977, provided a way for users to share and transfer files between computers without the need for the institutional resources of a state-backed laboratory (Wessels, 2010). Meanwhile, their development and release of the first computerised Bulletin Board System (BBS) in 1978 (Liang et al., 2017, p. 183) provided a set of programmes that pre-empted social networking platforms by allowing asynchronous and multi-user communications in a forum, drawing on:

> …a long tradition of amateur telecommunications inclusive of fanzines
> and the underground press, amateur and CB radio, CCTV, home
> video, and audio cassette tape trading cultures…

> (Driscoll, 2014, p. 16)

BBS afforded a new cultural form with associated new practices of sociality (online chat). Extending this, Tom Jennings released FIDONET in 1984 (Liang et al., 2017, p. 183) as a computer network based on a BBS. In doing so, he provided a publicly accessible and low-cost alternative to ARPANET (Bush, 1993) which, by the year *"…2000 comprised over 40,000 nodes and 3 million users"* (Castells, 2003, p. 13).

In short, the early internet (up to the 1980s) provided a *"…a very general communications infrastructure… a network of networks"* (Berners-Lee, 1999, p. 20). There was no central protocol or organising principle to enable coherent interoperability between the growing number of networks,[8] despite the movement towards a collectively shared set of standards in TCP/IP and DNS (2.2.1). This made sharing documents and files between networks difficult and cumbersome due to a lack of any universal means of encoding, locating, retrieving, or decoding information (Castells, 2010, p. 50). Likewise, multiple conceptualisations circulated around what shape the internet ought to take (a platform for securely sharing documents over a uniform protocol, or a cultural form invoking new forms of sociality and participation) – a discussion that continues in the conceptualisation of digital maps today (2.4.4). It was not until the development of the web as *"…an application running on top of the internet"* (Castells, 2003, p. 10) that such a centralisation occurred.

2.3. The forming of the web: technologies that underpin digital maps

The previous section described the development of the internet. While it described work on MODEM, BBS, and FIDONET, it did not fully consider the intrinsic cultural politics at stake and the practices of alternative participants inherent within each.[9] This section describes the technical development of the web (as an application of the internet) with greater sensitivity towards those cultural politics and practices (2.3.1). It then charts the associated developments in software that underpin digital maps (2.3.2).

2.3.1. Developing the web: URL as both a technical and intellectual project

As explained above, the internet evolved through an *"…unlikely intersection of big science, military research and libertarian cultures"* (Castells, 2003, p. 17). However, the composition of this meritocratic 'intersection' has shifted over time:

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[8] Despite the increasing popularity of UNIX as the common programming language amongst grassroots internet participatory programmers and research institutions (Castells, 2003, pp. 13–14).
[9] For comprehensive outline, see Castells (2003, 2010).

> …the Internet has always been driven by a core group of designers…
> the form of that group has changed as the number of interested
> parties has grown… [into] a proliferation of stakeholders… with an
> economic as well as an intellectual investment in the network

> (Leiner et al., 2009, p.31)

For both Leiner et al. (2009) and Castells (2003, 2010), collective intellectual investment in building the internet (and web) stemmed from a shared[10] *"…technocratic belief in the progress of humans through technology…"* (Castells, 2010, p. 61) that predates the forming of the internet. For example, when Vannevar Bush (1945; Castells, 2003, p. 15) speculated that future technologies might make the world's information accessible to everyone,[11] he envisaged a system where individuals could store and archive personal books, music recordings and photographs on microfilm, for later retrieval and access. This relied on a uniform indexing system that Bush called *memex*, and which later thinkers relabelled *HyperText* (Nyce and Kahn, 1991). Intellectually, what Bush conceived was the basis of what would later become personal computing and hyperlinks (Wessels, 2010, p. 20).

When Tim Berners-Lee began to develop solutions for converting the internet from a 'network of networks' into a coherent whole, his aim was both technical and intellectual. He developed the Hypertext Transfer Protocol (HTTP) in 1989, referencing Bush's *HyperText* (memex) in its naming convention (Berners-Lee, 1999, p. 26). While TCP/IP was a common protocol for packeting and sending information over the internet at this time (2.2.1), it required specialist expertise and was error-prone; the programming languages used to send information often differed from those of the recipients, and information frequently got lost in translation (Berners-Lee, 1999, pp. 21–22). As a solution, HTTP provided a *"…protocol simple enough... to get a webpage fast enough for hypertext browsing...* [with]*… a fetch rate of about one-*

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[10] Although neither elaborate in detail on how this belief or culture is shared or made collective, beyond an assumed voluntarism at an individual level.

[11] As the anonymous editor of Bush (1945) notes, Bush was *"Director of the Office of Scientific Research and Development…*[overseeing]*…some six thousand leading American scientists in the application of science to warfare".* Note, where Robinson's (discussed in 3.2) directorship of the OSS maps division was largely intelligence-led, Bush's presided over a *federal* state organisation, gaining perspective on emerging technologies and their implications *both* for warfare *and* the prevention of future war.

tenth of a second" (Berners-Lee, 1999, p. 42)[12]. Intellectually, HTTP presented a shift away from *"…sending text that was fixed and consistent…* [towards]*… letting go of that consistency…* [to]*…allow the Web to scale"* (Berners-Lee, 1999, p. 30). The faster fetch rate also enabled users not only to access information, but also to post and modify (edit) content with ease too (Berners-Lee, 1999, p. 42).

To fully realise this technological and conceptual shift, Berners-Lee needed some way of accommodating participants that were unable to adopt HTTP immediately. For example, servers with large volumes of documents would most likely continue using the file transfer protocol (FTP) (Berners-Lee, 1999, p.42; Leiner et al., 2009, p.38). This led Berners-Lee to develop a uniform resource identifier (URI):[13]

> …(this became) the one specification every Web program, client or
> server… uses when any link is followed. Once a document had a URI,
> it could be posted on a server and found by a browser… hidden
> behind a highlighted word that denotes a hypertext link is the
> destination document's URI… a bit like the five-digital zip code used
> by the US postal service.

> (Berners-Lee, 1999, pp. 42–43)

The URL provided a means for entirely separate networks (using different protocols and languages) to share content and files using a common framework without the need to reconfigure their own (local) protocols. In short, it offered a means of connecting the networks of networks together, which Berners-Lee called the 'WorldWideWeb' or 'web' for short (Berners-Lee, 1999, p. 26).

2.3.2. Software that underpins digital maps: from HTML to GeoJSON
With URL in place as a uniform protocol for accessing and sharing files, Berners-Lee next turned to focus on their display. He developed a simplified standard generalised mark-up language (SMGL)[14] in 1990 called HyperText Markup Language (HTML).

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[12] All computers work by using a Fetch-Decode-Execute cycle, where commands are first 'fetched' from memory by a processor before being decoded and then executed (Page, 2009, p. 176). Increased fetch-rate refers to an increased speed with which a computer can transmit commands from memory to execution.

[13] URI was later renamed URL (Uniform Resource Locator), to better reflect the non-static location of documents (Berners-Lee, 1999, pp. 68–70).

[14] SMGLs provide a means of adding *"..additional information to be dispersed amongst the natural text of a document…"* (Goldfarb, 2000, pp. 5–6), providing instructions on how to process it.

While initially intended as a short-term solution, HTML *"…became amazingly popular…"* (Berners-Lee, 1999, p. 45) owing to its easy human readability, relatively simple syntax, and the speed with which it allowed web browsers[15] to fetch and display content (Berners-Lee, 1999, chap. 4). HTML has undergone various iterations since 1990. For example, a set of framing elements were introduced in the HTML 3 standard (Ladd et al., 2001, p.216), providing a way to fetch and display content inside a separate window on a webpage (frames) – which allow digital maps to be displayed as embedded parts of business webpages. At the same time, graphical options have grown increasingly sophisticated too:[16] cascading style sheets (CSS) provide a refined set of options for displaying content (Castro and Hyslop, 2013, pp. 169–170); while Javascript provides programming (scripting) capabilities that increase the dynamic scope of websites (Ladd et al., 2001, chap.18).

While HTML, CSS, and Javascript provided a crucial foundation for digital maps (as front-end programming languages),[17] more recent applications that build on them are equally important. For example, the development of eXtensible Markup Language (XML) in 1997 provided a pared down SMGL using a subset of HTML (Berners-Lee, 1999, pp. 129–130) to enable more efficient interoperability across websites for content written in different programming languages. Likewise, in 2005 Jesse Jarrett (working at Google) combined Javascript and XML to develop Asynchronous Javascript And XML (AJAX) (Ullman and Dykes, 2007, p. 2). AJAX enabled the (Javascript) scripting of website content within a specific HTML frame on a webpage, while using the simplified structure of XML and its associated faster fetch rate:

> …AJAX achieves this effect by working asynchronously, meaning that
> you can make a request to a server via Hypertext Transfer Protocol
> (HTTP) and continue to process other data while waiting for the
> response

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[15] I have omitted a history of web browsers because it would add little to contextualise digital maps.
[16] I only include discussion of CSS, Javascript, XML, AJAX and JSON in this section, although there are various other technologies; I have excluded various other technologies, i.e. PHP (a Javascript like open source tool for scripting actions in which HTML can be embedded) for a lack of direct relevance to digital maps.
[17] Front-end languages are the human-readable languages that define how a website looks and performs, while back-end languages define the operations of servers and databases (Taylor and Smith, 2015, p. 36).

(Clark, 2006, p. 32)

In combination, AJAX enabled *"….richer, faster and more interactive experiences by updating data without reloading the entire page"* (Ying and Miller, 2013, p. 72), i.e. embedding a dynamic (interactive) digital map on a webpage. Extending this capability further, the release of Javascript Object Notation (JSON) in 2006 provided a (lighter) Javascript native alternative to AJAX (Smith, 2015)[18]:

> An alternative data format to XML… a lightweight data interchange format based on a subset of… JavaScript… JSON has the advantage of being compact and directly supported by JavaScript…[the] disadvantage of JSON… [it is] not very readable for humans.

> (Ying and Miller, 2013, p. 74)

While JSON and AJAX offer separate methods for scripting the way that information is processed (with a trade-off between speed and human readability), various coding techniques and third generation technologies (such as jQuery) allow AJAX and JSON to be made compatible with one another (Wang et al., 2011). However, JSON is often the recommended standard for contemporary digital maps (Rinner et al., 2008, p. 387). For example, Google recommend GeoJSON (a pared-down subset of JSON specific to mapping) in their application programming interface (API)[19] documentation (Google, 2017c). Likewise, Microsoft have recommended GeoJSON for Bing Maps API since July 2016 (Microsoft, 2016) with their prior web control (version 7) as the last to include an AJAX control within their 'best practices' (Microsoft, 2016). Overall, the direction of travel in the technical development of the web-based technologies that underpin digital maps indicates an emerging consensus between digital map providers with GeoJSON being adopted as the collectively shared standard for digital map development, and HTTP as the relevant protocol for their distribution.

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[18] In web development nomenclature 'native' commonly refers to functions that are inherent within a given programming language - not added to it from elsewhere. For example, JSON is a subset of Javascript (derived from it). The commands (and objects) it employs are derived solely from Javascript. AJAX is compiled from XML and Javascript; it is not solely derived from or native to either.
[19] An API is a human-readable interface used to connect applications together *"…or* [to] *an operating system, database, network…Google Maps API allows an application to integrate 3rd-party content, such as restaurants overlaid on a Google Map"*. (Conrad et al., 2016, p.449)

2.4. Defining digital maps: charting key developments and conceptualisations

This section defines what digital maps are (and what they are not). To do so, it explains how digital maps differ from other digitised cartographic technologies, e.g. geographic information systems (GIS) or satellite navigation systems (2.4.1). It then charts the technical development of digital maps from precursor technologies (2.4.2) into their contemporary form as rich and dynamic Javascript-based applications that afford dataset interoperability through GeoJSON (4.4.3). Alongside charting their technical development, the section also highlights a set of cultural politics at play throughout their development. This serves to a highlight a plurality in existing theoretical considerations of digital maps. The section closes by defining digital maps as slippy, spreadable, and emergent popular everyday technologies that are delivered over the web, and which provide map-users with various affordances (4.4.4).

2.4.1. The digitisation of cartography: digital map related technologies

Since the advent of both the internet and the web, several cartographic technologies have been digitised. This ranges from the possibility of photocopying or scanning an existing paper-based map and then distributing it over the web, through to the digitisation and web-based delivery of traditional paper-based map systems, such as the Ordnance Survey over geoportals.[20] Similarly, the internet and web have also afforded the development of several new forms of digitised cartography. While these technologies are not defined or considered as digital maps in this research (2.4.4), they have provided various advances in mapping and in managing spatial data that digital maps draw on. To that end, this subsection provides brief overview of those technologies and advances.

Several digitised maps have developed alongside digital maps. For example, thematic mapping packages such as MapViewer have allows users to develop their own thematic maps since 1993, and to distribute them over the web, albeit within the narrow context of science and industry mapping (Golden Software, 2019). They provide a basis for digital maps to extend and offer similar functionality to some of the

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[20] Ordnance Survey (OS) is a major paper-based map vendor, and one frequently cited by participants in this research. Starting as a British state project in 1747, in the wake of a Scottish rebellion in 1745 (OS, 2019), the OS started to map the Scottish highlands as a strategic military resource (Ordnance Survey, 2018). Since then, it has provided several cartographic innovations, ranging from the principal triangulation of Great Britain (1783-1853) and its later retriangulation (1936-1962) (Ordnance Survey, 2018). In 2001 they released MasterMap as a detailed proprietary spatial dataset based on a digitisation of their paper-based maps ready for use in GIS packages (Ibid.)

precursors of digital maps, e.g. Microsoft's AutoRoute (see 2.4.2) in so far as their graphical user interface (GUI)[21] enabled non-expert users to generate their own maps. However, like other industrial digital mapping packages, the narrow specialism of MapViewer content (e.g. maps of mines, terrain modelling, and quantity surveying for land and/or hydrographic assessment), and their lack of wider public dissemination meant they had little direct impact on the everyday social practices.

Census agencies such as the Office for National Statistics (ONS) have produced, and made available, their spatial datasets on electronic media since 1966, and over the web since 2001 (ONS, 2019). However, they are not widely engaged with by a lay public audience, and tend instead, to be used within specialist *"…geographical Information Systems (GIS) or Computer aided Designs (CAD) systems…"* (UK Data Service, 2019, np.) rather than as everyday technologies. Similarly, HM Land Registry, and by extension the Register of Scotland's (ROS) cadastral map, which uses Land Registry as a base (ROS, 2019) - have used a geoportal to deliver their digitised maps over the web since 1993, having started to digitise newly registered property deeds in the 1980's (Land Registry, 2014). While both provide a set of digitised maps that are delivered over the web, and that are circulated widely in everyday life, e.g. when buying, selling, or modifying property, or looking up the history of it, they are not directly amendable. That is, map-users cannot generate or amend content. Likewise, their content tends to be based on a fixed location (a property or the land around it at a set scale). As such, they simply provide digitised maps, rather than digital maps per se (as clarified in 2.4.4).

In addition, as Dodge (2017b) notes (see 3.6.3), the decline in print media and rise of online news via both traditional media channels and social media has led to an increased use of maps to display display statistics and complex data as a form of 'mediated geovisualisation'. At times this relates to map-users engaging with, amending, and geolocating themselves when producing, sharing, or consuming news by using digital maps. However, at other times the use of digitised maps (whether of physical terrain, or of data) is less open to participation. That is, as Dodge goes on to note, journalists produce maps and invest them with an inherent situated politics in

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[21] A graphic user interface (GUI) or 'gooey' is an screen-based interface that employs *'…the mouse and pointing and selecting as the primary human-computer communication…'* (Galitz, 2007, p. 7)

order construct a believable story, which are then consumed as ontological secure sources by the news audiences (consumers). In this, he urges concern over:

> *'…the way that geospatial data and interactive maps are deployed by journalists and activists to tell their stories. Cartography could be an effective means to communicate complex issues, but how maps in the news media are designed and deployed needs critical scrutiny'*
>
> *(Dodge, 2017b, p. 956).*

By extension, the same principle can be applied to other forms of 'mediated geovisualisation', including those that seek to establish legitimacy through a map by informing users from relatively neutral standpoint, rather than trying to persuade them. For example, the British Police use GeoJSON to embed a non-amendable digital map layer (using OpenStreetMap) on their website in order to display crime statistics by postcode in an accessible format, albeit with little guidance of their classification scheme or taxonomy (Police, 2019).

As well as the digitisation and web-based delivery of traditionally paper-based map services, and the increased use of maps within news media, two key geospatial technologies emerged alongside digital maps, both of which merit discussion: Satellite Navigation (SatNav) systems – and by extension web-based targetted navigational products; and Geographical Information Systems (GIS).

The first, SatNav, relies on a network of 31 satellites launched in 1978 (NASA, 2019) called the Global Positioning System (GPS) that continually orbit the Earth to map its surface (Milner, 2016, p. xv) – a system that *'…is arguably the first system in human history to allow direct measurement of the Earth's surface…'* (Speake, p. 345). By extension, GPS-based products (locative media) that offer location-based services now *'…comprise the fastest growing sector in web technology businesses…'* (2016, p. 243) and permeate everyday social practices to the extent that it likely that *'…unlocated information will cease to be the norm…'* (Gordon and de Souza e Silva, 2011, p. 19). However, while SatNavs and locative media may employ maps for mediated geovisualisation of global data, they are not in and of themselves digital maps (as defined in 2.4.4). To that end, they are not directly considered within this research. They do, however, flow in and out of participant's discussion of digital maps, with users readily able to distinguish between the two technologies. For example, in subsection 6.5.1 Pam describes her rationale for opting use a digital map

to plan a driving route when visiting potential properties to buy, despite having a SatNav device in her car and the competence to use it.

The second, GIS, often sits in juxtaposition with digital maps, and as noted later in the thesis leads to conflicting conceptions that go to the heart of defining what digital maps are (2.4.4). For example, subsection 3.6.1 sets out two different conceptualisations of GIS: (1) Sui and Goodchild's (2011) contention that the easy of usability and advances in GIS GUIs will lead to its eventual convergence with digital maps; (2) Crampton's (2009) argument for disparity in the underlying data politics (and ideology) behind each technology that he aligns with a wider set of cultural politics in the ongoing development of the internet and web (2.2 and 2.3). Crampton argues that the free, open-sourced (and thus participatory), web-based delivery of digital maps to the public en masse, negates any possible convergence with GIS; seen as highly specialised, proprietary software[22] requiring access and training. To that end, as a set of software packages that draw on various spatial datasets – from digitised maps to GPS, through to locative information coded in XML - GIS provides an ability for users to generate their own maps, provided they have access to relevant software and the competence to use it. As such, GIS remains a relatively specialised venture, with little direct engagement amongst non-experts in their everyday social practices.

2.4.2. Precursory elements and concepts: early digital maps

One the first precursors to digital maps that saw wide public engagement was AutoRoute, Microsoft's 'text-based routing' programme that translated spatial relations into a road map-like image (Hoffman and Stewart, 1993). AutoRoute was developed by UK start-up NextBase in 1988 and acquired by Microsoft the same year (Microsoft, 2017a). Its focus lay with usability and the development of a smooth GUI, a feature that popularised it as innovative mapping software[23] at a time when personal computing was beginning to emerge as a new market:

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[22] Notably, there are now open-sourced GIS packages (such as QGIS) which are freely available on the web. However they require a large download, and expertise to use them.

[23] As Hoffman and Stewart note, in the early 1990's AutoRoute was the *'…most popular routing package in the world…'*, having sold *'…more than 300,000 copies in the US and 150,000 in Europe'* (1993, p. 47).

> …when most software was text-based and came on floppy disks, AutoRoute stood out with its emphasis on graphics… given to a small number of journalists and spread like wildfire… at one time NextBase Limited estimated almost half of the computers in the UK were running a copy.

> (Microsoft, 2017a, n.p)

The second major precursor to today's digital maps was Xerox Palo Alto Research Center (PARC)'s HTML-based Map Viewer, released in 1993, which combined:

> …the ability of HTML documents to include graphical images with the ability of HTTP servers to create new documents… [a] computer generated map of the world is embedded into an HTML document using the (IMG) tag...

> (Putz, 1994, p. 274)

PARC produced a very simple map ready for distribution over the web via HTTP (an advancement on AutoRoute). It worked by holding longitude and latitude coordinates in the URL, enabling web browsers to reference and fetch specific portions of a larger global map (held as a single image in the HTML code of a website). The same URL instructed web browsers how to display (frame) that portion of the map i.e., height, width, and location on the web page (Putz, 1994, p.276). Despite its deployment as an web-based on-demand map service allowing public users to retrieve self-defined portions of a map, it remained a specialised venture, accessed by a small community of researchers only. In part, this was due to the limited topographical detail it offered and its issues with caching speed (Newton et al., 2005, p.249).

Following PARC's Map Viewer, America Online (AOL) released Mapquest in 1996 (Edelman, 2015, p.373). While Mapquest was not the first free-to-use map deployed over the web (O'Leary, 1997), it was the first to make *"… a huge impression… [bringing] online mapping into the public sphere"* (Geller, 2011, p. 186) by gaining over a million users in its first year (O'Leary, 1997). As a Javascript application

(Mapquest, 2017) that combined satellite and geocoded data[24] from paper-based reference maps, it offered a web browser accessible digital map that worked a lot like PARC's HTML map. It fetched:

> …a map image selected from a database or [would] generate map images on the fly… embedded in an html page… [any] change in the map, however small, has to be sent back to the server for regeneration of the image.
>
> (Johnson, 2002, p. 5)

With Mapquest, AOL achieved the first massively popular, freely available, and publicly accessible digital map on the web. However, despite a promising focus on the front-end GUI (following AutoRoute), web developers' uptake of Mapquest was hampered somewhat by a lack of uniformity at the back-end:

> …only developers who know in detail the markup structure and have specialized tools can extract useful information. MapQuest's geo-referencing has no well-defined structure and location information differ among all the datasets.
>
> (Lee and Torpelund-Bruin, 2012, p. 9387)

This raised a challenge for later digital maps to address, highlighting nuance people's engagement with digital maps, i.e. web developers and general users differ in their approaches and needs.

The next major shift in the conceptualisation of digital maps came with Microsoft's launch of MapPoint in 2000. As a license-based proprietary desktop product, MapPoint was not a digital map *per se* - it was not served over a web-browser (2.4.4). However, it did provide a new understanding of digitised maps as:

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[24] Geocoding is the process of *"…converting addresses (like "1600 Amphitheatre Parkway, Mountain View, CA") into geographic coordinates (like latitude 37.423021 and longitude -122.083739)"* (Google Inc., 2017, n.p), with 'reverse geocoding' the conversion of coordinates to named addresses.

…not only a map backdrop, but also road map data (raster data from

the Ordnance Survey (OS)) and a streetmap database from

NAVTECH and the capability to import, link, and map other sources of

data held in a spreadsheet, e.g. MS Excel, Access, and Outlook

(Green & King, 2000, p.149)

By doing more than simply geocoding an existing map image or set of coordinates on-screen (like AutoRoute, Map Viewer, and Mapquest), MapPoint repurposed digital maps. Its GUI allowed existing datasets to be 'mapped' over a base reference map as a thematic layer to create a new user-generated map.[25] In this, MapPoint re-appropriated the map as an ordinary reference tool for both commercial business and domestic home users (map-making was no longer the preserve of specialists). Instead, any existing spreadsheet or document containing geocodable data could be 'mapped' for easy visualisation; potentially, anything could be mapped by anybody with access to the relevant competence or know-how, material resources, and will to do so. Meanwhile, it meant that a map perspective could be applied to almost any data. Conceptually, MapPoint provided a realisation that digitised maps could be more than on-screen equivalents of paper-based reference maps – it allowed people to generate their own map content, and to populate maps with that content.[26]

2.4.3. The development of digital maps: from AutoRoute to StreetView

This section has so far outlined developments in precursor technologies that underpin digital maps. It has also discussed the reconceptualisation of maps as everyday tools that enable non-experts to self-generate maps. This subsection moves on to explore the development of digital maps from those precursors, remaining attentive to shifting conceptualisations of what constitutes a digital map.

In 2003, a Sydney-based start-up called Where2 released a desktop map application called Expedition. They sought to place the *"…map* [at] *the center of the display… letting people scan around and zoom in and out…"* (Gannes, 2015, n.p). Like

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[25] Other packages such as Golden's MapViewer had done this earlier (in 1993) but only covered thematic maps for scientific and industrial research (Golden Software, 2019); they had not reached the popularity or wider uptake by non-experts as MapPoint.

[26] Reference maps refer to two-dimensional (often topographically based) representations of grid coordinates, which may (or may not) includes a thematic or topological focus, e.g. a map of the local area with detail on political election voters by administrative area (Petchenik, 1979; Haklay and Weber, 2008).

AutoRoute, Expedition aimed towards GUI innovation by changing the visual aesthetics of map display. It drew on HTML framing and AJAX to:

> …present the JavaScript on a webpage… into a map frame, including beyond the view-frame of the browser… That way, a user could pan around the map, a 'slippy map', without reloading the whole page for every minor adjustment as industry-leader MapQuest required at the time.

> (Dalton, 2012, p. 84)

Where2 sold Expedition to Google in 2004 before remodelling it for them as a web-based map application (Gannes, 2015). In doing so, they produced the first web-based digital map where user's navigation across the map on-screen simply required data to be *"…fetched in the background rather than having to be refreshed to get new data"* (Gannes, 2015). This provided a faster fetch-rate than Mapquest, while allowing richer information, such as hyperlinks and framed photographic images to be included within the map content. Google launched both Google Earth and Google Maps in 2005 alongside a publicly open API (Crampton, 2010). This marked a pivotal moment for digital maps, where end-users could generate their own *web-based* maps as thematic layers over a base reference map for the first time. Likewise, the intuitive GUI and AJAX base (later updated to GeoJSON) of Google Maps' afforded users access to both: the simple syntax of XML (making almost any dataset interoperable); and the rich scripting capabilities of Javascript – the language which Google Maps remains written in to date (Google, 2017d).

While Google Maps offered a major technical development for digital maps, their open API fostered new cultural forms of engagement at the back-end too. For example, following the public release of Google Maps' API "*…within only a matter of hours programmers had reverse engineered it…*" (Crampton, 2010, p. 26) to display their own content. For Crampton, this again, marked another pivotal moment in the history of digital maps – the first *map-hack* (Ibid.). The first *map mashup* soon followed (Crampton, 2010, pp. 26–27) with people layering content from external data sources over Google's base map to create their own hybrid user-defined digital maps. For both map-hacks and map mashups, it was the XML functionality of Google Maps' open API that allowed users to:

> …produce their own custom annotated Google maps, e.g. based on
> their own GPS (Global Positioning System) locational data, and to
> even tie in images and video to create interactive multimedia maps…

> (Boulos, 2005, p. 2)

Google's conceptualisation of digital maps (and their associated API) as 'open' was expanded further in 2007 when they released MyMaps (Google, 2007). As a user-friendly, GUI-driven, map-creation service, MyMaps required no coding knowledge or experience to combine external datasets with a digital map, and therefore enabled users to build personalised, shareable maps (Hudson-Smith et al., 2009, p. 526; McConchie, 2015, p. 884) without the need for specific cartographic or computing competence.

By allowing public users to recombine content to generate their own maps (via mashups and map-hacks), Google Maps 'opened' them from their previously black-boxed form[27]. In turn, this raised several conceptual questions. For example, if a digital map could be appropriated, hacked, and/or mashed-up with other content to create something new, then what roles did consumers and/or producers play?[28] Also, who 'owned' the map; where did the intellectual property sit? Likewise, if anybody could generate their own map, what level of authority or claim to realism or veracity could that map hold; what degree of trust could be placed in it?

Many of these questions had already been raised by and levied against the OpenStreetMap project (OSM), *"…born at University College London (UCL) in July 2004…"* (Haklay and Weber, 2008, p. 13) – a year before Google Maps. For McConchie, OSM was a significant development for digital maps, both in terms of organisational practices and the shift in relations of production it offered:

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[27] As Orlikowski notes, *"…users of a technology often treat it as a closed system or "black box," while designers tend to adopt an open systems perspective…"* (1992, p. 407) . This thesis uses 'black-box' to refer to an uncritical mode of digital map use with users unaware of how to change them.

[28] This debate extends beyond digital maps into web-based technologies (new media) in general. For example, Bird argues that, through the emergence of new media, *"…the nature of media consumption has been transformed. It is harder than ever before to define specific acts of media use; being a media 'audience' member is basically what people do continually"* (2011, p. 512). While she differentiates the terms 'produsage' and 'prosumerism', Bird also argues for a focus on the practices of end-users and their ongoing engagement with media to unravel the increasingly complex interplay of production and consumption that web-based media enable and, by extension, on the roles they afford end-users.

Unlike the mashups and map-hacks built parasitically on Google Maps, OpenStreetMap… is much more internally collaborative… [its user] community exemplifies the ethical norms—and internal contradictions—of FLOSS and hacker communities, translated into the geospatial field…[showing]…completeness and accuracy can be achieved using an open source ethic of mass participation.

(McConchie, 2015, p. 886)[29]

In this, OSM led to the emergence of another cultural form called volunteered geographic information (VGI) (Perkins, 2014). Because OSM was constituted by volunteered geographic information (VGI) – a process where crowdsourced geocoded data is supplied by individuals en masse (knowingly or otherwise), McConchie argued that the VGI *was* the map - not just the data represented on it. Conceptually, this challenged the definition of digital maps set out below (2.4.4). Mapquest provided a publicly open, web-based reference map that represented geocoded data obtained from a satellite via a GUI. Similarly, Google Maps offered the addition of an open API to allow end-users to create their own map-hacks and mashups – but as layers over a pre-defined base reference map. In contrast, OSM is iteratively revised through a continual flow of VGI. In this, McConchie (2015) presented digital maps to be in a state of constant and iterative emergence (always unfolding or coming into being).[30] In short, the development of OSM offered an alternative conceptualisation of the digital map as a process, not a product.

A further shift in the conceptualisation of digital maps came with Microsoft's 2006 release of a three-dimensional (3D) map 'view' for Windows Live Services Maps (later rebranded Bing Maps). Like Google's Maps, Microsoft's Windows Live Services Maps provided an open GUI for accessing various thematic perspectival layers or 'views' (satellite, road, etc.). However, their addition of a view that allowed users to 'move through' a 3D on-screen representation offered a new visual aesthetic; one specific to digital maps. It went beyond the flat, top-down, two-dimensions (2D) of traditional paper-based maps or GIS, and arguably bore closer resemblance to the

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[29] FOSS refers to *"Free/Libre Open Source Software (FLOSS) or Free/Open Source Software (F/OSS))"* (Lin, 2011, p. 18), where software is publicly open and free, with participatory input used in exchange to develop the product.
[30] A position that matches those held by Kitchin and Dodge (2007) and Corner (1999)

multiple-sheeted panoramic maps of Renaissance Europe (c.f Barber and Harper, 2010, pp. 36–37).

The 3D digital map view works by applying altitude, pitch and viewing direction data to a 2D map, and modelling it against latitude, longitude, and style data (Microsoft, 2017b). Meanwhile, a short script embedded within the HTML code of the webpage instructs web browsers to display the digital map modelled in 3D. It works much like PARC's HTML map, albeit with six data points rather than three. By offering a navigable 3D view, Microsoft created a new perspective for digital maps that surpassed Where2's ambition with Expedition, further demarcating digital maps as more than simply a digitisation of their paper-based antecedent (opposed to the offer OS made with their digitised map product 'Mastermaps'). Extending this demarcation further, Google followed Microsoft to launch an innovative view for digital maps in 2007 called StreetView (Plantin, 2018, p. 492); a project which ambitiously sought to map the entire earth in photographic detail at ground-level. At a technical level, the Google StreetView team managed this by developing:

> *…a custom panoramic camera system dubbed R5… mounted on a custom-hinged mast, allowing the camera to be retracted when the vehicle passed under low bridges…[It had] three laser scanners on the mast, thereby enabling the capture of coarse 3D data alongside the imagery…[an] online Kalman-filter-based algorithm is deployed on the vehicles to provide real-time navigation…we use a batch algorithm open sourced by Google… [for]… a smoother and locally accurate solution for the pose trajectory… computed at a resolution of 100 Hz, which is necessary to process laser data and to accurately correspond camera pixels to 3D rays in the presence of a rolling shutter.*

> *(Anguelov et al., 2010, p. 33–34)*

Since 2007, Google have continued to extend the scope of StreetView, moving beyond its initial auto-centric perspective[31] to now include underwater locations such

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[31] An approach for which it has previously been criticised in its homogeneous representation of lived spaces (Hanchard, 2009).

as the Great Barrier Reef (Google, 2017e), interiors of buildings via 'Indoor Maps' (Google, 2017a), such as the Sistine chapel in Rome (Globetrotting Virtual, 2018), through to less accessible sites of interest such as Mount Everest base camp (Google, 2017f).

Conceptually, by presenting a photographic view, StreetView redefines the basis of digital maps as more than a simple plotting of geocoded data as a thematic layer over a coordinate reference map (whether 2D or 'coded-up' to 3D). Instead, it presents a claim to legitimacy based on the realist representation of photographic imagery, rather than by drawing on abstract icons or a thematic scheme to be interpreted by the map-user as representation of voracious indexicality[32]

Alongside public sentiments of mistrust over Google's StreetView,[33] and its appearance in several novel and anecdotal stories in the popular press,[34] more critical claims of stigmatisation have been levied against it. For example, Power et al. (2012) and Hanchard (2009) both argue that StreetView offers a one-dimensional 'outsider' perspective that homogenises the lived reality of place, where:

> *…the immediacy of the view offered in Street View can collide with the potentially global remoteness of the viewer, resulting in the development of either a fetishised relationship with the location or a disengaged voyeurism… in spite of its utopian promise, new media settings also reproduce images of places that are partial, limited and pathologizing*
>
> *(Power et al., 2012, p.1029)*

Their argument rests on an assumption that users are passive and lack reflexivity, However, Power et al. (2012) do not explain *how* a lack of map-user reflexivity leads to stigmatisation of place. Although they do raise a crucial point on the shift in power

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[32] Interestingly, despite the apparent realism of Google StreetView, users can navigate a map on-screen to look directly down at the ground. In the process of mapping, a car is situated between the camera and the ground. In StreetView, when a user looks down at the ground, the map displays a composite of images to 'fill-in' the blank space on the map, powered by an algorithm (Anguelov et al., 2010) – it is a false reality.

[33] In part, owing to Google's "accidental" pre-Snowden scandal era collection of *"…extracts of personal web activity from domestic wifi networks through the StreetView cars"* (Guardian, 2010).

[34] Ranging from local newspaper stories of people caught in the act of public indecency (Mack, 2015) to the recreation of music album covers (Guardian, 2014).

relations that StreetView represents, locating its advent as a pivotal moment for the cultural politics of digital maps. They argue that unlike OSMs' open API, Google StreetView:

> *…represents a particularly interesting exception to the broader trend towards participative mapping… [It is] not crowd-sourced cartography, but a process in which control over the construction of place rests finally with a transnational corporation.*
>
> *(Power et al., 2012, p.1034)*

In short, the development of digital maps charted above follows a trajectory of increasingly sophisticated modes of visualisation. In terms of defining what digital maps *are*, Power et al. – like McConchie (2015) – argue that content has become increasingly important. Moreover, it has become increasingly easy for non-experts to contribute towards and amend digital maps. In certain cases, this has afforded an increased agency for digital map-users to shape their own representations of place. Google StreetView disrupts this trajectory, providing a 'black-boxed' (i.e. locked and concealed) view of content, collected and defined by Google only. To some extent, Google re-opened the map-making process with their release of MapMaker in 2011, which extended *"...the familiar tagging and layering interface of Google maps to allow users to create or edit the base map itself"* (Boulton, 2010, p. 1) – akin to the VGI generation of OSM. However, Google withdrew MapMaker in March 2017 (Google, 2017b).

In contrast, Microsoft offered a potential to maintain the openness of digital maps whilst offering an innovate street-level photographic view in their 2009 release of StreetSide, a web-based map application:

> *…which takes directories of photos, finds commonalities, and stitches them into a seamless single-object experience. Given some level of location context (such as a particular city), Streetside Photos can register a user's Flickr photo with its location, given commonalities between that photo and a Streetside photo.*

> *(Pendleton, 2010, p. 16)*

It works by automating the geocoding of reference map data to present a photo-realist street-level map view. However, where StreetView sources its photographic content by algorithmically stitching together images collected by Google's own cars, StreetSide sources content from various interoperable datasets, i.e. social media and Copyleft[35] photo libraries (including historical photographs that add a temporal dimension). Conceptually, this challenges the notion of reflexivity in VGI. While StreetSide employs user-generated content within licensed agreement terms, unlike the VGI that generates OSM, end-user input towards StreetSide is not purposive or necessarily knowledgeable. Instead, StreetSide draws on various sources to build a composite map itself, leaving users in the position of being both consumers and indirect producers rather than active and direct in their input. Later developments in StreetSide have focussed on automatic geocoding in real-time, with a 2010 demonstration processing geolocative data of images live (in real-time) from a GPS-enabled camera (Pendleton, 2010, p. 16). This offers potential for knowledgeable VGI and a participatory-generated photo-realist view as an alternative to Google's StreetView – a partial abatement of the issues raised by Power et al. (2012). However, at the time of writing Microsoft had developed no such provision.

Since 2012, digital map technologies have advanced further still, with Google releasing 700 trillion pixels of data based on Landsat-8 satellite data in 2016 (Herwig, 2016). This provided end-users with far more detail in satellite views, including the removal of clouds and an algorithmic stitching of archival satellite data (using Javascript) to simulate seasonal change (Meyer, 2016). At present, Google Maps are focussed on developing AirView, a view that seeks to provide a visualisation of air pollution at street-level across the world (Bettman, 2018). Meanwhile, Bing Maps

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[35] Copyleft is "*…a legal contract…that grants licensees or end-users rights of reuse, medication, and reproduction of a work or its derivatives as long as those same rights are passed onto others when the work is reproduced or distributed*" (Dixon, 2004, p. 23).

focus' is on commerce and transport, following their release of three new API's in 2016, each dedicated to travel routing (Bing, 2017).[36]

2.4.4. Digital maps as slippy, spreadable, emergent and centring

This subsection provides a definition of digital maps. In general, the thesis understands digital maps to be slippy, spreadable, and emergent resources. They are publicly accessible and amendable - allowing users to generate or amend content within the parameters of a fixed and preset reference map. They may be embedded within other media via AJAX of JSON based technologies and/or contain hyperlinked URL's to external resources (e.g. other websites, e-mail addresses). As web-based technologies, they may also be accessed across a range of physical devices without being downloaded. More importantly, they offer a range of affordances that paper-based maps, digitised maps, mediated geovisualisations, GIS, SatNav, and locative media do not – including (as this thesis goes on to argue) the ability to anchor (6.5.2) people's practices and orientations. To that end, this subsection covers a range of concepts whilst taking care to note that there are plurality of conceptualisations in existing thought on what constitutes a digital map.

As a first term then, in describing the development of digital map technologies, Boulos et al. note they use:

> …a powerful server generating 256 × 256 pixel raster tiles…paired with a fast caching system to serve these tiles to a JavaScript or Flash-based browser…Users can drag or slide the map around as if on a giant virtual piece of paper, in what is known colloquially as a 'slippy' map'...
>
> (Boulos et al., 2010, p. 2).

In turn, cartographic theorists such as Crampton (2007) use the term 'slippy' to describe the ability to pan and tilt across a screen via a digital map to navigate place.

Alongside their slipperiness, digital maps are also understood to be spreadable. That is, in their capacity to allow users to add and/or amend content, they follow a wider trend in media facilitated by the wider set of cultural politics of the internet and web:

---

[36] This thesis draws on research conducted between 2013 and 2015. It can only make claims related to accounts of digital map use prior to 2016.

> *…towards a more participatory model of culture, one which sees the*
> *public…as people who are shaping, sharing, reframing, and remixing*
> *media content in ways which might not have been previously*
> *imaged... not as isolated individuals, but within larger communities*
> *and networks…*
>
> *(Jenkins et al., 2013, p. 2)*

In this, the ability to generate, amend, and reconfigure digital map content, e.g. in mashups and map hacks (3.6.2) leads to an understanding that digital maps are both slippy and spreadable web-based media resources. In addition, this thesis uses the term 'spreadable' in second sense, in that digital maps as web-based resources may be accessed across devices and media, e.g. a digital can be distributed from a laptop to a smartphone, or vice versa - or printed out.

As noted above (2.4.3), discussion surrounding digital maps has led to a plurality of conceptualisations over what exactly constitutes a digital map. For media theorists, digital maps are often taken for granted as an intrinsic object of study that simply exist as they are. By contrast, cartographic theorists such as Kitchin and Dodge (2007) and McConchie (2015) argue that digital maps are continually enacted and brought into being – a position towards which this thesis is sympathetic in understanding digital maps as emergent. In turn, this marks a key difference between digital maps and GIS (see 2.4.1), with the latter requiring specialised software and competence for a user to generate a specific and static cartographic project (map).

Later, in the discussion of findings the definition of digital maps as slippy, spreadable and emergent web-based media is expanded. There they are also understood to be centring resources (9.6) that anchor various practice performances and social positions, alongside various senses of place, and sense of security (9.5) through the specific set of views they offer (9.4), e.g. slippy street-level photorealist imagery (see 2.4.3).

2.5. Conclusion

This chapter outlined the development of digital maps, and the technologies they rely on. In doing so, it provided an overview of the composition of digital maps and the various conceptualisations that their changing affordances have brought forward. It

has also drawn out a discussion of the cultural politics at play throughout their development, and on the degree of agency afforded to end-users. This section addresses the central aim of the chapter before setting out the central topic discussed in Chapter 3.

The purpose of this chapter was to define digital maps as an object of study. It has argued that any serious discussion of digital map engagement requires a definition of what a digital map *is*. Working towards such a definition, this chapter asserted that digital maps differ from Geographic Information Systems (GIS) in their scope. This frames GIS packages as software that allow end-users to self-generate individual maps based on variable coordinate systems, and that are proprietary. In contrast, digital maps are publicly accessible projects distributed (often freely) over the web using a shared base reference map. At times, map providers generate digital map content. At others, it is generated through VGI – whether people volunteer information knowledgeably and reflexively or not is another matter. In short, digital maps are publicly shared web-based resources that represent geographically coordinate place (one can visit the places represented). They can also be formed and reformed by their end-users. This chapter also presented different conceptualisations of what constitutes a digital map - whether it comprises the shared base or the content added to it, i.e. the digital map as both product and process.

This chapter also highlighted a general trend towards increasing end-user agency in shaping digital map content (as bespoke layers on a base map) – and, by extension, in self-representations of place. Notably, the chapter highlighted this within a discussion of the emergence of map-hacking and mashups as new cultural forms of digital map practice. The chapter argued these are new expressions of agency which open APIs afford in combination with a reconceptualisation of maps (via digital media) as ordinary tools for mapping self-defined data. In turn, this frames digital maps as spreadable media, following a wider cultural shift that the internet and web have afforded:

…towards a more participatory model of culture, one which sees the public…as people who are shaping, sharing, reframing, and remixing media content in ways which might not have been previously imaged... not as isolated individuals, but within larger communities and networks…

(Jenkins et al., 2013, p. 2)

In summary, this chapter highlights a plurality in the way digital maps are understood and defined (2.4.4). Their ongoing technical developments and ensuing shifts in their conceptualisation leave digital maps defined loosely as emergent entities. In this, the chapter offers a position commensurable with several contemporary cartographic theorists (3.6); that digital maps are in constant state of becoming. For example, OSM relies on frequent iterative revision through a constant stream of VGI, while Google Maps is brought into being through a constant stream of technological innovation and end-user creative re-appropriation, i.e. map-hacks and mashups. As technology, like the internet and web, digital maps are enacted through an interplay of practices carried out between a meritocratic set of providers and a wider group of end-users, each with varying degrees of reflexivity.

As a defining property then, this chapter has highlighted the development of various digital map 'views' as unique forms of representation; each raising new conceptualisations of what digital maps are. For example, 3D views that allow panning and tilting across a screen lead Crampton (2009a) to define digital maps as 'slippy'. Furthermore, when digital maps provide photo-realistic detail of the world at a ground-level (i.e. StreetView and StreetSide), they offer potential to shape the perceived identity of place with greater authority than previous map formats in their claims to veracity (Power et al., 2012).

Alongside defining digital maps as spreadable, slippy, and emergent centring resources that anchor various practices (see 2.4.4), this chapter has raised several questions for the thesis to address: If digital maps can be increasingly engaged with as mundane resources by non-experts, then how pervasive or prevalent are they? And to what extent do people engage with them, how important are they held to be, and what influence might they have on wider sets of social practices? Likewise, if digital map views move towards realist imagery, then what degree of trust do users place in them? And how far are the affordances taken up for end-users to generate and amend content taken up (a question that resonates with the discussion of

affordances, use, and engagement in 6.2.1). Following Power et al. (2012), there are also questions about the influence of digital map use on spatial identities, and the extent to which they might inform senses of place. In addition, the above discussion of knowledgeability in VGI raised an epistemic question on how academics might go about studying digital map use. To address these questions, Chapter 4 develops and justifies a practice theory orientated conceptual framework, while Chapter 5 focusses on its methodological operationalisation. The next chapter explores theories surrounding map-users and map use.

3. Digital map use and users in cartographic theory

3.1. Introduction

This chapter examines the treatment of map use and map-users in cartographic theory. Rather than providing a literature review, the chapter frames digital map use as a sociologically undertheorised subject; it reveals a gap in cartographic theory and contextualises how that gap emerged. The chapter bridges the technically descriptive outline of digital maps in Chapter 2 and the conceptually abstract framework building of Chapter 4. As such, it provides a base on which the conceptual framework can be built. This warrants a descriptive style, albeit with some analytical insight focussed narrowly on themes that are relevant to the research questions. As a result, it omits some major debates in cartographic theory for brevity and lack of direct relevance. For example, there is no discussion of map projections (how to 'accurately' represent the Earth in two-dimensions), or of 'mental maps' and spatial knowledge (i.e. Laurier and Brown, 2008). For a comprehensive overview of the full spectrum of debates in cartographic theory, see Kitchin et al. (2007), Dodge et al. (2011), or Crampton (2010).

First, the chapter details an initial literature search, explaining how it led to a focus on cartographic theory. It then progresses in loosely chronological order, starting with the emergence of cartographic theory and their development into progressivist map-communication models between World War II and the 1980s. It then moves on to the diversification of cartographic theory between the 1950s and 1980s, before discussing the emergence and refinement of humanist critical cartography from the mid-1980s to the mid-1990s. The penultimate section discusses contemporary cartographic theory (from the mid-2000s to date), covering the arguments this thesis is best situated against. The chapter concludes by summarising the trajectory of cartography theory from its origin to date, and by highlighting how a sociological approach might extend it by exploring digital map use as a set of practices performed within (and constitutional of) wider social practices. After defining this extension as an aim of the thesis, the chapter provides tentative suggestions for developing a conceptual framework.

3.2. Contextualising the chapter: an initial enquiry into theories of map use

As noted in Chapter 1, this thesis stems from an underlying frustration at witnessing people using digital maps in various contexts with a lack of criticality, also at the

limited range of sociologically-focussed concepts that adequately encompassed digital map use or users. Initially, this led to a focus on understanding how digital map use might affect the mundane routine practices that make up daily life, such as choosing which route to take between points A and B when commuting to work, visiting a friend of family member, or choosing which restaurant to eat at. To refine that focus into a set of research questions, an initial literature search (carried out between October 2012 and January 2013) served to assess existing literature on the topic, in order to inform the approach to data gathering and analysis. For this, I selected two academic databases: Elsevier SCOPUS, because it covers an extensive time-period (from 1823 onwards) and includes a vast range of content (Elsevier, 2013); and the Association of Computer Machinery (ACM) as a technology-specific database. I used broad search terms on both,[37] for example, I set SCOPUS to return all English language items assigned to arts, business studies, economics, social science (including sociology and geography), multidisciplinary, or psychology items that contained the keywords 'map' or 'cartography' alongside 'new media', 'online', 'digital', or 'internet'. I set no disciplinary parameters for the ACM search, but kept the search broad, locating all items containing the keywords 'digital', 'internet', new media', or 'web' alongside 'map', mapping' or 'cartography'.

To process the search findings, I exported a .csv file of item details including a hyperlink to each item and full abstract (one item per row in a spreadsheet). I categorised the returned items (articles, proceedings, theses, etc.) into eight themes: (CA) content analyses of map data; (DH) digital humanities (research on the digitisation of artefacts); (GU) physical geographic and geological research using maps as an illustration/output; (HD) hardware development (of map-related infrastructure); (NR) not relevant, e.g. medical articles 'mapping' neurological pathways; (NU) use of maps to spatialise data (as an illustration/output) in a context that differs from physical geographic and geological research, i.e. political maps of voting patterns; (PO) potentially of importance; and (SD) – software developments relevant to maps, i.e. discussion of digital maps within a broader context such as advances in HTML. To categorise items, I read abstracts and (at times) just titles,

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[37] For ACM: '((new and media) and 'or' and (internet) and 'or' and (web) and 'or' and (digital)) and ((map) or 'or' or (mapping) or 'or' or (cartography))', returning 535 items on 03/10/2012. For SCOPUS: 'TITLE-ABS-KEY('newmedia' OR 'internet' OR 'online' OR 'digit*' AND 'map*'OR 'cartograph*' AND 'use*' OR 'practice*' OR 'consum*' OR 'prosum*') ANDSUBJAREA(mult OR arts OR busi OR deci OR econ OR psyc OR soci) AND (LIMIT-TO(LANGUAGE, 'English'))', returning 3,481 items on 03-Oct-2012 and 3,661 on 05-Jan-2013. 49 of the 'extra' 180 were not duplicates.

paring the literature down to 185 'potentially of importance' (PO) items. I then refined the PO items through a second reading, recategorising them a more focussed set of themes: as relevant for a literature review (LR) (incorporated into this chapter); useful for providing contextual background (CB) about digital maps (used in this chapter and Chapter 2); or as being of no relevance (NR).

Initially, I anticipated the literature search would lead to a systematic literature review that would inform the research. Instead, the search identified a limited range of literature on digital map *use* beyond hardware design (with an engineering focus on the manufacture of products on which digital maps are served), usability studies (often based on screen layout and ergonomics) or assumed media effects. The search highlighted a sparsity of literature on the lived practices of map use. The limited range of literature surrounding map use (not just digital) that it did identify fell within the narrow subfield of cartographic theory. As a result, the literature search directed me towards a narrative review of cartographic theory literature (rather than a systematic one), incorporating relevant items from the literature search where appropriate. I expected that undertaking a narrative review of cartographic theory literature might locate a theoretical framework to drive the research. However, as the research progressed it became apparent that existing cartographic theory literature did not offer a suitable framework or set of concepts to fully address the research questions or findings that emerged throughout the data analysis (5.6.1). In this, the research revealed that a sociologically focussed extension of cartographic theory could usefully contribute towards a gap in theory on the ways in which digital maps are used. As such, the review of cartographic theory literature was repurposed and changed in form and focus. As a result, this chapter presents the findings of that narrative literature review as a contextual background to the development of cartographic thought, both to set out the contribution this thesis makes, and to situate it as a digital sociological extension of cartography theory.

3.3. Early thought about maps: the emergence of cartographic theory

This section describes how cartographic theory emerged and developed in academic cartography, and its later refinement in map-communication models (MCMs); it also describes two subtly different extensions to MCMs, highlighting the differing conceptions of map-users in early cartographic thought. The section also introduces a few themes for later discussion, e.g., the shift in the status of map use – from

military and elitist specialism to dispersed everyday public act, and the degree of agency both accorded to map-users.

3.3.1. Early theories maps: academic cartography

One of the earliest theories of maps was Eckert and Joerg's (1908) contention that a new 'map logic' could provide a way to generate accurate (realist) representations of space whilst standardising how we understand people's perceptions of maps. As a later development, Arthur Robinson extended Eckert and Joerg's thought amidst the context of World War II (Edney, 2005; Crampton and Krygier, 2006; Dodge et al., 2009, p. 5). As Chief of the US Office of Strategic Services' (OSS) Maps Division throughout World War II (Robinson, 1947; Crampton, 2010, 2011), Robinson led ~150 staff, composed of artists (graphic designers), printers and geographers (Crampton, 2011), and oversaw work on various maps and mapping technologies of worldwide significance. This accorded Robinson significant influence over the discipline of cartography at a near-global scale. At the OSS, Robinson followed Eckert and Joerg to theorise how an objectively veracious map might be created. He sought a means by which objectivity could be created within maps to negate the difficulties (and casualties) caused by map propaganda throughout World War II (Crampton, 2011). This involved analytically separating cartography into *"…collecting and accurately reproducing spatial data at large scales…"* (Edney, 2005, p. 715) and the *"…creation of smaller-scale 'specialty' and thematic maps* [as] *a design process…"* (Ibid.). In this, Robinson focussed on removing subjectivity from map production by developing *"…standard systems of symbolization, and set map scales…"* (Crampton, 2011). By approaching maps as artefacts that *could* be technically and progressively refined towards truthful normative representation, he relied on a positivist (and empiricist) base. However, *"…there was little else* [Robinson] *could do…"* (Robinson, 1979, p. 100) to expand his theory at this time; the OSS employed him to *"…make maps, not to do scholarly research in cartography"* (Ibid.).

After World War II, public demand for maps grew as individuals and institutions planned and carried out post-war rebuilding of damaged cities, towns, and infrastructure:

> *Increased planning and controls called for maps; restoring*
> *devastated cities and areas required maps; rebuilding the economies*

of nations demanded maps; expansion of transportation facilities delayed by the war needed maps; analysis of the consequences of development called for maps; integrating water use in drainage basin organization necessitated maps; and so on, almost without end…

(Robinson, 1979, pp.101–102)

Maps were no longer specialised apparatus. Instead, a partial democratisation and banalisation of cartography started (through an increase in public use and demand of maps). Maps became mundane technological resources situated (and consumed) in various everyday contexts – although map-production remained a specialised venture. In America, this was further facilitated by redeployment of the OSS maps division to the US civil service following dissolution of the OSS in 1945 (Robinson, 1979, p. 100) – a move that altered the role and focus of state-level cartographic resources and expertise whilst increasing public availability (supply) of maps. Also, in response to the burgeoning demand for cartographers and maps, universities began to provide standalone cartographic qualifications and integrated cartographic training within geography courses (Robinson, 1979, pp. 101–102; Board, 2011a, p. 167).

Situating the above in historical context, the shift in maps' status (from specialised to mundane resources) was framed within a *"…period in American geography when quantitative methods were being explored and adopted…"* (Robinson, 1979, p.101) as part of a larger quantitative 'revolution' (Barnes, 2004). It was in this context that Robinson saw an opportunity to further develop his theory of maps[38] and to *"…regularize the principles of map design… [to]… establish cartography as a properly academic discipline"* (Edney, 2005, p. 715). Building on his thoughts at the OSS, Robinson typologised cartographies as either: *transgressive* (non-scientific) cartographies based on subjective and aesthetic sensibilities; or *academic* (scientific) cartographies aimed towards increasing map functionality and developing an objectively 'true' kind of map (Crampton, 2010). Working towards '*academic*' *cartography*, Robinson proposed two ways to *"…raise cartography "up" to a science"* (MacEachren, 2004, pp. 2-3), either: standardise map symbols and production procedures worldwide; or draw on social science to develop functional maps based on end-users' needs (Crampton 2010, pp. 52-53). The former was logistically

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[38] Completing what is believed to be the first PhD thesis to theorise cartography (van den Hoonaard, 2013, p. 109), aptly titled 'Foundations of Cartographic Methodology' (Robinson, 1947).

unfeasible (despite Robinson's influence and considerable network of contacts), while the latter required a shift in focus from map-production to design.

Robinson turned to architectural theory next, drawing out an (architectural) functionalist perspective that centred on the cartographer as neutral expert responsible for developing maps based on end-user needs:

> *…a parallel between cartography and architecture is not difficult… each, since its beginnings, has been more or less under the control of its consumers… a structure will be planned and built according to the needs of its future users. It is not expected that the inhabitants will conform to the structure. Function provides the basis for the design. A similar revolution appears long overdue in cartography.*
>
> *(Robinson, 1947, pp. 9–10)*

In this, Robinson's academic cartography was not only one of the first theories of maps; in centring map readability, it was also arguably the first theory of map use.[39] Working towards such a 'revolution' throughout the 1960s and 1970s (Edney, 2005, p. 716), Robinson devised a functionalist inspired map-communication model (MCM).[40] This approached spatial information as being passed from cartographer to map-user via 'neutral' mediation of a map, where *"...context was deemed to be irrelevant; the world existed independent of the observer and maps sought only to map the world"* (Crampton and Krygier, 2006, p. 4). While Robinson provided a degree of agency to map-users by drawing on elements of psychophysics (Morrison, 2008, p. 233), his focus on map design left map-users poorly conceived as passive recipients. He believed that maps should be evaluated on their ability to provide accessible and truthful (empirically verifiable) information about an immutable landscape, with the cartographer addressing any 'filters' or 'interferences' that might affect the encoding and decoding of information between map and map-user. The study of how maps were used within social practices or made meaningful by map-

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[39] Robinson would have preferred the term 'percipient' to 'map-user'. He separated casual map 'viewers' from those who "*augment…spatial knowledge of the milieu as a consequence of looking at the map… coordinate with the cartographer, one who attempts to communicate spatial information about the milieu by making a map*" (Robinson and Petchenik, 1976, p. 20). There is little benefit in maintaining this separation when explicating his thoughts on maps and map-users at a general level.
[40] As part of his project to create an objective science of cartography, Robinson also developed a new projection (Robinson, 1974) in an attempt to depoliticise representations of the world (Wood and Krygier, 2009).

users did not enter Robinson's framework - his focus lay on the production of maps as media artefacts.

3.3.2. Extending the model: the development and refinement of MCMs

Robinson's MCM remained dominant in American cartographic theory throughout the 1960s and 1970s. This partly followed Robinson's wide-ranging influence through his position at the OSS, but also through his publication of 'Elements of Cartography' (Robinson and Sale, 1969)[41] and supervision of several influential cartographic theorists, including *"…Norman Thrower, Judy Olsen, Henry Castner, and David Woodward"* (Crampton, 2010, p. 58). However, his MCM was not wholly accepted; several extensions and refinements were proposed. For example, Morrison sought to develop a map communication *science* (MCS). Like Robinson, he treated the cartographer as a neutral expert responsible for selecting, classifying ,and simplifying information (Morrison, 1970, 2011), in order to 'successfully' transmit a 'truthful' representation:

> *Communication via a map between two cognitive realms utilises a cartographic language. Successful communication results in the addition of correct information about reality to the cognitive realm of the receiver…*
>
> *(Morrison, 1977, p. 55)*

Morrison's treatment of map-users was equally functional - as partially agentic recipients of information. However, his scheme accounted for active interpretation by the cartographer, for whom the map (as message) could be directly received and amended to create a 'better' message for users. This followed a position that leaned further towards structuralism than Robinson's desire for a standardisation of signs, instead Morrison assumed that a universal cognitive scheme existed amongst all map-users (Morrison, 1977).

While Morrison's account highlights the dominance of MCMs (and derivatives like MCS) in American cartography up to the 1970s, a similar story can be told across the Atlantic. Until the 1950s, British cartographers drew on a long history of mapping innovation where cartographic practice was largely informed by *"…Debenham, then*

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[41] Which, according to Crampton (2010, p. 58), was the unchallenged central textbook for cartographers worldwide for 35 years.

by Monkhouse and Wilkinson" (Board, 2013, p. 105), and focussed solely on technicalities of map production without any underlying theoretical stance. That is, cartography was framed normatively as a technical and objective science. However, by the 1960s, Robinson's MCM began to take hold, and with it came an understanding that cartography warranted theory (Board, 2011a). Initially, this involved extending Robinson's MCM rather than accepting it wholly. For example, Board (like Morrison) developed a complex schema that extended Robinson's MCM by accounting for interferences that cause *"…progressive loss of information in both mapmaking and analysis… a discrepancy between the cartographer's and map user's reality..."* (Board, 1972, p. 44). By envisioning both map-makers and map-users as active interpreters, his extension of MCMs veered closer to an agentic account of map-users than Robinson's or Morrison's MCMs. However, Board did not directly focus on map use or map-users, or on the veracity of information being transmitted. Instead, he adopted a normative approach in his treatment of map use and a realist perspective on map content.

3.4. Diversification of cartographic theory: three different approaches

This section describes several challenges and extensions to early cartographic theory from the 1960s to the 1980s. It begins by reviewing positivist-inspired analytical cartography (3.4.1), before turning to semiotic (3.4.2), and cognitivist-behaviourist geographical approaches (3.4.3). This provides a general overview of three main directions taken within cartographic theory's diversification. As a literary device, the section considers theory that treats maps as structuring of action, before moving on to those which consider individual's interpretations as central to their map use. This maintains a coherent narrative following the shift from positivism in early cartographic theory (3.3) to constructivism in critical cartography (3.5), but it does so at the expense of a strict chronology.

3.4.1. The map-user as marginalised subject: analytical cartography

One major strand of cartographic theory that challenged the dominance of MCMs was Tobler's 'analytical cartography' (2011), an approach that exerted a strong influence over several strands of contemporary cartographic thought, and underpinned much of GIS practice (Möellering, 2000). While Tobler sought to develop an equally progressivist cartographic science by removing 'interferences' (Tobler, 1970) in map design, he sought to do so by simplifying the represented data, rather than by improving information flow :

…I tried to eliminate complicating factors… I invoked 'the first law of geography: everything is related to everything else but near things are more related than distant things.' …using the idea of a change in the 'unit inhabitant,' and ignoring many other possible influences.

(Tobler, 2004, p. 304)

In context, Tobler was working in a period where technological developments, *"…many of which were digital, such as CRT display images, digital terrain models, and spatial databases"* (Möellering, 2000, p. 205), were leading to challenges over the conceptual basis of existing cartographic practices. By drawing on (new) computing technologies not available to academic cartographers (Morrison, 2008, p. 234), alongside principles of photogrammetry and geodesy (Tobler 2011, pp. 32–33), Tobler was able to systematically collate, order, and reproduce spatial data at large-scale. He shared Robinson's aim of 'raising' cartography up to a science within an empiricist framing (replete with a scientific 'law'). However, Tobler believed that refining cartographic science would lead to an accurate and truthful (Cartesian) representation of a singular existing reality; a singularly veracious map. In this, his starting point differed from earlier cartographic theorists; Tobler provided no account of the map-user. While he approached maps from a similar ontological base as academic cartographers, as a point of epistemic difference, Tobler grounded cartography within statistical data alone, with little question of the veracity of information at ground-level.[42] He saw purposeful omission of any local social or cultural detail as a means of achieving generalisation (Tobler, 1970, p. 234). Instead, he supplanted contextual specificity (the messiness of social relations in everyday life and place) with a scientific 'law' of relationally-ordered spatial associations (Sui, 2004).[43] This differed from academic cartography and MCMs, which located end-users as integral to map design (if only as relatively passive recipients). Thus, Tobler diverted cartographic theory away from functionalist-inspired map design and towards mathematical map-making principles which muted local specificity (place). This rested on a structuralist treatment of people as homogeneous aggregates of data. That is, when Tobler argued that a map would be more usable when

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[42] This marks a stark contrast with Robinson, for whom a first-hand experience of cartographic propaganda during WWII was a key motivation for the empirical basis of academic cartography, notably in making more accurate ground-level maps of landing zones at a local level for troops (Crampton and Krygier, 2006, p. 20).
[43] Tobler's first law of geography (like his analytical geography in general) remains a central part of spatial science today (Sui, 2004).

generalised, he assumed that all people interpret maps in a relatively homogenous way, without relying on any local specificities of the places (or people) being represented.

3.4.2. Reading the signs: semiotic cartographic theories

The second branch of cartographic theory to challenge MCMs arose from semiotics. Working in response to a wider cultural turn in the 1970s (Chaney, 1994, pp. 2–3; Nash, 2001), cartographic theorists began to focus on meaning: what maps might mean to both producers and users; how those meanings might be constructed, maintained and shared; and how best to go about analysing the 'hidden' meanings of maps. At times this was commensurable with early cartographic theory. For example, Schlichtmann (1985) proposed that a closer engagement with the semiotics of painting (art theory) could enable map-makers to better understand the process of map signification in order to produce more useable maps. Sympathetic to both earlier cartographic theory and Tobler, Schlichtmann assumed a structuralist position that map-use entailed reading and comprehending the text through a universal set of signs. Meanwhile, others described more pronounced differences. For example, Wood and Fels (1986) adopted a cognitive-semiotic approach (Perkins, 2003, p. 343) to maps – as symbol-carrying texts imbued with a politics made meaningful (Żyszkowska, 2015) through the interpretation of shared semiotic 'codes':

> *…cultural artefact, accumulation of choices… loaded with intentions and purposes… in code: all meaning is meaning, all significance derives from codes, all intelligibility depends on them…*
>
> *(Wood and Fels, 1986, p .64)*

Wood and Fels saw end-users as active (agentic) interpreters of encoded messages, instead of generalised, homogenous readers of a universal set of signs. Rather than *"…placing the map image in the context of other signs, it's placing the map in the context of its audience"* (Wood and Fels, 1986, p. 97). In that sense, Woods and Fels argued that map analyses should focus on how specific maps are contextually situated, rather than assuming the existence of a universal set of signs or singular interpretation. They contended that map use depends on the meaning(s) map-users gain from information *posted* on the map,[44] which are in turn framed by the interests

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[44] For Woods and Fels, a map works by claiming *"…that this of nature is – a waterfall or cliff… and that it is there – at this bend in the river… nature is made spatial… implies a reality test, that you can go*

of the cartographer *and* the local context in which their map use is situated. In contrast to analytical cartography, Woods and Fels (Ibid.) focussed on understanding the relationships between the map (as a system of signs engaged within situated contexts), the map-user, and the relationship between map-users (as an audience) and the context of their map use. In other words, they asserted that map use is locally specific and deeply related to place (it is situated and relational). However, Woods and Fels' foregrounding of map-users as active interpreters came at the expense of any account of map *use* (in terms of consumption). They did not examine the process of *how* maps are made meaningful or how 'codes' might be shared, exchanged, or circulated between map-users beyond a generalised underlying assumption that the collective interpretation of codes was somehow constrained by local context.

MacEachren and Kraak (1997) trace a similarly semiotics-based argument to Woods and Fels (1986), using the term 'presentation' to denote *both* the encoded messages map-maker place (or post) onto a map *and* its active interpretation by map-users:

> *Presentation is often equated with cartographic communication (in the information-theory sense that underlies the communication model approach to cartography). Presentation can, however, include both the transfer of some predetermined 'message' and the prompting of new insight on the part of the person who experiences or accesses the presentation.*

> *(MacEachren and Kraak, 1997, p. 339)*

This challenged earlier cartographic theories in a different way than Woods and Fels (1986). Rather than assuming that shared sets of codes constrained by local contexts act as the mechanism that structures shared meaning, MacEachren and Kraak (1997) argued that map-users are active individual interpreters (readers) and that they collectively co-constitute meanings. This accounted for the diversity of visualisations made possible through a map (MacEachren, 2004) without sacrificing the analytical importance of the design process (which made the presentation, transfer and shared understanding of messages possible). Furthermore, MacEachren and Kraak felt they were responding to developments in map technology that

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there and look" (Wood and Fels, 2008, pp.189-190). They refer to this signified-referent relationship as 'posting' on a map (Wood and Fels, 2008, p.190; cf. Brighenti and Mattiucci, 2010, p.8).

afforded *"…instantaneous changes… not only in a quantitative difference in the number of things a user can make visible, but a qualitative difference in the way users think"* (1997, p. 335). This led them to adopt an ethical position on what cartographic practices should be, and how map-making ought to adapt to encompass the growing diversity of users' needs. However, this position limited their analysis in conceptualising *how* maps are used. Thus, like Woods and Fels, MacEachren and Kraak's focus on conceptualising the meaningfulness of maps left the lived practices of map use undertheorised.

3.4.3. Processing maps: cognitive-behaviourist cartographic theory

A third branch of cartographic theory centred around the cognitive behaviour of map-users at the moment of use. This aimed to address a limitation of MCMs and early cartographic theories that centred on design, arguing that they:

> *…tell us little of what went on in the reading process itself... the reader was simply a 'black box'… If general principles of design were ever to be derived, they would only come from a thorough knowledge of how the reader processes graphic information…*

> *(Eastman, 1985, pp. 95–96)*

By placing map-users at the centre of analysis (as individuals), cognitive-behavioural theorists took cartographic theory in a new direction. Rather than concentrating on map design, or (generalised) map-users' meaning-making practices – as active (yet undertheorised) interpreters of signs (cf. Keates, 1996, p. 145), cognitive-behavioural theorists pinpointed the act of interpretation itself as the main site of study. However, their work falls within two opposing modes of thought (Eastman, 1985, p. 100; Lobben, 1999, p. 7): *systems-based* approaches that focus on the cognitive aspects of perception; and *process-based* approaches that focus on what happens at the moment of cognition itself. Both shared a positivist contention that "*…a cartographer operates with the same* [universal] *visual mechanism as other people…*" (Keates, 1996, p. 147) and that each individual map-users holds:

> *…his or her own cognitive structures, built through personal experience, with which the information displayed is understood… [what the] cartographer supplies is the spatial context of entities and the relationships between them…*

(Eastman, 1985, p. 100)

However, the two approaches foregrounded different aspects of cognitive behaviour. Systems-based approaches examined the biological relationship between the retina and cortex in visualising maps (Eastman, 1985, p. 96) and on understanding what happens inside a user's brain while processing map imagery (Eastman, 1985, p. 97). This included adaptations of psychological theory about how imagery is organised into cognitive structures (Eastman, 1985, p. 98; Żyszkowska, 2015, p. 184). While this approach treated map cognition as physically embodied, it offered no conception of the map itself or map use. It also introduced a complex issue of rationality. To clarify, in academic cartography and MCMs, map-users were treated as muted recipients with limited agency. In analytical cartography, there was no coherent concept of map-users. In semiotic cartographic theory, map-users were treated as partially agentic interpreters of shared sign systems posted or presented on a map. By contrast, systems-based cognitive-behaviourist cartographic theorists offered no account of how maps might be used or interpreted in similar ways by different people. Instead, interpretation as individualised and pinned to map-users' subjectively developed 'cognitive structures', where:[45]

> *…perception involves interpretation, and by definition emphasizes the cognitive elements… perception cannot be regarded as independent of the knowledge and mental state of the perceiver…*

(Keates, 1996, p. 152)

The second cognitive-behaviourist approach aimed to model cognition within map use (Keates, 1996, pp. 152–153). It argued that people use inductive (rather than abductive) cognition to make sense of maps (Lobben, 2004), and explored whether map-users interpret a map and *then* apply cognitive schemes to it or if they do both in tandem. As a minor subfield at the intersection of psychology and cartography, however, little progress has been made in resolving this debate, with work in the mid-2000s concluding that further research is needed.[46]

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[45] This infers, but fails to articulate, an assumption that shared interpretation must follow on from shared experiences – commensurable with notions of socialisation, and akin to Giddens' (1984, p. 17) 'Memory Traces' discussed in Chapter 4.

[46] Whilst there is a small body literature in this subfield, it lacks direct relevance for this thesis. For a comprehensive outline, see Keates (1996, chap. 3) or Lobben (1999).

As with systems-based approaches, process-based cognitive-behaviourist cartographic theorists treat map-users as individualised and map use as rational behaviour. As a key divergence from earlier cartographic theory then, both modes of cognitive-behaviourist cartographic theory provided insight on how maps might be processed by individual users. However, they provided little for addressing how map use might be collectively shared, how cartographer and map-user conceptions might relate to one another, or how maps might be interpreted in the same way between different map-users. Likewise, following analytical and semiotic approaches to cartographic thought, they did not consider the importance of understanding the social practices in which map use occurs or the degree of map-user agency involved.

3.5. Power struggles and war: the development of critical cartography

This section reviews cartographic theory between the 1980s and late 1990s, a period when cartographic theorists began to engage with social theory following the 'cultural turn' (Chaney, 1994, pp. 2–3; Nash, 2001). In this period, cartographic theorists started to challenge the legitimacy of maps as carriers of objective knowledge stemming from a neutral cartographer's singular perspective (Crampton, 2010). Tod do so, this section first covers the emergence and development of critical cartography. It then discusses a series of exchanges between cartographic practitioners and humanist and critical cartographic theorists in the 1990s (called the 'GIS wars).

3.5.1. An unfinished philosophy of maps: early critical cartography

Above, Robinson was framed as the key protagonist in the initial development of a theory of maps (3.3.1). This subsection presents Brian (J.B) Harley as his intellectual counterpart. While Robinson intended to advance cartography towards progressivist science, Harley aimed to develop humanist critique to uncover the subjectivities and power imbalances inherent within it. Harley's career began with Marxian analyses of historical social change in relation to topographical maps (Ravenhill, 1992), before moving on to write guide books on historical Ordnance Survey (OS) maps for local historians and cartographers. Beyond his impressive acumen and knowledge of map symbology and procedures (Harley and Philips, 1964; Harley, 1975), conceptually Harley treated maps as more than representative media, and instead as "*…complex series of interactions, involving their use as well as their making*" (Harley, 1987, p. 2). To further develop his thought, Harley turned from writing guide books to a career-long focus on developing critique (Laxton, 2001, p. x), aiming instead to expose:

> *…hidden agendas concealed in maps… more than passive
> representations of space, they also expressed social structures,
> political aspirations, the exercise of power and domination*
>
> *(Ravenhill, 1992, p. 365)*

Collaborating with Woodward on the 'History of Cartography' project,[47] Harley sought to de-centre positivist representations of space by placing them alongside traditional and indigenous maps without differentiation. According each an equal value challenged the assumptions and power-relations in standardised cartographic taxonomies (of people and things); it was an antithesis to the notion of positivist cartographic science that was accepted as transcending subjective representation. This exposed the separation of 'transgressive' and 'academic' cartographies (3.3.1) as a false binary that legitimated one form of knowledge whilst silencing the heterogeneity of local and subaltern others (Harley, 1988b, pp. 98–100; Crampton, 2010) .

Harley also started to develop a theoretical framework for map critique, which was "*…noticeable in the changing character of the multi-volume "History of Cartography"…*" (Edney, 2014, p. 92).[48] Initially, he drew on social constructionism, critical theory, semiotics, and post-structuralism (Harley, 1989, pp. 164–165; Andrews, 2001, pp. 8–9) to describe maps as *"…refracted images contributing to dialogue in a socially constructed world…"* (1988a, p. 53). He argued that such a critique entailed decoding maps from an iconological perspective, which would uncover a 'deeper' symbolic level of meaning beyond a coordinate 'surface' one. Like semiotic cartographic theorists (3.2), Harley believed it was:

> *…only through context that meaning and influence can properly be
> unraveled… the circumstances in which they were made and
> produced…*

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[47] A six-volume book collection which Edney holds responsible for "*…the formation of the history of cartography as a field of study*" (2005, p. 712) and Crampton describes as *"...perhaps the most significant intellectual project in cartography"* (Crampton, 2010). Notably, it is held at the University of Wisconsin-Madison (Krygier, 2015, p. 24), where Arthur Robinson worked (1945-1980) and served as Dept. Chair (1954-1958 and 1966-1968) (Wilford, 2004; Martindale, 2017).

[48] While Harley passed away before refining his framework into a coherent whole, he did leave a tentatively titled (but unpublished) paper called '*The Map as Ideology: knowledge and power in the history of cartography*' (Laxton, 2001, p.xiii). This informed Laxton's approach when collating Harley's essays into a posthumous edited collection (Harley, 2001). See Ravenhill (1992) for a chronologically-ordered bibliography of Harley's work.

(Harley, 1988a, p. 56).

This foregrounded the situated local context of map use, rather than the posting or presentation of signs (map-making), marking a turn in cartographic thought towards the study of the power-relations involved with map-making.

To extend his theory, Harley drew on Giddens and Foucault to conceive maps as apparatuses that were central to forming a spatial discipline where *"[m]aps impinged invisibly on the daily lives of ordinary people…"* (Harley, 1988a, p. 62). In doing so, he emphasised the importance of understanding how maps embedded in everyday life might structure the movement of people and things (social practices). He also edged towards a conception of map use as both a disciplined and embodied activity. However, Harley did not expand on either strand in any depth, leaving his analysis short of explaining what or how maps might influence people's daily lives. Instead, he moved on to explore the power-relations of silencing in maps and their relationship to place. Using the example of seventeenth-century atlas-making (when map legends and key symbols were first standardised), Harley argued that *"…the lack of qualitative differences in maps structured by the scientific episteme serves to dehumanise the landscape"* (1988b, pp. 98–99). Harley considered that the legitimation of a Cartesian perspective and spatial generalisation in cartography had led to the omission of local detail (not just alternative modes of representation), both as a deliberate act of censorship and as a form of unintentional subalternation. While this might have provided an opportunity for Harley to critique prior cartographic theories on epistemic grounds, he instead continued to further refine his framework.

In doing this, Harley (1989) drew on Derrida and Foucault (whilst acknowledging their incompatibility) to argue that a set of cartographic 'rules' had emerged: first, in the treatment of cartography as 'science' (from standard atlas-making procedures to the empiricism of land surveys); and second, in the dominance of practices *"…governing the cultural production of the map… related to values, such as those of ethnicity, politics, religion, or social class…"* (Harley, 1989, p. 156). In this, there is a great deal of similarity between Harley's constructivist conception of how cartography was legitimated as science and Latour's (1988, chap. 6) discussion of the construction of cartography as science; both in terms of how different actors were recruited and assembled together and the power-relations that their combination and maintenance entailed. However, despite both writers working at the same, Harley did not discuss Latour's work (nor did Latour refer to Harley's). Instead, Harley focussed on

developing an argument that selecting what to represent or omit (silence) on any map was driven by an intrinsic positioned politics of representation (hidden agendas):

> *To catalog the world is to appropriate it… we have to consider for maps the effects of abstraction, uniformity, repeatability, and visuality in shaping mental structures and in imparting a sense of the places in the world*
>
> *(Harley, 1989, p. 167)*

Overall, Harley argued that maps frame knowledge about the world, which in turn informs individuals' senses of place. Meanwhile, a positivist mode of representation legitimated through social rules[49] enables the silencing of some knowledges and prominence of others. For Harley, it was the cartographic theorist's task to critique each map and to expose its hidden agenda(s). Unfortunately, Harley died before completing his framework, leaving a critical gap in theorising the interpretation or reading of maps – and the question of whether this is achieved individually or collectively (and by what mechanism) unanswered. Thus, while Harley acknowledged the importance of understanding that map-users are locally (and contextually) situated, his assertions (i.e. that maps shape people's knowledge of and about the world and impinge on their everyday lives) rely on the assumed effects of representation on a generalised (and passive) user.

3.5.2. Refining map critique: the expansion of critical cartography

Between the late 1980s and early 1990s, cartographic theorists extended Harley's work in one of two ways (Crampton and Krygier, 2006, p. 11). For some, cartographic practice itself presented a means of critique, leading them to generate maps as humanist tools to challenge various spatial and social injustices. For example, Bhagat and Mogul's development of atlases and essays from subaltern perspectives that *"…subverts conventional notions in order to actively promote social change…"* (2008, pp. 6–7) by exposing the hidden agendas behind dominant maps. Likewise, Barford and Dorling (2007) illustrated their texts with density-equalising maps (gridded cartograms) derived from their WorldMapper project (Dorling, n.d) to present statistical geographical data as distorted atlases that challenged realist representations.

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[49] By this, I use 'rules' in a Giddensian sense (as did Harley) – as part of structure (4.2.2).

By contrast, those focussing on the theoretical critique of maps began to address some of the limitations of Harley's framework.[50] However, they did so within period when social theory was being influenced (and characterised) by a broader 'spatial turn'[51] (Arias, 2010; Pugh, 2009) that framed place, space, and spatiality to be constructed through social practices, and not as directly structuring of them. For example, Black's (2002) focus on the embedded politics within realist map representation mirrored Harley's concerns with 'hidden agendas' and connections between map use and map-making:

> *…users rely on the apparent accuracy, and objectivity of maps...*
> *map-making and map using processes* [which] *cannot be divorced*
> *from aspects of the politics of representation*
>
> *(Black, 2002, pp. 9–10)*

Although Black claimed that the 'apparent' objectivity of map knowledge was a form of discursive power – with map-makers imbuing maps with politics – he continued to treat map-users as passive recipients. Meanwhile, Wood's (1992) semiotic analyses treated maps as political tools that served the interests of those they represented at the expense of those omitted from the map. In this, Wood followed Harley, Woodward, and Black in arguing that maps present (and legitimate) certain forms of knowledge while silencing others. However, Wood also emphasised the historical role that maps had played in the social construction of place - albeit without conceptualising *how*:

> *The world we take for granted – the real world – is made like this, out*
> *of the accumulated thought and labour of the past. It is presented to*
> *us… made present… every map facilitates some living by virtue of its*
> *ability to grapple with what is known instead of what is merely seen.*
>
> *(Wood, 1992, p. 7)*

In contrast, Cosgrove (1999) moved from uncovering and investigating the power-relations (hidden agendas) behind maps to theorising the politics of mapping or map-

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[50] It is worth noting that critical cartographic theory at this time centred around a relatively small community, with the University of Wisconsin-Madison as a key site (where David Woodward, John Krygier and Matthew Edney worked) (Krygier, 2015).

[51] A turn that saw geographers draw on constructionist theory to explore space as processual, and place as constructed, rather than considering either a fixed entity (Cresswell, 2006, p. 51).

making as a critical process in itself, but still without providing a conceptualisation of map-users.

Overall, critical cartography provided a new humanist-inspired direction for cartographic thought. It treated maps as instrumental tools laden with power-relations and hidden agendas, serving to legitimate one representation of place over others. However, it offered no account of interpretation or meaning-making. Instead, it assumed that maps would be accepted by a passive audience (map-users). Similarly, throughout its development in the 1980s and early 1990s, critical cartography had little impact on cartographic practice; map critique held marginal purchase (Dodge et al., 2009, p. 6) while positivist approaches to map-making remained dominant.

3.5.3. Cartographic theory and practice collide: the GIS wars

Following a series of technological advances in computing, cartographic tools became increasingly sophisticated and widespread in the early 1990s (Chapter 2), while geographical information systems (GIS) became a central facet of map-making. Amidst the context of a broader 'science war' (Flyvbjerg, 2001) these advances led to a set of heated exchanges between cartographers (employing GIS) and cartographic theorists, later named the 'GIS wars' (Schuurman, 2000, 2008)[52].

The first GIS war (early 1990s) involved exchange between critical cartographers and GIS practitioners (GISers). It opened dialogue but provided little resolution: critical cartographers berated GISers' positivism (Schuurman, 2000, p. 576) as a *"…dangerous and self-defeating renunciation of an intellectual (as opposed to technical) agenda..."* (Smith, 1992, p. 258), referring to the 'de-humanised' basis of GIS as a branch of computer science rather than geography (Goodchild, 1991; Longley, 2000). In response, GISers berated critical cartographers' lack of technical expertise, charging them with naïve conceptualisations of GIS cartography as unreflexive. For example, Openshaw (1991, 1997) framed critical cartography as crudely anti-positivist, and GIS as apolitical in its empirical grounding steeped in a reflexive form of realism:

> *…if people actually believe the stories that some geographers can readily fabricate… 'true' representations of reality, there needs to be*

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[52] Critical GIS is distinct from critical cartography *per se* through its explicit focus on GIS technologies. However, the term 'critical cartography' is broad enough to encompass all cartographies – including GIS.

some hard empirical proof that they are. Geography is not like
physics or chemistry where there appears to be a strong degree of
universal orderliness underlying complex phenomenon….

(Openshaw, 1991, p. 258)

This first GIS war problematised the status of cartography but offered little discussion of map-users or map use; debate skirted around production. In the mid-1990s, a second GIS war provided a partial reconciliation between GISers and critical cartographers through two events: (1) the pivotal 'Friday Harbour' conference brought thinkers from both sides together for the first time, leading to the establishment of 'critical GIS' (Schuurman, 2008, pp. 726–727). Also, as an outcome of the conference, the US National Centre for Geographic Information and Analysis (NCGIA) launched a new initiative on 'GIS and Society' (I19); (2) the publication of Pickles' (1995) 'Ground Truth'[53] the first collection to bring together a collection of critical GIS writings from both sides. While Pickles provided a balanced view of the main positions in the field, but he failed to provide a meaningful account of map use or map-users (the focus remained on production). The third GIS war (late 1990s) culminated in a theoretical refinement of the various approaches in critical GIS. For example, in an influential article at the time, Wright et al. (1997) typologised critical cartographers within a continuum between: those who view GIS technologies (and maps) as neutral tools, but treat map-makers is subjective (GISers); and those who view GIS as a narrowly positivist spatial science of mapping geographic detail (GISci). He situated those who treat GIS as a set of toolmaking practices, and that seek either to educate others on how to use GIS or to further develop the technological scope of GIS as being between the two opposed positions.

Subsequently, following the GIS wars, feminist theorists and grassroots activists (from the midground of Wright's continuum) began to engage with GIS for participatory action-based interventions (cf. Pavlovskaya and Martin, 2007; Dunn, 2007). In doing so, they provided a new, more inclusive and emancipatory conceptualisation of map-users *as* map-makers. For example, Kwan argued that:

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[53] As O'Sullivan notes:*"This edited collection was originally planned by Brian Harley and John Pickles, building on Harley's ground-breaking critical work on the role of maps as representations and assertions of power"* (2006, p. 784). Pickles compiled this edited collection of critical GIS thought, which quickly became a seminal founding text for the subfield (Goodchild, 2006).

...engagement in the material and discursive de/reconstruction of dominant GIS practices can lead to critical practices that are congenial to feminist epistemologies and politics

(Kwan, 2010, pp. 261–262)

By arguing that GIS could redress uneven power-relations within people's spatial representations, Kwan echoed Harley's concerns, albeit centring the silenced subjects' voices rather than speaking on their behalf from an assumed position of expertise. Taking this further, critical cartographers employing GIS as tools of empowerment sought to directly include map-subjects in their own self-representations in a field later referred to (interchangeably) as 'participatory GIS' (PGIS) or 'public participation GIS' (PPGIS) (Dunn, 2007). Rather than omitting local detail for generalisability (e.g. Tobler), P/PGIS provided map-users with the ability to create their own grassroots maps, and thus foregrounded the heterogeneity and local specificity of place. In doing so, they also shifted the balance of power in map-making from the state or large corporations to individuals and local communities (Young and Gilmore, 2014).

Overall, the GIS wars, feminist GIS, and P/PGIS opened a rich set of debates for cartographic thought. They shifted focus away from deconstructing maps or revealing power-relations embedded within them, foregrounding instead the claims to knowledge that map-users might make by using maps as tools. In this, cartographic theory throughout the 1990s provided varying theoretical perspectives on the agency of map-users (from passive recipients to active, agentic, and reflexive map-makers). However, the treatment of map use itself (*how* people use maps in everyday life, and what they do with them) remained a minimal concern.

3.6. Cultures of use and media effects: the limits of current cartographic theory

This section discusses contemporary cartographic theory (early 2000s to date) - the timeframe in which digital maps have emerged (2.4). First, the section provides an overview of cartographic thought from the early to mid-2000's. Next, it covers cartographic thought throughout the 2000s, summarising the 'manifesto' for map studies set out by Dodge et al. (2009). Finally, it turns to contemporary cartographic theory (2010 to date) to argue that digital map use and digital map-users remain sociologically undertheorised.

3.6.1. Separating digital maps from GIS: an initial assumption of convergence

In the 1990's GIS applications were specialised client-based proprietary software packages. As computing technologies developed throughout the 2000s, not only did they afford the development of digital maps (2.4), they also allowed GIS to be provided as web-based applications. In turn, this afforded a provision for experts and non-experts alike to produce their own maps. Similarly, advances in web technologies such as HTML, AJAX, and JSON began to provide an opportunity for developers to embed content from one source within another (2.3.2). For Sui and Goodchild, such technological advances also meant that GIS and digital maps[54] had become a form of social media, offering new affordances for collaboration and sociality:

> *…from the old model… of a single user seated at a desk, to a new mode in which GIS act as media for communicating and sharing knowledge… with and among the masses... GIS not only bring people together in cyberspace but also attract people to meet in person… sharing requires a common understanding of meaning, as well as a set of common standards of format.*
>
> *(Sui and Goodchild, 2011, pp. 1738–1739)*

In this, Sui and Goodchild depicted a moment where GIS (previously a specialised activity) was seen to be heading towards a partial democratisation through the advent of digital map technologies. However, their argument rested on an assumption that digital maps and GIS would eventually converge, and *pace* Hudson-Smith et al., (2009) that such a convergence would enable non-expert map-users to collaboratively produce their own maps. However, Sui and Goodchild offered no conceptualisation of how such a converged technology might do this, and no account of how such maps might shape practices, or the degree of map-user agency likely to be involved:

> *…geographers of various philosophical persuasions have long recognized the role of media and communication (and more broadly*

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[54] Sui and Goodchild did not differentiate between GIS and digital maps, using the term 'GIS' to encompass both.

*of language, maps, and GIS) in shaping space and place at various
levels.*

(Sui and Goodchild, 2011, p. 1746)

In contrast, Crampton argued that a set of data politics behind the two technologies presented a major challenge to any notion of their convergence:

*…new spatial media and GIS are being torn in two distinctly different
directions. On the one hand is the FOSS geoweb, and on the other…
professional certification and 'bodies of knowledge'… competing
directions mirror the larger tensions between open and closed
source…*

(Crampton, 2009, p. 97)

The difference here is a matter of scale. Sui and Goodchild considered GIS as technological resource. Meanwhile, Crampton's less optimistic focus on the data accessed through both technologies led him treat digital maps as freely open public resources and GIS as specialised technologies tied to a legitimisation of authority – a separation to which this thesis is sympathetic (2.4.4). As a further differentiation of the two technologies, cartographic theorists in the mid-2000's began to adopt the separate term 'neogeography' (Turner, 2006) when referring to de-centralised grassroots maps using web-based digital maps. Meanwhile, P/PGIS referred to map-making on GIS software that requires a central expert to facilitate activity.

Whilst neogeography and P/PGIS provide two avenues for exploring (and facilitating) map-making (production), neither provided an explicit focus on theorising digital map-users or digital map use. This limitation was not unique to cartographic theory. As McGuigan (2005) notes, media studies literature in the mid-2000s had likewise yet to explore the sociological significance of smartphones by focussing on use or users, despite their near-ubiquitous proliferation as technologies that mediate daily interactions (Ling, 2012b, p. 2). In short, as Featherstone (2009, pp. 3–4) notes, the pace of technological development in web-based technologies throughout the 2000s was so intense that academic theory failed to adequately keep up. As this subsection demonstrates, in cartographic theory throughout the early 2000s, this failure to keep up led either to: optimistic expectations of a convergence between digital maps and GIS and the democratising potential it might offer (e.g. Sui and Godchild); or a swift

dismissal of any likelihood of such a convergence (e.g. Crampton). Both perspectives, however, were steeped in a theorisation of map-production, again leaving digital map-users and digital map use undertheorised.

3.6.2. Five modes of mapping: the manifesto for cartographic theory

This subsection outlines cartographic theory between the mid and late 2000's. For brevity and structure it draws on the "*…manifesto for map studies for the coming decade…"* set out by Dodge et al. (2009, p. 220) and their typology of five intersecting 'modes' of cartographic thought. In doing so, Dodge et al. align with Edney in their treatment of each mode as *"…a unique set of cultural, social, economic and technical relations within which cartographers and the map production processes are situated."* (2009, p. 220-221). That is, Edney identifies an internalist focus on map form in cartographic thought before the 1980's – composed on one modes, which he notes collectively *"…catalysed the development of socio-cultural map histories after 1980 but did not itself change along those new lines…"* (2014, p. 83). By contrast, Dodge et al. (2009) draw together works that do exactly that, identifying five modes.

The first mode Dodge et al. (2009) present concerns the *interfaces* encountered, e.g. the screen-spaces of smartphones, tablets and computers. Dodge et al. (2009) argued that map interfaces should be assessed critically through a cultural politics of interaction (between humans and material objects). They noted this approach was made difficult by the black-boxing of digital map technologies (Dodge et al., 2009, p. 222). This approach corresponds to similar debates within studies of human-computer interaction (HCI), user-centred design (UCD), and user experience (UX) (Roth, 2011) - especially in is direct applicability to screen/display design (see UCL, 2012). However, cartographic theory on interfaces tends to focus on software and screen studies (Dodge and Kitchin, 2012; Roth, 2011). It concentrates on moments of interaction where "[i]*nterfaces en-frame and exclude, working as mediating windows onto the world'"* (Dodge et al., 2009, p. 222) by exploring representational strategies and screen experiences, rather than on understanding how such moments of interaction (with a digital map via a screen) might influence wider sets of social practices. This stems from foregrounding representation in analysis over the social relations involved with use. In turn, the interfaces mode of inquiry provides little focus on why digital maps are used, or how specific combinations of technologies are enacted through engagement with an interface (i.e., map-hacks and mashups).

Similarly, it offers no direct focus on the power-relations involved with making maps, or on the degree of agency involved with digital map use. What the focus on *interfaces* does highlight however, is the importance of understanding map-use as a material-semiotic process; it infers that the materiality of devices used to access digital maps (as interfaces) should be considered when exploring their use.

The second mode, studies of *algorithms,* presents an opportunity to open the black-box of digital maps. By drawing on software and surveillance studies, Dodge et al. mirrored Harley's (3.5.1) intention to "*...reveal the social power frozen in code and the dangers of discriminatory effects emerging from automated sorting of people and code-based representations of place"* (Dodge et al., 2009, p. 223)*.* Later, Kitchin and Dodge (2011) expanded on this to assert that urban infrastructures (from traffic flow to water pressurisation systems) are 'encoded', supplanting human-operated functions so fully that *"…if the code fails, then the object fails to operate."* (Kitchin and Dodge, 2008, p. 178). In doing so, they identified the complex infrastructure of coded objects, processes, and institutions as a key site for theorising an ever-emergent social order; a position that asserts digital maps are entangled as encoded objects within this social order emerging *in* practice. Whilst this echoes Sui and Goodchild's (2011) notion of map-use as place-making activity, it also follows Crampton's (2002, 2010) concern over the data politics of digital maps (3.6.1). Especially in its foregrounding of datasets embedded within digital maps and the systems of algorithmic automation behind them. However, to do so they theorise "*…how the technicity of code works in automatically affecting spatiality*" (Dodge and Kitchin, 2012, p. 206), rather than by exploring end-user agency or providing an analysis of *how* or *why* digital maps are used in specific ways.

As a third mode, Dodge et al. (2009, p. 220) suggested that cartographic theory should focus on *cultures of map use*, drawing on visual and comparative media studies (including software/computer game studies) to explore the social practices involved with the construction, distribution, and circulation of maps. Theorists in this mode often emphasised the importance of contextually-situated case studies. For example, Perkins argued that *"*[w]*hen local contexts of map use are explored the potential of alternative approaches beyond science becomes clear…"* (2008, p. 157). In context, this fit within Perkins' larger argument (framed by the GIS wars) that the seemingly irreconcilable disparity between *"…mapping as a practical form of applied knowledge* [and]*…critique* [of] *the map and the mapping process*" (2003, p. 341)

could best be overcome through a *"…cultural approach* [which] *can allow us to answer different questions about mapping and to explore different aspects of the ways in which our society deploys the map.*" (2008, p. 150). Similarly, Dodge et al (2009, p. 220) argued that *"…maps emerge in process through a diverse set of practices…constantly in a state of becoming…transitory, fleeting, contingent, relational and context-dependent…*" (Kitchin and Dodge, 2007, p. 340) – following Perkins to highlight the importance of local cultural contexts in order to *"…focus on how maps emerge through practices; how they come to be in the world."* (Kitchin and Dodge, 2007, p. 342). In that respect, cartographic theorists within this mode focussed on how maps are produced within use (as an ongoing process of circulation and distribution) but not on how they are consumed; they did not address how maps are engaged or entangled within wider sets of social practices, i.e. how digital maps might be engaged (in terms of consumption) throughout the process of buying a house, or planning a countryside walk.

A fourth mode, *authorship*, explored the altered power-relations brought about by the web-based affordances for end-users to generate and modify digital map content. For Dodge et al. (2009, p. 224). This mode raised questions about: the altered shape of power-relations and extent to which the medium and mode of production were being democratised (with potential scope for debate on map-user agency). Also, the importance of understanding how crowd-sourcing (Perkins, 2014), volunteered geographic information (VGI) (Elwood, 2008), and user-generated content (UGC) – including (by extension) social media content (Shelton et al., 2015) might relocate authorship, i.e. problematising who might now be considered the 'author' of a map, and what might motivate or influence their actions. On this, Dodge et al. suggested a political economic approach, appropriate for uncovering the *"…monetary and political structures underlying the production of maps used in everyday practice"* (2009, p. 228). However, while this might suit an exploration of the cultural politics involved with end-user's engagement with the web-based affordances that digital maps offer for amending or generating digital map content, it again leaves consumption (digital map use) undertheorised.

As a fifth mode, Dodge et al. suggested a focus on the material *infrastructures* that *"…make mapping possible…*[such as]*…the military and corporate structures underlying mapping…*[and]*…the ways in which mapping modes contribute to infrastructure themselves"* (Dodge et al., 2009, p. 228). They argued that when maps

are drawn on *"…in consumer marketing and crime mapping…*[they constitute] *surveillance infrastructure…*[which] *is active in deepening the social power of corporations and the state over the citizen…"* (Ibid.). In turn, they suggest cartographic theorists should concentrate on theorising the power-relations and cultural politics behind specific arrangements of material resources and organisations that make digital mapping (map-making) possible. Whilst this might serve to address the hidden agendas of behind digital maps, it again, offers little purchase for exploring digital map-users, or how digital maps are used in a practical sense (in terms of consumption) as slippy, spreadable, and emergent media resources (2.5) entangled within a wide array of social practices.

When Dodge et al. (2009, chap. 12) presented their 'manifesto' as five-fold typology of cartographic theories at the time, they did so on the basis of a comprehensive review of literature undertaken at a time when digital maps were a relatively new technology. In this, their typology holds that cartographic theory should focus on: (1) design-orientated studies of end-user interaction with material *interfaces*; (2) the data politics of immaterial *algorithms* and their encoding of automated systems that increasingly constitute the material world; (3) studies of local *cultures of use* to better understand the construction, circulation, and emergence of maps in everyday life; (4) critical discussion of the cultural politics involved with web-based affordances for end-user *authorship*; (5) and the *infrastructures* (material and immaterial) that contribute towards the provision of digital maps. Within this typology, it is only theory within the third 'cultures of use' mode that provides a focus on digital map use. The next subsection explores contemporary theory within this mode in more depth.

3.6.3. Cultures of use and play: cartographic theory from 2009 to date

When Perkins (2008) described the disjuncture between cartographic theory and the emergence of digital maps in the early 2000s, he focussed on the potential for inclusive self-representation, i.e. via neogeography. He also argued that digital maps offered a set of web-based affordances that provide greater potential for map-making than previous formats. However, Perkins noted that only a limited range of theorists had begun to explore map-users' engagement with or experiences of such affordances:

> *Desktop mapping and GIS gave the general public tools to make*
> *their own maps… interact and explore, rather than just employing the*

image as a final presentation… everyday map use is probably more
common now than at any time in human history... [yet] this map use
is unresearched and beyond science…

(Perkins, 2008, p. 151)

By extension, he argued that a cultural approach focussed on the *"…relations*
between many different artefacts, technologies, institutions, environments, abilities,
affects, and individuals…" (2008, p. 151) could provide an appropriate theoretical
lens. For this, Perkins suggested Actor-Network Theory (ANT) combined with *"…a*
mix of ethnographic and textual approaches" (2008, p. 155) could provide useful
insights into the relationships between *"…different artefacts and agents… [the]*
assemblage of actants" (Perkins, 2009, p. 174). Employing an ANT-based lens,
Perkins (2008) sought to uncover the affective quality of maps and the construction
of place identities through map-terrain relationships, by comparing case-studies of:
grassroots mapping projects in Britain and America, which exposed local variances in
engagement with web-based affordances for generating content between situated
contexts; with a study of how divisions of labour were managed, and knowledges
circulated in constructing virtual golf courses in computer simulation games; and
another on how maps were distributed (as artefacts) amongst vernacular and
antiquarian map collectorship groups. Throughout his comparison, Perkins
maintained an argument for methodological sensitivity towards cultural context
(3.6.2), focussing on mapping (map-making/production) and on how maps are
circulated and distributed within specialised communities. In doing so, Perkins
addressed how maps are assembled by and within local networks. However, he did
not explicitly focus on the practicalities of how digital maps are engaged in everyday
life, or how such engagement might influence wider sets of social practices, i.e. how
engagement with a digital map might influence a home-buyers choice of home, a
student's choice of which restaurant to eat at, or a countryside leisure-walkers choice
of which route to take between two places.

Perkins later moved on to explore VGI and the 'wikification' of OSM mapping[55]
arguing that *"…interface design scripts particular crowd actions"* (2014, p. 314). In

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[55] In this context, wikification is reference to the popular online encyclopedia and the form of *'…web-*
based mass collaboration [it engenders]*…which relies on free individual agents to come together and*
cooperate to improve a given operation or solve a problem…' (Sui, 2008, p. 1) as found in VGI
produced maps.

this, he echoed a sentiment of earlier critical cartographers (3.5.2) that (digital) maps structure particular actions – albeit referring to collective action, not specific practices performed by individuals. However, Perkins attributed this more to GUI design than to the content of digital maps. Later, Perkins extended his theory on cultures of map use further through a turn towards ludic forms of map use, arguing that while map use is often assumed to be directed towards a specific end or purpose, maps are also often used playfully and in ways that differ from map-makers intended purpose or design. To address this, he suggested that:

> *…a more ludic approach… might be a useful device for understanding how the process of mapping, and the map as entity, operate in different social contexts… rather than a tool somehow separate from the cultures that they belong to...*
>
> *(Perkins, 2009, p. 169)*

Interestingly, this argument resonates with Robinson's initial reading of architectural functionalism in analytical cartography (3.3) in so far as both argue that users cannot be expected to conform to an object's design (whether it is a building or a map) – a position that Robinson deviated from when developing his MCM. Similarly, Lammes also suggests a ludic approach to understanding map use, arguing that *"…[t]he advent of digital maps and a simultaneous ludification of culture has thus opened up new possibilities for maps to function as "play equipment"…"* (Lammes, 2015, p. 200).

Like Perkins, Lammes drew on an ANT-based framework to present play as the means by which new configurations of actants were assembled, and through which maps continually emerge:

> *…it doesn't matter that travellers constantly wipe out the image of the map. New connections and translations can always be made between satellites, users and program sources… [it] makes digital mapping interfaces highly immutable and highly mobile… Storage is situated elsewhere, and at the hands of the user, the image of the map has become a transformative surface for transmitting locations.*
>
> *(Lammes, 2016, p. 12)*

However, she added that within this emergence "*…digital maps are simultaneously media, cartographies and technologies*" (Lammes, 2016, p.2). In this, her account of digital maps as both *media* and *technologies* connects with the modes of cartographic theory on interfaces, algorithms, and infrastructures (3.6.2) in so far as all relate to digital maps as objects imbued with a set of power-relations. However, her focus on digital maps as *cartographies* relates to the process of mapping itself (map use as production) and to the establishment and maintenance of a network of actants directed towards the circulation of maps. In this, Lammes treats digital maps as surfaces used to 'transmit' information (akin to MCMs). Although she does not treat map-users as passive recipients, her foregrounding of mapping comes at the expense of any direct analysis of how, when, or why digital maps are engaged – or on their influence on the way social practices are performed. Similarly, working in collaboration, Lammes and Perkins explored *"…the hybridization of mapping and play in daily life…"* (2016, p. 13) by theorising *what* is playfully mapped, and what that process of mapping entailed. However, rather than focussing directly on engagement with digital maps or the extent to which it might anchor or order the constitution of wider sets of social practices, they focussed on how mapping (as an act) is constructed.

Cartographic theorists have begun to theorise digital map-users and their engagement with digital maps. For example, Wilmott argues that the development of digital maps and associated (entangled) technologies have led to an increased use of geolocative media:

> *Since the development of mobile media technology, there has been widespread proliferation of geo-locative, quasi-cartographic mapping practices in which people use applications (apps) on their mobile phones to narrate and navigate their way through urban space*
>
> *(Wilmott, 2016, p. 9)*

To explore this, she focusses on *"…the role that cartographic reason plays in power/knowledge relations…"* (Wilmott, 2016, p. 13)*.* Drawing on archival and ethnographic research, Wilmott works towards a conceptual *"…folding of the representational and the more-than-representational, and the discursive and the more-than-discursive"* (2016, p. 14). In doing so, her work resonates with Harley's (1987) comparison of map content and locally-situated knowledges (of the subjects

represented on a map). Her work also extends Perkins' concern to move beyond a *"…scientific representation* [which] *relies upon academic distance and underplays everyday practice…"* (Perkins, 2008, p. 151). As Wilmott demonstrates, digital map-users regularly encounter errors and discontinuities in map content (which she labels 'hauntings'). She argues that digital maps partially (but do not fully) inform knowledges of place, and that this undermines the claims to apparent objectivity on which their authority rests (Wilmott, 2016, p. 267). However, like Lammes, Wilmott's focus on the process and cultural politics of mapping comes at the expense of a direct account of engagement with digital maps, or how the specific web-based affordances they offer might influence wider sets of social practice beyond wayfinding; for instance, how a digital map might be engaged with when selecting which properties to shortlist when buying a house or choosing a holiday destination.

In more recent cartographic thought, Dodge has identified an emerging focus on 'deep mapping' – the use of AJAX/JSON technologies to incorporate various datasets into digital maps as *"…a kind of topographic story-telling that captures the spirit of a place and has a political agenda…"* (Dodge, 2017a, p. 91). He argues that deep mapping may produce maps that hold multiple and heterogeneous histories of place that account for plural, locally situated, and ephemeral knowledges. In turn, this challenges realist inspired assumptions that maps are veracious and rely indexical. Dodge (2017b) also identifies an emerging theoretical focus on the various representational perspectives (views) that digital maps offer (2.4.4) including their development towards 'verticality' (or away from the 'horizontalism' of the traditional top-down 2D perspective of paper-based maps (2017b, p. 5-6). He describes this as a focus on *"…the conceptual, perceptual and political issues in regards to documenting spaces beyond the ground surface…* [undertaken] *by human geographers interested in "verticality"…"* (Dodge, 2017b, p. 5). However, Dodge notes that theory on the 'verticality' of digital maps remains marginal, with traditional 2D topographic maps dominant as the most commonly used format:

> *…[n]avigating in 3D on screen interfaces is often awkward tactilely and cognitively time-consuming; this is why 'flat' Google Maps win out over 3D Google Earth for most routine cartographic tasks*

> (Dodge, 2017b, p. 5)*.*

Extending this to the politics of representation, Dodge approaches theory about digital map views through an *algorithms*-based mode of inquiry (3.6.2). He asserts that digital map views provide *"…newly inscribed power geometries, based on automatically generated rankings…"* (Dodge, 2017b, p. 8) which may be *"…problematic when fed unreflectively back into "top-down" urban policy, commercial investment decisions and discriminatory policing strategies"* (Ibid.). Moving to public discourse, he shifts to focus on *authorship*, suggesting that cartographic theorists should be:

> *…concerned with the way that geospatial data and interactive maps are deployed by journalists and activists to tell their stories… how maps in the news media are designed and deployed needs critical scrutiny*

> *(Dodge, 2017b, p. 8)*

In this, Dodge echoes Power et al. (2012) in as far as both argue that digital maps directly affect knowledge and action (2.6.2). His position also bears a similarity with Shapiro's focus on the 'datafication' of place through Google StreetView:

> *…[Google] Street View illuminate[s] novel configurations of sociality and surveillance that both promise and threaten to reorganize social landscapes… media scholars and technology producers [should] remain vigilant about which commitments are embedded within technologies designed to abstract place through datafication and to circumscribe the authority to know and speak for communities*

> *(Shapiro, 2017, p. 15)*

However, unlike Dodge, when Shapiro (2017) and Power et al. (2012) argue that Google StreetView has a capacity to stigmatise place, neither explain *how*. Furthermore, Shapiro accords cartographic theorists an elevated status as experts that 'speak for' subjects represented on the map. In this, both follow an underlying assumption that map-users are not only passive, but that they are also subalternated and marginalised as others. However, neither Shapiro or Power et al. provide an account of *why* map-users trust digital maps' content, or why they do not amend content despite the ready availability of affordances to do so (2.4.4). In this, both rely on a limited account of digital map use. Both Shapiro (2017) and Power et al. (2012)

argue that digital maps *are* directly structuring of people's senses of place and action, basing their claims on an unsubstantiated underlying assumption that map-users are uncritical in their engagement with digital maps.

Beyond cartographic theory, media theorists that have focussed on digital maps have started to move beyond the five modes of thought set out by Dodge et al. (2009, p. 220). For example, Plantin historicises digital maps through an archaeology of Google Maps' development as both a *platform* and a *service*:

> *Google Maps is a platform, inasmuch as it relies on the programmability of its content and on multiple forms of participation from users; on the other hand, by being the most widely used mapping service and by powering numerous everyday third-party applications, Google Maps provides a service without which contemporary societies could hardly function anymore, similar to infrastructures…*
>
> *(Plantin, 2018, p. 490)*

Plantin's dual definition is compatible with Lammes' (2016, p. 2) threefold depiction of digital maps as media, technologies, and cartographies (above), and the definition of digital maps as slippy, spreadable, and emergent centring resources that anchor practices (2.4.4). That is, digital maps may be drawn on and used as wayfinding tools or for VGI/neogeography (map production) both individually and collectively – as a platform (media and technology). Equally, digital maps may be embedded within webpages or used to display external datasets – as a service. However, it is worth noting that Plantin leaves one of his central claims unsubstantiated – that digital maps are central to everyday life, and that without them *"…contemporary societies could hardly function…"* (Plantin, 2018, p. 490). Instead, he concentrates on historicising the development of Google Maps by focussing on Google's business strategy. This comes at the expense of any critical account of digital map use, or variance in map-users' VGI. In turn, Plantin (2018) follows a dominant trend in cartographic thought dating from World War II to date, in which map-users have either been held as relatively passive recipients of information or omitted from consideration entirely.

3.8. Conclusion

This chapter has outlined the development of cartographic theory, from its origins in post-World War II academic cartography to the present day. It intended to provide a contextual background to cartographic theory for readers unfamiliar with the topic and from outside the discipline. It also sought to draw out a discussion of the treatment of map use and map-users throughout cartographic theory. For example, Section 3.2 discussed the functionalist base underlying academic cartography and MCMs, noting that both relied on an empiricist assumption that maps were accurate representations of an existing reality which could be uniformly understood by users. In contrast, Section 3.6 noted a recent shift towards digital maps being theorised as platforms that inform users' actions, whilst describing the dearth of analyses about how this occurs. Overall, this chapter highlighted a potential avenue for a sociologically focussed contribution to extend cartographic theory on digital map use and users.

To clarify, a small number of cartographic and media theorists have recently started to explore people's engagement with digital maps and their web-based affordances. However, there has been very little discussion of how critical digital map-users might be within their engagement, or on the extent to which the affordances that digital maps offer might be taken up, i.e. in map-hacks, mashups, or neogeography. Similarly, the spreadability of digital maps is currently under-theorised – both in terms of how they are circulated and shared, and how their content might be collaboratively produced or consumed. The exception here are theories focussing on cultures of map use. However, they tend to focus on how maps are locally constructed and enacted (produced) by focussing on how they are circulated – little focus is given to how digital map use might influence wider sets of social practices, e.g. choosing a home. In part, the under-theorisation of digital map use stems (as this chapter has demonstrated) from the development of cartographic theory as a field aimed towards improving map design and developing critique.

To conclude, cartographic theory and media studies of digital maps both offer useful terms and concepts to deploy in the analysis and discussion of findings. However, a different approach is required to address the central research question of this thesis: To what extent, and in what ways does engagement with digital maps feature in the constitution of social practices. As this chapter has shown, the existing literature surrounding digital maps often considers map-users as passive recipients of

information or omits them from direct consideration. Meanwhile, the limited range of studies that treat map-users as active agents (3.6.2) tend to theorise the process of mappings carried out through digital map use, rather than directly on people's engagement with digital maps or its connection to wider sets of social practices. Furthermore, cartographic theories often tend not to connect with a discussion of the technical composition of digital maps. This leaves them limited in explaining how advances in computing technologies might affect digital map use. There is, therefore, a need for a new approach which is sensitive to understanding how critical people are in their engagement with digital maps, and towards the interplay and interoperability between digital maps and other technologies. It also needs to provide a suitable means of addressing people's engagement with digital maps at both the individual and collective level, and its connection to wider sets of social practices. The next chapter builds on these observations to devise an original conceptual framework, drawn on later to aid in the analysis of empirical findings.

4. Practice-orientated digital sociology

4.1. Introduction

This chapter sets out the conceptual framework that sensitised the data analysis. The conceptual framework was developed throughout data analysis, and from needs that arose from the data rather than being imposed onto it a priori. To that end, the theoretical terms, concepts, and overall position were primarily driven by the data analysis. However, practice theory literature does sensitise the philosophical underpinnings of the research, notably in its ontological positioning (5.2). Where practice theory lacked relevant concepts to aid with the discussion of research findings as they emerged, relevant concepts have been drawn from elsewhere, i.e. media studies and sociologies of the internet.

The chapter is structured as follows: first, it outlines the key tenets of practice theory, before comparing it to other cultural theories and Science and Technology Studies (STS) – illustrating its relevance for addressing the research questions. Next, there is a discussion around the ontological basis of the conceptual framework, considering how new practices are formed and stabilised, and how new technologies (such as digital maps) are integrated into them. The chapter then focuses on power and social positioning to foreground a theme running throughout this thesis – that practices are key sites of inequality in the stabilisation and change of performed identities and social positions. The chapter then integrates concepts from media studies and sociologies of the internet to locate the conceptual framework within a wider digital sociological debate. It argues that sensitivity towards these other disciplines is important for addressing the extent to which digital map engagement anchors or orders wider sets of social practice.

4.2. A practical orientation: setting out practice theory as an appropriate lens

This section sets out the core tenets of practice theory and explains its suitability for sensitising the data analysis. It does not provide a complete or coherent framework, but instead aims to draw out a set of key terms and concepts that add depth to contemporary practice theory, and that are useful for describing and analysing the research findings.

4.2.1. Key tenets and relevance: locating practice theory as a sensitising lens

There have been two 'waves' in practice theory; the first (1970s and 1980s) *"…laid the foundations that we now regard as practice theory…"* (Postill, 2010, p. 6), the

second (early 2000s to date) extends those foundations (Ibid.). Despite a lively body of literature, there is no unified approach in practice theory; instead it encompasses a disparate set of theorists who coalesce around a shared philosophical concern to deny primacy to either structure or agency (Schatzki, 2001, p. 11; Couldry, 2004, pp. 120–121; Postill, 2010, p. 6). Amidst this diversity, Schatzki (2001) typologises practice theories as: philosophies that focus on knowledge and intelligibility; approaches to STS that examine relative roles of humans and non-humans; or social and cultural theories that revolve around a discussion of social order. As a shared point of coalescence, Schatzki argues for an ontology where:

> *…knowledge, meaning, human activity, science, power, language, social institutions, and historical transformation occur within and are aspects or components of the field of practices...*
>
> *(Schatzki, 2001, p. 11)*

He connects this to an epistemology where practices are *"…embodied, materially mediated arrays of human activity centrally organized around shared practical understanding"* (Schatzki, 2001, p. 11). Reckwitz asserts this differentiates practice theory from other, equally praxeological, cultural theories (2002, pp. 243–244). For example, where performative gender studies *"…highlight the significance of shared or collective symbolic structures of knowledge in order to grasp both action and social order…"* (Reckwitz, 2002, p. 246), they locate discourse, not bodies or material arrangements, as the central unit of analysis – despite focussing on practised performances. Similarly, in Actor-Network Theory (ANT), *"…bodies are not the site of the social, but are rather epiphenomena or instruments"* (Reckwitz, 2002, p. 251). In ANT, a flattened social ontology is constructed, maintained, and transformed (assembled and translated) with *"…no distinction* [made] *between human and non-human actors…"* (Gonzalez, 2013, p. 52); objects and subjects (people and things) are accorded an equal amount of agency in generalised symmetry (Callon, 1986; Preda, 1999, p. 357). In contrast, practice theorists focus on human activity mediated by or through objects.[56]

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[56] There are several posthumanist practice theorists (Schatzki et al., 2001, p.III). However, rather than treating objects and subjects as equal 'actants', they tend to focus on objectual practices – agency *through* objects. For example, Knorr-Cetina describes cars as ready-to-hand technologies for driving practices (2001, p.187) – a position that opposes any ANT-based assumptions of a symmetrical car-driver assemblage (i.e Hind & Gekker, 2014).

Similarly, in STS, technologies are often treated as *"…knots of socially sanctioned and active knowledge"* (Preda, 1999, p. 352). That is, as socially constructed (Pinch and Bijker, 1987) or socially shaped (MacKenzie and Wajcman, 1999). Despite understanding that *"…technology always involves interaction between human beings and the material world"* (MacKenzie and Wajcman, 1999, p. 39) adherents to both the social construction of technology (SCOT) and social shaping of technology (SST) strands of STS consider technologies to be black-boxed, arriving *"…at the ordinary user already "stabilized" – its form, uses and even meanings fixed…"* (Bell, 2007, p. 39). In this, SCOT and SST both lack a specific focus on how technologies are practised *after* production and adoption (uptake). Other STS (i.e. the domestication approach) do address this point, by studying the consumption and diffusion of technologies, focussing specifically on:

> *…how that shaping process [is] continued once ICTs started to be consumed… individually and especially in households… working out how exactly to fit them into their everyday routine*
>
> *(Haddon, 2011, p. 312)*

Domestication theory adherents focus specifically on integration; how 'wild' technologies are 'tamed' or domesticated within local contexts (Haddon, 2007, p. 26). They also account for the incorporation of new technologies into existing routines, and address how they are made meaningful by users who are active, rather than passive (Haddon and Silverstone, 2000, p. 278). However, a domestication approach does not provide analytical focus on the wider sociological implications of engaging with technology beyond its immediate context of use, e.g. how engagement with one technology (such as digital maps) might anchor or order wider sets of practice that extend and connect it with other practices beyond the local context (Berker et al., 2006, p.8). That is, the approach would leave any connection between digital map use and choice of route within countryside leisure-walking undertheorised. The domestication approach also tends to concentrate on individualised use, often at home or work, from a 'single actor' perspective, albeit with *"…some concern regarding interaction between users…"* (Ask and Sørensen, 2017, p. 4). This limits its applicability for exploring shared or collaborative practices[57] – a key facet in

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[57] Or any combination of the two drawing the affordances of web-based technologies e.g. through prosumption (Ritzer and Jurgenson, 2010; Wessels, 2013) or by produsers (Bird, 2011).

understanding how web-based technologies (such as digital maps) are engaged (Beer and Burrows, 2010; John, 2012) in everyday life.

In contrast, practice theorists view technologies as material resources which are entangled within recursively organised sets of embodied activity. This requires a focus on participants accounts of their past practices, rather than discourse itself. It also opposes the generalised symmetry of ANT. In developing a conceptual framework, this chapter, draws on practice theory to treat digital maps as slippy and emergent media resources (2.4.4) that are made meaningful *in use* amidst a complex set of engagements with other practices and technologies. This contrasts STS approaches that assert technologies, once constructed and stabilised, somehow teleologically script future practices. Instead, practice theorists argue that technologies are recursively *"…constructed by actors working in a given social context, and…the different meanings they attach to it"* (Orlikowski, 1992, p. 406).[58] Practice theorists also maintain that subversive and affective use is equally important for the ongoing re-interpretation (and reconstitution) of technologies:

> *When users do not use the technology as it was intended, they may undermine and sometimes transform the embedded rules and resources, and hence the institutional context and strategic objectives of the technology's creators, sponsors, and implementors.*
>
> *(Orlikowski, 1992, p. 412)*

A practice theory approach therefore provides a way to connect digital map use to wider debates about digital society that extend beyond the local context. That is, beyond a sole focus on the situated domestication of a specific technology. Instead, practice theory provides a way to examine how technologies such as digital maps are engaged, and how that engagement connects to wider bundles of social practices (4.4.2) such as volunteering geographic information (VGI) or buying a house. It also provides a means of exploring how digital map use relates to the performance of social positions, and how the web-based affordances for collaboration and sharing are engaged. In turn, practice theory offers a suitable approach for gaining insight on

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[58] Orlikowski describes her work as extending Giddens (1984) scheme to a "*…structuration model of technology*" (Orlikowski, 1992, p. 412). Thus, following Postill's (2010, p. 6) framing of Giddens (1984) as first-wave practice theory locates Orlikowski within its second-wave.

the extent to which engagement with digital maps can anchor the constitution of everyday life.

Overall, this section has outlined the core tenets of practice theory, comparing it with other praxaeological (practice-based) cultural theories and STS to note that it holds a unique focus on practices (in place of discourses or connections between individuals) as a defining feature. For example, some cultural theories centre on the relationship between discourse and performances (as a set of practices), but do not hold practices to be entities (4.3.1). Other more socio-material approaches focus equally on the practices of humans and objects – investing the latter with an equal degree agency (e.g. ANT) at the expense of connecting localised use with wider sets of social practices. Similarly, SCOT and SST only deal with practices directly involved with the production of an isolated technology, while domestication theory does follow on to a focus on consumption practices, but only within local contexts (e.g. home or the workplace).

While this section has argued that practice theory is well suited to address the research questions, it is important however, to note that the approach remains limited in its scope for understanding how discourse might shape structural differentiation (beyond classifications and meaning – see 4.3.4). Likewise, it is equally limited in charting interactions between the individuals responsible for producing or generating a digital map, i.e. to address how Google's own contributions weigh-up against VGI in the ongoing development of Google Maps content.[59] To that end, the research employs a practice theory lens, but supplements it with concepts from media studies and sociologies of the internet (4.5). The chapter turns to first-wave practice theory next, drawing out a useful set of terms and concepts in the process.

4.2.2. Concepts that underpin practice theory: Giddens' structuration theory

This subsection and the next provide an overview of first-wave practice theory (Postill, 2010, p. 6), focussing on the theorists and their conceptual frameworks that are most relevant in addressing the research questions.

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[59] There is room here for a study of the history of digital maps, perhaps by extending Chapter 2 and Plantin's work (2018) supplemented by software studies literature (e.g. Fuller, 2006), but this remains outside the remit of this thesis.

For example, this chapter builds on Giddens' (1984) structuration theory as its base. For Giddens', structure and agency are reconciled through a duality[60] where the *"...structural properties of social systems are both the medium and outcome of the practices they recursively organise"* (1984, p. 25). Giddens provides varying definitions of structure (1984, pp. 376–377), for which his argument has been: criticised (Bryant & Jary, 2001, pp. 14–16), strengthened (Stones, 2005, pp. 17–18), adapted (DeSanctis and Poole, 1994), and redressed (Sewell Jr., 1992). For simplicity, this thesis draws on his definition of structure as *"…recursively organised sets of rules and resources…"* (Giddens, 1984, p. 25) that may be further separated into constituent *"…cognitive and moral rules and to allocative and authoritative resources"* (Bryant and Jary, 2001, p. 16).[61]

Giddens also describes structure as *"...a property of social systems, "carried" in reproduced practices embedded in time and space"* (Giddens, 1984, p. 170). While introducing spatiality and temporality,[62] he asserts that structures (rules and resources) are practically reproduced to constitute wider social systems. Here, he treats social systems as macro-scale *"…self-subsistent entities: social classes, discourses, the market, the state, etc."* (Nicolini, 2017a, p. 100).

In refining 'structure', Giddens relates both types of resources to power, referring to them as: *"…allocative, or material, and authoritative, or non-material; the former derive from dominion over things, the latter from dominion of people"* (Bryant and Jary, 2001, p. 13). The rules (cognitive and moral) that constitute structure are understood as *"…(codes, norms) methodologically applied, generalizable procedures of action implicated in the practical activities of daily life…"* (Schatzki, 1997, pp. 290–291). However, it is worth noting that this differs from:

> *Formulated rules – those that are given verbal expression as canons of law, bureaucratic rules, rules of games and so on – are thus codified interpretations of rules rather than rules as such.*
>
> *(Giddens, 1984, p. 21)*

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[60] This differs from approaches where structure and agency are dialectic but analytically separable (c.f. Archer, 1982).

[61] Giddens' use of 'rules' and 'resources' are discussed below.

[62] Giddens' discussion of time-space distanciation *"…where the link between time and space is decoupled…"* through technological advancement is omitted for lack of direct relevance (Bell, 2007, p. 75). Notably, his argument for time-space distanciation is at odds with later practice theorists who consider space and time to be deeply entwined (e.g. Schatzki, 2010).

In addition, Giddens shows an epistemological concern not to view individuals *"…as cultural dopes, but rather knowledgeable and capable agents who reflexively monitor their action"* (Bryant and Jary, 2001, p. 12). By arguing that technologies do not script practices, Giddens rejects both rational motivation and free-floating individualism. Instead, he treats individuals as reflexive and self-monitoring. He does this by drawing an analytical– albeit permeable (Mathieu, 2009) – separation between discursive consciousness as *"…knowledge the actors are able to articulate…"* (Orlikowski, 1992, p. 63) and practical consciousness as knowledge they *"…are able to draw on in action but are unable to express…"* (Ibid.):

> *While competent actors can nearly always report discursively about their intentions in, and actions for, acting as they do, they cannot necessarily do so of their motives. Unconscious motivation is a significant feature of human conduct.*
>
> *(Giddens, 1984, p. 6)*

In short, Giddens treats people as knowledgably competent actors (Giddens, 1984, p. 3) who skilfully negotiate various rules and resources in the *durée* of everyday life (Ibid.) – even if they cannot always verbalise exactly how or why. Extending this, Giddens introduces *memory traces* and *ontological security* as concepts that deal with *how* people negotiate structures and social systems. For example, when Giddens asserts that structure only exists in memory traces (Bryant and Jary, 2001, p. 16), he holds memory as the mechanism through which rules are drawn on and resources comprehended:

> *…'[p]resent' cannot be said or written without its fading into the past. If time is not a succession of presents but 'presencing'… then memory is an aspect of presencing…*
>
> *(Giddens, 1984, p. 45)*

That is, structure is not *just* benignly enacted, nor is it reified to 'emerge' of its own accord. It is actively brought-into-being by knowledgeable actors drawing on previous biographical experience (in practical consciousness) to negotiate rules and resources. Thus, structures and the social systems they constitute are always emergent and aligned to individualised personal histories (raising the question of how structures might be shared). However, Giddens scheme does not explain why some

rules or resources structure action while others do not, or how structure is brought into being amidst a plethora of competing memories? For this, Giddens refers to ontological security:

> *…the confidence that most human beings have in the continuity of their self-identity and in the constancy of the surrounding social and material environments of action…*
>
> *(Giddens, 1990, p. 92)*

Drawing on Freud, Erikson (Kort & Gharbi, 2013, p. 96), and Laing (Hiscock et al., 2001, p. 50), Giddens argues that participants' early socialisation is generative of feelings of trust (or mistrust) as *"…the deepest lying element of the basic security system…"* (Giddens, 1984, p. 50). He believes that when ontological security initially emerges during early socialisation, its genesis matches an individual's memory traces. However, Giddens states that an individual's *"…relationship to his/her caretakers is emotional rather than cognitive, and is grounded in the unconscious…"* (Tucker, 1998, p. 83). In this, Giddens centres interaction and affect,[63] inferring that people are not only knowledgeable, but also hold affective links to one another (and to their social and material environment). In turn, this raises questions about how (individualised) ontological security might be shared. Giddens addresses this by asserting that ontological security does not just rest on a sense of reliability in others. It also involves *"…people having confidence in the social order, in their place in society, in their own right to be themselves, and a belief that their self-realisation can be achieved"* (Hiscock et al., 2001, p. 50). In short, it is an existential security (Giddens, 1991a, chap. 2), orientated towards the shared structures, set social positions, and material arrangements of everyday life.

4.2.3. Concepts that underpin practice theory: Bourdieu and de Certeau

The framework developed in this chapter is primarily based on practice theory derived from Giddens' (1984) structuration theory. However, other first-wave practice theorists offer additionally useful concepts. This subsection carefully integrates a few concepts from Bourdieu and de Certeau, aligning them those from Giddens.

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[63] This thesis follows Reckwitz to use *affect* in place of *emotion*; Reckwitz notes that 'emotion' is understood as an internal and individual property of self (and therefore discursive). In contrast, 'affect' reflects an embodied process but may also be used as a verb to encompass power-relations, e.g. one's capacity to 'affect' others (Reckwitz, 2017, pp. 120–121).

In contrast to Giddens' (1984) relatively abstract scheme, Bourdieu advocates a more empirically grounded and politically motivated approach (King, 2004, p. 39), based on three core concepts: *habitus* as internalised *"…systems of durable, transposable dispositions…"* (Bourdieu, 1992, p. 53); *doxa* as *"…the process through which socially and culturally constituted ways of perceiving, evaluating and behaving become accepted as unquestioned, self- evident and taken for granted…"* (Throop and Murphy, 2002, p. 188); and (social) *fields* as *"…places of power relations where practices of agents are not arbitrary…"* (Walther, 2014, p. 9). The unifying concept for Bourdieu is habitus (Bennett, 2010, p. xix), where:

> *...[the] deeply buried structure that shapes people's dispositions to*
> *act in such ways that they wind up in accepting the dominance of*
> *others, or 'the system', without being made to do so...*
>
> *(Ortner, 2006, p. 5)*

Bourdieu states that structure is internalised through doxa and then into habitus as a set of 'dispositions' embodied by individuals (Bourdieu, 2010, p. 170). This approach views people as both reflexive performers and carriers of shared practices, providing a partial account of how structural differentiations (such as class, gender, and ethnicity) are collectively internalised and enacted. While this aligns with Giddens' separation of structures and social systems, it differs in understanding how rules and resources are negotiated (4.2.2). For Giddens, individuals are reflexive and self-monitoring when they draw on memory traces, however, he leaves 'structural differentiation' poorly conceived (Thompson, 1994, p. 65). Bourdieu, on the other hand, asserts that individuals draw on transposable (changeable and shareable) schemes which are embedded in habitus (and therefore structured by structural differentiation). As with Giddens' notion of 'ontological security' (4.2.2), Bourdieu's 'transposable schemes' relies on an ongoing process of socialisation, with habitus formed most firmly during early childhood:

> *…the relationship of immediate adherence that is established in*
> *practice between a habitus and the field to which it is attuned, the*
> *pre-verbal taken for granted of the world that flows from practical*
> *sense. Enacted belief, instilled by the childhood learning that treats*
> *the body as a living memory pad….*

(Bourdieu, 1992, p. 68)

However, Bourdieu considers practices to be more rigidly structured through habitus than Giddens does; rules are less ephemeral. For Schatzki, this is a key limitation to Bourdieu's work that leaves it unable to account for how individuals might modify their behaviour, act emotionally (affectively), or make mistakes:

> *The actor is portrayed as necessarily or mostly in control of herself…*
> *Only Giddens's acknowledgement of wants hints that human activity*
> *is sometimes ill-aligned with circumstances and regularly determined*
> *by phenomena (e.g., emotions/moods) that do not always contribute*
> *to people masterfully getting about.*

(Schatzki, 1997, p. 301)

In this, Giddens provides a better basis for understanding how people engage with digital maps, and how they engage with the web-based affordances that digital maps provide. However, Bourdieu's habitus and doxa prove useful later in this thesis as standalone concepts when employed as heuristic tools to 'speak to' when discussing findings on shared practices and collective forms of digital map use (6.2.1).

Alongside Bourdieu, de Certeau (1984) offers another set of concepts that the thesis later draws on as heuristic tools to discuss findings (8.2.1). Notably, he argues that *tactics* and *strategies* are constitutive of *space* and *place*. For de Certeau, *"...place is the empty grid over which practice occurs, while space is that created by practice"* (Cresswell, 2006, pp. 38–39). Put simply, *"…space is a practised place… the street geometrically defined by urban planning is transformed into a space by walkers"* (de Certeau, 1988, p. 117). This speaks to Lefebvre's spatial triad (Lefebvre, 1991, pp. 33–34; Watkins, 2005), where a threefold duality (triality) exists between: a) an abstract conceptualisation of place (spaces of representation); b) perceptions of space, e.g. digital map imagery (representational space); and c) spatial practices such as walking. All three are held as mutually constitutional (or productive) of social space. However, for brevity and lack of direct relevance there is insufficient space to expand on this further here. Meanwhile, *strategies* represent the practices that (re)produce a structuring logic, and which are recursively enacted and/or challenged through *tactical* practice (de Certeau, Jameson and Lovitt, 1980, p. 6; Barassi and Trere, 2012, p. 1277). By extension, *tactics* are argued to often be subversive (Ahearne, 1995, p. 183). For de Certeau, *places* hold subtle traces of history too –

memories of past strategies and tactics (and their conflicts) are inscribed in their material form - for instance, the built urban environment:

> *…beneath the fabricating and universal writing of technology, opaque and stubborn places remain. The revolutions of history, economic mutations, demographic mixtures lie in layers within it, and remain there, hidden in customs, rites, and spatial practices…*
>
> *(de Certeau, 1988, p. 201)*

In this, materials carry meaning and memory traces and therefore structure practices (as allocative resources). This suggests micro-scale interactions situated in local contexts are the appropriate site for studying practices, with a sensitivity to the local material environment.

4.3. Materials, competence, and meanings: the core concepts of practice theory

Having outlined and compared first-wave practice theory concepts above, this section turns to second-wave practice theory, setting out the concepts employed throughout the discussion of research findings (chapters 6 to 8).

4.3.1. Understanding practices: separating performances and entities

There are various definitions of 'practice' (Schatzki, 1997; Rouse, 2001; Hui, 2017). For example, Reckwitz (2002) uses 'practice' both for an abstract description of everything humans do (*Praxis*) and as a singular term for specifically reproduced ways of doing (*Praktik*). In this thesis, the research questions lead to a focus on the latter, where the terms 'practice' (singular) and 'practices' (plural) are used interchangeably to refer to various everyday life activities. However, this thesis does not hold practices to be solely individualised ways of doing (c.f. Giddens, 1984, chap.1). Instead, it relates them to a separation Shove et al. (2012) make between practices-as-performances and practices-as-entities. Hui neatly describes this separation as one between:

> *…performances, undertaken by multiple practitioners in diverse spaces and times [which] can be conceptually brought together in considering a practice-as-entity*
>
> *(Hui, 2017, p. 55)*

This affords two discrete (but connected) levels of analysis, each operating at a different scale. A focus on *practice performances* provides access to empirically observable behaviours within locally situated contexts. Meanwhile, *practice entities* are constituted through multiple performances carried out in more or less the same way, by either the same or different people (potentially at different times) across local contexts. Therefore, a focus on practice entities provides access to how different practices performances anchor one another; a useful starting point for understanding how engagement with digital maps might serve to anchor or order wider sets of social practices.

4.3.2. Elements of practice: materials as co-constitutional of practices

While Shove et al. (2012) present practice performances and practice entities as separable levels of analysis, they argue that all practices (at both levels) are constituted through an interplay between three interrelated *elements* (materials, competencies, and meanings)*. This subsection focusses on the first of those elements – *materials*. Interestingly, as Blue and Spurling note, a focus on materials foregrounds the historical influence of STS on the development of practice theory between its first and second waves:

> *…[although] things barely feature in the writings of Bourdieu and Giddens, science and technology scholars have demonstrated that physical objects and technologies are mobilised in the doing of practices…*
>
> *(Blue and Spurling, 2017, p. 32)*

However, when Shove et al. claim that material 'things' (objects and technologies) are *"…integral to the conduct of a practice…"* (Shove, 2017, p. 157; also Shove et al., 2012), they locate materials as internal (intrinsic) elements *of* practice. In this, they focus on *"…the roles that materials play in the enactment of any one practice…"* (Shove, 2017, p. 157). By contrast, Schatzki contends that *"…practices transpire amid particular arrangements and are molded by them in various ways…"* (Schatzki, 2010, p. 73). He argues for a focus on the continually emergent *"…material arrangements amidst which practices transpire"* (Shove, 2017, p. 157). In this, Schatzki's argument rests on an assumption that materials structure practices from outside (Schatzki, 2001, p. 11) rather than being constitutional of them alongside other elements. For Schatzki materials externally mediate and therefore should be

central to analysis. This opposes Shove and her collaborators (2012, 2017) who argue that Schatzki's scheme cannot *"…distinguish between things which are directly, routinely, or only distantly and occasionally implicated in the conduct of practice"* (Shove, 2017, p. 157). Similarly, viewing material 'things' as internal elements of a practice entity requires an understanding of *how* those 'things' have been accessed and used within practice performances – or negotiated as allocative resources – and not just an understanding of how they are 'arranged', contra Schatzki (2010). This leads to a loose definition of materials as *"…things, technologies, tangible physical entities, and the stuff which objects are made…"* (Shove et al., 2012, p.14). Building on this, Spurling et al. (2013) define infrastructures as materials (equal to objects and tools), a point that Shove et al. extent to argue that:

> *…infrastructures like road networks and electricity grids constitute forms of materiality…[they are] multiple in the sense that they are implicated in the conduct of several practices at once, collective and obdurate… Such arrangements do not occur at random, hence our interest in planners' and designers' roles in shaping the material elements and arrangements of which multiple practices are constituted*
>
> *(Shove et al. 2015, p. 10)*

This subtly shifts the location of arrangements away from Schatzki's (2010) focus on practices being constituted *within* arrangements of materials (materially mediated practices), to consider how materials (and arrangements of materials) travel across practices and how they might serve to constitute infrastructures. In this, materials remain co-constitutional in so far as they are not the central factor around which practices are structured, but are instead equal to other elements.

Extending this definition of materials to digital maps avoids any *a priori* assumption that they *do* mediate practices (pace Power et al., 2012; Shapiro, 2017), whilst remaining sensitive to their anchoring potential as internal elements of practice that *might* do so. Alongside a deeper query on how to treat virtual materials (such as digital maps, films, or software applications) this raises questions about how practices intersect (4.4.2) and on the degree of knowledgeability at stake in people's engagement with technology. On the latter point, it is worth adding that Shove et al.

(2012) do not assume materials are drawn on unconditionally or passively. Instead, they acknowledge that materials require access, expertise, know-how, willingness, and skill (requiring a sensitivity to structural differentiation during data analysis); also that materials must be meaningful to people in some way. Thus, the next subsections discuss *competence* and *meaning*.

4.3.3. Elements of practice: competence as transferrable and latent skill

People must possess prerequisite knowledge or skill in order to be able to engage with a *material*; a lack of competence can present just as much a barrier as a lack of access to materials. Likewise, *"…bodies also offer a range of sensory capabilities that enable…"* (Maller, 2017, p. 73) or limit a participant's ability to perform a practice. To simplify this notion, Shove et al. conflate *"…multiple forms of knowledgeability and practical knowledgeability…"* (2012, p. 23) into the single term '*competence*'. To describe how competence operates, they argue that *"…knowledge has to be "abstracted" from a local situation before it can travel…* [before being] *reversed when it arrives in some new destination…"* (Shove et al., 2012, p. 48). In turn, they address questions about *how* such abstractions and reversals take place, and how competences 'travel' – both across practice entities and between participants. To do so, Shove et al. avoid any simple or linear encoding/decoding models of communication such as those found in functionalist inspired map-communication models (3.2).

Instead, they introduce the concept of *transferability*, asserting that:

> *...competences like those of controlling a ball or speaking in public can be carried over and reproduced in others… [s]pecific competences are transferrable because they are common, or at least common enough to a number of practices.*
>
> *(Shove et al., 2012, p. 51)*

While this explains how some 'common' competences may be transferred, it requires pre-existing overlap between practices, rendering the concept useful only when the practices are 'common enough' for competences to be transferrable. They add that, when competences are not 'common enough' to be directly transferrable, *"…commonality ha*[s] *to be actively built at the level of ideas and discourses before related forms of know-how could be transferred"* (Shove et al., 2012, p. 53), which would also account for knowledge generation or creation. This notion of an enacted

commonality resonates with Collins' assertion that competence is *"…gained by prolonged social interaction with members of the culture that embeds the practice"* (2001, p. 116). This locates competence within sociality, repetition, and the building up of commonality through the normative sanction*s* of a locally enacted structure (Barnes, 2001, p. 34; Blue et al., 2014, p. 7). In turn, this connects competence with meaning (4.3.4). It also partially addresses a question of how competencies are distributed and shared (discussed below).[64]

Shove et al. (2012) conceptualise abstraction, reversal, and transference to take place within ongoing practice performances carried out by knowledgeable and reflexive participants. This connects both with Giddens' memory traces and Bourdieu's habitus, where *"…the capacity to decode is unequally distributed… born of previous practice-based experience…"* (Shove et al., 2012, p. 53). In this, Shove et al. use the term 'decode' in a different way than in early cartographic theorists' functionalist discussion of cartographers encoding and map-users decoding map content (3.3.1). Instead, Shove et al. use the term to account for why different participants' individualised performances of a shared practice entity might vary. In their scheme, decoding requires that individuals draw on personal memory traces of past practices in order to locate, abstract, and reverse the relevant competencies to carry out a practice.

Furthermore, Shove et al. assert that competencies are *"… modified, reconfigured and adapted as they move from one situation or person to another and as they circulate between practices"* (2012, p. 53). They extend this dynamism by adding that all three practice elements *"…have lives that extend before and after those moments of integration"* (Shove et al., 2012, p. 40). This separates competence (as a practice element) from the moment of integration (in performance) without assuming that competence is drawn on or enacted in discursive consciousness (4.2.2). Connected to this, Shove et al. assert that *"…competences can lie dormant, persisting in memory for years without being activated, or… preserved in written forms…"* (2012, p. 34). That is, competence may be stored in an individual's memory traces and can travel through time as latent competence, ready to be drawn on in memory traces and applied within other practices. Alternatively, competence may be mediated via

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[64] A discussion of 'social networks' or 'communities of practice' could be drawn out here, focussing perhaps on participation or membership of social groups in the circulation and regulation of 'correct' competence (Barnes, 2001; Blue et al., 2014). However, it would be beyond the remit of this thesis.

(material) allocative resources, such as book or films. In other words, objects may store and mobilise competence across practice entities (Watson and Shove, 2008). This connects with a central theme of this thesis – a suggestion that media (such as digital maps) should be treated as more than simply instrumental materials, but as resources that store competence and enable it to be abstracted, reversed, and transferred across contexts. In turn, this raises a set of questions about the role of media (such as digital maps) and how they operate (4.5), and how meanings relate to materials and competence (considered next).

4.3.4. Elements of practice: meaning as classifications and associations

For Pantzar and Shove (2010, p. 450), 'meanings' refer to the symbolic 'image' of a practice entity, and they introduce the terms *association* and *classification* to account for how materials and competences are made meaningful (how images are constructed). For example, where Shove et al. (2012, p. 53-56) describe the emergence of Nordic walking practices,[65] they follow Pantzar and Shove (2010) to describe walking sticks as materials that were initially symbolically *associated* with frailty and thus *classified* as medical aids. They then describe subsequent successful attempts by experimental walkers (with the competence and will to do so) and manufacturers (multiple participants) to *disassociate* walking sticks from that specific meaning. Next, they chart their *reclassification* and recursive *association* with a new image – as materials that are symbolically representative of health and outdoor activity. In doing this, Pantzar and Shove (2010) discuss the practice performances that lead to the emergence of this new image as being undertaken by multiple participants to generate a practice entity that is collectively labelled Nordic walking.[66]

This conceptualisation foregrounds meaning at the level of practice entities, leaving an important question about how meanings are enacted through shared performances unaddressed; a limitation that practice theory has been rightly criticised for (Hui et al., 2017, p. 2). However, this *is* partly addressed where Shove et al. employ meaning to:

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[65] In their discussion of Nordic walking, Pantzar and Shove define it a sport which emerged in the late 1970's that *"…has come to signify everyday fitness and active well-being for ordinary people in Finland and in many other European countries"* (2010, p. 453) - a sport that deviates from traditional countryside leisure-walking through its inclusion of walking sticks that are *"…about 15cm shorter than normal cross-country ski poles"* (Ibid.).

[66] Interestingly, their approach bears similarity with ANT in its tracing of associations between multiple participants, and in their points of translation. While neither Pantzar and Shove (2010) or Shove et al. (2012) accord agency to materials, their approach does highlight a point of convergence where ANT and practice theory might be combined (c.f. Gonzalez, 2013).

> *…collapse what Reckwitz describes as mental activities, emotion and motivational knowledge… to represent the social and symbolic significance of participation in any one moment…*

> *(Shove et al., 2012, p. 23)*

In this, they follow an underlying epistemic stance that *"…as soon as a person is competent to perform a practice and is "carried" away by it, she incorporates and actualises its mood"* (Reckwitz, 2017, p. 119). This connects with an argument that practice performances are only meaningful in relation to the entities they constitute and reproduce (Schatzki, 2001) – and in which they are constituted. In turn, this raises a related question about how such relational meanings might be stabilised or modified. In addressing a similar point, Orlikowski argues that:

> *…if agents changed the technology—physically or interpretively— every time they used it, it would not assume the stability and taken- for-grantedness that is necessary for institutionalization*

> *(Orlikowski, 1992, p. 406).*

She views interpretation as something that *can* be rational (inside people's heads) – and carried out in discursive consciousness. Moreover, she introduces the concept of 'interpretive flexibility' (Orlikowski, 1992, p. 407) to argue that individuals *may* understand and use technology as instructed/designed (scripted). Alternatively, to borrow de Certeau's terms, they may 'tactically' modify their understanding or use of a technology in ways that differ from its 'strategically' scripted design. In this, individuals are understood to be interpretive (reflexive) in their understanding of practices, both in their conceptualisation of materials, in the competencies they apply, and in the meanings they ascribe (through classifications and association). However, for meanings to become stabilised, they must be brought into being (emerged and enacted) *through* repeated (and shared) performances. In the case of digital technologies such as digital maps, this underlines the importance of remaining sensitive (throughout analysis) to the processes by which materials become 'taken- for-granted' (Throop and Murphy, 2002, p. 196; Ling, 2012a, p. 14). For instance, how ubiquitous media (such as smartphones) become embedded within people's everyday routines (Featherstone, 2009), and how meanings operate within that process of embedding.

Overall, treating meaning as a set of performed associations and classifications is useful for understanding how meanings are constructed and modified – but only at the level of practice entities. Meanwhile, a relational understanding provides an account of meaning at the level of practice performances, connecting the two levels by considering practice performances to be individual re-enactments (or contestations) of a practice entity. However, this requires an understanding of how repetition leads to stabilisation, which the next section provides.

4.4. Practice theory ontology: how practices overlap and connect

The previous section drew on Shove et al. (2012) to describe the constituent elements of practice theory. While it provides a foundation for the practice theory framework drawn on throughout the discussion of findings (chapters 6-8), so far it still holds several limitations. For example, it does not offer any means of explaining how practices are stabilised, how technologies come to be taken-for-granted, how agency is distributed in shared practices, or how practice elements travel between practices. This section addresses those questions by refining the ontological position of the thesis. It does this by explaining how practices persist, change, and interrelate, and how practice elements are arranged within the practices they constitute.

4.4.1. How practices form and change: from stability to contingency

The notion of separate practice entities presupposes some degree of contingency and reproduction in so far as practice entities are maintained through repeat performances (4.3.1). However. this chapter has not yet discussed *how* practices are initially formed - or how they come to be stabilised, maintained, or changed. It has presented materials and competences as elements that travel across practices (4.3.2 and 4.3.3), and meanings as elements that are constantly in flux (4.3.4). However, the chapter has not yet examined why some elements are brought together in a practice while others are not.

Some of these limitations stem from the chapter's base in first-wave practice theory. For example, Giddens holds 'instantiation' as an entry point for discussing practices, where social structure is *"…internalised in what actors "know"…instantiated in their actions"* (2010, p. 1287). He also notes that practices are ephemeral, constituted within (and against) structures, and that they are enacted as an ongoing accomplishment (4.2.2). However, he does not address *how* they are initially instantiated (where practices begin). That is, Giddens presents practices as emergent within pre-existing sets of relations, but without genesis. Elsewhere, he

argues that *"…[r]outines of day-to-day life are fundamental to even elaborate forms of social organisation"* (Giddens, 1984, p. 65). In this, he connects routines with the constitution of social order, but again, does not explicitly define *how* those routines are instantiated (Macintosh and Scapens, 2001). Although tenuous inference may be drawn out by linking the biographical memory traces of participants to their collective and recursive enactment of structure.

Bourdieu and de Certeau both harbour similar limitations. As Schatzki notes, for Bourdieu *"…practices are self-perpetuating… interwoven activities (or games) carried out in a specific domain of practice, or field…. produced by dispositions…"* (1997, p. 287). This rest on Bourdieu's understanding that habitus is generative with *"…an infinite capacity for generating products – thoughts, perceptions, expressions, actions…"* (Bourdieu, 1992, p. 55). However, Bourdieu (like Giddens) fails to address *how* practices are instantiated. Instead, they self-perpetuate without origin, other than being structured through a habitus steeped in childhood socialisation (4.2.3). Similarly, for de Certeau, strategies always precede tactics, whilst being informed by them (4.2.3). Strategies set the parameters within and against which further conflicts of strategies and tactics (practices) are carried out (no place is to be considered tabula rasa). However, de Certeau provides no starting point for strategies. His approach does not address *how* strategic (or tactical) practices are initially formed. In contrast, this research addresses questions that focus on engagement with a relatively new technology (digital maps). Doing so requires an ability to address how new technologies become integrated within existing social practices, and/or how they might co-constitute entirely new ones, that is the research requires an understanding of how the process of instantiation works.

In second-wave practice theory, there has been a subtle shift in the focus of analysis which now partially addresses this limitation. For example, where Reckwitz folds practices and routines together, he argues that:

> *…practices are routines: routines of moving the body, of understanding and wanting, of using things, interconnected in a practice… the 'breaking' and 'shifting' of structures must take place in everyday crises of routines.*
>
> *(Reckwitz, 2002, p. 255)*

This marks a shift from focussing on recursive (routinised) enactment of structure towards one that considers the recursive enactment of the linkages between practice elements that make up that structure. That is, rather than focussing on the composition of structure (within routines), second-wave practice theorists concentrate on the moments when stable linkages between elements are challenged, modified, or formed. In turn, this marks a shift in register from focusing solely (and abstractly) on the rules and resources that are constituent of a structure or stable practice (entity), and onto a focus primarily on the performances that recursively bring them into being (instantiation). To clarify, Pantzar and Shove (2012) argue that practices only:

> *…come into existence, persist and disappear when connections between foundational elements like those of material, image and skill are made, sustained or broken…*
>
> *(Pantzar and Shove, 2010, p. 450)*

They argue that analyses should be directed towards exploring linkages between elements, not their stable arrangement itself. Extending this, Shove et al. (2012, pp. 24–25), refine the position further by arguing for a focus on linkages at three stages: (1) in their latency (in the pre-formation of a practice); (2) in their formation and initial enactment; (3) and their de-formation – where links are no longer enacted.

Taking this broader focus, and situating analysis at each moment of change, rather than on stability:

> *…helps us to account for the ways in which new technologies become integrated into existing social practices, in turn developing them, as they are taken up and absorbed into daily life.*
>
> *(Merchant, 2012, p. 772)*

Thus, contemporary practice theorists recognise the emergent and contingent nature of practices, by presenting an argument that *"…stability and routinization are not end points of a linear process of normalization… [but]… ongoing accomplishments"* (Shove et al., 2012, p. 24) with an identifiable origin. In that sense, while routines are still acknowledged, second-wave of practice theorists tend to consider routines to be less stable or secure than they were for first-wave practice theorists. Instead, practices and routines are understood as provisional and contingent, where the *"…potential for contestation and conflict is permanently there… The normalcy of*

practice is a truce" (Nicolini, 2011, p. 613). In turn, this open a question on how to address the way practices interrelate with one another.

4.4.2. An ontology of practices: bundles, complexes, and a plenum

Earlier, the chapter discussed an analytical separation between practice performances and practice entities (4.3.1). This was premised on the assertion that performances *"…undertaken in diverse spaces and times, can conceptually be brought together in considering practice-as-entity"* (Hui, 2017, p. 55). In turn, this accounted for some degree of interpretive flexibility in the arrangement of elements and in the links between them - which are internal to practice entities. This provided a partial account of change and variation within practices. However, the separation did not fully address how to conceptualise the external connections between and across practices. For instance, when materials, competencies, or meanings are transferred from one practice to another, what points of connection do they draw on and provide between those practices? In turn, this raises the question of how to conceptualise different levels of closeness and distance in the connections between practices.

To address this, Shove et al. (2012, p. 84) introduce the terms *bundle* and *complex*. They assert that bundles refer to *"…sites and settings where practices shape each other… loose knit patterns like those based on co-location…"* (Shove et al., 2012, p.87). In other words, bundles refer to the loose connections between practices that offer little or no effect on the stabilisation or change of each other in mutual constitution. Meanwhile, *"…when practices do come to depend on each other… they constitute complexes"* (Ibid.). That is, where practices are co-constitutional, the connection binding them together provides a greater 'closeness' or coherence than a bundle, even where their connection extends beyond the local context.

Whilst the demarcation between bundles and complexes may be relatively loose, they are useful terms for describing connections between practices in this research. For example, searching online for house being sold in a specific area may be assessed as practice that forms part of a home-buying *complex*. Meanwhile, less co-dependent practices (that remain connected through transferral of materials and competences), such as instructing a solicitor, or updating a local authority record are practices that constitute part of *bundle*. While the difference may seem arbitrary, the terms provide a useful way to describe differences in the circulation of elements across and between practices. Extending the terms further, Schatzki devises an ontology, where the practical constitution of all social order relies on:

> *…organised manifolds of doings and sayings… [that] form practice-arrangement bundles… Such bundles in turn, connect to other bundles to form wider constellations…Taken together, bundles and constellations form one gigantic nexus of practices and arrangements, what I dub the 'plenum of practice'.*
>
> *(Schatzki, 2017, p. 133)*

While Schatzki agrees with Shove et al. (2012) on the provision of practices and bundles as useful concepts, he introduces the terms *constellation* and *plenum* in place of complexes. While *constellation* and *complex* are commensurable in so far as both refer to a collection of interrelated practice entities that extend beyond a local context, Schatzki's wider notion of a *plenum* encompasses an overarching interconnection of all practices, bundles, and complexes. It provides a distinct ontology, where for Schatzki, the social world is continually brought-into-being by interconnected layers of practices that are bundled together into complexes. In turn, those complexes combine to constitute the plenum of practices.

4.4.3. Positioning practices: how elements relate to one another

This subsection considers how elements are arranged *within* practices. As Hui (2017) notes, there is scope for variance between performances of a practice entity (4.4.2) because people are interpretively flexible. However, the framework developed so far provides no means of assessing how elements are stabilised into predictable arrangements, how practices remain relatively stable, or in Nicolini's terms (2011, p. 613) how the 'truces' between practice elements are formed and maintained. Similarly, the discussion of competence (4.3.3) suggests that individuals do not come into practices from an equal footing. Instead, people are conferred (or denied) specific social positions based on their subjective memory traces (which Bourdieu may also consider to be structurally differentiated – see 4.2.3). To that end, beyond assessing individuals' access to relevant materials or competence, the framework developed so far is limited in its ability to conceptualise how people are positioned in practices.

First-wave practice theorists partially addressed this question. For example, Bourdieu asserts that individuals are positioned within social fields, with habitus comprising a central factor in their positioning:

One comes to learn 'one's place' and… how that is positioned in relation to others' through the acquisition and development of the habitus… present and past positions in the social structure that biological individuals carry… in the form of dispositions which are so many marks of social position and hence of social distance…

(Bourdieu, 1977, p. 82)

Bourdieu claims that people's dispositions towards specific elements structure their performance of practices. By extension, the performances they take up or reject define their social position (or relative 'place') within a complex of practices. Thus, while Bourdieu provides a way to account for structural differentiation, he attributes social positioning to individuals themselves.

In contrast, de Certeau holds place (not habitus) central to understanding social positions. He argues that *"…place is thus an instantaneous configuration of positions. It implies an indication of stability"* (de Certeau, 1988, p. 117). He conceives place as a product of various social positions being 'instantaneously' performed. In this, he infers a contingent stability that suggests people are spatially 'configured' (arranged) into social positions - but does not explain *how* this occurs. Instead, he focuses on place to assess how different social positions interrelate.[67]

By contrast, Giddens treats social positions as relational identities that are structured and performed within local contexts:

A social position involves the specification of a definite 'identity' within a network of social relations, that identity, however, being a 'category' to which a particular range of normative sanctions is relevant

(Giddens, 1984, p. 83)

That is, rather than arguing that social positions are internalised (in habitus) or stabilised through the performed constitution of place, Giddens approaches them as 'categories' that are meaningful to individuals within specific structures and informed by rules. By extension, he considers social positions to be structured via social interaction (distributed and shared amongst a network). In that sense, Giddens does

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[67] In this, de Certeau's position resonates with ANT in its attempt to map a network of relations between people and objects.

not hold social positions to be solely attributable to individual performances or located within habitus, but as collectively enacted. Extending Giddens' thought to second-wave practice theory, where people are treated as reflexive performers of practice entities (4.3 and 4.4.1), suggests that social positions are classified and associated with patterns of activity that are routinely performed within a local context. For example, in home-buying, the home-buyer is positioned as the person who searches for and views homes. Meanwhile, the estate agent is positioned as an expert authority able to suggest specific properties, and to advise on the home-buying process. Their related performances require a recursive enactment of linkages between elements and social positions that align with the practice entity.

While this accounts for how elements are positioned within practices, it does not explain how linkages between elements are distributed. To clarify, if *"…[e]very practice distributes its Practioners into different positions with distinct perspectives, thus differentiating them…"* (Alkemeyer and Buschmann, 2017, p. 14), then what makes some individuals align with and perform particular social positions and not others? For this, Blue et al. turn to the body itself, arguing that:

> *…practices that require extremely fit and flexible bodies are less*
> *likely to recruit from amongst the frail or the very elderly. The*
> *chances of becoming a practitioner consequently depend on what*
> *the practice itself demands…*
>
> *(Blue et al., 2014, p .9)*

In this, material constraints and competence (including physical body limits) afford some individuals greater opportunity to perform a specific practice than others. However, these affordances do not always lead to engagement – people are reflexive and may reject certain opportunities. For this, Giddens' (1984) use of memory traces (especially of cognitive and moral rules) provides a useful understanding that previous shared practices might also structure the performances taken up by participants relative to one another. That is, past experiences of not being able to perform a practice through material body limits may inform an individual's likelihood (or not) of attempting to perform similar practices in future.

4.5. Integrating media studies and sociology of the internet

Earlier, the chapter drew on Shove et al. (2012) to argue that media resources can store latent competence (4.3.3). This raised questions about their role as media as

material elements of practice. Likewise, Shove et al. argue that people often hold *"…limited first-hand experience of how a practice is reproduced by others, it is nearly always the case that elements of meaning are quite literally mediated"* (2012, p. 55). However, they provide no direct account of *how* mediation operates. Couldry (2014) finds a similar limitation in other praxaeological approaches. For example, he notes there is *"…no account of how representational contents and interpretations get embedded in the world…"* (Couldry, 2014, p. 31) in ANT or non-representational theory (NRT), leaving both unable to address how media operate. Thus, practice theories alone are limited in their capacity to explain how media are engaged in the development, maintenance, and circulation of associations and classifications (meanings). They are also limited in their consideration of connections between and across media (such as between digital maps and external datasets) within practices, bundles and complexes, or their relation to the wider plenum of practices. Therefore, this section draws on media studies and sociologies of the internet to redress the limitations of practice theory, and to supplement the framework developed so far. In doing so, this section connects the chapter with a wider digital sociological debate on the social implications of digital technologies.

4.5.1. Integrating media studies: remediation, hypermediation, immediacy

To describe the way media operate, Couldry refers to *mediatisation* as a plenum-level process:

> *…comparable to globalization and individualisation… any overarching concept not identifiable with any single logic… [that] points to the changed dimensionality of the social world in a media age…*
>
> *(Couldry, 2014, p. 137)*

By contrast, when other theorists describe *mediation* (Couldry, 2014, p. 135), they refer to either: (1) micro-processes of mediatisation (Livingstone, 2009, p. 8), i.e. studies of media consumption are used to bridge a conceptual gap between individual performances and larger bundles and complexes of practice, such as the impact of viewing Google Earth for humanitarian interventions (Parks, 2009); (2) a duality between individualised media consumption and the classification and association of a new media at the point of its integration within society (Haddon and Silverstone, 2000; Webster, 2011); (3) the *"…cultural processes by which power is*

negotiated between dominant institutions and popular or resistant movements" (Livingstone, 2009, p. 10) where materials are de-centred, e.g. viewing neogeography as an emancipatory set of mediations that subvert hierarchical power structures (Turner, 2006, also 3.5.3); or (4) the processes by which media – as instrumental material artefacts (objects, devices, things) are used to *"…overcome (or transform) distance, both physical and symbolic, in time and space"* (Livingstone, 2009, p. 10).

All four definitions are valid. However, this research draws on a twofold understanding of mediation. It follows Webster (2011) and Haddon and Silverstone (2000) to treat mediation as a duality between the use of media (understood as a material element) within practice performances, and the performance of classifications and associations (ascription of meaning). It also follows Livingstone (2009) to hold mediation as the process by which media enable practices to extend beyond a local context.

This leads to a twofold definition of media: (1) as the overarching combination of information and communication technologies (ICTs) that permeate the plenum of practices and carry meanings; and (2) as a plural term for medium (an instrumental material artefact). To that end, understanding how media circulate and interact requires some unpacking. This is complicated by the entanglement of digital maps with other resources, i.e. external datasets embedded within digital maps, the affordances to engage with digital maps across various physical devices, and the ability for embedded digital maps within other media (using AJAX/JSON). In turn, understanding how media operate requires appropriation of a few terms and concepts from media studies. For example, when Bolter and Grusin explain that (new) media *"…oscillate between immediacy and hypermediacy, between transparency and opacity…"* (1999, p. 21), they argue that as media artefacts develop, they move towards a 'transparent immediacy' where user-experience extends:

> *...beyond the medium to the objects of representation themselves… linear-perspective painting and film may keep the viewer distant from what he views, in virtual reality the viewer steps through Alberti's window and is placed among the objects of representation*
>
> *(Bolter and Grusin, 1999, p. 83)*

Relating this to digital maps, their ability to provide views that shift cartographic representation from the primarily topographic static representation on paper-based maps to the slippy, dynamic, and navigable photo-realist street-level imagery that mimics the visual aesthetic of lived experience (4.4.2), e.g. Google's StreetView or Bing's StreetSide, could be labelled 'immediacy' (Bolter and Grusin, 1999). Likewise, when Power et al. (2012) and Shapiro (2017) express concerns over Google StreetView's potential to stigmatise place identities (2.4.2) they both rely on an underlying assumption of digital map's immediacy. In this, Bolter and Grusin (1999) and Power et al. (2012) both reify media by marginalising users as passive. They locate media effects as an attribute of the medium itself and invest media with agency. In this, both border on media-centricism. In contrast, practice theorists view media as co-constitutional material elements of practice; they treat specific media (such as smartphones) as artefacts that are engaged with in practical consciousness, according to memory traces, body limits, and specific competencies, and which are understood through the meanings ascribed to them. Hence, this thesis re-appropriates Bolter and Grusin's (1999) term 'immediacy', using it instead as a term to refer to scripted transparency in the design and development of a medium, rather than in its conceptualisation by users or in use. In turn, this raises an interesting question of how the immediacy of a specific medium is accepted or rejected throughout engagement – an especially pertinent question amidst debates on the growing ubiquity of media devices (Featherstone, 2009).[68]

In theorising connections between media, Bolter and Grusin argue that "*…[w]henever one medium seems to have convinced viewers of its immediacy, other media try to appropriate that conviction*" (Bolter and Grusin, 1999, p. 9). For example, Google's StreetView and Bing's StreetSide offer immediacy as standalone media resources while incorporating various datasets from elsewhere, such as public transport routes and business address listings (2.4.3). This provides a rich and 'immersive' user-experiences, or *"…a feeling of fullness, a satiety of experience, which can be taken as reality"* (Bolter and Grusin, 1999, p. 53). In this, digital maps invest their entangled datasets with the same immediacy they offer as standalone technologies.

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[68] Similarly, a study by Vines et al. (2017) found that, despite immediacy being scripted into the design of a specific medium (Google Glass), end-users engagement can often be unpredictable owing to participants' interpretive flexibility.

Alongside immediacy, Bolter and Grusin also present connections between media as *remediation* and *hypermediation*. They argue that 'remediation' refers to *"...the representation of one medium in another…* [as] *a defining characteristic of the new digital media"* (Bolter and Grusin, 1999, p. 53). For example, a digital map can be said to be remediated when it is embedded within a website via AJAX/JSON (2.3.2).

Bolter and Grusin add that remediation also entails *"…a process of cultural competition between or among technologies"* (Bolter, 2010, p. 23). In other words, in remediation, Bolter and Grusin *"…see old and new media as cyclic and dynamic whereby older media and practices always infuse the new"* (Hjorth, 2016, p. 175). This offers a non-teleological understanding of technical development, which remains congruent with practice theory in so far as it accounts for use – and not just design. For example, when Shove et al. (2012) discuss the changes to pen consumption patterns that occurred when ballpoint and biro pens were introduced and normalised in the 1960s (Shove et al., 2012, p.59), they do not hold their technical development or increased use to be necessarily destructive to practices that involve older media. Ballpoint and biro pens did not entirely replace fountain pens, instead fountain pens were (re)conceptualised (classified and associated) as normative materials for different practices. Ballpoints and biros became 'normalised' in terms of the way they were recursively stabilised through repeated performances as writing materials for a majority of everyday writing tasks. Meanwhile, fountain pens were reconceptualised (classified and associated) as 'normal' materials for important legal documents and specialist calligraphy (Shove et al., pp. 59–60). Similarly, for Bolter and Grusin (1999) the latest format or version of a medium does not necessarily replace previous ones. Instead, differing media formats co-exist alongside one another with users often drawing on both in creative ways to develop new and novel configurations, e.g. map-hacks and mashups (2.4.3). For example, a user may choose to print a digital map or to hand-draw a paper-based version of one seen on-screen.

If remediation explains competition *between* media, 'hypermediation' explains their entanglement. For Bolter and Grusin (1999) the development of graphical user interfaces (GUIs) at Xerox PARC in the 1960s and 1970s began with remediation, where affordances for 'windowing' content *"…replaced the command-line interface, which was wholly textual"* (Bolter and Grusin, 1999, p. 32). However, they also note that the *"…multiplicity of windows and the heterogeneity of their contents mean that the user is repeatedly brought back into contact with the interface…"* (Bolter and

Grusin, 1999, p. 33). In this, Bolter and Grusin treated GUIs as *centring* media that anchor other media (9.5), by acting as central point of convergence e.g. Google Maps centring of bus timetable datasets, or Bush's (1945) initial vision of memex (2.3.1).

4.5.2. Integrating sociologies of the internet: networked individualism

The previous section provided three key terms: (1) immediacy – the direction towards which media are designed – as increasingly transparent interfaces; (2) remediation – the competition between older and newer media formats and their combination in new hybrid forms; and (3) hypermediation – as entanglements of media, with one centred in another. While these terms describe how material elements (objects) are entangled within practice performances, they do not address media as a wider set of technologies that connect with any social transformation across the plenum of practices. To address this, this section discusses media practices in the enactment of social organisation.

Jenkins asserts that the development of 'new' (web-based) media initially brought about a shift towards a 'convergence culture', where mass-participation replaced mass-distribution, in which *"…consumers are encouraged to seek out new information and make connections among dispersed media content"* (Jenkins, 2006, p. 3). This suggests (new) media technologies offer emancipatory potential through their affordances for remediation and hypermediation - commensurable with a similar sentiment in PPGIS and neogeography (3.5.3). However, Jenkins has more recently moved on to extend his conceptualisation of (new) media as 'spreadable':

> *…technical resources that make it easier to circulate some kinds of content than others, the economic structures that support or restrict circulation, the attributes of a media text that might appeal to a community's motivation for sharing material, and the social networks that link people through the exchange of meaningful bytes.*
>
> *(Jenkins et al., 2013, p .4)*

In this, Jenkins et al. approach media as material elements that offer emancipatory potential, but that also connect to wider societal change at an ontological level, raising serious questions about the extent to which media constitute everyday life. Their suggestion is that content carried across new media (such as digital maps) serves to structure practices. In turn, their position is media-centric in so far as it

elevates the status of media (as materials) into holding greater weight in the constitution of practices than other elements. However, the concept of new media being 'spreadable' provides a useful term, whilst raising questions about how media engagement relates to social organisation – and thus to the ordering of social practices within the plenum of practices at a macro-scale.

Working to address those questions, Castells claims that the development of web-based technologies have not only brought about a cultural shift in the way meanings are circulated, but that they have also radically transformed politics, economies, and modes of social organisation. He argues that a 'Network Society' (Castells, 2010) is emerging, where *"…social structure is made around networks and microelectronics-based, digitally processed information and communication technologies…"* (Castells, 2009, p. 24). Furthermore, he argues that:

> *…we have entered not only a new technological paradigm, but a new form of organizational structure for everything we do… from the vertically organized, standardized, rationally structured, hierarchically structured forms of activity to networking forms of activity…*
>
> *(Castells, 2000, p. 152)*

This network metaphor matches Berners-Lee's (1999) original vision of the web as a structure of 'nodes' that would organically connect people, fostering greater collaboration and equality. However, Castells goes further in assuming that new media have led to an ontological shift - away from vertical and hierarchical societal structures and towards horizontal networks (Castells, 2010, p. 176):

> *Increasingly people are organized not just in social networks, but in computer-communicated social networks… the Internet provides an appropriate material support for the diffusion of Networked Individualism as the dominant form of sociability*
>
> *(Castells, 2003, pp. 130–131)*

In this, Castells argues that not only has the internet led to a change in the way societies are organised (through computer-mediated social networks), but that micro-social interactions have changed as a result. He argues the internet mediates interaction between people to the extent that sociability (and, by extension, social

positions) have radically changed, marking a shift towards 'networked individualism'; a term that Rainie and Wellman further extended by arguing that people:

> *…have become increasingly networked as individuals… it is the person who is the focus: not the family, not the work unit, not the neighbourhood, and not the social group…*
>
> *(Rainie and Wellman, 2012, p. 6)*

In this, Rainie and Wellman follow Castells to argue that a radical ontological shift in the plenum of practices is underway, where individuals' interactions are performed through dispersed networks, rather than amongst local groups. In contrast, Webster contends that, while ICTs (including the internet) often do mediate interaction, they have not (yet) begun to constitute an entirely new form of social organisation*:*

> *…the movement of products, peoples, and information has expanded and accelerated to become a defining feature of life today… Information and Communication Technologies are important to this, but they should not be thought the determining factor.*
>
> *(Webster, 2014b, p. 136)*

In short, Webster opposes Castells' notion that a network society is emerging. Instead, he argues that, although ICTs offer greater affordances to connect individuals and practices across contexts, they should not be assumed to be responsible for any wider structural transformations to society *a priori*. Instead, Webster suggests that a turn to the mobilities paradigm could help to address such complexity without falling foul of the technological determinism he locates in Castells' approach (Webster, 2014b, chap. 7).[69] However, he does not directly dispute the emergence of a networked individualism, or any change to modes of social organisation. Webster simply observes that media may not be the sole catalyst for social change and argues that they should not be assumed to be central. In addressing its central research question, this thesis remains sensitive and open to the possibility of an emerging network individualism throughout analysis. However,

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[69] While outside the remit of this thesis, a connection could be made between the practice-orientated digital sociology framework developed in this chapter and Mobilities literature; notably through virtual, corporeal, and material mobilities (Sheller and Urry, 2006; Urry, 2010).

the analysis is guided by Webster's rejection of any *a priori* assumption that the plenum of practices has already been radically altered.

4.5.3. Defining the framework: practice-orientated digital sociology

This chapter has integrated concepts from media studies and sociologies of the internet with those from practice theory to develop a conceptual framework, which is used later in this thesis as lens to discuss findings (Chapters 6-8). However, it is not the first attempt at doing so. Nick Couldry took a very similar approach, in calling for:

> *…a new paradigm of media research…[that] take[s] in the whole range of practices in which media consumption and media-related talk is embedded… as practices oriented to media*
>
> *(Couldry, 2004, p. 120)*

Couldry's attempt to decentre media (as text and content) followed his argument for a 'socially-orientated' approach to media studies that understood media use as part of a wider set of social practices, and not necessary central to them (Couldry, 2014, pp. 6–8). In appropriating his term, this thesis refers to its framework as 'practice-orientated', rather than as socially-orientated or as a practice theory per se. Similarly, where it has incorporated concepts from sociologies of the internet, the chapter has tried to develop a framework that might be more broadly applicable to the social implications of digital technology in general, and to other specific web-based media resources - not just to digital maps. This connects to Lupton's assertion (2015), that we are amidst a broader 'digital turn' (Ash et al., 2018) in social theory, where an emerging theoretical concern rests with understanding people's:

> *…[m]ovement in public space…* [and their] *interactions with government and commercial institutions are organisations* [that] *are now mediated via digital technologies in ways of which we are not always fully aware*
>
> *(Lupton, 2015, p. 3)*

In this, Lupton locates four distinct approaches for contemporary sociological research on digital technologies (Lupton, 2015, pp. 15–16), collectively labelling them 'digital sociology': (1) *professional digital practice*, where sociologists embrace digital public life (e.g. Carrigan, 2016); (2) *sociological analysis of digital technology use* (Marres, 2012); (3) *digital data analysis*, including novel methodologies of dealing

with big data (e.g. Savage and Burrows, 2007; Ruppert et al., 2013); and (4) *critical digital sociologies*, which focus on understanding political economies and power, for instance, amidst the structuring potential of algorithms (e.g. Kitchin & Dodge, 2011; Beer & Burrows, 2010).

Similarly, where Orton-Johnson and Prior (2013) draw together various sociologies of digital technology under the title 'digital sociology', they separate the field into research on: *relationships* and the complexity of understanding mediated sociality; studies of the constitution of *spaces* (virtual and physical space and place) in the context of increased surveillance and mediated negations of trust and risk; *structures*, from macro-scale social systems to enactment through practised engagement with digital technologies – including a discussion of a network society (van Dijk, 2013). Orton-Johnson and Prior also locate a focus on *mediations*, directed towards the changing *"…role of social actors in new forms of digital mediation…"* (2013, p. 7); and another on *practices,* in a subfield that centres on the impact of technological change and innovation on existing practices – primarily in education and healthcare (albeit with little connection to practice theory).

Overall, by drawing on the terms and concepts set out above (4.2 and 4.3) alongside a practice theory ontology (4.4), the framework might be considered a practice theory. However, by drawing on media studies (4.5.1) and sociologies of the internet (4.5.2) to redress some of the limitations of practice theory, i.e. in its treatment of media as materials (4.3.4), the framework could be described as practice-orientated rather than a practice theory per se. Alternatively, the framework could be described as a digital sociology in its focus on developing a 'sociological analysis of digital technology use' (Lupton, 2012, 2015) focussed on 'mediation' and 'practices' (Orton-Johnson and Prior, 2013). To that end, the conceptual framework developed in this chapter is best described as 'practice-orientated digital sociology'.

4.6. Conclusion

This chapter developed a conceptual framework as a lens to draw on when discussing research findings (Chapters 6-8). The conceptual framework is practice theory based, although several useful concepts have been integrated from media studies, and sociologies of the internet. In summary, the underlying basis of framework stems from two distinctions that Shove et al. (2012) make: (1) between practices-as-performances and practices-as-entities as separate levels of analysis (4.3.1); and (2) between materials, competencies, and meanings as the three

elements that constitute all practices at both levels (4.3.2 to 4.3.4). The chapter details each of those three elements, with materials understood to encompass both physical and virtual objects, i.e. media devices (artefacts) and software. Competencies are understood as latent and transferrable across practices. Meanwhile, meanings are understood to be steeped in personal classifications and associations. Integrating additional concepts from first-wave practice theory provides additional purchase. For example, Giddens' structuration theory (4.2.2) provides an understanding that latent competencies often exist within memory traces, and that individuals draw on their competences in practical consciousness. Also, that individuals may not always be able to articulate the classifications and associations they draw on to ascribe meanings.

By setting out a practice theory ontology (4.4) the chapter explained how a focus on practices at both levels provides an understanding of how an individuals' micro-scale performances connect to the wider (macro-scale) plenum of all practices through bundles and complexes. One limitation of the framework however, is that it does not offer a direct way to analyse whether any structural transformations to modes of social organisation have taken place (c.f. Castells, 2010; Wellman et al., 2006). In addressing the research questions however, the analysis is not directed towards macro-scale phenomena; it focusses on micro-scale engagement with technology (practice performances) and the extent to which that engagement contributes towards the anchoring or ordering of macro-scale phenomena (the plenum). To ensure thoroughness, however, the research remains sensitive to the possible emergence of a networked individualism.

Overall, this chapter has integrated terms and concepts from media studies and sociologies of the internet into a practice theory-based conceptual framework without abandoning its ontological or epistemological foundation. Doing so shifts the framework away from being a (pure) practice theory per se, and instead extends the framework to one that can be understood as a digital sociology that draws on structuration theory inspired practice theory as a base, and that incorporates concepts from socially-orientated media studies and sociologies of the internet; or simply, a practice-orientated digital sociology. he next chapter explains how the conceptual framework has been operationalised within the research through a qualitatively-driven research design without abandoning its practice theory-orientated foundations.

5. A practice-orientated methodology

5.1. Introduction

This chapter describes the research methodology. First, it sets out the philosophical underpinnings of the research, framing it as an empirically informed approach that draws on aspects of constructivist grounded theory. It then aligns the methodology with the practice-theory ontology set out in Chapter 4. Next, the chapter focusses on the research design. It does so by restating the research questions and thesis aims (Chapter 1) before outlining the approach taken towards addressing them. It then describes the sampling strategy, presenting the units of analysis as 'contexts' (and individual participants' accounts as units of observation) before detailing the rationale behind the specific selection of contexts. Next, the chapter justifies the choice of data gathering methods, alongside the practicalities and ethical considerations each entailed. The chapter then moves on to discuss data analysis. It describes the approach taken towards coding and memoing, connecting both to the overall research design. The chapter then provides a discussion of the ethical considerations within each research interaction and on the use of a video-recordings. Overall, the chapter defines the methodology as a qualitatively driven approach that borrows heavily from constructivist grounded theory whist remaining aligned to the practice theory ontology set out in chapter 4.

5.2. Philosophical foundations

This section describes the philosophical foundations of the research. First, it compares the research to grounded theory (GT), defining it as an empirically informed approach that borrows from constructivist GT (5.2.1). It then connects the methodology with the practice theory ontology presented in chapter 4 to clarify the epistemic stance taken within this research (5.2.2).

5.2.1. Defining the approach: empirically informed theory development

By generating empirically informed theory on an underexplored topic (digital map use and users) the research aligns with the central aim of GT – to inductively develop theory on a topic where little is known by grounding the argument in data (Goulding, 2002, p. 34). There are several versions of GT, each advocating a slightly different approach and informed by a different underlying philosophical stance. This research takes a practice theoretical approach, drawing on individuals' own accounts to focus on how digital maps are drawn on within practice performances and the meanings

that people ascribe to them (4.3). To that end, it is broadly interpretivist, which, as this subsection explains, aligns with constructivist GT.

Glaser and Strauss developed GT in 1967, amidst a context where grand theory and quantitative methods dominated the research landscape (Glaser and Strauss, 1999; Charmaz, 2006; Hernandez, 2009a). As a rigorous and systematic approach to inductive theory generation, GT aimed *"…stop hypothesis testing that was irrelevant and drew on conjectural theory explanations, by grand theorists – theoretical capitalists"* (Glaser, 2012, n.p). Working within a realist lens, Glaser and Strauss sought to render *"…abstract generalizations separate from the specific conditions of their production."* (Wertz et al., 2011, p.168). Thus, they understood researchers as interpretive observers sat outside analysis. In their modification of classical GT, Strauss and Corbin took a different stance. They developed 'Straussian GT' by foregrounding the influence of American Pragmatism and (Chicago School derived) Symbolic Interactionism (Strauss and Corbin, 1990, p. 18) in their interpretation of data, centring on *"…meaning, action, and process"* (Charmaz, 2005, p. 509). By contrast, Charmaz drew on social constructionism to develop 'constructivist GT' (Charmaz, 2006), treating analyses as subjective interpretations that are co-constructed through researcher-participant interactions. Charmaz did not follow the realist assumptions of classical GT to contend that theory is out there waiting to be 'discovered' (Glaser and Strauss, 1999; cf. Charmaz, 2005, p. 509). Nor did she follow the symbolic interactionism of Strauss and Corbin (1990) to argue that *"…analysis means researchers interpret data but implies that such interpretation is an unavoidable limitation…"* (Charmaz, 2006, p. 127). Instead, she embraced interpretivism and the active co-construction of analyses in its capacity to 'give voice' to participants, allowing them to "…*set the tone for analysis…*[as] *a counterpoint to the rhythm of* [researchers'] *authorial voice."* (Charmaz, 2006, p. 174).

Following their epistemic differences, each variation of GT approaches literature and existing theory in a different way. Classical GT starts with no prior literature review; external concepts are brought in for integrative fit *after* analysis (Charmaz, 2006, p. 165). Meanwhile, Straussian GT *starts* with a brief literature review *"…to determine what has been done before in the area of interest…"* (Evans, 2013, n.p.) in order to narrow the topic of study while remaining *"…in tune to the meanings of data…"* (Strauss and Corbin, 1990, p. 266). By contrast, Charmaz draws on Henwood and Pidgeon's (2003) notion of 'theoretical agnosticism' to argue that *"…researchers*

should take a critical stance to earlier theories…" (Charmaz, 2006, p. 168). She accepts that an early literature review can inform the general topic study but adds that it should be 'left fallow' until *"…categories and the analytical relationships between them…"* (Ibid.) emerge.[70]

Despite their diversity, all grounded theories follow three basic stages (Mattoni, 2014, p. 34): (1) coding data; (2) amalgamating codes; and (3) developing an analytical or conceptual framework. In classical and Straussian GT this starts with 'initial coding' – a process of writing descriptive labels in the margin of transcripts or field notes to highlight 'incidents' (Glaser and Strauss, 1999, p. 106). This fractures data *"…into as many categories as possible…*[before]*…integration of categories* [in later stages]…" (Heath and Cowley, 2004, p. 146). Charmaz refers to this stage as being open e.g. 'open coding' (Charmaz, 2006, p. 11), thus her approach is commensurable with earlier GTs at this point. In the second stage of 'selective coding', Glaser and Strauss argue researchers should identify a 'core' category *"…with the most explanatory power…"* (1999, pp. 69–70) and code selectively towards it (Hallberg, 2006, p. 143; Hernandez, 2009b). Strauss and Corbin (1990) later introduced a 'conditional matrix' to structure this stage, adding a step of 'axial coding' (Strauss and Corbin, 1990, p. 163) to bring *"..data back together again into a coherent whole…"* (Charmaz, 2006, pp. 60–61). As Evans (2013, n.p.) notes, the systematic approach of their matrix shifts analytical focus from inductive theory development towards an emphasis on verification; a shift that is further pronounced in Strauss and Corbin's approach to literature (discussed above).

This research borrows Charmaz's terminology and approach to coding, alongside her approach to memos and literature. It also aligns closely with her epistemological stance – albeit framed by practice theory ontology (4.4) rather than social constructionism. This serves to position the researcher as a central facilitator responsible for storying participants' accounts of past practice performances, whilst using 'between-methods triangulation' (Flick, 2018, pp. 38–39) to gain participant feedback on the emerging analysis (5.3.2 and 5.5.3). That is, the approach focuses on participant's account of lived practices in their engagement with digital maps (what they do with them), including a focus the rules and resources (4.2.2) that structure those practices rather than focussing narrowly on participants' experiences.

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[70] Charmaz refers to *data* and *concepts*, rather than 'incidents' being ordered into the 'subcategories' of a 'core' category (Gibson and Hartman, 2014, p. 67).

Despite borrowing heavily from constructivist GT, this research employs an a priori purpose sampling strategy based on predefined contexts and participant types (5.4). In doing so, it does not follow the theoretical sampling strategy considered central to GT (Draucker et al., 2007, p. 1137; Glaser & Strauss, 1999, p. 46; Strauss & Corbin, 1990, pp. 135–137; Charmaz, 2006, p. 100). Instead, the research takes heed of Charmaz's argument that:

> *Whether or not students engage in theoretical sampling, they can construct incisive categories. They can increase the power of their analyses using grounded theory to inform their data collection and by adopting its strategies of coding and memo-writing.*
>
> *(Charmaz, 2015, p. 1611)*

To that end, this research is not a grounded theory as classically perceived. Rather, it is as an empirically informed approach that borrows heavily from constructivist grounded theory. It addresses the research questions by inductively developing concepts through data analysis, drawing on practice theory for an ontology and as lens through which data are discussed (4.4).

5.2.2. Aligning the methodology with practice theory

The conceptual framework chapter described the practice theory ontology that underpins this research (4.4). However, it did not provide an epistemic stance. This reflects a wider trend in practice theory. For example, reflecting on structuration theory as (then contemporary) approach to theorising modernity, Giddens noted that he was *"…not particularly interested in the epistemological aspects…"* (1991b, p. 207). Stones (2005, p. 33) explains this followed Giddens' broader post-empirical attempt to divert social theory away from an over-emphasis on epistemology throughout the 1970s. As such, Giddens considered structuration theory to be a sensitising device directed towards *"…ontology-in-general rather than situated ontology…"* (Stones, 2005, p. 35), thus he provided little insight on its empirical application. Likewise, when de Certeau described his epistemic stance as a balance between realism and relativism, he provided no statement of where to position researchers other than somewhat ambiguously:

> *…between two unacceptable positions: representational naturalism*
> *(a naive belief in the transparency of 'facts', 'images' and the like);*

and the 'total' critiques of representation (all is constructed, nothing
has any epistemological foundation)

(Highmore, 2007, p. 17)

By contrast, Bourdieu drew on his experiences of ethnographic participant observations (Jenkins, 1992, p. 28) to discuss difficulties in gaining purchase on how meanings are associated with materials without forcing a classificatory scheme onto analyses:

[T]he social world, the site of the hybrid compromises between thing
and meaning that define 'objective meaning' as meaning-made thing
and dispositions as meaning-made body, is a real challenge for
somebody who can breathe only in the pure universe of
consciousness and 'praxis'.

(Bourdieu, 1992, p. 43)

In this, Bourdieu's epistemic stance matches Strauss and Corbin's (1990) treatment of researchers' position within the research as a limitation (5.2.1); a position at odds both with Glaser's (1999) objectivist treatment of researchers as neutral external observers and Charmaz's (2006) understanding of researchers as active co-constructors of knowledge (5.2.1). However, Bourdieu's approach does resonate with Charmaz's constructivist understanding that participant accounts present plural "…*obdurate realities*…" (Charmaz, 2006, p. 132), each holding equal weight. To clarify, Bourdieu argues that habitus (4.2.3) *"…mediates the opus operatum of structure and the modus operandi of practice, heavily constraining action but not definitively determining it…"* (King, 2000, p. 426). That is, an individual's past experiences form a structure (obdurate reality) that influences (but does not determine) their future practices. In turn, this raises questions about what drives change in individuals' interpretations, and what degree of structural differentiation is at play.

In short, first-wave practice theorists left little guidance on how to operationalise their concepts, or where to position researchers. They operated instead at the level 'ontology in general' (Stones, 2005, p. 35). Addressing this shortfall has been a key area of development for second-wave practice theorist, leading Nicolini (2017b) to assert that practice theory now operates within four different epistemic 'orientations':

(1) *Situational-orientated* practice theories understand that practices are entangled to the extent that:

> *… When people talk about 'snowboarding', they usually ignore the practices of driving, playing, eating, drinking… that are part [of it]… [F]ocusing on one particular 'filament' in the rope or bundle, we can thus go about studying snowboarding as an object of episteme…*
>
> *(Nicolini, 2017b, pp. 28–29)*

This provides analytical purchase on how practice elements and performances move in and out of practice entities. In turn, it provides a way to explore how people's engagements with digital maps feature within wider sets of social practices. By extension, it supports sampling for contexts rather than rigidly bounded cases (5.4). For example, a smartphone can move in and out of students' practice performances when gaining orientation to a new University campus. Understanding that movement provides a holistic account of the practice as an entity constituted through multiple performances each situated within various practice entities and bundles.

(2) *Genealogical-orientated* practice theories focus *"…on the development and disappearance of individual practices…* [and how] *elements are associated, by whom and under what conditions…"* (Nicolini, 2017b, p. 28). Historicising individuals' competences and meanings alongside the movement of materials helps overcome the limited account of change in first-wave practice theory. For example, Pantzar and Shove (2010) and Shove *et al.* (2012, pp. 48–49) both explore persistence and change in practices by studying the abstraction and reversal of competencies and circulation of meanings within Nordic walking (4.3.4).

(3) *Configurational-orientated* practice theories align in part with Actor-Network Theory (4.2.1) by considering *"…how concerted accomplishments and performances hang together… [to] form constellations and broader configurations"* (Nicolini, 2017b, pp. 29–30). They provide a mapping of how practices are shared, and how materials, competencies, and meanings are translated and exchanged between people.

(4) *Conflict-sensitive-orientated* practice theories focus on *"…the co-evolution, conflict and interference of two or more practices…"* (Nicolini, 2017b, p. 30) as elements and performances transfer between them. i.e. how competencies gained in one practice (e.g. work) can influence those in another (e.g. buying a house). This

raises questions about what a practice *is* (and *is not)*, and where the boundary between practices sits (Nicolini, 2017b, p. 29).

This research follows all four orientations at times, and as such the data analysis remains sensitive to: (1) how elements travel between practices; (2) the history behind each practice – and how they have formed, and changed over time; (3) how practices are shared and collectively (re)enacted; and (4) how practices interrelate. To do so, the research draws on Schmidt's (2017, pp. 149–150) argument for a focus on similarities and differences between participant accounts (their portrayals of past practice performances) rather than on participants themselves as directly observable units of analysis (i.e. through participant observation). This aligns with Charmaz's epistemic stance (5.2.1) by acknowledging that participants' accounts (and researchers' rendering of them) are highly interpretive. It also matches Giddens (1984, p. 85) contention that participant accounts are steeped in the memory traces of individuals – but only as amenable to them discursive consciousness (4.2.2). Rather than holding this as a limitation, the research seeks out corroborations and similarities between participants' accounts throughout data analysis. Codes that occur frequently across accounts become concepts. Meanwhile less frequently occurring codes become the categories that sit hierarchically beneath concepts (5.6.1). In this, the research develops a practice-orientated theory that is grounded within participant accounts and refined through participants' feedback on the emerging analysis.

5.3. Research design

This section outlines the research design. First, it sets out the research questions and thesis aim (5.3.1). Next it describes a rationale behind the selection of data gathering methods and their sequence, connecting both to the constructivist GT derived approach taken within data analysis (5.3.2).

5.3.1. Research questions

The motivation for undertaking this research was tied to a core aim of understanding how digital maps are engaged, and how such engagement might influence wider sets of social practices (Chapter 1). The research meets this aim by addressing a central research question:

> *To what extent, and in what ways does engagement with digital maps feature in the constitution of social practices?*

This question was framed by a practice theory ontology (4.4) in so far as it assumes that all social practices *are* constituted. Rather than starting with an a priori assumption or hypothesis that engagement with digital maps *does* feature in the constitution of wider sets of practices (e.g., buying a house, choosing a holiday, selecting a route from point A to point B) the research addressed the *extent* to which they might do so – if at all. It remained open and attentive to the possibility that they might not. Likewise, as the research later demonstrates (see 6.2 and 9.2), digital maps are encountered, interacted with, and practised (engaged) in ways that extend beyond traditional accounts of *use,* e.g. digital maps can be engaged with through purposeful non-use, or as ready-at-hand resources.

To operationalise the central research question, the thesis addressed three subsidiary research questions:

(1) *How do people engage with digital maps?*

This question explores people's engagement with digital maps, i.e. how they draw on them, select them, and with what degree of knowledgeability. It also asks which features or affordances lead map-users to draw on digital maps – see Chapter 6.

(2) *How do people engage with the web-based affordances of digital maps?*

This question moves beyond exploring instrumental uses of digital maps (as geolocative resources) to question how the web-based affordances they offer are engaged, i.e. affordances for amending/generating digital map content. Rather than treating digital maps as standalone resources that people engage individualistically, the question also explores how people engage with the affordances they offer for collaboration and sharing, and their experiences of digital maps remediate and hypermediate entanglement with other resources (e.g. external datasets) – see Chapter 7. To that end, the use of the term 'affordances' in this question aligns with a theoretical lineage that stems from Gibson's (1979) relational (and somewhat realist) understanding that affordances are the opportunities an object offers to a user, which remain the same even if the user changes.

(3) *What influence does people's engagement with digital maps have on the way they perform wider sets of social practices?*

This questions shifts analytical focus from individual accounts of *how* digital maps are engaged onto a discussion of: a) *what* (if anything) such engagement serves to

constitute (what digital maps anchor); b) *how* such engagement constitutes both practice performances and wider set of social practices; and c) *to what extent* such engagement can be said to constitute wider social practices – see Chapter 8.

5.3.2. Outline of the research design

Addressing the research questions required an in-depth analysis of individuals' accounts of practice performances (descriptions of past engagements with digital maps).

That is, rather than observing the way participants engage with digital maps, the research sought to address how (and to what extent) the technology is embedded within participants' wider set of social practices. For example, assessing how digital maps are engaged with throughout the process of buying a house, and the extent to which they influence the way those home-buying practices are performed requires a method that captures data over an extended period; buying a house can take years, and often requires intermittent engagement with digital maps (see account in). As such, observational research (such as an ethnographic participant observation or walking interviews) would not capture the full range of practices. In turn, this research questions led me to adopt a qualitative approach to data collection, one well-suited to addressing experiential (how and why) questions that cannot be quantified (Mason, 2006, p. 16; Silverman, 2010, pp. 8–9) that also captured to diverse array of practices in which engagement with digital maps is entangled over the duration of a specific context. Connecting this with the practice-orientated and interpretivist underpinnings of the research (4.4 and 5.2) required careful consideration – both in the choice of methods and in their sequencing within an overall research design. To that end, the research started with a scoping survey (to identify a relevant contexts – as relevant research samples), with semi-structured interviews employed to gather accounts of practices within each context, and focus groups deployed later within each context to gather feedback on the emerging analysis.

The research began with a scoping survey, which gathered N=391 responses (n=260 with full completion). It asked respondents basic questions about how, when, and where they used digital maps, which digital map-maker's map they had used, and via which hardware, alongside their understanding of adding/amending content (Appendix E). However, as explained in subsection 5.5.1 below, the survey sample was not intended to be statistically significant, nor representative of any larger population. Instead, the survey served as a scoping exercise; it sought to identify

relevant contexts (5.4.1) which then informed the recruitment strategy for interviews as the starting point for data collection. As such, the survey is an aspect of the sampling strategy and is not drawn on within the data analysis.

After the scoping survey, the research gathered participant accounts of past engagement with digital maps through 36 semi-structured interviews, which marked the start of data collection (5.5.2). As explained further in subsection 5.5.2 the interviews gathered individuals' rich descriptions of their past engagement with digital maps, including detail on their preferences for specific maps, and the influence of their digital map use on other practices (both within the specific context and beyond it).

After the interviews, focus groups were employed as a third method for between-methods-triangulation' (Flick, 2018, p. 14). The three focus groups provided a way to elicit participant feedback on the emerging analysis within each context. That is, in working towards data analysis through the constructivist GT derived approach described above (5.2.2), the interviews were transcribed and open coded (5.6.1), with memos drafted at the same time (5.6.2). Open codes were then amalgamated into a smaller and more focussed set through a second stage of analysis (5.2.2). During both open and focussed stages of coding, analyses within each context were kept separate (see figure 1). The initial analyses that emerged through the focussed coding and memoing were taken as the basis of a set of generalised statements (Appendix C). Those statements became topics of discussion within each focus group – one per context (5.5.3). Rather than gathering feedback on the emerging analysis via another method (e.g. a second bout of interviews), the decision to include focus groups was steeped in a concern to maintain participants' 'voice' as "*…a counterpoint to the rhythm of* [researchers'] *authorial voice"* (Charmaz, 2006, p. 174). That is, epistemically facilitating a shared group discussion of the emerging analysis served to partially decentralise my position as researcher,

After the focus groups, focussed codes and memos were refined and further amalgamated into three context-specific sets of theoretical codes. Developing the memos served as way to integrate the three sets of theoretical codes within a single set of concepts (5.6.2, also figure 1). This process generated the seven concepts (alongside several categories and subcategories) that are employed throughout the findings chapters (6-8) and form the basis of the practice-orientated digital sociology of maps presented in chapter 9.
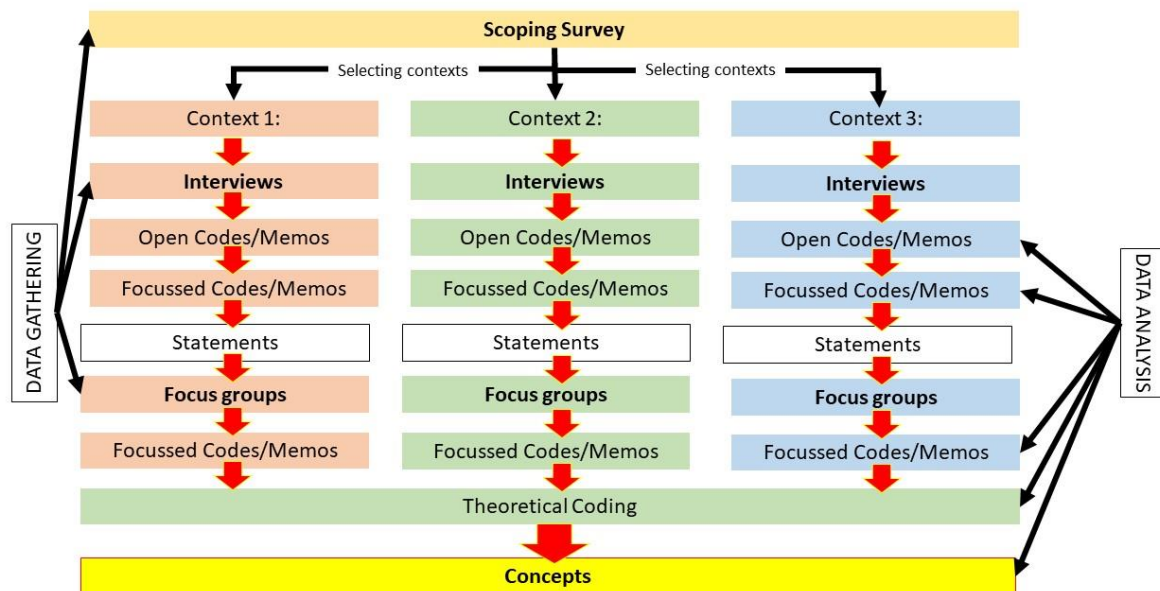
Figure 1: Map of the overall research design

5.4. Sampling Strategy: contexts and participant types

This section describes the sampling strategy. It defines the unit of analysis as 'contexts' (5.4.1) before justifying the choice of contexts within this research (5.4.2). It also describes the use of 'participant types' within each context as an additional facet of the sampling strategy (5.4.3).

5.4.1. Defining contexts as sensitising units of analysis

This research employs 'contexts' as a unit of analysis. Contexts differ from cases in the extent to which they are bounded. To clarify, Yin argues that a 'case' refers to a:

> *…bounded entity (a person, organization, behavioral condition, event, or other social phenomenon), but the boundary between the case and its contextual conditions—in both spatial and temporal dimensions—may be blurred*

> *(Yin, 2012, p. 6)*

Concentrating on cases as bounded practice entities (Merriam, 2009, p.40; Stake, 2008, chap.40) might suit a conflict-sensitive orientated approach (5.2.2) by enabling one practice to be compared with others. For example, following a multiple or collective case-study research design (Silverman, 2010, p. 139) to compare Nordic walking (Pantzar and Shove, 2010) with motorcycling edgework (Murphy and Patterson, 2011) *as practice entities* could help locate similarities, differences, and

synergies between the two practices. Likewise, Yin's acknowledgement that *"…the boundary between the case and its contextual conditions…may be blurred"* (2012, p. 6) could account for recursive enactments of linkages between practice elements (4.3.1). Thus, a multiple case-study research design would be fully commensurable with the practice-theory orientated framework developed in Chapter 4.

This research explored people's engagement with digital maps and the influence of that engagement on their everyday life in a broader sense (how it features in the constitution of their wider social practices). This shifted the unit of analysis from bounded (neatly defined) *practice entities* and *performances* towards a focus on continually emergent *practice bundles* and *complexes* which overlap and entangle one another – often in unbounded ways (4.3 and 4.4). That is, the research followed both a situational and conflict-sensitive orientated approach (5.2.2) to provide a better understanding of how engagement with digital maps features within wider sets of social practices than those observable within the bounds of any specific case(s). To that end, the research required a sensitivity towards the abstraction and reversal of competencies *across* practice entities (4.3.3) and of how elements transfer *between* them (4.3.1). It also required sensitivity towards understanding how individuals might be positioned within social practices (5.2.2). For example, in the process of buying a house, home-sellers can refer to and perform practices that overlap with those of web developers, or draw on common ICT competencies gained at work, e.g. the ability to generate a map mashup as part of their home-selling practices (discussed in 8.2.3). Therefore, focussing solely on home-buying as a 'case' might have lost some of the detail and nuance involved with the practices that surround people's home-choice practices. Likewise, cross-over discussions occurred in interviews that might have been lost if the focus had been set on a comparison of cases. For example, students searching for a shared house perform practices that would fit within two cases in a multiple case research design (home-choice and university life). By contrast, treating each as 'contexts' (5.4.2) at the level of *practice bundles* and *complexes* provides insight on how practices (and their elements) travel across contexts. To that end, this research employs 'contexts' in place of 'cases' to denote a less firmly bounded unit of analysis.

While separate analyses were maintained for each context in the early stages of analysis they were later amalgamated and presented as a single set of concepts (5.3.2 and 5.6.2). This again differs from a multiple-case study research design,

where it would be important to "*…preserve the wholeness and integrity of the case*" (Silverman, 2010, p. 138). Instead, the research employed 'contexts' as a sensitising heuristic device to guide the sampling strategy, rather than treating them as integral to the final analysis.

5.4.2. Selecting contexts: drawing in the scoping survey

While this research employs contexts (not cases), literature surrounding case-study research design is useful in justifying the rationale for the specific choice of contexts. For Emmel and Hughes, single case-study research designs risk "*…making claims for generalisability and transferability of findings that cannot empirically be supported*" (2009, p. 322). Meanwhile, although Yin is less critical of the claims made on the basis of single-case research designs (holding them useful for exploring rare, critical, or unusual phenomena). He also advises that combining "*…two or more…*" (Yin, 2009, p. 61) cases produces research that is *"…more compelling…*[and]…*therefore regarded as more robust"* (Yin, 2009, p. 53) because it offers greater validity (reliability) through corroboration (Yin, 2009, pp. 61–62). Extending this to 'contexts' (5.4.1) suggests that the reliability of any claims that stretch beyond the local specificities of a single context require data from more than one context.

As noted above, the scoping survey was used to locate relevant contexts (5.5.1). An initial reading of responses (see Appendix F for detail of findings) suggested that temporal scale was important to understanding how digital maps are engaged. For example, it demonstrated that Google Maps was engaged with more extensively than any other digital map. It also identified, somewhat paradoxically, that digital maps are most often used either whilst on the move or whilst at home (figure 2).
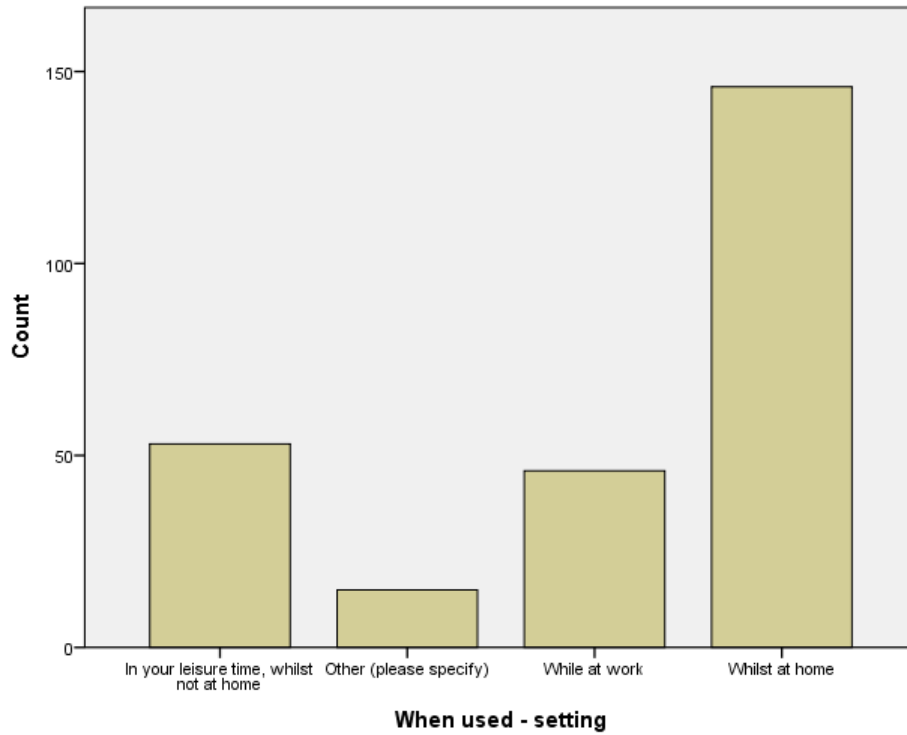
Figure 2: Survey findings - when used (setting)

In addition, it found that digital maps were primarily used either before or during (at the same time) an activity (figure 3), but less so afterwards; also that a majority of people use digital maps monthly (or more) with most doing so weekly (figure 4).
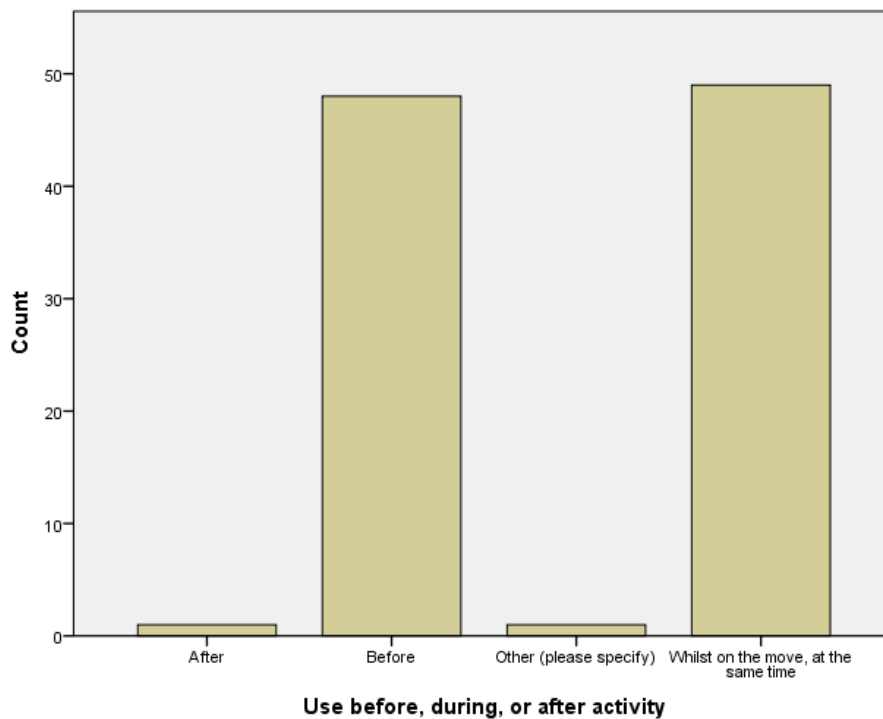
Figure 3: Survey findings - when used (before, during, or after an activity)
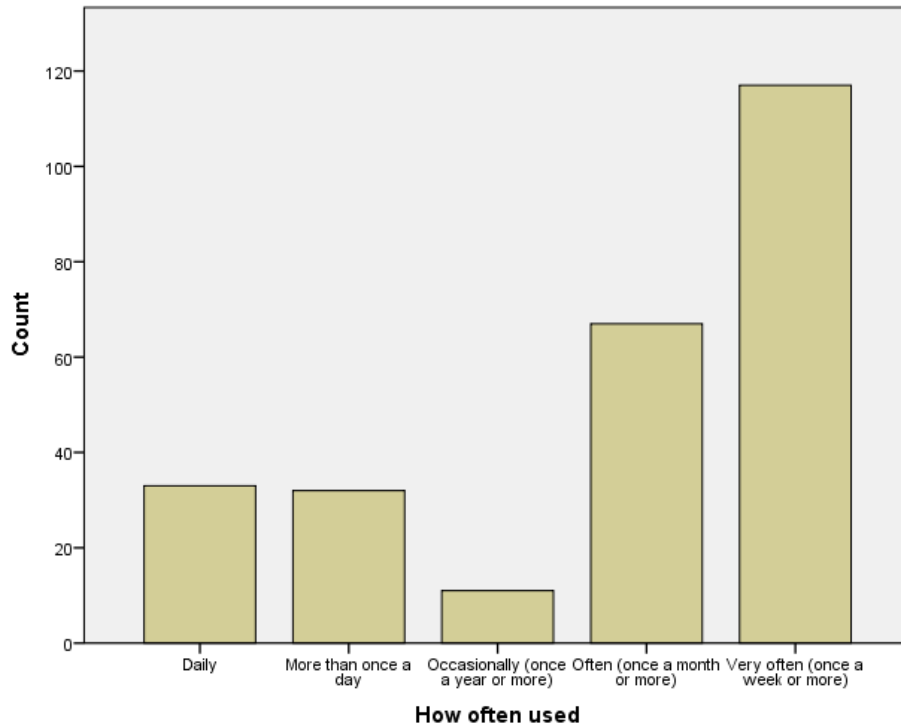
Figure 4: Survey Findings - How often used.

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In this, the scoping survey identified temporal scale as a potentially important aspect of people's engagement with digital maps, as such it followed that temporal scale should inform the choice of contexts. As a personal choice, I felt that two exploring two contexts could lead to a false dichotomy e.g., comparing map use in home-choice (which can take place over a number of years) and University choice (which a an overview of the survey sample by occupation type suggested involved more in-situ uses – see Appendix F and figure 3) would pitch longer-term planning processes against shorter-term immediate uses of digital maps. As such, it would provide little depth on the nuance of uses between. To that end, a third context was included as a 'control' of sorts (countryside leisure-walking); it covered a mid-level temporal stage between long-term planning (home choice) and short-term in-situ use (University orientation). It also sought to problematise mobile internet access, with a limited number of survey free-text responses suggesting that people in rural areas might be more likely to meet poor access/connectivity as a barrier to digital map use.

Context 1: Home-Choice	Context 2: Leisure Walking	Context 3: University Orientation
Repeat	Instant/Repeat	Instant
Long-term	Medium-term	Short-term
Advance	Advance/In Situ	In-Situ
Choice of Site	Choice of Route	Choice of Route/Site
Assessment	Wayfinding	Resource location

Figure 5: Contexts - temporal scale

Similarly, I limited the selection of contexts to only those with which I had prior familiarity and experience, anticipating that to approach the topic as an 'insider-researcher' (Costley et al., 2010) would afford a deeper understanding of specific terms encountered in interviews and focus groups. For example, having worked in tenancy and home-owner services, and in a policy writing team for a social housing organisation (Chapter 1) provided me with understanding of key terms used by interviewees in the home-choice context (Appendix C). This ranged from legally defined terms such as 'conveyancing' or 'completion' (Jones Lang LaSalle and Estates Gazette, 2004) to informal terms used by estate agents, letting agents, landlords, and housing officers such as 'second-viewing' (physically visiting a property on a second occasion to further assess it after having made an offer to buy) or 'handover day' – the date a buyer receives their keys and formally takes ownership of a property (Ibid.). Having personal familiarity and experience with each context provided better access to participants' accounts of practice performances. Similarly, to maintain an insider-researcher position (Costley et al., 2010), participants were recruited from Derby (my hometown) and Sheffield (a nearby city that also skirts the peak district national park). This provided a sample of participants with whom I share a dialect and geography, affording me better access to the subtleties of colloquial terms within their accounts. For example, one participant (Sarah) used the term 'jitty' (see 8.4.2). As an insider-researcher I understood this to refer to a small publicly open pedestrian pathway between houses connecting to two or more roads. While I may have been able to locate the meaning of such terms post-hoc, being able to do so within the interaction itself enabled better discussion of the

local area and geography within interviews and focus groups than might have been possible had I recruited from an area unknown to me.

Pseudonym	Dataset	Context	Age	Gender
Dave[1]			38	M
Pete			20	M
Francis			18	M
Sarah[1, 3]			18	F
John			19	M
Mike[1]			44	M
Emma			Refused	F
Claire[3]		University Life	37	F
Laura[3]			38	F
Matt[3]			24	M
Michelle			24	F
Mary			45	F
Liz[1, 3]			25	F
Paula[3]			41	F
Luke			37	M
Eleanor			68	F
Stacey[1]			58	F
Glenn[1]			71	M
Tom			60	M
Sharon[1]			69	F
Terry	Interviews and Focus Groups	Leisure-Walking	73	M
Phil			43	M
Chris			51	M
Jenny[1]			32	F
Tony			40	M
Joe			34	M
Beth[2]			38	F
Pam[1]			44	F
Dawn[1]			39	F
Becky[2]			35	M
Rob			34	M
Scott		Home-Choice	38	M
Rick			47	M
Kelly			36	F
Jim[1]			47	M
Jay[2]			Refused	M
Malcolm			27	M
Ralph			59	M
Donna			30	F
Mandy	Survey	N/A	39	F
Theresa			24	F
Sam			23	T
Frank			23	M
Charlie			49	F

Figure 6: Research participants (cited in this research)

[1]Attended Interview and Focus Group / [2]Skype Interview / [3]Multiple person interview

5.4.3. Participant types: sampling within contexts

Rather than aiming for a random sample of participants, the research recruited from three distinct 'types' of participant within each context (figures 6 and 7), gathering insights from a diverse range of perspectives.
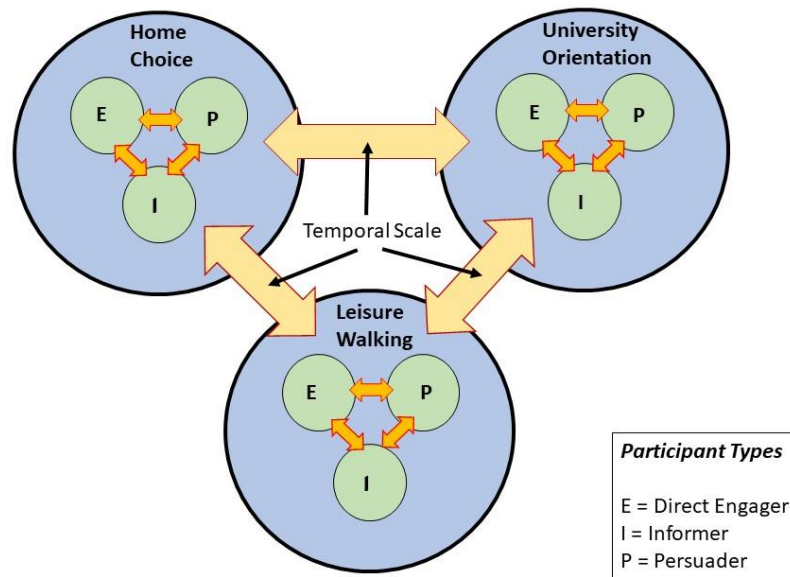
Figure 7: Participant types (diagram)

The choice of participant types was informed by the initial reading of responses from a scoping survey (5.5.1), which found that respondents referred to engaging with digital maps either to navigate and make-sense of place (as *direct engagers*) or to *persuade* and/or *inform* others (understood as analytically separable forms of engagement). For example, Malcom (a student) described using a digital map as a direct engager to *"*[find] *out if there is a cheap pub (e.g. Wetherspoons) in the vicinity and* [directions for] *getting there",* while other respodents describing drawing on digital maps to inform or persuade others – with latter often intended to infrom the practices carried out by another (7.4).

Direct Engagers	Informers	Persuaders
Engage for navigation, routing, or sense of place as routine part of (context-specific) practice performances.	Engage to provide information to others - no intent to anchor the practices of others - possibly as part of an information service.	Engage to provide information to others – specifically to anchor others' practices.
Context 1: Home-buyers/Renters	Context 1: Estate agents and housing associations, and university services	Context 1: Home-sellers and landlords
Context 2: Leisure-walkers	Context 2: Walking related tourist information services	Context 2: Leisure-walking-facing businesses
Context 3: Students	Context 2: Walking related tourist information services	Context 3: Student-facing businesses

Figure 8: Participant types (table)

To that end, the scoping survey identified three types of participant:

(1) People who engage with digital maps as instrumental resources within their practice performances (*direct engagers*). For example, home-buyers, leisure-walkers and students;

(2) People who engage with digital maps to provide information to others with a relatively neutral intention (*informers*). For example, estate agents, housing associations, tourist information services, and university services;

(3) People that engage with digital maps specifically to persuade others to direct the practice performances of others (*persuaders*). For example, home-sellers, walking tourism-facing businesses, and student-facing businesses.

As noted above (5.3.2) the separation between participant types was not maintained during data analysis. Instead, the three participant types were employed as a heuristic device (as an aspect of the sampling strategy) to ensure that the research gathered a diverse set of perspectives within each context (see figure 8); likewise, as

noted above (5.4.2), rather than comparing (or cross-tabulating) contexts, the research employed them only to ensure the sample covered a broad of temporal scale (figures 5 and 8). The aim of the research was to generate exploratory findings on digital map in everyday life and in a wider range of social practices.

5.5. Data gathering strategy: choice of methods

This section justifies the choice of data gathering methods and their sequence within an overall research design (figure 1). It covers the scoping survey (5.4.1), semi-structured interviews (5.4.2), and focus groups (5.4.3) as individual methods, defining their combination in a qualitatively driven approach as a form of 'between-methods-triangulation' (Flick, 2018, p. 14).

5.5.1. Scoping survey

The research began with a scoping survey (using SurveyMonkey) to identify suitable context(s) for further exploration (5.3.2). Respondents were recruited for the scoping survey by e-mail (Appendix G). The e-mail was sent to context-specific businesses, organisations, and to a university-wide distribution list that included both undergraduate, postgraduate, and mature students alongside staff.[71] Respondents were also recruited via social media (as they were for interviews and focus groups – see 5.5.2 and 5.5.3) via accounts created specifically for this research project on Google+, Facebook and Twitter.[72] For example, one Twitter post (to recruit for interviews) included the hashtag #sheffieldissuper; a hashtag linked to a local community account for the city of Sheffield that retweets all posts in which it is tagged, As a result, the tweet reached over 29,600 followers. As with all other recruitment channels, this served to elicit contact from potential respondents, who were then sent a full recruitment invite (which varied depending on the method they were being recruited for – see Appendix G, 5.5.2 and 5.5.3).

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[71] Recruitment e-mail sent to the *student-volunteers* distribution list at University of Sheffield (with ~30,000 members) on 13-Jun-2013.

[72] Twitter: *@ondigitalmaps*; Google+ 'circle' associated with the defunct University of Sheffield e-mail address sop11msh@Sheffield.ac.uk; Facebook account *Matthew Hanchard (ondigitalmaps)* – https://www.facebook.com/matthew.hanchard.96.

Figure 9: Example recruitment post on Twitter.

The survey recruitment invite (Appendix G) explained how respondents' data would be managed and provided contact details for queries/issues. It also stated that all responses would be anonymised.

The survey questions (Appendix E) gathered basic detail about respondents (e.g. demographic details such as age, gender, e-mail address, location, etc.). It then asked questions about their general engagement with digital maps, e.g. which digital maps they use, when, where, and how often (see 5.4.2 and Appendix F). Next it asked questions about their engagement with the web-based affordances of digital maps, e.g. their knowledge and experiences of amending/generating content (see Appendix E and F). Overall, the approach taken to recruiting respondents for the survey was aimed towards gathering input from across a broad range of ages, genders, and occupational types. However, the survey actually recruited (and gathered) responses from a relatively young sample – with over half the respondents being aged below 40. While this means that the survey findings are not statistically representative of any wider British population, it remains aligned with the aims and underlying epistemic stance of this research; that is, the research is exploratory and

aims to develop theory which may later be extended into statistical significance through further research.

The survey ran between May and July 2013, gaining N=391 (n=260 full completion) responses (Appendix F). While the non-representative sample could not warrant any claim to statistical significance, an initial reading of responses served to identify temporal scale (5.4.2) as a potentially important factor for understanding how digital maps are engaged with. That is, the survey responses did not inform the data analysis. Instead, as part of the sampling strategy they informed the selection of contexts and participant types (5.4.2 and 5.4.3). Although the survey was employed in this way as a scoping exercise, relevant quotations from free-text survey responses (qualitative data) are included in the findings chapters (6-8) for additional illustration where appropriate – and only in support of discussion of findings from interviews and focus groups.

Despite the inclusion of the survey as a quantitative data gathering method, the data analysis remained steeped within qualitative data. In this, the approach aligns with Mason's (2006) definition of 'qualitatively-driven mixed-methods' research in so far as it adopts a 'multi-dimensional' research strategy by creatively combining methods from opposing paradigms. For Mason, qualitatively-driven mixed-methods research is not just about ensuring that qualitative data receives more weight than quantitative data within analysis. Instead, she argues that by accepting that "…*social experience and lived realities are multi-dimensional…*" (Mason, 2006, p. 15) interpretive researchers need to be reflexive, creative, and think outside-the-box in their choice of methods. In this research, the survey is employed as a scoping exercise, identifying relevant contexts to further explore through an analysis of qualitative data. To that end, the specific choice of methods within this research leads towards a qualitatively-driven approach (5.2.2). Meanwhile, their sequence in an overall research design (5.3.2) gathers participants' accounts at differing levels, and for different purposes, while remaining aligned to practice theory ontology (4.4) and the interpretivist epistemic stance aligned with constructivist GT that underpins the research (5.2.2).

5.5.2. Semi-structured interviews

This research draws on 36 interviews conducted between October 2013 and June 2015.[73] The sample included 23 male and 20 female participants with a mean age of 40 and median of 38; notably this may be skewed slightly where two participants declined to provide an age (see figure 6). Recruitment started following closure of the scoping survey (5.5.1). The survey closed by asking if respondents would be willing to take part in future research (see Appendix E, Question 14). Those that indicated 'yes' were approached and invited to interviews by e-mail. The social media channels used to recruit survey respondents (5.5.1) were also used in a similar way to recruit interview participants (see figure 9). In addition, recruitment tended to snowball, e.g. social media posts were shared by others, and willing survey respondents suggested other people to interview – as relevant to each context. To that end, the recruitment did not seek a representative sample for interviews. Instead, it primarily sought to recruit people based on their participant type (5.4.3) and context (5.4.2); however, where possible I did seek to gather input from a diverse range of ages, genders, abilities, and occupational types in order to gather input on the practices of broad range of participants.

During open coding (5.6.1), if two or more participants offered conflicting accounts, additional data was gathered to refine analyses through theoretical sampling (Teddlie and Yu, 2007, p. 81). This led to 5 more interviews being conducted than initially planned. In addition, 3 interviewees arrived with other people (e.g. a partner or colleague). This led to 36 participants being interviewed across 32 interview sessions. Where more than one person arrived, I adopted a 'turn-taking' approach, asking the same question to each participant on an individual basis rather than incorporating dyadic interviewing (Morgan et al., 2016) as an additional method.

This research required individuals' accounts of practice performances. Interviews are a well-suited for gathering this type of data, and for eliciting meaningful reflections, in part because they mimic the flow of natural conversation (Latham, 2003, p. 123; Silverman, 2010, p. 189). This follows their ubiquity in everyday life:

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[73] The extended timeframe (20 months) was due to several factors, including the nature of part-time research, the challenges in recruiting estate agents/letting agents, a period of paternity leave and research leave (to a different project in Oslo), and to ensure that each context was properly open coded (5.6.1) before moving on to the next.

> *We have all been interviewed, at school, at university, for jobs, in a medical setting…We know the format, what to do and how to do it.*

> *(Edwards and Holland, 2013, p. 1)*

Alongside their familiar format, interviews invite participants to *"…speak in their own voice and express their own thoughts and feelings…"* (Berg, 2007, p. 96), allowing researchers to gather first-hand accounts in a relatively informal manner.

Structured interviews (like surveys) follow certain conventions (e.g. closed or nominal questions) that fracture the natural flow of conversation to enforce consistency across interviews (DiCicco-Bloom and Crabtree, 2006). By contrast, unstructured interviews focus on individuals' personal narratives and phenomenological experiences (Edwards and Holland, 2013, p. 30), with participants directing the flow of conversation without interruption (Morse and Niehaus, 2016, p. 125). Meanwhile, researchers 'bracket-out' their own preconceptions to accept anything expressed by the participant as valid (Moyle, 2002, p. 271) while reflecting on their own position within the research as interpreters (DiCicco-Bloom and Crabtree, 2006); an approach to which Charmaz (2006) is sympathetic (5.2.1). The semi-structured interviews employed in this research maintain the looseness and mimicry of natural conversation that unstructured interviews afford while providing thematic focus through topic guides for consistency across interviews (Arther and Nazroo, 2005, p. 118). This approach positioned me within a set of 'interpersonal situations' (Brinkmann and Kvale, 2014, p. 35), enabling me to develop of a coherent analysis through multiple 'inter-actions' (Ibid.) by following the same set of themes across interviews.

Following the interview topic guide (Appendix B), each participant was first asked which digital maps they had engaged with, and whether they preferred any specific map to others (and why). They were then asked for general examples of their past engagements with digital maps, eliciting detail on how digital maps relate to other practices. Next, participants were asked how they had engaged with digital maps within their respective contexts. Finally, they were asked what influence (if any) their engagement with digital maps had on their performance of wider social practices

While the topic guide provided consistency, it was not prescriptive. It provided a consistent set of themes to discuss in sequence (in all interviews) which directed the flow of conversation (and questions), but did not determine it, or direct its pace or

rapport (Charmaz and Belgrave, 2012, pp. 352–353). Rather, they allowed leeway for questions to be rephrased, for participants to speak 'off-topic', or for questions to be addresses asynchronously as conversations organically developed. Meanwhile, the topic guide acted as a point of reference to 'reign in' conversation if participants drifted away from addressing the question at hand. This provided enough consistency to aid the step from analyses of context-specific accounts (in theoretical codes) to developing concepts (5.6) without sacrificing nuance between different modes of expression (Galletta, 2013, p. 150) across a diverse range of participants.

5.5.3 Focus groups

By following-up the interviews with 3 focus groups (one per context, see figure 1) the research followed an 'interlaced sampling' strategy (Flick, 2018, p. 118) where each focus group was composed of participants that had previously been interviewed within the same context. That is, at the end of each semi-structured interview, each participant was asked if they would like to be invited to a follow-on focus group. While Scott, Rick, and Emma declined (see figure 6), the remaining 33 interviewees said "yes". All were invited to the focus group relevant to their context. Again, this was not aimed towards gathering a representative sample, but rather it sought to bring together different participant types within a context to elicit feedback on my reading and storying of their accounts in my analysis of their interviews.

To clarify, the focus group for each context was carried out *after* the interviews for that context had been completed (see figure 1) – as a form of 'between-methods-triangulation' (Flick, 2018, p. 14) in order to gather feedback on the emerging analysis (5.3.2 and 5.6.1).[74] This feedback was taken as *"...an opportunity to deepen the earlier analysis rather than* [as] *a test of it"* (Bloor et al., 2001, pp. 21–22). Rather than validating or reaffirming the emerging analysis (hypothesis testing) the focus groups sought to extend, refine, and/or modify the emerging analysis through further participant input. Thus, their use is consistent with both the inductive logic of constructivist GT and the interpretivist underpinnings of the research (5.2.2) in so far is it offered participants the opportunity to (collectively and collaboratively) decentre my position as the researcher, and to challenge my reading of their previous accounts in interviews.

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[74] The focus groups were conducted April 2014, October 2014, and June 2015.

In focus groups *"…participants are called on to discuss and confront each other collectively – as a group…"* (della Porta, 2014, p. 290) while researcher(s) facilitate that discussion (Greenbaum, 2000, p. 27). To that end, using focus groups for 'between-methods-triangulation' (Flick, 2018, p. 14) ensured that each context-specific focus group gathered the voice of a collective (group) of participants (Torrance, 2012) in a way that redressed the individualism of interviews and any participant-researcher power asymmetries they might have held as a result. Similarly, because participants shared the commonality of a context, each focus group held a 'natural' composition (Lunt and Livingstone, 1996; Hyde et al., 2005, pp. 2589–2590). This supported their discussions of digital map-related practices being focussed on a specific context (e.g. home-buyers and home-sellers held more in common in their engagement with digital maps than home-buyers might have had with walk-leaders).

The response rate for the focus groups was relatively low (figure 6) due to the interview gathering timescales and some participants' busy schedules. As a result, not all participant types were well-represented within each focus group. However, this was not troublesome because the overall analysis was not based on a comparison of participant types within (or across) contexts (5.6.1).

One of the strengths of focus groups is that they allow participants' accounts to be combined interactively while also centring thematically on a specific topic (Kvale, 1996, p. 72). In this research, focus group discussions centred on a set of generalised statements based the analysis that was emerging through interview coding (5.6.1). These statements were set out on a separate sheet of paper alongside a topic guide (Appendices C and D), and participants were directed to collectively discuss each statement in turn, highlighting anything they felt important.

5.6. Data analysis: the coding and memo-writing process

This section describes the approach taken towards data analysis. It starts with an outline of the coding process (5.5.1), it then describes the generation of memos and their connection to coding (5.5.2).

5.6.1. Coding: open, focussed, and theoretical coding

Analysis of interview data followed the three-stages of constructivist GT (5.2.2). It developed open codes, then amalgamating them into focussed codes and later (after the focus groups) into theoretical codes (5.2.2, also see figures 1). Rather than maintaining separate theoretical codes for each context, they were further

amalgamated into a single set of concepts (see figure 11 in Chapter 9). To clarify, this research is exploratory. The overall analysis is not based on a comparison of participant types, nor on a comparison within or across cases (or contexts). Instead, contexts and participants types are employed as heuristic devices – as aspects of the sampling strategy in order to ensure the research gathered data on accounts of practices that cover a broad temporal scale (5.4.2).

Interview and focus group transcripts were coded through the same process:

(1) Line-by-line transcription of audio/video recordings in Microsoft Excel. Horizontal rows separated the turns taken in each conversation. Vertical columns separated the speaker, start time/end time, and content of each turn. For focus group transcripts an additional column covered the statement being discussed.

(2) Importing the transcripts into NVivo involved copying/pasting the Excel-based transcriptions into Word, and then importing the Word-based documents into NVivo, before associating them with relevant recordings (media sources). When participants provided no consent to be recorded notes were imported instead.

(3) Coding transcripts. This involved a close-reading of transcripts/notes while listening to/watching any associated recordings while applying codes within NVivo. For interview transcripts, this marked the start of open coding. Focus groups transcripts were coded to focussed codes (leading to change, modification, and refinement of the coding scheme).

In open coding the interview transcripts, some of the codes used were in vivo, *"...rooted* [verbatim] *in the participant's own language"* (Saldana, 2012, p. 105). Others were more descriptive (Saldana, 2012, p. 102) or conceptual (Saldana, 2012, p. 119) – and therefore steeped in my interpretation of the data. However, to remain consistent with practice theory ontology the coding was primarily 'gerund' based (Charmaz, 2015, p. 1616) using present participle verbs to identify practices.

Bazeley and Jackson (2013, pp. 7–9) note that several criticisms have been levied against qualitative data analysis software (QDAS) like NVivo. For example, that *"…software can allow some users to get too close…"* (Johnston, 2006, p. 383) leading researchers to enter a 'code-and-retrieve' cycle where they code *"…every*

part of a document without taking time to think and reflect upon data" (Ibid.). Elsewhere, Andrews holds QDAS responsible for 'coding fetishism' where a *"..structural emphasis on coding makes coding an obsessive end unto itself…"* (2008, p. 286). Bazeley and Jackson (2013, pp. 9–10) add that QDAS automation also risks homogenising qualitative research in a generic approach divorced from its rich diversity of philosophical groundings.

To abate these concerns, and to avoid the coding scheme going 'viral' (Bazeley and Jackson, 2013, p. 104)[75] through 'coding fetishism' (Andrews, 2008, p.286), the open codes were generated, and then iteratively revised by being merged with and/or subsumed under others to form categories and subcategories, or promoted/relegated within a hierarchy. While this early process of amalgamation provided an initial set of focussed codes, I felt that doing so too fervently early in the analysis could risk moving towards a deductive approach where a narrow set of codes would then be forced onto data a priori. As a result, the research retained a relatively large set of focussed codes (Figure 10) which were then used to form the generalised statements discussed in each focus group (5.5.3).

Context	**Open Codes**	Focussed Codes		**Theoretical Codes**	**Concept**
		Before Focus Group	***After Focus Group***		
Home-choice	132	29	12	11	7
Leisure-walking	232	21	9		
University Life	166	19	15		

Figure 10: Coding stages (number of codes)

Following the focus groups, the focussed codes were reviewed and further amalgamated (based on participants' feedback) into three sets of theoretical codes.

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[75] Bazeley and Jackson (2013, p. 104) refer to 'viral coding' as a scenario where codes are developed into hierarchies with unnecessary repetition that later become unmanageable.

At this stage, a closer integration between codes and memos (5.6.2) led the research to move beyond descriptive analyses of participant accounts and towards a more theoretically abstract one, in which, the three sets of theoretical codes were amalgamated into a single set of concepts (see Chapter 9)

5.6.2. Memo-writing: from draft notes to concepts

The research generated a set of memos alongside the codes. This involved writing short pieces of text that incorporated participant quotations, codes, ideas, and thoughts/reflections on existing literature. Memos allow researchers *"….to examine data at a greater level of abstraction and to explore hypotheses, relationships and explanations…"* (Birks et al., 2008, p. 73) in a way that coding alone cannot.

In GT, data analysis fractures data in the early stages of coding, then weaves it back together again in later stages (5.2.1). Fracturing the data through open coding is a relatively easy task. Weaving it back together by amalgamating focussed and theoretical codes requires far more critical reflection, and careful consideration of how different codes (and their sub/categories) relate to one another. Memos supported this process, providing space to ruminate about what the data was saying, and how it connected to other knowledges. That is, they provided critical distance from the coding process itself, enabling a better data analysis. To that end, while the generalised statements used in focus groups were based on focussed codes (5.6.1), they were also refined (and brought together) through a process of memo-writing.

Similarly, while focussed codes (revised through participant feedback) were amalgamated into theoretical codes by revisiting data to review the coding, it was memos that provided a critical space to compare theoretical codes with existing theories in order to generate concepts. In short, memoing enabled a tighter integration between data analysis and writing (Glaser and Holton, 2004). For example, despite identifying it is as an important focussed code (and therefore an important aspect of participants' engagement with digital maps), the search for relevant literature (Chapter 3) found a dearth of theory surrounding people's engagement with digital maps as taken-for-granted. The memos provided a critical space to develop the findings into focussed code (called 'latent resources'), and to compare it with other focussed codes – leading to its further development into a theoretical code and then later re-assignment to a category of a concept called 'engagement' (9.2).

5.7. Ethical Considerations

This section sets out some of the ethical considerations this research entailed. First, it describes considerations taken within research interactions (5.7.1). It then discusses the value of video-recording interviews and focus groups for professional development (5.7.2).

5.7.1. The considered ethics of research interactions

To ensure participants felt safe, they were invited to select the location of interviews – albeit within practical constraints (e.g. avoiding noisy coffee shops where recording would be poor quality). This led 3 participants to request online (Skype) interviews.[76] This did not adversely affect those interactions – the 3 participants had prior experience (and competence) using Skype and were familiar with communicating through it. By contrast, focus group locations were based on ease of accessibility for participants (Appendix G). However, the University-choice context required careful consideration. While the university was a geographical locus for participants, it was laden with uneven power-relations amongst the participant types (e.g. it was a workplace for University employees, an authoritative institution for students, and represented access to a core market for local business owners/employees). To ensure the focus group was carried out in a neutral space I hired a conference room in a nearby hotel rather than using one within a university building.

At the start of each interview and focus group, all participants were provided with a topic guide and consent form (Appendices E, F and H). I also explained the purpose of the interview/focus group and explained how their data would be managed (stored on a dedicated password-protected hard-drive and backed-up regularly to a secure university server). The consent forms served to inform participants about the research topic and purpose and to advise them that they would be anonymised if quoted. This ensured that not only was consent provided, but that it was an informed consent. For interviews, participants were asked to consent either to: (1) video-recording, using a small camcorder placed at a side-angle to capture the interaction. This involved positioning the lens so as not to be directly facing either researcher or participant, making it less intrusive; (2) audio-recording, achieved by placing a large white sticker over the camcorder lens; or (3) no recording (with only written notes taken). Where more than one person attended (5.5.2), consent was sought from both

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[76] Online participants (Skype) were asked to digitally sign the consent form and return it by e-mail before the interview.

parties. Similarly, focus group participants were asked to sign a consent form to be recorded by video or by audio. Participants selecting audio would have been seated out-of-shot, however all participants were happy to be video-recorded. No option was provided for 'no recording' because it would have been logistically infeasible to record some participants in a focus group while not recording others. All participants were advised of the recording options in their invite to the focus groups. In terms of the interaction during both interviews and focus groups, my previous experience of working in sales/marketing and customer service led me to remain sensitive not to direct or lead participants towards any specific response. Instead, as far as possible, I matched their rapport and pace (Charmaz and Belgrave, 2012), ensuring they led the discussion.

Extending the ethical considerations beyond the moment of research interactions, I published a blog post (Hanchard, 2013), and posted a link to it on each dedicated social media account and e-mailed to all e-mail addresses provided by interview/focus group participants and survey respondents. This served to 'give something back', and to update participants/respondents on the research progress.

5.7.1. Video-recording for self-reflection

Video-recording research interactions is a relatively well-established practice within qualitative research (Pink, 2001). While audio-recordings of focus groups "*…are often difficult to transcribe because of the free flow of conversation, different voice levels, interruptions*" (Lunt and Livingstone, 1996, p. 82), video recordings made it far easier to identify which participant was speaking, and (importantly) who they were speaking to. This was a significant advantage when transcribing and reflecting on focus group sessions. However, the primary reason for video-recording interviews and focus groups was to gather richer data on each interaction than audio affords. Rather than using this visual data within data analyses or presenting it within the thesis (which might have detracted from the argument itself), I used it to analyse and reflect on my own research practice. That is, alongside coding for detail on participants' engagement with digital maps (5.6.1) I maintained a separate set of self-reflexive codes and memos. For example, one code (mirroring) covered aspects of interviews where participants uncritically repeated my words or terms set out in the questions or topic guide rather than addressing the question directly. For instance, one student (Francis) mirrored my somewhat clumsy use of the term 'performance' throughout their answer to a question. During the interaction, I was unaware of this.

By reviewing the video-recording it became apparent that each time Francis mirrored my term, he also pointed at the topic guide with his index finger; he did not point at the topic guide at any other time in the interview. To that end, the self-reflexive codes helped deepen the analysis and aided my professional development as a researcher.

5.8. Conclusion

This chapter has set out the methodology that underpins this thesis. It described the philosophical underpinnings of the methodology, asserting its coherence with the practice theory ontology set out in chapter 4. The chapter also provided a detailed description of the research design, including sections on the sampling strategy, and approaches taken towards gathering and analysing data.

As this chapter has illustrated, this research follows an inductive design that borrows heavily from constructivist grounded theory. It argues this methodology is suitable for developing a theory of digital maps and map use, moving beyond the localised specificity of individual contexts (e.g. in the analysis of interview and focus group data) to a more conceptual understanding developed through an amalgamation of codes and memoing. Overall, the analysis followed a grounded theory derived approach, albeit with purposive rather than theoretical sampling. While the methodology sits close to Charmaz's constructivism in terms of researcher positionality, it assumes an interpretive insider-researcher position rather following Charmaz (2006) to a locate researchers within the research as co-constructers of knowledge. The presentation of findings differs from constructivist grounded theory too. To clarify, the concepts developed through the research are discussed alongside existing literature rather than as standalone aspects of a grounded theory (see Chapter 9). To that end, the methodology is best described as a qualitatively-driven approach that borrows heavily from constructivist grounded theory.

6. Anchoring views: exploring how digital maps are engaged

6.1. Introduction

This chapter addresses the first research question: How do people engage with digital maps? That is, how do individuals go about using digital maps, and with what degree of knowledgeability,[77] and what is it they engage digital maps for?

The chapter argues that people engage with digital maps in practical consciousness (4.2.2), often taking them for granted as mundane resources that are 'just there'. In doing so, the chapter highlights a process of deferral, where individuals tend to draw on and trust the information presented on a map without critically engaging its veracity or reliability (6.2). The chapter connects this deferral to a lack of reflexivity in map-users' selection of digital maps (6.3). For example, rather than purposefully choosing a specific digital map, people often engage with a 'default' instead, by deferring to the pre-installed map application on their smartphone or the digital map framed within a webpage. Thus, the chapter argues that map-users tend to defer to defaults as material elements (4.3.2) that have been stabilised within established practice routines (6.4) – often with little or no consideration of possible alternatives. Moreover, the chapter argues that the routinised deferral to default digital maps serves to anchor wider practice bundles that extend beyond the specific local context, alongside various senses of place, senses of security and social positions (6.5). Overall, the chapter provides the basis for a theory of digital map engagement aligned to the conceptual framework developed in Chapter 4. This theory is extended through a discussion about: how the specific web-based affordances of digital maps are engaged with (Chapter 7); and what engagement with digital maps anchors – and how (Chapter 8).

6.2. Partial frames: how people engage with digital maps

This section argues that individuals engage with digital maps unreflexively, despite often also acknowledging that they anchor the performance of various everyday practices.

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[77] Use and engagement were differentiated in 2.1; 'use' refers to individuals' active operation of a digital map while 'engagement' offers a more encompassing term that also covers purposeful 'non-use' of digital maps and the potential to use them (as latent resources).

6.2.1. Taking digital maps for granted: engaging with ordinary resources

Digital maps are often engaged with as ordinary resources, with users ambivalent on their importance. For example, when Tom talks about how he uses digital maps as a group walk leader, he describes taking them for granted as instrumental tools that are readily available to draw on when planning walking routes:

> *Google Maps is just handy, and it's just there… click here and click there and it draws it up for you nicely. Um, it's available on the smart phones and 'knows what else, and they go everywhere.*
>
> *(Tom)*

When he describes digital maps being 'just there', Tom's account resonates with Throop and Murphy (2002, p. 196) and Ling (2012a, p. 14) who both argue that media technologies are 'taken-for-granted' because of their embeddedness in everyday life (4.2.4). Tom also notes that Google Maps' graphical user interface (GUI) allows him to self-generate a walking route by 'just clicking'. Similarly, Tom suggests that digital maps have a relative ubiquity; being available on smartphones alongside other (unspecified) media, they 'go everywhere' – they are not tied to any specific media device.

Furthermore, Tom's understanding of digital maps as resources *"…available on the smart phones and 'knows what else…"* extends beyond a description of digital maps as material elements of practice – as they would be for Shove et al. (2012). Instead, his description aligns more closely with Lammes' definition of digital maps as simultaneously *"…media, cartographies and technologies"* (Lammes, 2016, p. 2). For Tom, not only are digital maps available on different devices, as *media* they are spreadable (Jenkins et al., 2013) too in as far as they *"…go everywhere…" (Tom)*. At the same time, Tom portrays digital maps as *cartographies* (empirically verifiable representations), explaining that when he plans walking routes, a digital map *"…draws it up for* [him] *nicely…"*. In this, Tom also portrays them as web-based *technologies* with a GUI that allows him to self-generate walking routes *"…click*[ing] *here and click*[ing] *there…"* (7.2.1). However, Tom remains ambivalent about the importance of digital maps, describing them as 'just handy' but not integral to his everyday life.

Other participants attribute the importance of digital maps to specific affordances they offer.

For example, Matt describes using digital maps to generate directions between one place another, which saves him time when planning trips:

> *…it's just a time-save… you can say: 'this is where I want to go to', rather than trying to search through on a paper one. It's just easier. Not essential. I mean you could do it with a land map.*
>
> *(Matt)*

Like Tom, Matt does not consider digital maps essential to everyday life. He takes them for granted as mundane resources. For instance, when Matt describes self-generating a route, he follows Tom in taking digital maps and their web-based affordances for granted. In this, Matt's account connects with Bolter and Grusin's (2000) concept of remediation and hypermediation (4.5.1). For example, when Matt states that "[i]*t's just easier. Not essential. I mean you could do it with a land map…*", he presents a point of remediation where an older format (paper-based maps) might have be used in place of a digital one. Likewise, his account also presents a point of hypermediation; paper-based maps require that he manually searches for a route between two points, whereas with a digital map he can *"…say 'this is where I want to go to', rather than trying to search…"* manually, and the digital map then presents a route for him. Thus, Matt (like Tom) holds digital maps to be meaningful as mundane resources that are 'just handy', but 'not essential'. They save time when planning routes, but equally as Matt notes, he *"…could do it with a land map…"* suggesting that having no access to a digital map would have minimal impact on his ability to plan routes; a paper-based map would suffice.

Matt and Tom articulate a sentiment that digital maps are relatively inconsequential. Other people describe a similar sentiment. For example, when asked to clarify how important digital maps are, Luke explains he *"…could live without them; if they disappeared tomorrow, I wouldn't be crying".* However, other participants present a different perspective. For example, some people describe digital maps as resources that are *"… intrinsic to what I do… the only way I make choices these days"* (Dave), or assert that they *"…couldn't do without* [them]*…"* (Pete). In this, Dave and Peter both provide accounts that match Plantin's (2018, p. 490) assertion that digital maps

are central to everyday life (3.4.1). However, they both hold a high degree of competency in using digital maps; Dave and Peter are both university students with access to a wide range of digital maps and mapping technologies (as institutional material resources). Both also possess a high degree of (potentially transferrable) competencies using information and communication technologies (ICTs), including prior experience with mapping technologies. Relating this to the conceptual framework (Chapter 4), suggests that the importance Dave and Pete place on digital maps follows a more frequent and sophisticated form of engagement with digital maps than carried out by Matt or Tom. That is, not only do Dave and Pete have access to relevant materials and the competence to amend digital map content, it is also more meaningful for them to do so. To clarify, when Pete explains that his knowledge of *"…mapping relates to the work I do as a volunteer in the air cadet organisation…",* he adds that his previous experiences include frequent engagement with various digital maps:

> *Ordnance survey does a thing called 'get a map' which is quite*
> *handy. Google Earth, we have the pro edition through cadets. There*
> *is not much difference really, but you can do big, high quality satellite*
> *exports, which is quite nice for making posters and things…last year,*
> *I worked for Metro, who does the public transport for Leeds, well, the*
> *whole of West Yorkshire. On their system I did the allocating the*
> *routes for buses…*
>
> *(Pete)*

In this, Pete's past work experiences provided him with access to various digital maps as material resources and the competence to engage with them in a sophisticated way. Similarly, Dave portrays his engagement with digital maps as frequent (noting that he uses digital maps 'a lot') and sophisticated in as far as he understands the technological background to TripAdvisor's remediation of Google Maps:

> **Dave:** *I use it a lot. Not, I suppose, it's not just the mapping*
> *functionality, I use a lot of TripAdvisor a lot.*
>
> **Me:** *So is that, I mean, which map are you using when you use Trip*
> *advisor?*

> **Dave:** *It has it's own. I guess it used Google [Maps], but it's got its own.*

By contrast, when Mark and Mandy refute the centrality of digital maps in everyday life, they both cite medium-specific (material) limitations as their rationale for doing so. For instance, Mark argues that *"…you can write on a paper map. Also, less reliant on battery power when out and about…"* (Mark). Meanwhile, Mandy attributes her rejection of digital maps to the *"[l]ack of signal to the mobile phone or sat nav (or no battery)*' when 'out and about'…". Notably, both contextualise their digital map use within a specific practice entity (countryside leisure-walking). As a mobile practice, countryside leisure-walking in Britain often involves inclement weather, owing to the temperate climate. It also tends to be carried out in rural locations where mobile phone and internet signals may be weaker than in urban areas, and where limited opportunities may exist to charge media devices. Thus, their rejection of digital maps as a central technology to their everyday life is arguably based on a set of material limitations which they associate with the devices used to access digital maps; it is not attributed directly to digital maps *per se*. Neither Mark nor Mandy consider remediate forms of digital map use such as printing them, or generalised forms of use outside the specific context, e.g. engaging with a digital map to plan their journey to/from the start point of a walk.

In contrast, when Terry describes his engagement with digital maps as a part of his countryside leisure-walking practices, he frames his non-use in terms of sociality and competence:

> *…none of us sort of had, if you like, computer training in our own education… I wouldn't say we are at all computer literate… We can search for things, you know, but we're not that sort of, you know, technically orientated.*
>
> *(Terry)*

For Terry, not having the competence required to use a digital map *is* part of the walking group's shared identity and is held to be common amongst its members. The lack of computer training in previous formal education is something he assumes all

group members have experienced[78]. In conceptual terms, Terry's account of the walking groups' shared non-use of digital maps connects with the framework developed in chapter 4. For example, when Terry states that *"..none of us sort of had…computer training in our own education…",* his account connects with Giddens' assertion (4.2.2) that structure exists in memory traces (Bryant and Jary, 2001, p. 16) in so far as a shared lack of competence is based on (or limited by) a similar experiences of past formal education. When Terry adds that *"[w]e can search for things, you know, but we're not that sort of, you know, technically orientated…"*, his account also connects with Bourdieu's argument (4.2.3) that shared (structurally differentiated) experiences form individuals' habitus, which in turn influences their dispositions (or orientations) towards the technology.

In this, for Terry, a shared set of past practices set the non-use of digital maps as a rule for membership of the walking group. Returning to Shove et al. (2012), Terry's account of a shared rejection of digital maps also infers that there are no prior contexts from which group members might abstract or reverse the competencies required to use a digital map. This stems from his underlying assumption that having the competence to use a digital map would come from previous use of computers, rather than from experiences of using paper-based maps. In this, Terry's account challenges any linear understanding of digital maps as straightforward successors of paper-based maps. His walking group do not engage with digital maps as a digitised (remediate) form of paper-based maps. Instead, Terry explains that walking group members understand digital maps to require a set of competencies that are not directly transferrable from (or common with) their engagement with paper-based maps (4.3.3). In turn, this resonates with survey research carried out by Hurst and Clough (2013) which found that people's preferences for either paper or online map formats differed according to the task at hand (the context) and their level of competence in using either. They found that for leisure-walkers *"… preparing a walking route, is carried out quicker using paper maps"* (Hurst and Clough, 2013, p. 57); therefore, non-use in a leisure-walking context may not be performed in the same way in other contexts. Terry's account also resonates with the technical development of digital maps set out in Chapter 2, which explained that digital maps evolved from innovations in computing (the internet and web) and software (from

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[78] In part, this may also reflect the age of the sample. The countryside walking context included a sample of 10 people, with a median age of 54.5 and a mode of 53.1 (ranging from ages 32 to 73).

HTML to GeoJSON), and not directly from advances in paper-based mapping or cartography. That is, the competence required to engage with digital maps is best transferred from using other ICTs rather that from using paper-based maps; a point that follows on from Pete and Dave's accounts above, where both draw on a high degree of ICT competence to engage with digital maps in a sophisticated way.

In summary, this subsection has argued that while digital maps may be held meaningful as ordinary resources, or rejected as part of a shared practice of group membership, such polar positions tend to be limited only to participants with either highly specific forms of use such as Dave and Terry, or relatively low levels of ICT competence such as Terry and others in his walking group. By contrast, a common sentiment amongst survey, interview, and focus group participants matches Tom and Matt's assertions that digital maps are 'just handy' (Tom) and that for geospatial matters, they are "…*just easier. Not essential…*" (Matt). Both consider digital maps to be relatively inconsequential and mundane resources that are 'just there'; they are 'handy', but not central to everyday life. This raises a question of knowledgeability in terms of how far map-users are aware of the competencies and meanings they draw on when engaging with digital maps. It also provides an understanding that digital maps are not always actively used; they can be actively rejected (in purposeful non-use) or sit dormant ready-to-hand for use when needed. As such, the thesis argues that engagement offer a more encompassing term than use.

6.2.2. Partial frames: unreflexive engagement with digital maps

When people engage with digital maps as mundane resources that are 'just there', they do so unreflexively. They draw on digital maps in practical consciousness as allocative resources (4.2.2) – as materials that provide authority derived from "*…dominion over things…*" (Bryant and Jary, 2001, p. 13) – and that are ready-to-hand within their ongoing performances of routinised practices. For example, when Pam chooses a house to buy, she uses a digital map to shortlist potential properties before physically going out to visit them. She explains that a digital map delimits the range of properties that constitute her shortlist, but remains unreflexive in her choice of using a digital map or in any rationale or strategy behind the map-makers' decisions about which properties are presented or omitted:

> *…I would say they were about fifty percent really. Because it was*
> *going really based on what I found on the map, and then going and*

actually looking at it… without digital maps I wouldn't have actually viewed them. I wouldn't have put them on my list.

(Pam)

In this, Pam engages with digital maps through two property search websites – RightMove and Zoopla. Both present a bespoke layer on a Google Maps base reference map embedded on their websites, using GeoJSON to provide a dynamic list of properties, which is updated in real-time from an external dataset (RightMove, 2018; Zoopla, 2018b). Thus, Pam's engagement with digital maps is hypermediate (Bolter and Grusin, 1999, p. 53), since one media (the external dataset of properties) is represented within another (the layer on the map). When Pam discusses her engagement with digital maps, she describes them as mundane resources that are partially important in choosing a home. From a Giddensian (1984) perspective, Pam's ability to articulate that her choice *is* anchored by digital map use demonstrates that it is not unconscious (4.2.2); she is aware that her choice of house is partly determined by her use of a digital map. For Pam, any house omitted from either property search website would not make her potential buying shortlist. However, she cannot fully articulate the extent to which her digital map use anchors her choice of home, noting instead that they inform her choice by *"…about fifty percent…"* (Pam). In this, the extent to which digital maps anchor her choice is not obvious to her in discursive consciousness. Instead, Pam presents her digital map use as an activity carried out in practical consciousness; it is not something she critically reflects upon – despite acknowledging its importance in her choice of home. Similarly, Pam does not describe any consideration for the rationale or data politics behind the range of properties presented on RightMove or Zoopla, or of the algorithms behind them. Instead, she treats map content as a truthful and comprehensive (veracious) representation of a single reality, which provides a sufficient range of houses for sale for her to choose from. In turn, this raises epistemic questions about the politics of data presented on digital maps, and the degree of trust map-users place in it (8.3.1).

In contrast to Pam, Francis engages with digital maps for more spontaneous and immediate practice performances. He draws on them as in-situ geolocative media when 'out and about', rather than as tools for planning long-term decisions. Like

Pam, he portrays his engagement with digital maps as unreflexive, and carried out in practical consciousness:

> *...sometimes I use that 'Search nearby' feature, when I'm out and about. I just tap my location and search whether I'm near a McDonald's or whatever.*
>
> *(Francis)*

Although Francis acknowledges that digital maps anchor his choice of consumption site, he does not articulate the extent to which they do so, nor does he question the underlying data politics of *what* is represented (or omitted). Instead, Francis describes using a digital map via a smartphone app as a form of geolocative media for choosing consumption sites, tapping on his location to find places nearby to eat. Interestingly, Francis describes his digital map use as an activity carried out when *"...out and about..."* (Francis), in this, he depicts it as an instantaneous and mobile practice carried out as part of his gaining orientation to a new university campus. In contrast, when Pam uses a digital map to search for a new home, it is *"...normally on a laptop..."* (Pam). That is, Francis and Pam both acknowledge that their engagement with digtal maps in practical conciousness informs their practices, but neither attribute this directly to any affordances of the media devices.

Alongside their use of different devices, Pam and Francis also depict their engagement with digital maps over different periods of time (5.4.2). Pam portrays her engagement with digital maps as her routinised practices when choosing a home (also see 6.4.2). In this, her account covers engagement over a longer period than Francis' relatively immediate (and mobile) engagement to locate somewhere to eat 'when out and about'. However, both assert it is their use of a digital map that anchors their choice of site and subsequent practice. In so doing they both describe being knowledgeable of their immediate and instrumental use of digital maps. Similarly, both articulate their treatment of digital maps as mundane and taken-for-granted resources. However, in engaging digital maps in practical consciousness, neither provide a direct account of the *extent* to which their digital map use anchors their practices. Pam thinks that her engagement with a digital map structures her choice of new home by *"...about fifty percent..."* (Pam). Meanwhile, Francis consults digital maps for detail on what is near to him, which partially informs his choice of site; it influences but does not but does dictate or fully structure it. In this, Pam and

Francis both describe their engagement with digital maps as an activity that is carried out in practical consciousness; it is not something they consider with any degree of criticality. They can *"…report discursively about their intentions in, and actions for* [using digital maps]*…they cannot necessarily do so of their motives."* (Giddens, 1984, p. 6). In short, people may be able to discuss their intentions and rationale behind key decisions (such as choosing which house to buy), but they cannot fully articulate their internalised motives. Furthermore, when Francis and Pam describe their engagement with digital maps, their accounts suggest they both find the information presented on a digital map to be truthful. In turn, this raises a question about the degree of trust they place in digital map content (8.3). Having addressed how people engage with digital maps in this section, the next section addresses how people select digital maps.

6.3. Deferral to defaults: how people defer in their selection of digital maps

This section pursues the assertion above, that individuals are often unreflexive in their selection of digital maps. Rather than purposefully or rationally choosing a specific map, users tend to 'defer' to whichever specific digital map is established as the 'default' (9.3), either in terms of unreflexively using the map provided via a specific medium, or in continuing to use the established default for a practice entity. The section argues that such 'defaults' are established when a digital map is affiliated into an existing practice as a new material element (media-scripted deferral), or when it is transposed from one practice entity onto another through a cross-referencing of media (hypermediated deferral).

6.3.1. Media-scripted and shared deferral: mediated digital map selection

When individuals select a digital map, they often defer to a default. At times, this can be scripted by the media device in place within a given practice. Tom for example, defers to Google Maps when planning walks because it is *"…just there…"* (6.2.1). Likewise, when Beth (a student-facing landlord) describes selecting a digital map, she does not describe a considered or rational choice. Instead, she selects the pre-installed map application on her smartphone (Google Maps) because it is 'just there':

> *Me: …you sort of mentioned Google being the main map, is there any reason why?*
>
> *Beth: Just that's the app I've got… it's not a conscious choice… it's just the one I've always used, and it came with my phone, so yeah.*

Here Tom and Beth both describe a media-scripted deferral. For Beth, Google Maps was preinstalled on her smartphone as the default digital map application. Rather than purposefully choosing one from a range of alternatives, she defers to Google because it is 'just there' – it came with her phone. In this, her deferral is scripted by the smartphone – the medium she uses to access the map application. Interestingly, when Beth adds that *"...it's just the one I've always used…"*, she provides an account of routinised deferral. To clarify, Beth has Google Maps ready to hand as a smartphone app (a material element of her practice), she possesses the relevant competence to use it, and finds it meaningful as a mundane resource that is ready-to-hand. When Beth notes that *"…people do tend to have Google Maps on their phone…"*, she presents Google's Map as a widely engaged default that extends beyond her individual practices and onto those deferring similarly to the pre-installed app on their phone.

This suggests deferral to default digital maps may specific to a practice or context (and thus potentially shared), or personal to the individual map-user as a matter of personal habit. Similarly, when asked to specify which digital map she engages with, Mandy states that she uses '[w]*hatever the one is called that is on my iPhone... I use that a lot!'*. As a survey respondent, Mandy's account is not tied to any specific context. Instead, her response refers to her general use of digital maps in everyday life. However, Mandy's description of a media-scripted deferral matches Beth's. Moreover, when Francis describes his engagement with a digital map, both for orientation to his university campus and (more broadly) to navigate a city that is new to him, he depicts his selection of Google Maps as a similarly media-scripted deferral:

> *I just use Google maps, just because it came with my phone…*
> *sometimes if I'm walking, I'll use my phone… if I don't know where*
> *something is, I'll think 'Ooh, I don't know where that is' and I'll just run*
> *it through Google Maps.*

> *(Francis)*

In short, Beth, Mandy and Francis portray taking their smartphones for granted as mundane resources they engage in the ongoing flow of performances of everyday life social practices. They all describe their selection of digital maps as a deferral towards a media-scripted default (the pre-installed application). They also highlight a process of deferral that is not specifically related to their immediate practice. Hence, default

digital maps are not tied to any specific context, rather deferral as a form of selection carried out in practical consciousness is attributed to individuals' habitual (routinised) practices and the (material) media devices they use. This leads to a question about how digital maps are selected and distributed in shared or collaborative practices, addressed in chapter 7.

In contrast to the individualised accounts of deferral to media-scripted defaults above, other people describe their selection of digital maps as deferring to a shared default. That is, they choose a certain map that has been established as the pre-existing default for a practice entity or context. For example, when Tom selects a digitised Ordnance Survey (OS's), he depicts it as a deferral towards the established default map vendor that his walking group recursively defer to in their countryside leisure-walking practices. Thus, his choice of OS is a continuation of his walking group's shared deferral to OS paper-based maps as an established default:

> *…we're always using OS maps, and OS maps are always OS maps... because we're always using OS, the actual information on there is always the same*
>
> *(Tom)*

This partly relates to the symbolic value held by OS as the default map for leisure-walkers, irrespective of medium. In other words, Tom does not select the OS as a default through any individualised form of media-scripted deferral (like Beth, Mandy and Francis), but because it is collectively held meaningful as the shared default by his walking group. However, alongside his selection of OS, Tom also describes a media-scripted deferral to Google Maps for some aspects of planning walks, because it is *"…just handy, and it's just there…"* (Tom). Hence, his account suggests that people defer to more than one default and may reflexively modify their deferral according to the specific context of their practices. In this case, when Tom takes part in countryside leisure-walking - as a practice performance he shares with a walking group – his selection of digital map is structured by the rules of group membership, which considers OS to be meaningful as the default map vendor. Outside the context, he follows a media-scripted deferral to Google Maps. This leads on to examining how defaults are established and/or maintained – both by individuals and collectively within shared practices.

6.3.2. Breaking and remaking links: how defaults are established

Before a digital map can be deferred to (as a default), it must first be established as a default. This tends to happen in one of two ways: either an individual integrates a digital map into an existing practice as a new material element, or the established default for one practice is transposed onto another. For example, when Sarah selects Google Maps, she does so unreflexively. It is 'just there', pre-installed on her smartphone, ready to be deferred to when she is out and about, and irrespective of the research context or practice at hand:

> *…Google is my 'go to'… I wanted to find an Aldi supermarket*
> *yesterday. I had no idea where it was, so I Googled it, which pulled*
> *up Google Maps… I zoomed in on my destination to see what was*
> *around it.*
>
> *(Sarah)*

In context, when Sarah portrays her search for a nearby supermarket, she describes it as an account of just one practice within a wider bundle of entangled practices involved with gaining an orientation to a new city as a student. By describing Google Maps as her default 'go to' map, Sarah presents a deferral that extends beyond the specific practice or context. She also describes a complex interplay or entanglement between Google products. Initially, she draws on Google's popular Search engine, and her description of 'Googling' the supermarket suggests a deferral to Google Search as her default search engine. Hence, Sarah's account provides an example of a digital map-user deferring to Google Maps as a media-scripted default, albeit via a process of hypermediation and not necessarily through the device used to access the map. In other words, her deferral to Google Search leads her towards Google Maps; it is not scripted by a deferral to a pre-installed app on her smartphone. As Sarah notes, her deferral to Google Search as an established default search engine 'brings up' Google Maps as the default map. In this, Google Search integrates Google Maps within her practice of searching for supermarket, establishing it as the 'go-to' map that she will likely continue to defer to in future practices.

Other people reveal that, rather than a digital map being integrated into an existing bundle of practices as a new material element, it can be transposed from one practice to another. For example, Jay manages a small team responsible for

developing a housing association website. He describes an organisational (shared) media-scripted deferral to Google Maps as part of a collaborative business decision:

> *We only really consider two options when implementing a map…*
> *Google Maps or MapBox. Google Maps has a very well documented*
> *API and works flawlessly with the Geocoding API, so we didn't*
> *foresee any problems integrating the two and decided that, rather*
> *than having to support lots of APIs from different vendors, to 'keep it*
> *all under one roof'.*
>
> *(Jay)*

The team that Jay manages have access to Mapbox as an alternative, as well as the competence required to use it. However, they opt to embed Google Maps on their website, using a bespoke layer to display available properties instead. Jay explains this choice is based on the meanings his team ascribe to Google Maps' API – they associate it with reliability and believe it will be easy to integrate with legacy applications (pre-existing technical architecture on the website). Not only does this demonstrate a reflexive form of collaborative deferral, it also shows how defaults can be transposed from one practice (web development) onto another (choosing a home), presenting a point of potential inequality in the scripting of defaults for others (7.2, 7.5, and 9.7) – a power inequality in digital map engagement for many end-users. In Jay's example, when residents (direct engagers, see 5.4.3) search for a home on the housing website that his team (informers, see 5.4.3) develop, they encounter a bespoke Google Maps layer embedded on the webpage; the embedded map is presented as the *only* option (a scripted default) on the website and therefore delimits the range of their choice. By extension, when people use the website, they follow a media-scripted deferral to Google Maps as the default digital map, and therefore select it as an established default presented to them by Jay and his team. In turn, this raises several questions (considered next) about how default digital maps are maintained beyond their initial establishment, and the degree of reflexivity involved in sharing them (both in collective practices and in terms of setting defaults for others).

6.4. Routinising deferral: how default digital maps are maintained

This section considers the question of how specific digital maps are established as defaults, their position (as defaults) is recursively maintained through a process of

routinisation. To strengthen this claim, I explore what happens when individuals meet barriers that inhibit them from maintaining such routines.

6.4.1. Making and breaking links: recursively introducing digital maps

Understanding how digital maps become positioned as defaults requires a prior understanding of how defaults are established, maintained and/or changed. This begins with understanding how digital maps become integrated into existing practices. For example, when Stacey describes the introduction of a smartphone into her daily working practices as a bed and breakfast (B&B) business owner, she describes it as a medium that allows her to develop more mobile ways of working. In turn, it enables her to adapt to what she perceives are the shifting expectations of her customers:

> *…before, you didn't used to take your phone anywhere, but now with this [smartphone]…it saves folding a map up in the wet or whatever, or carrying a heavy book… we've had to adapt things... we get bookings through on…[the desktop computer] from all over the world, so the guests are coming in at different times of day, so I suppose it's adapting, like anything in life; it's about moving to that different way of doing things, isn't it?*

> *(Stacey)*

Stacey depicts a smartphone being held meaningful as a remediation of a desktop computer. She then explains how it affords more efficient and mobile working practices by providing her with access to the web (which supplants the materiality of books and maps for her). Stacey also frames her ability to use the smartphone in terms of past ICT competence (using a desktop computer) – a point that resonates with Shove et al's. (2012, p. 48) notion of abstraction and reversal as the processes by which competencies can be transferred across practices (4.3.3). To clarify, when Stacey describes the materiality of paper-based maps, she refers to accessing them through 'heavy books' and to issues folding them up in inclement weather. In this, her account highlights a recent change to her routinised performances following the introduction of a smartphone as a new material element. The mobility of her smartphone provides her with access to maps that are neither heavy nor difficult to use in inclement weather. When Stacey follows on with a discussion of her computer-based communication with B&B guests, she adds that *"…it's about moving to that*

different way of doing things …" (Stacey). In this, her account suggests the competencies that she draws on to engage with the smartphone were transferred from those she has drawn on for a longer period in using a computer. Also, when Stacey describes how the introduction of a smartphone brought changes to her working practices, her account highlights the point at which the smartphone (as a new material element) challenged stable linkages between practice elements. It disrupted the way she had previously worked and destabilised her performance desktop computer-based working practices by providing a set of affordances for more mobile working. In this, Stacey's account echoes Shove et al. (2012) in its depiction of how practices form and change through the breaking and establishment of linkages between practice elements (4.4.1). To clarify, when the smartphone is introduced to her daily practices as a new material element, it presents new affordances for using digital maps on the move which she associates with no longer needing to rely on 'heavy books' or folding up a paper-based map 'in the wet' (ascribing meaning to digital maps as better for inclement weather). By drawing on (and combining) transferrable competencies in using paper-based maps and a computer, she is able to use digital maps.

However, for Stacey, digital maps are not discursively separable from the smartphone. She takes the pre-installed (default) digital map application for granted as an integral part of her smartphone. When asked which digital map she uses, Stacey notes that she uses Google products on her smartphone *'…for everything, search engine, everything. Just tap it into Google and just comes in…'* (Stacey). While this highlights how a digital map can be integrated into an existing set of practices and established as a media-scripted default, it does not address how defaults are maintained after being established.

In addressing how defaults are maintained, Laura's account below sets out the process of routinisation; once a digital map is established as a default, it is maintained through recursive performances. Laura often visits schools as part of her work for the university, travelling to areas and sites with which she has little familiarity. When travelling, she draws on both Google Maps and the AA route planner as combined defaults:

> *… I use Google Maps because it was one of the first at the time I started using maps… I like the clarity… [it's] easy to interpret…[but] if*

I'm going to a school, I'll actually use AA route planner… to get directions about how to drive there…I will usually print out Google Maps, and usually I will print out the near vicinity... I've basically got two guidance points... this is where it sits within a town, so I know where I am heading to, but then within that cluster of streets, that's exactly where the school is…

(Laura)

Laura attributes her deferral to Google Maps to its readability, finding the representation clear and easy to interpret. Meanwhile, she attributes her deferral to the AA route planner for journey directions. She holds the two resources meaningful in combination – a relationally stable hypermediate arrangement of allocative resources. Google Maps provides her with a spatial visualisation based on local specificity, including detail "*…of this is where it sits within a town…*" (Laura). Meanwhile, the AA route planner provides *"…directions about how to drive there"* (Laura). She also notes her initial deferral to Google Maps was "*…because it was one of the first…*" (Laura) digital map she encountered, a point that further strengthens the claim that defaults are both recursively maintained in performances and that they remain relatively stable through repeat use because digital map-users tend not to critically reflect on their choice of map, or on their use of it.

Similarly, the digital maps Pam defers to when searching for a home to buy have also been established as defaults through a process of routinisation. When she describes her home-searching practices, she depicts it as a repetitious performance that involves a media-scripted deferral that combines four media resources (RightMove, Zoopla, Google Maps and Google Earth):

…mostly I have been on, is it RightMove and Zoopla who use their own map… I did a general search of the area, doing within 10 miles of where I would be working… then I would look on Google Maps and Google Earth, and they are the ones I would use… they were already there on my laptop, and that I am, you know, sort of used to using.

(Pam)

In her discussion of the digital maps that she has 'mostly been on', and 'usually used', Pam depicts a repeated deferral to the same hypermediate set of media-scripted defaults; a combination that remains relatively stable for her over time (in repeat searches). While Pam acknowledges her deferral to Google Maps, she incorrectly describes her indirect deferral to its satellite view as being towards Google Earth. Her account also portrays an indirect deferral to Google Maps through RightMove and Zoopla of which she is unaware; both use GeoJSON to call on a real-time data feed of properties and present that data as a layer over a base reference digital map embedded on a webpage (Longley et al., 2011, pp.52–53). In this, Pam presents a fourfold deferral to Google Maps as a default, of which she is only partially knowledgeable. Her account depicts a deferral to all four resources as something that is carried out in practical consciousness and not rationally considered. Instead, she notes *"…they were already there on* [the] *laptop… [and I was]… sort of used to using* [them]*…"* (Pam). Similarly, when Pam defers directly to Google Maps as the established and familiar default that is 'already there' on her laptop, she also provides an account of repeat performances of searching for a home, which recursively maintain it as the established default.

Although Laura and Pam combine different resources, both defer to Google Maps as their default and both demonstrate that their repeated deferral maintain it *as* the default. That is, they recursively maintain stable linkages between practice elements in their ongoing repeat performances of the same practice' a process of routinisation. Likewise, when Jayne discusses her deferral to OS maps as a practice-specific default for countryside leisure-walking, she describes a recursive deferral that serves to maintain the stability of OS maps as an established default. That is, she routinely defers to the OS, using a paper-based map when *"…walking in the peaks, where access to an electronic map isn't reliable and doesn't have walking paths marked on it…"* (Jayne). In this, Jayne follows Laura and Pam to highlight how linkages between practice elements are continually reproduced through repeat performances, to depict a process of routinisation (4.4.1). However, while Laura, Pam and Jayne all demonstrate how the ongoing maintenance of a default digital map is achieved through recursive practice, they leave several questions unanswered. For example, how do individuals carry on when the stable linkages between practice elements (or routines) are challenged? What degree of obduracy do stabilised linkages between

practice elements hold? To what extent might default digital maps be shared and/or collectively maintained? The next section addresses these points.

6.4.2. Routine challenges: reflexive acceptance and practice hacking

Earlier, this thesis argued that established practices are only stable so far as the linkages between practice elements (materials, competencies, and meanings) remain unchallenged (4.4.1), or rather that:

> …[practices] come into existence, persist and disappear when connections between foundational elements like those of material, image and skill are made, sustained or broken…
>
> (Pantzar and Shove, 2010, p. 450)

That is, the stability of practices is always an ongoing achievement, where practices are always contingent, emergent, and provisional, and the "…*potential for contestation and conflict* [between practice elements] *is permanently there…the normalcy of practice is a truce"* (Nicolini, 2011, p. 613).

This subsection extends that argument (in 4.4) by arguing that when the stability of a practice (linkages between practice elements) is challenged, individuals either: reflexively self-monitor their action and temporarily change their performances in order to maintain routine; or accept the limitation as a part of their everyday practices. Both resonate with an understanding that established practices *are* routines (Reckwitz, 2002, p.255), and that the establishment and recursive maintenance of linkages between elements can be considered a process of routinisation. For example, John does not own a smart mobile device (smartphone, tablet, or smartwatch). However, this does not hinder the mobility of his engagement with digital maps whilst on the move. Instead, John reinterprets the meaningfulness of material elements available to him in situ:

> A couple of times I've been unsure of where I am… I've kind of stopped and taken out my laptop… put it on a window ledge… to check my calendar… I check the maps to see where that is from there.
>
> (John)

By using his laptop as a mobile device, John demonstrates a reflexive self-monitoring of action. He perches his laptop on a window ledge *"…just outside the SU* [the Students' Union building]*…"* (John) within range of the university-wide wi-fi system to access a digital map without a smart device whilst mobile. Thus, John devises a creative workaround of a material limitation that allows him to use a digital map, by drawing on memory traces of various other practices to modify his existing performance through a re-appropriation of the material elements available to him – a process referred to as a 'practice hack' (Hanchard, 2016). Interestingly, when questioned about his peers' use of digital maps, John describes attending a music event with a friend, noting that had experience of using a smartphone to access a digital map on the move as part of shared practice:

> *I'm not sure if it was Google maps, but my friend had like an app thing on his phone which came in very handy…*
>
> *(John)*

Thus, John's practice hack might be seen as a means of re-establishing routine, rather than simply a personalised attempt to overcome a material limitation. Likewise, when Claire describes her interaction with students in an advisory capacity as a student-facing university employee, she observes that:

> *…often on an open day you can see them using their iPhone or whatever to actually use maps to guide them round campus… they are literally walking with it, with Mum stood next to them, and they're checking that they are coming to the Arts Tower, or making their way to the Student's Union and I think it's interesting how it's that sense of – they do want everything, right there…*
>
> *(Claire)*

In this, Claire recognises a rationale for students to draw on digital maps while on the move as web-based resources that offer affordances for geolocation in real-time. She depicts digital maps as material elements that are engaged routinely by potential students as part of their shared practice of attending university open days; as part of their gaining orientation to the university. Similarly, while John (above) describes his friend's use of a smartphone to access digital maps on the move as a routine part of a shared activity, he depicts his own practice hack as an attempt to re-establish or

maintain a comparable performance and to maintain routine despite the limitation of lacking an important material element for the routinised practice (no smart device).

Unlike John, when Dawn meets a limitation that hinders her use of a digital map, she does not attempt to develop a practice hack. Instead, she reflexively accepts the limitation as a routine part of her daily practice. At first, Dawn describes previous failed attempts to search for a home during moments of boredom at work. As a secondary school teacher, access to the web is 'unauthorised' in her workplace and controlled via allocative resources and a material limitation; the school provides no open wi-fi signal and there is no 3G signal available to her:

> *…You don't get any 3G signal at work. Everything has to go through the school Wi-Fi, which is – because it's a school – it's really closely guarded, and you can't get on anything like RightMove, it just comes up saying 'Unauthorised'…*
>
> *(Dawn)*

Here, Dawn reflexively describes the technological background to the material limitation she faces. She recounts both an awareness of the school's strategy in imposing such limitations, and of the extent to which limited access to the web prevents her home-searching practices when at work. However, Dawn accepts (and maintains) the limitation as part of her routine daily working practices; she does not attempt to challenge it through a practice hack. A comparison of John and Dawn's accounts show that when people face a barrier to their use of digital maps, they react in diverse ways. Some people develop practice hacks by reflexively reinterpreting and rearranging the material elements at hand to modify their performance of a practice. Others accept the limitations and knowingly e.g., accept non-use of digital maps as part of the structure of an ongoing set of routinised practices. Similarly, when Claire describes students' use of smartphones to navigate the university campus on open days, she depicts their collective maintenance of routinised practice entity through repeat performances as a shared activity. However, all three accounts relate to the maintenance of practices as routines, and to the routinisation of digital maps as a material element. Following the argument above, this presents digital maps as allocative resources that are engaged with and selected in practical consciousness, with established defaults deferred to within routinised practice. However, this leaves the issue of 'usage' unaddressed; while it provides an account

of *how* digital maps are engaged with, it does not explain *why* they are engaged at all. The next section explores this aspect of digital map engagement.

6.5. Anchoring views: why people engage with digital maps

This section focuses on the ways in which digital maps are engaged with as visual media resources demonstrating that their engagement anchors various practices (from performances to social positions) and orientations (senses of place and security).

6.5.1. Preview and postview: seeing the affordances of digital maps

Individuals often draw on digital maps to visualise place. For example, despite having a SatNav in her car, Pam defers to Google Maps as a default when viewing potential properties to buy (6.2.2). While she initially engages digital maps to do this at distance, the process of choosing a home often entails travel to view the shortlisted properties in person. For Pam, physically visiting properties was carried out within set time constraints (at weekends only). For this, she drew on Google Maps to plan travel routes to, from, and between properties:

> *…[I] usually go online and use Google Maps to plan the route… what*
> *road, numbers, things like that… generally it's just to plan routes... a*
> *couple of weekends I did actually go and view five or six properties…*
> *I just put the postcodes in and sort of planned a route to go through*
> *each one.*

> *(Pam)*

In contrast, Sharon draws on Google StreetView when planning countryside leisure-walks to select meeting places for the start point of walks and points to stop/break at (often pubs or car parks). This differs from Pam's use of Google Maps to plan specific journeys between properties (choice of route). Instead, Sharon uses Google StreetView to plan the start and end points of a walk and various designated stops along the way (choice of site):

> *…U3A ones are a nightmare, because they need to have a pub stop*
> *and a free car park… I can put a grid reference on… you can zoom*
> *in… you can include StreetView on that and you can see the car*
> *park, to see what it looks like when you get there.*

(Sharon)

To do this, Sharon uses gridreferencefinder.com, a website that overlays OS British National Grid (BNG) references as a layer on Google Maps, embedding it as a remediate frame as a core feature of the website homepage. In this, Sharon recursively establishes (maintains) both the OS BNG grid reference system (and by extension the OS) and Google Maps' StreetView as defaults. While Pam uses a digital map to obtain detail about routes, Sharon does so to gain detail about sites. However, both engage with a digital map in order to visualise a place before physically going there. That is, they both engage with a digital map to 'preview' a place. In this, they both engage with the view a digital map offers as an affordance and ascribe meaning to the information it posts (Wood and Fels, 1986) or presents (MacEachren and Kraak, 1997). To that end, they both hold a realist interpretation that the representation of place a digital map view affords is indexical and veracious. As a result, this interpretation allows the digital map to anchor their practice performance e.g. the choice of site they each go to.

As well as their affordances for previewing place, digital maps are also drawn on to visualise a place *after* visiting it (to postview place). For example, when Sharon describes planning a holiday with her son to his birthplace in Zambia, she describes drawing on a digital map both for preview *and* for postview in her location of relevant sites she plans to (re)visit. She also draws on digital maps in postview to aid in her reflection and memory of the past to maintain personal narrative in a time of change:[79]

> *…you think, oh, I should be able to find that... one of them just said 'Old Building'… it was the town hall… a focus for town-build superiority… it had been a British colony, things like that – but the quality is poor… they still haven't got a photograph of that… I still couldn't find our house, I still couldn't find those significant qualities… I can get good quality of our house, or somebody else's [in*

---

[79] During the interview, Sharon discussed her husband's recent death, noting he had worked as a pilot for a charitable NGO, which she explained, led to them both to spend much of their lives abroad. Throughout the interview she referred to engaging with digital maps as part of her grieving process, drawing on the photographic imagery of Google Maps' satellite view to aid her memory of specific places. In this, not only does her engagement with a digital map serve to memorialise place, it also anchors her sense of ontological security (Giddens, 1984; also 9.5). That is, it enabled her to 'look back' at her personal biography and in doing so maintain a sense of continuity of self through her engagement with the map.

England]…I can go on and see that years ago, oh someone lives in the front bedroom, or I can go on and say, I'll let you know – when you get here, that's what our house looks like…

(Sharon)

As well as using a digital map to aid her memory, Sharon describes a historically-situated politics of data evident within the digital map representation, noting that on a digital map she *"…can get good quality* [photographic detail] *of our house, or somebody else's…"* in Derbyshire, but *"…they still haven't got a photograph of…"* the town hall and the centre of civic engagement in 1970s northern Zambia. Comparing this with her past use of paper-based maps, Sharon describes on ongoing inequality in data quality and communications infrastructure:

…when we lived there, my husband was a pilot with Oxfam, at that time working for British Aid… with red locus control… the maps people were using in the mid '70s were going to be '48/'49 and, er, it just said 'data unavailable', and that was going all the way to Tanzania, which was a bit worrying when you don't actually know how you're going to land… sometimes he would go away and he could be missing a few days, and there would be no indication of when he would be coming back…when you say paper maps, the data is very good for here, but there were real tracts of Africa where there wasn't anything… satellites are a huge improvement... But still, for a lot of overseas countries… it pixelates when you zoom in.

(Sharon)

By comparing her past experiences of paper-based maps with more recent engagement with digital ones, Sharon reveals that, despite digital maps offering the potential for technologically advanced views of place, there remains an unequal distribution of map quality (globally) which she feels matches an historically-informed inequality in data gathering. For Sharon, the legacy of colonialism endures through an uneven distribution of the technological infrastructures that digital maps draw on; - both in terms of the material resources and potentially in local human competency for mapping. In this, Sharon's account resonates with those of Aouragh and Chakravartty (2016), who draw on a dual definition of infrastructure as both cultural and technical to explain how such an ongoing inequality persists.

Whilst this presents a different temporal facet to map use (looking back on the past via postview), it also highlights a reminder that the findings of this research may not be applicable in all contexts. The contexts from which this research gathers data are situated in the UK, where data quality and communications infrastructure are relatively well-established (historically) and well-maintained. As such, the findings from this study may not be generalisable to other contexts.

Above, Sharon describes engaging with a digital map for something other than informing her choice of route or site – instead, it offers her a way of looking back. In short, the digital map representation offers her a post-visualisation or 'postview' that 'anchors' her affective relation to place; the digital map view provides a sense of place (orientation towards it) that differs from more functional or instrumental accounts of map use. However, the orientation it provides is not complete – postview only works in this way for Sharon in combination with her past lived experience of having been there (memory traces). In doing so Sharon notes how the information presented (MacEachren and Kraak, 1997) on a digital map, alongside the veracity and the indexicality she ascribes to it, leads her to treat the map itself as an ontologically secure material object engaged to see what a place will be like, or to reminisce on how a place was. Thus, the digital map views she draws on ground or 'anchor' her knowledge of place. In turn, Sharon's account raises questions about the extent to which digital maps might be used for postview (as opposed to preview) – addressed in 8.4. It also raises questions on what engagement with digital map views (preview and postview) might serve to anchor, and to what extent – explored next.

6.5.2. Sense of place and practice: what digital map views anchor

As argued above, map-users often engage with digital maps to preview place, either to select sites (to carry out an activity), or to plan routes between them. However, it is important not to assume that digital map engagement somehow anchors practices – a priori without qualifying *how*; an abductive (and somewhat media-centric) leap that marks a point of limitation in contemporary cartographic theory (3.6.3). For example, both Power et al. (2012) and Shapiro (2017) assert that Google Maps' imagery stigmatises place, but neither elaborates *how* beyond an assumption of media effects which conceals an underlying assumption that its users are passive. This subsection avoids the research building on this assumption by exploring *how* engaging digital map use anchors map-user practices.

When map-users engage with digital maps, they tend to treat the views maps present as truthful and trustworthy representations (of a singular reality). Meanwhile, they also tend to classify and associate meanings to representations of place in those views by drawing on subjective memory traces. That is, users ascribe meaning to place on the basis of digital map preview and postview. If practices are anchored by digital maps, it is on the basis of the associations and classifications (meanings) that users apply to the views of place they provide. For example, when Pete describes his combined use of Google Maps and StreetView to assess a walking route when visiting a different city, he depicts the sense of place he gains from a digital map preview. He also explains how this sense of place leads to him adapt his practices (and selection of alternative route):

> *…You can tell if somewhere is run down, a bit rough, the kind of place maybe you wouldn't want to be walking through… I walked from the train station to the other side of town, and I'm glad I looked on StreetView, because it's not a brilliant place…that affected my decision not to walk through.*
>
> *(Pete)*

When asked to explain what led him to find the area meaningful as a place to avoid, Pete provides a classification of the place (applied to the digital map preview) as *"…not awful, not horrendous, but, um, it is a bit run own in the centre at night…"* (Pete).

Similarly, when Kelly describes hypermediate engagement with Google Maps and StreetView when choosing a home to buy, she explains that her selection of properties is anchored by the sense of place gained through a digital map preview:

> *…I used StreetView a lot to see what the surrounding streets were like… then I would look at the overview, the normal view… zoom in, and have a look at people's gardens, because I wanted to see if they were scruffy or not, to give me a better idea of how well the street was kept.*
>
> *(Kelly)*

While it is her choice of site (home) rather than a route that is anchored by a digital map preview, her classification of the local neighbourhood as either 'scruffy' or 'well-kept' based on its garden maintenance is like Pete's classification of a specific area as 'run down'. Both demonstrate how their performance of a practice is anchored within the sense of place they gain through a digital map preview. However, the approaches that determine how Kelly and Pete classify different sites or routes are both interpretive and subjective. For Pete, it is based on his subjective interpretation of the town centre as 'run-down', which he associates with a place he should avoid at night. Meanwhile, Kelly associates good garden maintenance with an area she desires to live in. Relating this to Shove et al. (2012), both accounts raise an important question on shared classifications, and by extension, on the extent to which meanings might be collectively ascribed to place through digital map views (addressed in 8.2.1).

For now, it is worth noting it is not only digital map preview that anchors map-users' senses of place and practices. As Stacey notes, postview can also anchor people's orientations to place and senses of belonging:

> … [we've been] *using digital maps since we've moved in… we've got views from across Sheffield… we can see this main road and this tree-lined road with a big building, and we wanted to know what we were looking at… so we pulled* [Google] *maps up and had a look… it showed us what we were looking at.*
>
> *(Stacey)*

Having recently purchased a property, Stacey and her partner use Google Maps to develop a relational sense of where their home is located in the landscape, and how it relates to the surrounding area. In this, Stacey depicts a form of engagement that is less task-orientated or instrumental - as it is for Hurst and Clough (2013); instead she depicts it as more playful - as it is for Lammes (2013) and Perkins (2009). It is an act of curiosity, rather than a practical activity like planning a route, assessing whether a place is dangerous or safe, or choosing an area to live in based on how others maintain their gardens. Nonetheless, she depicts a sense of place being anchored in digital map views.

In summary, this subsection has shown that digital map preview and postview can

both anchor senses of place and a wide range of practices. However, this is contingent on the subjective associations and classifications that digital map-users apply to these representations. The next section develops the argument further by considering *what* digital maps anchor.

6.5.3. Anchoring securities: beyond senses of place and practices

This subsection argues that digital map engagement not only anchor various senses of place and the performance practices (choices of route and site), but that it also anchors various senses of security and the performance of social positions. For example, when Claire describes her use of a digital map for wayfinding (to navigate places that are unknown to her), she depicts her engagement as being carried out in real-time while on the move (in situ). She also describes the sense of security gained from previewing place via a digital map, and how her practice performances are anchored as a result. Having a digital map available makes her:

> *…more confident using buses in areas I'm not familiar with… I knew the bus stopped near the bus station, but I didn't know where… got my little iPhone out and got a discreet view of how close I was getting… [it's] good for the university because it means I am less likely to use taxis, which are more expensive, and it is better for green impact… having a digital map gives me the reassurance of knowing I know where I am, or I know how far I am from where I need to be, or if I miss the stop I know how to get to where I want to be…*

> *(Claire)*

In this, Claire describes gaining a sense of security from a digital map view in two ways. First, by engaging a digital map via a smartphone, she is able to preview place in real-time whilst on the move. Claire notes this enables her to navigate *"…areas I'm not familiar with…"* (Claire), adding that being able to geolocate herself at any given moment enables her to feel 'more confident' using public transport; it provides 'reassurance' that if she misses a bus stop, she will be able to navigate her way back to the correct place. In this, Claire explains she need not even actively use the digital map, taking comfort instead in the knowledge that it is 'just there', ready-to-hand as a 'latent resource' (9.2) that *may* be drawn on if needed. She can get *"…her little iPhone out and [get] a discreet view…"* (Claire) of her current location at any time

and relate that to her intended destination. She notes that at times this relates to the mode of transport in question. For example, *"…a train will always stop at designated destinations, but a bus won't… having a digital map gives me the reassurance of knowing I know where I am…"* (Claire). Thus, her engagement with a digital map (even as a latent resource) provides a second sense of security. Her increased confidence and likelihood of using buses relates to a structuring set of rules that shape her practice performances; as a university employee, Claire's travel by public transport is less expensive for the university than taxis and adheres to a set of green travel practices. Thus, Claire depicts her use of digital maps as anchoring her sense of ontological security; the "…confidence in the continuity of [her] self-identity and in the constancy of the surrounding social and material environments…" of her life. (Giddens, 1990, p. 92). By carrying out working practices that are *"…good for the university…"* (Claire) she maintains the performances of a good employee and therefore feels more likely to maintain ongoing employment. At the same time, Claire's account demonstrates that her mode of transport (bus instead of taxi) is in part anchored in the sense of security she gains from having a map ready-to-hand too.

In a different research context, Beth expresses a similar sentiment to Claire. For Beth, a digital map preview anchors her performance of a social position (as a letting agent). She explains that students have started to engage with (and increasingly expect) digital maps to be supplied when they are searching for accommodation. Because of this, Beth has adapted her website and her mode of working to meet their demands:

> *We used to put up… an advert in each shop and they used to see it*
> *as they walked past us, but as they use technology more and more*
> *and it's getting more complex… people are perhaps using computers*
> *more remote to the locations where we have properties.*
>
> *(Beth)*

In this, Beth attributes her shift from paper-based adverts to a website to students' increasing use of technology (and expectations of a digital map). However, rather than approaching students' increasing engagement with technology as black-boxed, she displays a relatively high degree of ICT competence in reviewing the website analytics to *"…see how many people look at it, what kind of device* [they use]*, what*

kind of properties they are looking for and all that…" (Beth).[80] In translating this to her performance of working practices as a letting agent, Beth notes that the increase in mobile users has not only led her to adapt the website, but also to modify the way she communicates with students. She now takes fewer telephone calls and focuses more on communication via the website:

> *…[T]here are a lot of mobile users, we've actually had to adapt the website so that it would be better on a mobile… they would expect a map now… we still get a few people that phone to say 'I'm lost, I can't get to where I want to be', but it's getting less… people do tend to have Google Maps on their phone…*
>
> *(Beth)*

Interestingly, when Beth asserts the ready availability of digital maps via smartphones means students are less likely to get lost or ask for help, her position resonates with that of Claire above; confirming the idea that digital maps provide a sense of security as geolocative media. Beth's adaption of the letting agency website is also interesting; when asked about her choice of embedding Google Maps on her website (rather than alternatives), she depicts the choice as a hypermediated deferral to the default established by a web developer:

> *Me: I notice that you have got Google Maps embedded on your website… was there a rationale behind the choice of Google over, er, I don't know, say any other vendor?*
>
> *Beth: We had a developer and we thought for a competitive website that we needed something about the area. The location, and then the developer just said 'Oh, just use Google'. So, no. We didn't because they didn't give us any options.*

In this, Beth's account raises questions about how defaults are circulated within practice bundles. That is, while Beth explains how Google Maps is transposed as a default from web development to a letting property website, her account does not address how that transposition relates to students' choice of digital map when searching from properties. However, what Beth's account does demonstrate is that

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[80] The small sample size of the research means it cannot explore how prevalence such competence is amongst lettings agents; a topic which could be usefully expanded through further research.

not only are various senses of security and practice performances are anchored through people's engagement with digital maps, but so are the way in which social positions are performed (in Claire's case, how she goes about interacting with students as a lettings agent).

6.6. Conclusion

This chapter explored how people engage with digital maps. It argued that people engage with them as mundane resources that enable them to preview and postview places, and which users tend to engage unreflexively in practical consciousness. It also argued that the visualisations of place provided by digital maps views serve to anchor map-user's senses of place, senses and security, alongside their performances of practices and social positions. This chapter has also argued that specific digital maps are established, deferred to, and recursively maintained as defaults through repeated practice performances. In doing so, it introduced the idea that digital map-users are not passive, rather they display varying degrees of reflexivity and adaptability, and engage with digital maps for personal purposes other than just finding a place or planning a journey. In this, the chapter introduces an account of how digital maps are selected that extends contemporary cartographic literature.

Overall, this chapter presented an argument that serves as the basis of a theory of digital map use: that digital maps are engaged in practical consciousness for the views of place that they offer; that they anchor various practices, senses of place and security, and social positions; and that defaults digital maps are established, maintained, and deferred to through routinised practices. This goes some way towards meeting a core aim of the thesis in extending cartographic thought, beyond an assumption of map-user as passive and digital maps as relatively static resources. It also provides scope for beginning to address how people engage with the web-based affordances of digital maps (addressed in Chapter 7). To clarify, this chapter has focussed on exploring map-users' engagement with digital maps in terms of consumption. By contrast, digital maps also provide opportunities for users to create, amend, and recombine content in new and creative ways, as well as offering potential for new modes of collaboration and sharing. That is, digital maps offer opportunities for engagement in terms of production and distribution. Chapter 7 investigates this aspect in further detail, by building on argument in the chapter.

7. Centring anchors: engaging the web-based affordances of digital maps

7.1. Introduction

This chapter addresses the second research question: How do people engage with the web-based affordances of digital maps? Digital maps offer an ability for users to generate, amend, and recombine content in ways that previous map formats could not. They also provide new opportunities for the sharing and distribution of map content (2.4). To that end, it is important to understand how each of these affordances are engaged.

This chapter extends the previous one (chapter 6) by arguing that digital map-users often take the affordances for generating digital map content for granted; that is, rather than generating or amending content, they tend to defer to the existing (default) content of maps instead (7.2). In shared practices, individuals and social groups alike both engage with digital maps as centring resources; they act as a locus of information by hosting external datasets (owing to their hypermediate AJAX/JSON capabilities) and by providing access to other resources, e.g. through hyperlinks. In turn, this leads some users to draw on digital maps as authoritative resources (for authority). It also enables digital maps to be engaged to mediate sociality (7.3). Connecting this with chapter 6 suggests a potential for inequality in the degree to which some individuals may anchor the senses of place, senses and security, practices, and performances of social positions carried out by others (7.4). Likewise, engagement with the web-based affordances of digital maps enables some individuals to inform or persuade others by strategically curating the information available on a digital map, suggesting a potential for inequality through shared engagement with digital maps (7.5).

7.2. Manipulation vs. deferral: engaging the affordances to generate content

This section explores how users engage with the affordances that digital maps offer for map-users to generate content. It differentiates between direct and indirect forms of content generation, arguing that while map-users often unknowingly contribute towards digital maps content, they tend to provide accounts of uncritically deferring to the existing content of default digital maps (also see 6.3).

7.2.1. Direct and indirect: generating map content knowingly or unknowingly

People engage with the affordances that digital maps offer for generating or amending content in various different ways. Some people consider their direct generation of digital map content to be a relatively mundane activity. For example, when Kelly describes amending her employer's business listing on Google Maps, she does not treat it as an onerous or atypical task, explaining instead that she *"…adjusted where a business was located…*[because] *the company I worked for, their Google Map placement wasn't accurate…"* (Kelly). When questioned about the technical aspects of her amendment, she remarks that *"…used the engine just to recreate it"* (Kelly). In this, she demonstrates a relatively high degree of ICT competence and a sophisticated understanding of the technical background to digital map content generation; both by referring to the map engine for Google Maps API, and in recalling that she 'just' used it to amend her employer's address as a mundane task.

Other individuals draw on a similarly high degree of ICT competence in accounting for their indirect generation of digital map content as equally mundane. For example, Phil (a B&B/pub owner) purposefully engages with digital maps as a form of emergent media as part of his business strategy. He differentiates his customers' instrumental use of digital maps to locate or search for information from his own (more sophisticated) indirect generation of content, by asserting that *"…we manipulate digital maps; we don't use them… we're not really using digital maps"* (Phil). In other words, Phil draws on a hypermediate combination of resources to frame his business listing. To clarify, he uses the '*…appstore app* [for] *trending downloads in the local area to show what people use'* (Phil). After eliciting information on the specific web-based resources that potential customers are likely to use, Phil cultivates a relevant set of customer reviews tailored toward those resources, asking:

> *…guests and our regulars to add [reviews to]…Yelp and Google* [Reviews]*… which I know feeds into Google Map…* [and] *gives us better hit-rates…*
>
> *(Phil)*

When Kelly and Phil describe their generation of digital map content, they both depict it as a purposeful and knowledgeable activity, and both provide an account of them possessing relevant ICT competence. They also both express an explicit aim

beneath their respective generations of digital map content. For Kelly, it is to inform others on *where* the business is *really* located. Meanwhile, Phil seeks to persuade others that his B&B is the best rated in the local area according to customer reviews. In turn, this asserts a need for this thesis to not only address questions about the degree of trust that users place in digital map content, but to also address the trust placed in content generated by individuals or groups outside mainstream map-making corporations (8.4.1).

Below, Dave describes his indirect generation of content through his hypermediate engagement with digital maps. As a postgraduate student Dave navigates a campus and city that are new to him, occasionally travelling to other universities for seminars and conferences. In doing so, Dave portrays his orientation to university life as one that involves eating in various restaurants and occasionally staying overnight in hotels in places that are unfamiliar to him. However, he mentions that he has recently *"…started reviewing all these places I've been now…"* (Dave), using the review website TripAdvisor. As a media resource, the TripAdvisor website stores all user-generated reviews submitted to it, using an algorithm to rank them based on both *"…narrative content and a reviewer rating (1-5 stars)…"* (Jamerson, 2017, p. 127). TripAdviser presents its ranked reviews as a hypermediate layer on whichever digital map is set as the default for the website visitor's device. In this context, Dave (like Phil above) finds the digital map meaningful as a hypermediate and emergent resource. However, he also explains that adding reviews to TripAdvisor changes the degree of trust he places in the reviews that others have written, and the relative algorithmic ranking of places on the site - and therefore his contribution towards TripAdvisor changes the degree of trust he places in the content it provides:

> *…[Adding reviews] has made me be more discerning I suppose, and not necessarily trust what I see… rather than just looking at the last few… if there are 20 reviews, I take a sample, and don't just look at the five that are on the front page…*
>
> *(Dave)*

In this, Dave's reflexive account has epistemological ramifications; indirectly generating digital map content (by writing reviews) feeds back into the trust he places in digital maps. In turn, this restates the need to address questions about the extent

to which digital map-users trust the content of digital maps (8.4). Also, on the degree of veracity people attribute to digital map content (8.3.3)

The accounts above open questions about how much knowledgeability is involved in generating or amending digital map content; are individuals always aware that they are volunteering geographic information (VGI) when they add reviews to a hypermediated website? For home-buyer Dawn, the answer to this question is resoundingly negative. When asked if she has ever amended a digital map, Dawn states that she has not, citing a lack of technical competence as a key limitation:

> *Not that I am aware of, I mean how would you do that?...*
> *TripAdvisor, I've done reviews before*
>
> *(Dawn)*

However, while Dawn has not directly generated digital map content, she has done so indirectly by adding reviews to TripAdvisor (like Dave). The difference between the two accounts is that Dawn (unlike Phil and Dave) does not realise that her TripAdvisor reviews fit within a larger process of VGI that affects the ranking and ordering of a particular site (e.g. a restaurant) on a digital map (Jamerson, 2017). That is, Dawn does not associate adding reviews to TripAdvisor with amending a digital map. What this demonstrates is that when individuals indirectly (and at times inadvertently) generate digital map content, they often do so in practical consciousness through their use of hypermediated resources. They are not always aware that they are amending the content of a digital map. This suggests a need to consider the *extent* to which digital map-users generate content indirectly – both knowingly and unknowingly**.**

7.2.2. Deferring to defaults: competence and meaning as limitations

The research findings suggest that it is relatively uncommon for individuals to directly generate digital map content. For some people, directly amending digital map content could be a meaningful activity, but they lack the competence to do so. As Tony notes:

> *…I don't have a good enough understanding of doing things like*
> *that… if I did have, yes, definitely! Because, that's the whole idea of*
> *a digital map, it's something that you can adjust, it's something that*
> *you can make it right, and it benefits everyone.*
>
> *(Tony)*

Others feel that it is the lack of meaning they ascribe to generating digital map content inhibits them, rather than a lack of competence *per se*. For example, when asked if she had ever generated digital map content, Liz's telling response of "*God, no!*" reveals both shock and bemusement at the notion of doing so; it is an activity she believes herself very unlikely to ever perform. Likewise, university employee Matt also attributes not generating digital map content to a lack of meaningfulness:

> *…I might do if I saw it, like a button that said 'edit'… I'm not sure why you would possibly want to…*

> *(Matt)*

Several survey respondents also suggested that a lack of competence alone would not prohibit them from generating digital map content if they found it meaningful to do so. For instance, 204 (of 391) survey respondents answered *"No"* when asked if they have ever added or amended digital map content. However, when questioned further on whether they know how to amend digital maps or not (Appendices I and J), 38 replied *"Yes"* while, 72 answered *"No, But I know where to find information on how to do this*". When asked for further comments, respondents often referred to directly generating digital map content. For example, Theresa notes that, *"I have seen signs on the Google maps page where it says to click there to add content to the map. I guess I would do that…",* while Sam explains that he could refer to *"Googlemaps help, or just search how to do it in google…"* to learn how to amend the digital map.

Other survey respondents referred to indirect forms of content generation. For example, Frank explains that he *"…would click the review button when I find the business or shop on G*[oogle] *maps…".* In this, he refers to indirectly amending the content of Google Maps by engaging with the reviews function (like Phil in 7.2.1) that is hypermediated within the map. Likewise, Charlie notes that *"…*[s]*ome business review sites allow you to add comments, and I would look at the links on that site to find instructions…'.* In this, Charlie describes how she might go about indirectly amending the content of a digital map. However, she relies on an underlying assumption or expectation: first, that business review websites (such as TripAdviser) will provide instructions on how to add comments (reviews) which feed into the ranking an ordering of sites presented on a map; and second that business review websites will provide hyperlinks to instructions on how to generate or amend digital map content. Overall, whether they refer to direct or indirect forms of digital map

content generation, the research participants tend to classify the affordance to amend a digital map as one they *could* engage with if they so desired.

Overall, the accounts above suggest that a lack competence does not necessarily prohibit users from generating or amending digital map content (directly or indirectly). Instead, map-users are often open to the possibility of generating content and are, at times, knowledgeable about how to gain the competence to do so. Similarly, when people describe not generating digital map content, it is not necessarily attributed to a lack of access to relevant materials or know-how (competence). Instead, it is the meaning that users associate with generating content that acts as a barrier. At times, this can intersect with limited competence. For example, Sarah expresses a desire to directly generate digital map content but believes that it is administered by some other authoritative party:

> *…I would like to be able to do that, put in all the alleyways 'this is what it's actually like'… I've never quite known how, or whether I would be trusted to do that.*
>
> *(Sarah)*

When Sarah describes a desire to rectify errors on the map at a local level, she depicts it as meaningful to her to generate digital map content. However, she reflexively defers to the existing content of a digital map instead, whilst remaining aware of its errors.[81] When Sarah states that she "*…would like to be able to…*" rectify errors on the map, she describes her lack of technical competence as one barrier. However, she also expresses uncertainty about whether she *"…would be trusted…"* to generate digital map content. In this, she classifies amending digital map content as an activity overseen by a legitimate authority. Although Sarah does not specify who the other trusting party/parties might be, or on what grounds their claim to authority rests, her account does show that competence and meaning can intersect to form a combined limitation. Likewise, Claire tells a similar story, describing how her limited competence intersects with an associated meaning to inhibit her from generating digital map content, leading her to a reflexive deferral toward the existing content of a digital map:

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[81] This opens a question on the degree of trust that user place in digital map content when aware of potential errors, and on what garners such trust (8.4)

I would not assume I could change a digital map… someone else
has published that content, therefore they are the owner of it –
unless it's Wikipedia, of course.

(Claire)

For Claire, this deferral is towards the digital map as a singularly authored product.[82]
Unlike Sarah, she classifies the digital map as black-boxed resource, contrasting it
with the user-generated online encyclopaedia Wikipedia, which allows users to
openly contribute towards or amend the content of articles (Bird, 2011, p. 503).
Despite the different meanings that Sarah and Claire ascribe to generating digital
map content (VGI), they both describe their non-engagement with VGI (a form of
non-use – see 6.2.1) as leading them to defer to the existing content of digital maps.
However, the meanings that Sarah and Claire ascribe to digital map content
generation are individualised and deeply subjective. This opens questions about how
such meanings might be shared and circulated; and how digital maps and the
affordances they offer for generating content might be engaged with collaboratively.

7.3. Centring Resources: collaborative engagement and sharing of maps

This section considers how digital maps are shared and collaborated on. It argues
that when people collectively engage with digital maps are, they tend to consider
them as central resources in their organisation of shared practices. Also, that
collectively generating digital map content tends to involve specific social hierarchies.

7.3.1. Centring resources: engaging digital maps in shared practices

At times, digital maps are used instrumentally – as geolocative media that aid the
organisation of a shared practice. For example, when Matt (a university employee)
arranges to meet his colleagues face-to-face, he refers to the (Google maps based)
university-provided map application via his smartphone:

There is a university online map thing, where you can use people's
online GPS mobile phone trackers to identify where they are on the
university precinct… If I could see they were in the [building], I could
just text them and say "Oh, I'm coming on over, do you want a coffee
in the cafe?"

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[82] Although it sits outside the remit of this thesis, Claire's account of deferral raises an interesting
potential avenue for research following the 'authorship' mode of cartography theory discussed in 3.6.2.

(Matt)

By drawing on the digital map alongside SMS text messaging, Matt and his colleagues can arrange to meet for a coffee and locate one another on the campus without the need for further micro-coordination. When Matt engages with the digital map, he sends an SMS text message to the colleague he intends to meet. In this, he clarifies that he can preview his colleagues' location *before* contacting them. Therefore, Matt views the digital map as a hypermediate resource that is central to the micro-coordination of a shared practice; finding out where a colleague is located, and if appropriate, arranging to meet them. This suggests a minor shift to the performed temporality of managing personal relationships; through a digital map, Matt can locate his colleague *prior* to making contact, rather than making contact in order to gain that information. However, although Matt portrays himself as taking a lead role in organising the meeting, he does not specify whether his colleagues also use the same digital map application or not, nor does he expand on the role of digital maps as material elements within such interactions. This opens a question about the degree of equality at stake in the shifting organisation and micro-coordination of shared practices that digital maps afford.

Likewise, when forestry centre manager Jenny describes generating and maintaining local walking routes on Walk4Life,[83] she depicts it as a collaborative practice tied to a deeply unequal (hierarchical) and geographically-localised social network. She also accords herself a lead role in that hierarchy. Walk4Life provides collaborative user-generated routes (as content) for public use in self-guided countryside leisure-walks. Thus, Walk4Life is at the centre of an ongoing set of shared practices carried out between walkers, volunteers, walk leaders, and the forestry centre:

> *…with Walk4Life… walk leaders… can put their walks up… not only are we making a pool of useful information for ourselves, but then it's open for anybody else to use…[there are] close to 240 volunteers… if they have uploaded their walks, and I have uploaded my walks, everybody has got a really good resource… similar to MapMyRun…*

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[83] *Walk4Life* (Walk Unlimited, 2019) is a website that presents nation-wide walking routes on an OS digital map layer framed within the website. It also provides a GUI for users to upload walks, reviews and ground detail of conditions at specific sites, Initially, it was free to use as a Public Health England (PHE) project linked to Change4Life. The Department of Health stopped funding the service in 2012, with the social enterprise 'Walk Unlimited' managing the service since (partially subsidised, with end-user subscriptions for access).

very colourful… user-friendly in that sense… I'm not technically
capable… if I managed it, anybody can…

(Jenny)

At a basic level, Jenny's account depicts a horizontal form of social organisation where the map is held to be central to various individuals' practices and presents no distinct hierarchy. However, she later notes that the 240 volunteers who upload their walks onto the site are geographically dispersed across *"…three different districts…"* (Jenny)*.* In short, she differentiates local volunteer contributors from public users of Walk4Life, presenting the digital map content as being disproportionately generated by local users. This leads to questions about the importance of proximity and/or co-presence in the collaborative generation of digital map content. In some ways, this presents Walk4Life as an antinomy to Tobler's erasure of local knowledges of place and marginalisation of the subject too (3.4.1), offering an alternative position that resonates with neogeography (3.5.3) in its account of map-users being enabled to self-represent on via maps – albeit moderated by via a central facilitator. However, when Jenny goes on to assert that Walk4Life content is only generated by volunteers *"…if we've shown them how to use it…",* she highlights the importance of specific ICT competencies required to generate Walk4Life content. She also notes that this competence is locally administered and distributed via the forestry centre. That is, the forestry centre is positioned as the 'official' body for moderating knowledge about amending the content of Walk4Life, and thus it is legitimated. In turn, this presents digital map content generation as an activity steeped in hierarchical and uneven forms of social organisation. As such, Jenny engages with Walk4Life as an authoritative resource (Bryant and Jary, 2001, p. 13); she draws on to advise walkers and to structure volunteers' VGI practices, which in turn requires that she manages and develops (moderates) volunteers' competence.

In combination, what Matt and Jenny highlight is the *centrality* of digital maps to social organisation within differing social practices, alongside their affordances for anchoring practices (6,5,1). Matt draws on a digital map to organise meetings with his colleagues. Meanwhile Jenny engages with the Walk4Life map as a collaboratively produced authoritative resource that informs other people's walking routes in order to and situate herself in a social position of local expertise. Both engage with digital maps as a resource that is central to the social organisation of a

shared practice, rather than at its periphery; the Walk4Life community interact with one another through the map. While this presents digital maps as 'centring' of practices and social positions, it also raises questions about the extent to which they might mediate or anchor the organisation of shared practices, and how such a centrality might differ amongst privately and publicly shared practices.

7.3.2. Mediated sociality: the centrality of maps in private and public

As shareable resources, digital maps foster diverse forms of collaboration. For example, continuing from the previous subsection, Jenny notes that sharing digital maps can transcend the private/public divide. For instance, in her role as a forestry centre manager, Jenny maintains a register of risk assessments for local walking routes. She has uploaded this information onto the Walk4Life website (represented as a set of hyperlinks on the map) to make it publicly accessible and amendable. Jenny implemented this as a new business process that allowed her to be disturbed less during her maternity leave. Instead, the staff member covering her workload can refer walkers directly to the Walk4Life website to address any queries or to advise them about the risk involved with a particular walk:

> *…the person who held my role before I did never mapped anything…*
> *her risk assessments just say: "footpath is open to cyclists",*
> *"crossroads at certain points", "Horses, possibly"…[I]t's useless*
> *really… all very abstract… Whereas if it's mapped, then there is a*
> *route… during my time off, my replacement was able to find all the*
> *maps… it was a home start and I didn't need to take anything with*
> *me… I had already mapped it successfully… instead of ringing me*
> *when somebody asked "what's it like doing that route?", it's there for*
> *everyone – it's just a map. Just to show them.*

> *(Jenny)*

In this, Jenny draws on Walk4Life as an authoritative resource that mediates her interaction with others – even in her absence from work (see above and 4.2.2). It mediates her private social interaction with the member of staff covering her workload by limiting the number of likely queries. It also mediates her public interaction with walkers by making the risk assessments publicly accessible. Hence, the digital map offers a remediation of telephone calls for Jenny and is central to the interactions between the forestry centre and walkers. Moreover, Jenny's account illustrates how a

digital map can be drawn on as a central and mediating resource in the micro-coordination of everyday practices; in her case, when walkers ask for detail on the risks involved with specific local walks. However, Jenny's account provides a subtle depiction of a hierarchical form of social organisation. The risk assessments that Jenny uploads to Walk4Life are based on her predecessors' notes and steeped in informal discussions of past walks with several walkers and walk leaders. Therefore, Jenny decides which information is included in, or omitted from the local walk risk assessments, and whether this is presented on the Walk4Life map or not, in order to inform others. In return, she notes that others recursively legitimise her social position as the central facilitator of Walk4Life content for the local area by drawing on the digital map. In turn, this anchors Jenny's social position as a central facilitator of knowledge for the social network surrounding leisure-walking in the local area:

> *…when they are on the walks, I get a lot of people ringing me telling me stiles are broken, or the paths are broken, so then I'll let the footpaths officers know, and they'll go out and fix it…*

> *(Jenny)*

However, Jenny's social position is not one of total authority. Anybody may amend the Walk4Life map (it is publicly open). Alternatively, it may be drawn on in hypermediate combination with other resources, i.e. a walker may use Walk4Life as a rough secondary guide but use an OS paper-based map as their primary material resource for navigation.

Unlike Jenny's public use of Walk4Life, when Kelly engages with a digital map as part of her practices of choosing a new home, she does so in private collaboration between herself and her partner. In this, Kelly's account involves a far less hierarchical form of social organisation than Jenny's, since she and her partner collaborate equally. However, Kelly also follows Jenny in her portrayal of a digital map as a centring resource within her shared practice. In other words, when Kelly and her partner search for properties separately they both tend to do so at work because "*…it's more efficient in time, in terms of saving your time because you can do it at work..."* (Kelly)*. Kelly and her partner defer to smartphone applications (RightMove and Zoopla) as media-scripted defaults, and they both save their search findings to a shared list which they later review together at home on a laptop, owing to the usability of the larger screen:

…RightMove and Zoopla apps… we both have mobile phones, so we could both log in and look up and save things to our list… [at] home we would go onto the laptop… [for] the bigger view… we would sit down together and go through that… generally put in a route… how far is it from the flat to drive… how far is it from the train station, things like that.

(Kelly)

This differs from the form of social organisation outlined in Jenny's account, in terms of how sociality is mediated. Jenny believes that Walk4Life is collaboratively generated, with the digital map as its centring resource. The social organisation involved in maintaining Walk4Life content involves a wide range of public users, a group of volunteer contributors, and Jenny herself – situated as the central facilitator. For Kelly, collaboration is closed to a private group – only Kelly and her partner have access to their shared list of properties. Hence, she depicts a private collaboration where activity is equal and is collectively mediated through Zoopla and RightMove as centring resources. When at home (in co-presence), Kelly's collaboration with her partner changes – not only in terms of the materials they engaged with (a single laptop instead of separate smartphone), but also in terms of their refining a shortlist of properties together as an equal collaborative practice with individual facilitators. In summary, Jenny and Kelly both employ digital maps as centring resources (9.6) in order to anchor (9.5) a collaborative digital map practice. However, their accounts highlight how different forms of social organisation can surround collaborate engagement with digital maps in public and private. In turn, this raises questions about how collective engagement with digital maps (as centring resources) can anchor social positions. In other words, *how* does engagement with digital maps situate some users as central facilitators.

7.3.3: Lending authority: facilitating practices through digital maps

When digital maps are shared (publicly or privately) they are often engaged with as authoritative resources that enable some individuals to inform or persuade others. At times, this serves to maintain the stability of existing social positions. At other times, it enables new forms of social organisation to emerge (6.4 and 7.3.2). For example, when university welfare officer Mike describes his use of the university-managed digital map, he depicts it as a collaboratively generated media resource which presents information from various stakeholders to a student audience. While the

option to amend or generate content is not open to students, Mike explains that university map content is generated through a negotiation between various university services and the Students' Union. Thus, Mike highlights a disparity in the information presented on the map – information which various parties assume will relate to the *needs* of students is presented, while information that he identifies as relevant to their *wants* is not:

> *…the university map… through an app… [with] places around campus marked… to highlight key services, like Student Services Information Desk, Health Services. interestingly, the dynamic sometimes is… things that students think they need to know are different to the things the university thinks the students should know... the Union and the university are two separate organisations, so there's different conversations going on all the time about… what information students should get…*
>
> *(Mike)*

In this, Mike highlights a hierarchical social organisation at play where students have little or no input on the content of the map itself while various university services and the Student's Union do. This provides a strategic means for the university to legitimate its institutional identity and its social position as the central facilitator (and information provider) for university life; one that is recursively enacted in students' use of the university's digital map. Mike later explains that this social position follows into his sharing of the university map as an allocative resource when arranging to meet students:

> *…*[students] *might be reluctant or hesitant to come and see me if it's a welfare issue, or if it's a personal issue… [to] make sure there is as few barriers as possible to be able to get them here… in my e-mail, saying where I am… I'll often point them to a map to say, this is where it is.*
>
> *(Mike)*

By sharing the university map to provide his office location, Mike recursively maintains it as the routinised default digital map (6.4) for a complex array of student

welfare practices. In doing so, Mike's account rests on an assumption that students *will* engage with and trust the map that he provides and the content it presents.

In contrast, when Dawn shares a digital map with her partner (as part of their collaborative search for a new home) she does so specifically to persuade him that some of his suggested properties do not match their agreed criteria (to only shortlist properties within the Bradway area of Sheffield). Rather than just presenting the information deemed to be useful for informing another party (as the university map does), Dawn draws on the digital map as an allocative resource (4.2.2) that both she and her partner trust in order to justify her rejection of the properties he has suggested, and to persuade him to accept her rejection:

> *…my other half would go: "What about this street?" And I would go… "That's not quite in the area I want to be in, I don't like that"… he was moving right out the area, and I was like "that's not Bradway"… the maps were really quite useful for that…*
>
> *(Dawn)*

For Dawn, the social organisation involved with using a digital map in this way is dynamic. At times, she and her partner are equal in their collaborative practice of choosing a home (like Kelly above). At other times Dawn draws on a digital map not only as an allocative resource, but also as an authoritative resource – in order to situate herself within a faciliatory role. In this, the digital map is engaged with as a centring resource that temporarily situates her as a central facilitator by legitimating her objection to properties suggested by her partner. In combination, what Mike (above) and Dawn both demonstrate is that digital maps are not only important elements in a wide array of shared practices (e.g. those involved with choosing a home or gaining orientation to a university), but that they also serve to mediate those practices, either as allocative resources to navigate or make sense of place, or as authoritative resources (4.2.2) that lend authority to some people, enabling them to inform or to persuade others (9.6 and 9.7). This raises questions about how digital maps circulate within social groups (how they are shared), and what degree of equality is at stake.

7.4. Informative and persuasive defaults: the distribution of digital maps

This section explores how digital maps are shared and circulated within both publicly and privately shared practices. It argues that when digital maps are shared, they are

often drawn on as authoritative resources to inform or persuade others. This enables central facilitators to establish or 'script' the default digital map that others defer to within privately shared practices. Similarly, when digital maps are shared publicly, users tend to defer to the digital map established as the default for the specific practice.

7.4.1. Private and public deferral: establishing defaults by sharing

When one person sends a digital map to another, it can establish that map as the default that both parties defer to within the practice at hand. For example, when Pam describes her interaction with an estate agent as part of a home searching process (first discussed in 6.5.3), she recounts how the estate agent scripted or established her initial use and adoption of Zoopla and RightMove as hypermediated defaults:

> *…they just sent me the links to it online, and that was it… I know the old-fashioned way where everybody sent paper copies of everything to each other, but no, they just e-mailed you with a link to Zoopla, RightMove…*
>
> *(Pam)*

Pam explains that her estate agent sent her an e-mail containing hyperlinks to RightMove and Zoopla to make her aware of potential properties. In this, she depicts digital maps being engaged with as a direct remediation of paper-based brochures previously sent by post. Hence, Pam portrays the hierarchical power-relations within the initial communication between buyer, seller, and estate agent as being weighted toward the estate agent. They hold a central faciliatory role in the selection, integration, and routinisation of Zoopla and RightMove as practice-specific default digital maps. Like Jenny's account of her collaboration on Walk4Life (7.3.2), Pam depicts an unequal and hierarchical form of social organisation in which one individual takes faciliatory role in informing others by drawing on a digital map. However, this rests on Pam's acceptance and trust of Zoopla and RightMove as legitimate sources of information, and her deferral to them when choosing a new home.

While Pam's absence of any attempt to generate or amend content could be attributed to a lack of competence, her continued use of the hypermediated default (Zoopla and RightMove) set by her estate agent rather than any alternative suggests a degree of trust. However, whether she places her trust in the digital map content

itself or in her estate agent as an expert central facilitator (a legitimate authority) remains unknown. In either case, Pam draws on (and defers to) the default digital map established by her estate agent when deciding which home to buy. Therefore, the estate agent has drawn on a digital map as an allocative resource, and shared it with Pam. In turn, Pam's uncritical acceptance of the digital map invests the map with authority – she enacts it as an authoritative resource.

A similar deferral towards a default established by one user and shared with another is evident in Beth's account of commissioning a website for her student-facing letting agency (first discussed in 6.5.3). Beth notes that the web developer she hired chose Google Maps as the digital map to embed on the website without any collaborative input:

> *We had a developer and we thought for a competitive website that*
> *we needed something about the area… the developer just said "Oh,*
> *just use Google [Maps]"…they didn't give us any options.*
>
> *(Beth)*

While Pam and Beth both describe the uneven social organisation involved with sharing digital maps, alongside the establishment of defaults being transposed from one practice to another (akin to Jay's account in 6.3.2), they only relate to private forms of sharing. Sharing digital maps publicly often stems from a similar process of deferral. For example, Glenn describes how he publicly shares walking routes, timings, and specific route details. He relates doing so to his deferral towards a hypermediate set of established defaults involved with countryside leisure-walking; namely OS maps. As a walk leader, Glenn notes that getting his walks published in the local Rambler's Association guide book comes with set deadlines and instructions that structure his performance of walk leading practices:

> *…by the end of July we had to have all the walks in, so you've*
> *planned them, you've done a PDF and you've submitted that PDF,*
> *so that people can see… they've got a trace of your route… they like*
> *having a map, but I don't think they would enforce it… you have to*
> *give a start point and grid references. That's a compulsory.*
>
> *(Glenn)*

When walking a route to generate a shareable file, Glenn notes that he *"…never relies on any GPS on its own…*[because] *they're just not that accurate…"*. He adds that in built-up areas he engages with a digital map instead because "*…when you see two roads… the GPS won't always tell you which one it is….*" (Glenn). In this, he draws on a hypermediated combination of resources, including a printed (remediate) version of Google Maps to ascertain specific location details. Glenn also explains why he finds Google Maps meaningful as a better source of information to preview built-up areas than GPS, attributing it to their up-to-datedness:

> *…there's a couple of little villages near us where GPS are useless… where they've built new houses. Google Maps is usually quite up to date and sharp with them… I take the Google Map, and I print them off…*

> *(Glenn)*

After completing a walk, Glenn reviews the walked route using MemoryMap.[84] When questioned about his choice of this map, he attributes it to the interoperability of MemoryMap with OS maps, inferring that the latter are established as the default for countryside leisure-walking practices (see 6.3):

> *…It was the fact that I could actually use the maps that I was familiar with, which was the OS maps.*

> *(Glenn)*

Here, Glenn's account matches those of Beth and Pam, in so far as he connects digital map sharing with the establishment and maintenance of a default. However, while Beth and Pam (above) both defer to a default set by another, and frame their discussion in terms of mediated communication, Glenn refers to a recursive maintenance of an established default within a specific practice. This opens questions on the degree of equality at stake in the sharing and circulation of digital maps.

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[84] MemoryMap is "*…the UK's most popular outdoor recreational digital mapping system… licenced suppliers of cartography from Ordnance Survey…*" (MemoryMap, 2017). As a web application it can be accessed via a computer or it can "*…turn your iPhone, iPad or favourite Android device into an outdoor GPS*" (Ibid.)*.*

7.4.2. Sharing defaults: engaging with digital maps to persuade or inform

The key difference between sharing digital maps publicly and privately is the constitution or organisation of the social network or group involved. In publicly sharing a digital map, the social network or group is open and may involve unknown others (at times from other local contexts). Sharing privately often involves smaller and/or more intimate closed social groups, consisting primarily of known others. For example, below Beth describes how a specific digital map is legitimated as a shared default via hypermediation. Rather than sending information or links to friends and family, she assumes they will use Google Maps' StreetView for a preview, anchoring their sense of place on their own terms. That is, she assumes they will engage with the established default for the practice bundle:

> *…our family and friends have been on, and they used StreetView and um, after saying this is where we're moving to, and had a look at what the area might be like, instead of just looking at the map.*
>
> *(Beth)*

Beth's account contains two claims: first, that friends and family will perceive places through digital map previews in the same way that she does; and, second, that sharing (distribution) is not always direct. In other words, Beth does not directly share a digital map or hyperlink to any specific resource, yet she assumes that her friends and family gain a similar sense of place to her through their use of a collectively-shared default (Google StreetView).

By contrast, rather than assuming her stepfather *will* use the same map as her, Dawn directly shares a specific digital map in order to purposefully anchor his sense of place:

> *…my stepdad, what he wanted to know is "how am I going to get there in my car?"… I showed him so he now knows the way to drive to our new house, and to him, that helped him picture where it is in relation to there.*
>
> *(Dawn)*

In this, Dawn draws on Google Maps purposefully, both as a default and as a centring allocative resource that collates and spatialises various hypermediate sources of information (route, location, photograph). She uses it to help her stepdad

"*…picture where* [the new house] *is in relation…"* (Dawn) to its surroundings; to anchor his sense of place through preview (6.5.1) In doing so, she highlights how inequality can be operationalised through the sharing of a digital map. For Dawn, this rests on a mutual (shared) deferral by both herself and her stepdad to the digital map that she has chosen. Thus, she has drawn on a digital map as an authoritative resource to purposefully inform her stepdad.

In summary, this subsection demonstrates that sharing a digital map amongst a small, closed, private social group can engender a collective form of deferral in which one person may purposefully share a digital map in order anchor another's sense of place. On the other hand, the public sharing of a digital map often involves a collective deferral towards an established default and can also involve deferral towards the digital map or content presented by a central facilitator (e.g. Jenny's account in 7.3.2). Therefore, this chapter argues that there is an inequality in how far some digital map-users are able to draw on digital maps as allocative resources, and to share them (privately or publicly) in order to persuade or inform others. In turn, this raises questions about how central digital maps are in anchoring senses of place and senses of security, and to what extent they anchor social practices, especially when they are engaged with alongside other resources.

7.5. Centring curation: inequalities in hypermediate affordances

This section explores how individuals engage with digital maps as media, focusing on their affordances for hypermediation and remediation. It argues that digital maps are engaged with as centring resources (7.3.1); that is, as media at the centre of a hypermediate arrangement of resources. Also, that inequality in the way such affordances are engaged with enables some users to 'strategically curate' the digital map content that others draw on, effectively enabling some users to anchor the practices and orientations of others.

7.5.1. Centring resources: engaging digital maps as hypermediate resources

Most individuals encounter and engage with digital maps as remediate resources in one way or another (evident in the quotes up to this point). For example, as Tony notes, digital maps not only provide access to other resources, they also offer a visual locus as a central point of reference; one that is dynamic and emergent in a way that static paper-based maps are not:

…like a rabbit's warren of information isn't it? Whereas with this (opens leaflet/tourism brochure with a map on it), it's "Right, I've read as much as I can read, what do I do now? Oh, there's a website…." So I have to go onto my phone and look again for something… a digital map on my phone, it's just click, "Ooh", and again. Zoom in… instant, and, um, dynamic, because the content – it's forever going to be updated.

(Tony)

For Tony, using a digital map means that he no longer needs to consult separate websites after viewing map content. Instead, the relevant resources are ready-to-hand within the content of the map, providing him with simultaneous access. In this, digital maps are not just spreadable (Jenkins et al., 2013), i.e. in the way they make information accessible. Rather. they also mark a shift in the spacing and timing of map use practices. In other words, spatiality and temporality are important aspects of digital map use. With paper-based maps, the map itself was a point of departure – map-users could gain an orientation to a place (via preview) and *then* look for other resources. In contrast, as Tony's account demonstrates, digital maps are simultaneously both a point of departure *and* a destination – with information converged within them in a process of hypermediation. Similarly, when Pam refers to Zoopla to search for a home to buy, she recursively maintains it as a default as both departure and destination. In doing so, she maintains Google Maps (the base reference map for the product) as a default alongside several dataset layers hypermediated within it:

…on Zoopla, you know, they have got links to show you the local area… there is a breakdown by school… council tax by property… education, they have got the crime rate, local tax, employment, all sort of different useful guides on there.

(Pam)

For example, when a map-user (like Pam) uses Zoopla to generate property report, they select detail on local schools and the website presents the relevant dataset on a digital map. This includes detail on the *'…[p]roximity schools by mode of transport…'* (Zoopla, 2018a) alongside links to Office for Standards in Education, Children's Services and Skills (OFSTED) reports for each school (Ibid). When Pam engages

with Zoopla, she engages with the hypermediate set of resources that it centres (such as the local school ratings, council tax banding, and crime rate reports) as integral parts of the digital map, rather than as separate resources to be consulted afterwards. In this, Pam's account depicts a hypermediate form of engagement, where the digital map is engaged with as a centring resource. Moreover, her account suggests that she places trust in the various resources embedded within the digital map. In that sense, Pam's deferral to a default digital map translates into a legitimation of the various hypermediate resources (external datasets) entangled with it. This raises questions about the degree of interrelatedness between digital maps and the resources they hypermediate.

Tony and Pam both provide media-centric accounts; they only discuss the (digital) media resources which are entangled with one another. In contrast, when Scott describes the hypermediate combination of resources he engages with when searching for a home, he depicts a far more complicated and messy process that includes a non-media resources too. For example, some of the information Scott accrues to help him shortlist properties is accessed through a digital map and gleaned from recommendations or reviews alongside Zoopla or RightMove i.e. Market Oracle, a "[f]*inancial Markets Analysis & Forecasting online publication*" (MarketOracle, 2019) that provides detail on housing market trends and various other market data. Scott also obtains information on flood risk and the local water table from a separate website and gets direct verbal (unmediated) recommendations from friends. To combine these multiple sources of information, Scott draws on Google Maps to generate his own digital map layer (a mash-up). He treats the digital map as a centring resource that enables him to gain an overall visualisation (preview) of place to inform his choice of new home:

> …*put together a Google Map with recommended and dis-*
> *recommended regions… a bit about flooding… [and] draw areas…*
> *put pointers on and then you can save it, a configured map…*
> *because I had got information from two or three different sources,*
> *and pulling it all together… I really needed to get something actually*
> *on the map, that I could see… [I] did spend quite a bit of time doing*
> *that… to visualise. It was because there was more than one*
> *dataset… some stuff we had looked up from, I think it was Market*
> *Oracle… [and] different people say different things about the area…*

> *it was very difficult to reconcile it without having some sort of*
> *graphical display.*
>
> *(Scott)*

As Scott notes below, he possesses a high level of ICT competence gained from working as a web development consultant. In this, his use of 'Google Map' as a generic term for digital maps is indicative of his recursive enactment of Google Maps. This reiterates the point that map-users deferral towards an established default digital map is not solely based on a lack of competence, but often intersects with ascribed meanings too (7.2.2). For example, when questioned on his selection of digital map, Scott notes that it relates to his use of other software – it is a hypermediate deferral that stems from his use of Google Chrome (web browser) in his software development practices, which is then transposed onto his home-buying practices:

> **Me:** *You have used OSM and you have used Google a lot, is there*
> *any reason why, for example, Google and not another map – say*
> *Bing, or… is there any reason for that specific choice?*
>
> **Scott***: I can go months without realising that Bing exists… we don't*
> *have a single computer in the house that uses Microsoft software. I*
> *tend to use [Google] Chrome because it's a good brand for software*
> *development – I do software development, so I tend to use Chrome*
> *for that…*

Interestingly, although the range of information Scott draws on is varied, and includes non-media sources such as verbal recommendations, by collating them together in a digital map, he remediates them into a single format. In doing so, Scott (like Pam and Tony) engages with the digital map as a centring resource. In turn, this raises questions about how much importance users place on digital maps as centring resources.

7.5.2: Strategic curation: informing/persuading others through digital maps

At times, the hierarchical forms of social organisation that digital maps enable (7.3) continue into the distribution and sharing of hypermediate resources that are centred within them. For example, below Joe illustrates how a national tourist information provider delimits the scope or range of information presented within a default digital map at a local level. In Joe's case, his role as central facilitator is geared toward the

interests of local chamber of commerce member organisations. Thus, he is positioned to carry out a set of strategic practices that involves convincing local Tourist Information Centres (TICs) to use relevant social media platforms (Facebook and Twitter) in a relatively uniform manner. In doing this, Joe describes his engagement with a wide range of media resources, noting their hypermediate interconnections:

> *…Twitter seem to have a wider reach… Facebook seems to get more engagement… I'm actually working a project now… getting the TICs using Twitter in a consolidated fashion, so it's familiar for the customers… they see their role as… curators of content, so they don't ultimately want to host… [they] just want to drag the interested people in and say: "There you go…there's the Peak District… there's the Cotswolds"…*
>
> *(Joe)*

Joe's account suggests a degree of recursion: the resources that countryside walkers and tourists collectively draw on (such as specific social media channels) are monitored by Joe's organisation; providing information that may be used to inform the resources and links that Joe's organisation later opts to place on the map. However, this recursion is steeped in a deeply uneven form of social organisation. As Joe observes, by selecting which resources they make available for their customers via digital maps, his organisation seeks to 'curate' the content engaged with by others. What is interesting here is that these organisations collate and make available a specific range of hypermediate resources, by drawing on the digital map as an authoritative resource alongside social media to purposefully sculpt, manage, maintain and spread a uniform identity across various platforms. This suggests a well-managed process of strategic curation, which in turn raises questions about the relationship between different modes of social organisation, and how far digital maps might allow some users to anchor the sense of place that others gain. Also, on what types of tactics are deployed in attempting to strategically curate digital maps. In turn, these questions feed into a larger set of questions around how, and to what extent, digital maps anchor everyday social practices (addressed in chapter 8).

7.6. Conclusion

This chapter addressed the second research question by exploring how people engage with the web-based affordances of digital maps. It extended the argument of Chapter 6 by moving beyond a focus on explaining how individuals draw on digital maps. Instead, it focussed on how digital maps and digital map content are collectively produced, shared, circulated and distributed. Also, how digital maps are engaged with as hypermediated resources rather than as standalone technologies.

In addressing how map-users engage with the affordances to generate or amend content, the chapter argued that people tend to defer to the existing content of digital maps, rather than amending it. This enables some people to establish and maintain specific digital maps as defaults. In addressed how people engage with the affordances for collaboration that digital maps offer, the chapter argued that digital maps are often engaged with as centring resources; they mediate shared activities and act as a locus for the hypermediation and remediation of other resources. At the same time, central facilitators often engage with digital maps as authoritative resources to anchor their social positions. Similarly, in addressing how digital maps are distributed and shared, the chapter argued that the legitimate authority gained through the sharing of a digital map enables some people to inform or persuade others. Finally, in addressing how digital maps are engaged as remediate and hypermediate resources, the chapter argues that central facilitator(s) tend to strategically curate the information available to others through digital maps. Overall, the argument developed in this chapter opens a question (addressed next) on what influence people's engagement with digital maps has on the way they perform wider sets of social practices?

8. Rough guides: examining the influence of digital maps

8.1. Introduction

This chapter addresses my third research question: What influence does people's engagement with digital maps have on the way they perform wider sets of social practices? It extends the previous two chapters by investigating how, and to what extent, digital maps people's senses of place and senses of security, alongside their practice performances and social positions. To do so, it explores in greater depth this study's assertions that digital maps are engaged with as hypermediate centring resources that add legitimacy to other sources of information (7.3 and 7.5.1). It adds that digital maps as engaged as 'rough guides'; users engage with them within situated contexts and remain open to potential error.

Initially, the chapter argues that digital maps anchor the movement of bodies in space (from landed capital acquisition choices to the selection of a leisure-walking routes); the meanings that individuals ascribe to place – both individually and collectively (ranging from sense of pace to imaginative geographies); the practice performance that constitute various social positions; and various ontological securities. It covers *what* digital maps anchor in a material sense (see 8.2). The chapter then moves on to consider *what* digital maps anchor in an immaterial sense, before focussing on *how* such anchorage works. It investigates the process of how digital map use anchors practices performances across the entire plenum of practices that constitute everyday life (8.3) – a central facet of practice theory ontology (4.4.2). Next, the chapter considers the *extent* to which digital maps anchor the practice performances that constitute everyday life (8.4)

8.2. Arranging the plenum: understanding what digital map use anchors

This section builds on the argument presented above (6.5), to address what it is that digital maps anchor – from the specific spacing and timing of practice performances and the movement of bodies in space, to the various orientations (senses of place and security) gained through engagement with digital maps.

8.2.1. Practical anchors: anchoring the movement of bodies in space

Digital maps often anchor peoples' choices of site and/or route. For example, revisiting an account presented earlier (6.5.1), Pam explains that when she searches

for a home to buy, a digital map informs the route she takes between properties when travelling to visit them:

> *…it's just to plan routes… literally put in the postcode, door-to-door sort of thing. Um, a couple of weekends I did actually go and view five or six properties, but it was just driving around them… I just put the postcodes in and sort of planned a route to go through each one*
>
> *(Pam)*

Pam treats the digital map as a hypermediate centring resource (7.3). She enters postcodes of properties she intends to visit onto a digital map, then generates a route between them as a hypermediate map mashup.[85] In doing this, Pam demonstrates a competence to generate digital map content, also that she finds it meaningful to do so. In conceptual terms, Pam's account suggests that digital map use anchors the movement and distribution of bodies in space in so far as it influences her specific choice of route between properties, and by extension the temporal sequence in which she visits them. This opens question about the extent to which digital map use anchors practice performances (addressed in 8.4). Pam's account also suggests that she trusts the route provided by the digital map, raising questions on the degree of trust placed in digital map content (addressed in 8.3).

As well as selecting a route *between* sites, people often draw on digital map previews to select sites. For example, when Dave describes his deferral to TripAdvisor when choosing consumption sites (also in 7.2.1), he explains that he would not consider sites that were omitted from TripAdvisor:

> *…if I know that I'm going somewhere, I'm kind of like already on TripAdvisor for example… then decisions are made… They just, they weren't listed, so they were missed out.*
>
> *(Dave)*

While this illustrates how an indirect deferral to a default digital map (as a key feature of the product he engages) can anchor the specific performance of a practice (where he chooses to go), it also suggests a potential curation of content (7.5.2). Comparing

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[85] In this, Pam re-enacts the performance of the first map mashup (Crampton, 2010, pp. 26–27).

this to Pam's account, the conceptual point stands – that people's engagement with digital maps can anchor their decisions and movements.

As a point of clarity, it is not just the specific choices of route or site that engagement with digital maps serves to anchor; the timing and spacing of practice performances which those choices relate to are anchored too. For example, when Pam expands on how she uses a digital map to select a route between properties, she mirrors Dave by explaining that the range of sites (properties) from which she made her selection was itself delimited to only those presented on a digital map:

> *…without me being able to go on and do the research, and see where it was, I would have to have a lot of trips up there and travel around I think, just to view. By having the [digital] map, I could say a definite yes or no just by looking.*
>
> *(Pam)*

Hence, Pam extends her discussion of her route selection being anchored by demonstrating that it is anchored by a remediate engagement with a digital map. First, she engages with it to preview places in order to select properties. She then enters postcode information for a shortlisted set of properties in order to generate a route between them (as a map mashup). Thus, Pam's engagement with a digital map anchors both her choice of site and choice of route. In turn, the preview informs the spacing and timing of her property-viewing practices, since, without a digital map, she would have had *"…a lot of trips up there… just to view"* (Pam)*.* The digital map affords less repetition in her physical travelling to and from sites visits by enabling Pam to shortlist properties based on a preview (6.5.1), allowing her to "*…say a definite yes or no just by looking…"* (Pam). In short, the digital map anchors both the timing (frequency) and spacing of (which properties visited) of her physical (corporeal) movement in space.

Digital maps do not just anchor the movement of individuals, they also anchor shared movements. For example, when Becky engages with a digital map to plan a countryside leisure-walk with her partner,[86] she draws on it to preview places in order

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[86] Becky works for an organisation attached to a university which provides student lettings information and was interviewed as such. However, she discussed her use of digital maps for countryside leisure walking at certain points in the interview. This reiterates the methodological value of research contexts as sensitising devices over firmly bounded cases (5.3.1).

to select a suitable route and to assess whether the walk's starting point is accessible by public transport:

> *…We like to go to the Peak District… so I go: "Can we go by public*
> *transport?" And go: That's a good way"… Look at the area, zoom in,*
> *get a bus stop and then see, then look at the blue lines*
>
> *(Becky)*

In this, she describes her digital map engagement anchoring the shared movement of bodies in space (between herself and her partner). In combination, what Dave, Pam and Becky all describe is an engagement with digital maps to preview place, adding that this preview anchors their subsequent practice performances. While Dave is only concerned with his choice of site, Pam and Becky focus on choosing both a site and a route. In combination their three accounts demonstrate that what engagement with digital maps anchors is the timing and spacing of people's movements - and thus the spatial and temporal distribution of bodies in space. In turn, this re-opens questions about *how* digital maps anchor (8.3), the extent to which they do so (8.4), and on what (if anything) engagement with digital maps anchors - beyond the movement and distribution of bodies in space (covered next).

8.2.2. Immaterial orientations: anchoring senses of place and security

As well as the physical movement of bodies in space, engagement with digital maps can anchor the immaterial senses of place and security experienced by individuals (6.5). For example, returning to Pam's account again, when she engages with a digital map preview to plan her route between properties, she gains a sense of place through the preview:

> *…I was sort of zooming in and looking at places on the outskirts and*
> *in the countryside… what the building looked like, it was more the*
> *local area that it was in, so you could get an overview and see how*
> *close they were to fields and open areas.*
>
> *(Pam)*

Pam explains that her choice of sites (which properties to shortlist) is anchored by her sense of place, and that in turn, her sense of place is anchored by her previewing of places through a digital map. When she explains that the proximity of properties to open green space is a key factor in her shortlisting criteria, she portrays the

representation of green space in digital map views as anchoring of her choice of home. The preview allows her to categorise properties as either worthy of being shortlisting or not (4.3.4).

Similarly, when Sarah describes her search for a part-time job as part of her orientation to the university, she also describes her choice of site being anchored by the meanings she ascribes to place on the basis of a digital map preview:

> *…I was looking at jobs recently and I looked on a map to see where this job was, and it was on a golf course, and it was south of Sheffield, and it looked like it was surrounded by public space, i.e. no public transport, and so I was like, maybe not!*
>
> *(Sarah)*

Sarah's decision not to apply for a specific job is steeped in a sense of place gained through digital map preview – specifically, an understanding that the site lacks public transport connections. While Sarah's account reiterates the importance of addressing the degree of trust people place in digital map content (8.3), it also provides a conceptual understanding of how digital maps might structure people's practices – as they do in the media effects theses held by Power et al. (2012) and Shapiro (2017). For Sarah, (like Pam above) it is her interpretation of the digital map preview that serves to anchor her specific practice (choice of job). In this, Sarah's account suggests that individuals must find the representations that digital maps present to be meaningful in some way. That is, it suggests that digital map-users are – to some extent at least – reflexive in their interpretation of digital map content (6.5.2). In turn, this suggests a complex interplay between the views of a place presented on a digital map and the meanings that individuals ascribe to those views. Considering the meanings ascribed to views as a practice element composed of associations and classifications (4.3.4) steeped in deeply subjective memory traces (4.2.2) once again raises the question of *how* digital maps anchor (addressed in 8.3).

It is not just digital map previews that anchor senses of place, postviews can too. For instance, Sarah explains that, after visiting Amsterdam, she engages with Google Maps to look back at places she has visited (she postviews place). This enables her to gain a relational understanding of the size and scale of the city, and to make sense of its location in comparison to others, e.g. Utrecht:

…I've been to Amsterdam… so just out of interest I used Google Maps again, and see that: "Oh, this is a big city!" So that when people talk about Utrecht for example, and I'll be like "Oh, I know where that is!"…

(Sarah)

In this way, Sarah's sense of place is anchored in her engagement with a digital map differently than it is for Pam. For Pam (above), previewing place enables her to make decisions on which homes to shortlist. It anchors her choice of site and route, influencing the material movement of her body in space. At a wider scale, this anchors her decision about which property to buy (8.2.1). When Sarah decides not to apply for a specific job on the basis of a digital map preview, she describes having *"…looked on a map to see where this job was…",* and then interpreting the site as being *"…surrounded by public space…*[and therefore] *was like, maybe not!"* (Sarah). In this, both Sarah's sense of place and the movement of her body in space are anchored by a preview. However, when she engages with a digital map to postview Amsterdam, it is her immaterial sense of place that is anchored. The practices involved with her being there have already been performed. In addition, while the postview provides her with an orientation (sense of place) to places she has already visited, it also enables her to make sense of other places, i.e. Utrecht. In conceptual terms, therefore, what the digital map postview anchors is Sarah's orientation towards place in the form of an imaginative geography.

In addition to the senses of place discussed above, digital maps also anchor various senses of security (6.5.3). For example, when Paula describes travelling to meetings in another city as part of her job, she explains that having a digital map ready-at-hand provides her with a sense of personal safety. She feels more confident navigating unknown places when she has a digital map available as a 'back-up':

When I go to Manchester for meetings, which is a strange place, I use Google Maps… it lets me feel safe and more confident not having to ask people… [because I have] got a back-up.

(Paula)

By describing a preference for engaging with a digital map in situ rather than *"…having to ask* [strangers]…", Paula opens an avenue to discuss engagement with

digital maps in terms of an emerging networked individualism (4.5.2). Her account also foregrounds two important points. First, that it is not the affordances for preview or postview that anchors practices *per se*, but the orientations (senses of place or senses of security) that such views provide. Second, that digital maps need not be actively used to anchor senses of security; having the potential to *access* to views can anchor orientations just as much as directly engaging with views themselves. To clarify, when Paula describes her engagement with a digital map, she considers it to be meaningful as a latent resource (6.5.3 and 9.2). She does not directly engage with *a* digital map, instead, her sense of security is anchored by the *potential* to engage with it via a smartphone sat idle in her pocket.

At other times, senses of place and security are harder to distinguish. For example, Dave explains that, because digital maps enable him to geolocate himself (when he does not know where he is), they anchor both his sense of security *and* his sense of place:

> *I don't like not knowing where I am… I find the ability to be able to quickly and easily pull a [digital] map of where I am to be really kind of comforting… [it] gives me a sense of, you know, where I am, where things are in relation to me, how far I am from things… it gives you a sense of security… that you're not really that lost, you know.*
>
> *(Dave)*

However, when digital maps anchor an individual's sense of security, it is not always due to them having the ability to geolocate themselves ready-to-hand. Digital map views can also anchor senses of security through the affordances they offer for map-users to locate others (as Matt demonstrates above when locating his colleague to arrange a coffee meet – see 7.3.1).

Similarly, when Tracey explains how she draws on digital maps for previews, she describes doing so in multiple ways; both to gain a sense of place when searching for a new home, and to track her daughters' journey to South Africa. On the latter, the digital map provides a sense of ontological security (and an affordance for parental surveillance) in being able to geolocate her daughter in real-time, encouraging her to assume that her daughter is safe. Thus, the digital map not only reassures her, it also anchors her self-identity and social position as a mother, and her ontological security in the likely stable continuity of both:

> *…[I used] Google StreetView to gauge the feel of a neighbourhood when looking at new houses… the airline map to follow my daughter's progress to South Africa and found it very reassuring*
>
> *(Tracey)*

Interestingly, Tracey's account demonstrates an implicit trust in the accuracy or veracity of the digital map preview she is presented with. She assumes that Google StreetView accurately represents the immediate area surrounding properties she is considering (as a photo-realist representation). Also, that the live flight-tracker (a dataset hypermediated within Google Maps) will accurately and truthfully present the exact location of her daughters' flight-path in real-time. This again, opens questions on the degree of trust placed in digital maps (8.3.3)

Digital maps do not only anchor the senses of place and security of the individuals engaging with them. Rather, they can be shared by an individual to inform or persuade another, and at times to strategically anchor others' senses of place and security. For example, when organising a trip to London with her mother, Dawn draws on a digital map preview to provide her mother with a sense of place and a sense of security, abating her anxiety about getting lost:

> *…I took my Mum to London… we were going to a theatre and a restaurant, and she's a bit nervous of London and the underground… I had said to her, don't worry about that, I'll have it all planned… partially on maps and kind of said: "We'll go here, and we're going to get the tube from here to this street. It will take us five minutes to the theatre, then afterwards we've just got to walk from here to here to get to the restaurant". So that she knew there weren't going to be any surprises… any points where we go "Er, where do we go now?"*
>
> *(Dawn)*

In this, Dawn discusses her engagement with a digital map to persuade her mother *prior* to the performance of the practice itself (the London daytrip). This raises the question of how senses of place and security gained through digital map previews compare with the embodied experiences of 'being there' – especially if the lived reality of being within a place differs in some way from the preview (8.4) – a point that

resonates with Wilmott's (2016) notion of 'hauntings' (3.6.3). In combination, what Dave, Dawn, Pam, Paula, Sarah, and Tracey demonstrate is that access to digital map views can anchor various 'orientations' (senses of place and senses of security). In conceptual terms then, in addition to anchoring the timing and spacing of the movement of bodies in space, digital maps also anchor the meanings people ascribe to place (senses of place) and their feelings of personal safety and ontological security (senses of security).

8.2.3. Positioning anchors: which social positions are anchored?

When a new material element is introduced into an existing practice, it is either rejected or it leads to a rearrangement of the elements that constitute that practice (4.4.1). When digital maps are introduced into an existing practice (as a new material element), it often leads to a rearrangement of elements. At times, this can anchor and alter the performance of social positions (see 6.5.3). For example, Stacey explains how the introduction of various web-based technologies, including digital maps, has altered her customers' practices. She also describes changes that have resulted to her practices as a B&B owner:

> *…people used to ring up the local tourist board looking for places to*
> *stay in the local area and book through them. Whereas now…*
> *(gestures to using a smartphone)*
>
> *(Stacey)*

In the past, potential customers would contact the local tourist board by phone, which would in turn provide tourists with details of registered B&Bs in the local area. For Stacey, the introduction of web-based technologies affords walkers and tourists the capacity to search for local B&Bs themselves. Thus, Stacey notes that, rather than receiving B&B bookings via the local tourist board, customers now contact her directly. This has not only led to a change in the way Stacey performs her day-to-day practices, it has also rearranged relative social positions within the local area (and local economy) in so far as the tourist board is no longer considered the central facilitator of local B&B bookings. In setting out how she adapted to this newly-arranged social position, Stacey describes an interaction with her web developer and her rationale for setting Google Maps as the default on her website:

> *… [there's] literally hundreds [of B&Bs] in Matlock… at the moment,*
> *if we get the bookings from Bookings.com, we pay a commission…*

he said if you use Google Maps more and a virtual tour, you can try
and get more direct bookings, because you're not paying out the
commission…

(Stacey)

She incorporates a digital map into her website as a strategy aimed both to persuade customers to choose her B&B over others, and to maximise her business profit by gaining more direct bookings (without paying commission to third-parties). In short, the practice performances that constitute Stacey's social position have been rearranged through the introduction of digital maps into the practice complex (4.4.2) surrounding the local tourism industry. In conceptual terms, when customers began to draw on web-based technologies as new material elements, they developed new competencies in searching for B&Bs. As a result, their practices reconfigured the meanings ascribed to the local tourist board. In adapting to these changes, Stacey employed a web developer (for their competence) to tailor her website towards her customers' changing practices. In doing so, Stacey's social position (as a B&B owner) become increasingly independent and less reliant on the local tourist board or commission-based facilitators. Hence, as well as portraying her social position as shifting towards a networked individualism (4.5.2), Stacey also demonstrates that people's engagement with digital maps is, at times, entangled with various other resources. In combination, such resources can anchor the performance of social positions that spread across a wide array of practices (4.4).

Returning to Pam's account (7.5.1) provides a similar account of digital maps anchoring (and destabilising) social positions. Pam describes her interaction with an estate agent throughout the home-buying process, noting that, in the past, an estate agent would have sent her paper-based details of potential properties via the post. With the introduction of digital maps, estate agents now e-mail a hyperlink to specific properties instead:

[T]hey just sent me the links to it online, and that was it. So, I know
the old-fashioned way where everybody sent paper copies of
everything to each other, but no, they just e-mailed you with a link to
Zoopla, RightMove, things like that to have a look.

(Pam)

In this, a previously stable set of practice performances positioned the estate agent as an expert information provider (a legitimate authority) that facilitated the home-buying process. By only distributing details of specific properties, estate agents treated their paper-based files on properties as authoritative resources (4.2.2). By strategically curating and/or delimiting the range of potential properties from which a buyer might choose, they anchored buyers' choices of home. As Pam notes, estate agents follow a similar set of practice performances following the introduction of digital maps, only sharing hyperlinks to certain properties. However, Pam notes the hyperlinks her estate agent shares are search results from two hypermediate property search sites (Zoopla and RightMove); both of which provide a digital map alongside access to information about a wide range of alternative properties. Thus, in the past, the estate agent was understood as a central facilitator of information (a gatekeeper). Here, Pam's account reveals how the social position of estate agents has been destablised and shifted over time; they now provide suggestions, while Zoopla and RightMove (hypermediate digital maps) delimit her choice of properties.

Digital maps not only anchor individual social positions, they anchor institutional ones too. For example, when Kelly and her partner sold their flat, a potential buyer alerted them that the Land Registry (the state institutional body for safeguarding records of all land holdings in the UK) details were incorrect. In response, Kelly drew on ICT competencies gained from past employment in web design (stated elsewhere in her interview) to combine imagery from Google Maps' standard reference view and StreetView in a map mashup. In turn, her map mashup strengthened her claim when raising the issue with the Land Registry:

> *…We had a query that came through when we were selling… an issue on the Land Registry… the whole building was rotated 180 degrees the wrong way, so our flat was positioned right, but because it was rotated, it was wrong. But to prove that it was wrong I actually used Google Maps, I took screen shots from Google Maps, I sort of Photoshopped on their documents to show which way around it should be, and then I also used StreetView to explain exactly which street it should be, and I also drew a big box around the flat to show which street it was actually on, so they could see it wasn't facing a car park, it was facing a railway, and I sort of sent those over and*

Land Registry [who] *found them really useful as evidence to support their map as well.*

(Kelly)

By drawing on a digital map as an authoritative resource (as an individual), Kelly was able to persuade the Land Registry to change a formal and legal state record. Thus, Kelly's account demonstrates a threefold anchoring of social positions. First, when the Land Registry accepted and acted on the map mashup provided by Kelly, they legitimated her social position as a central facilitator of geographic information about that specific property (or local place). This opens questions on *how* social positions are anchored (addressed in 8.3). Second, when the Land Registry accepted and acted on Kelly's advice, they treated her map mashup as a truthful representation of reality. In this, the Land Registry legitimated a user-generated and hypermediate preview of place based on a mashup of privately owned, publicly open, digital map content generated (in part) by volunteered geographic information (VGI). This raises questions on the level of trust placed in digital map views – both by individuals and organisations and the data politics this involves (addressed in 8.4). Third, by correcting their record, the Land Registry have recursively legitimated their own social position as the body that maintains an accurate register of UK land and holdings. Overall, what Kelly's account demonstrates (like those of Stacey and Pam above) is that not only does engagement with digital maps anchor the timing and spacing of practice performances (8.2.1), and people's senses of place and security (8.2.2), it also anchors their performances of social positions. The next section moves beyond a focus on *what* is anchored in engagement with digital maps, to focus on the process of *how* digital maps anchor.

8.3. Meaningful views: how digital maps anchor

This section explains how digital maps anchor and to what extent. It argues that the meanings people ascribe to place through digital map views enable digital maps to anchor various practices, orientations, and social positions. It asserts that individuals ascribe meaning to place through digital map views by drawing on memory traces for pre-existing associations and classifications, and that, when digital maps are shared, there is a collective and generalised assumption of veracity in the information that digital maps present.

8.3.1. Engaging views: what is it about digital maps that anchor things?

As I have demonstrated so far, people mainly engage with digital maps to view specific places, and it is those views that anchor their practices and orientations. For example, when Chris, a Tourist Information Centre (TIC) manager, discusses planning a trip to France, he describes using Google StreetView (for preview) to virtually traverse the streets he later went on to visit:

> *…we went on holiday to France in September and before I had even*
> *been there I had walked around the whole village…I knew where all*
> *the restaurants were, and it was almost like I could recognise people*
> *when I got there: "Oh! you were sitting in so and so restaurant!"…*
> *that gives you more of an idea about a place, but an actual physical*
> *map (with the roads of this and that) is just functional…*
>
> *(Chris)*

The digital map preview anchored his sense of place beyond a merely instrumental mapping of the road layout. In this, Chris hints at a sense of place being anchored by a digital map that aligns with de Certeau's (1988, p. 201) notion of *place* (4.2.2); the digital map provides a preview of the lived experience of being there and represents more than just the materiality of the locale. Instead, it allows him to form an imaginative geography of the dynamics of past activities carried out there. However, the complexity with which digital map views are engaged with does not necessarily correlate with their potential to anchor. For example, when Laura describes her experience of witnessing students' use of digital maps on university open days, she observes that they do so at different temporal stages:

> *[I]t's interesting how much it's preparation, and then in use, and then*
> *re-enforcement. So, in preparation, before they come to an event –*
> *"Can I get a sense of the layout?" "Where do I need to be?" – using*
> *when they're actually here. And actually, after they have been, as re-*
> *enforcement that we did go on a campus tour… just refresh [their]*
> *memory again where things are in relation to one another…*
>
> *(Laura)*

She asserts that students initially draw on digital maps for a functional preview of place to *"…get a sense of the layout…"* (Laura) of the campus prior to visiting the

university. This refers to a more materialist understanding than the sense of place than Chris gained based on his preview of social dynamics via preview. Laura adds that while at the university, students also engage with digital map previews *in situ* to navigate around the campus (as geolocative media). After visiting, they draw on digital map postviews to aid their memory and relational understanding of the campus layout. Thus, Laura (like Chris) highlights that the ability to view place through a digital map is what serves to anchor people's senses of place. While Laura's account is partial – based only on her assumption of how students *might* use digital maps, it does resonate with the direct accounts of students themselves. For example, when John (a student) discusses his engagement with digital maps, he describes gaining a preview of place before going out and a postview afterwards – the specific timing and spacing of which change according to the practice at hand:

> *…ten minutes before I leave the house, I'll be like, "I've got to go here". It depends on the thing, sometimes I look on it the night before, and then I'll look at it 10 minutes before as well, the next day.*
>
> *(John)*

Moreover, John notes that he when engaged with digital map previews to orientate himself to the campus during his first week at university, it anchored his sense of place. However, he then notes that his sense of place has developed further over time and relationally as he gains a familiarity with places through being physically on campus:

> *…in intro week, we had this timetable… I would find out what the building was and go on Google Maps to see where that building was… how I could get there from where I live… then I sort of have my bearings, so I could be walking and know where I am and be like, "Oh this is that building I saw there, and I have to turn here"… I can relate then what I've seen on the map to my physical bearings…*
>
> *(John)*

In this, John presents a digital map preview as anchoring of his sense of place. However, he also describes drawing on a memory of the preview and comparing it with the lived experience of being physically situated in the represented place. This further differentiates use and engagement (6.2.1) in so far as that while John

engages with the digital map through recall (in memory), he does not always actively use it *in situ*. Sarah tells a similar story – she engages with digital maps to preview place, and to plan a route through the university campus. However, it is her sense of security (in being able to geolocate herself) that the preview anchors, not her sense of place:

> *…usually before, and as a last resort during… I don't have much data on my phone contract, so as soon as I see a little bit is draining away I start panicking… I try and commit as much to memory, and write it down… I'll look at the streets around where I'm supposed to go, in case I take a wrong turn, and you know – 'I'm on this street…' but I'll know I'm nearby and I can correct myself.*
>
> *(Sarah)*

When Sarah describes her engagement with a digital map, she portrays it as a practice hack (6.4.2) in which she writes down directions after previewing a place on-screen, later using the written notes to navigate. In this way, she maintains her engagement with a digital map in remediate form when encountering a material limitation (the cost of data in using her smartphone *in situ*). Her account matches John's, since both share an understanding that when digital map views anchor practices and orientations, they do so relationally to physically being present and *in situ* in the represented place. In turn, this opens questions on *how* digital map views anchor.

8.3.2. Ascribed meanings: how digital map views anchor things

As the previous section outlined, when people draw on digital maps, they often do so to view a place. In turn, it is those views (or potential access to them – see 8.2.2) that anchor the performance of various practices, social positions, orientations (senses of place and senses of security). In this, individuals to ascribe meaning to place on the basis of digital map views. They then act according to those meanings, drawing on subjective memory traces to do so. Here, meanings are understood as practice elements composed of classifications and associations (4.3.4). For example, revisiting Kelly's account (6.5.2) demonstrates that in her engagement with Google Maps StreetView as part of her process of buying a home, she gains a sense of place through its preview:

*…when I found a property I was interested in, I used StreetView a lot
to see what the surrounding streets were like… [to] look up and
down the street… at the overview, the normal view, and then have a
look at, um, zoom in… look at people's gardens, because I wanted to
see if they were scruffy or not, to give me a better idea of how well
the street was kept.*

(Kelly)

For Kelly, the digital map preview anchors her choice of home. However, digital map views do not stigmatise or assign identities to places on their own accord. Rather than reifying the map, Kelly explains that, by looking at a preview of the street and the local area, she is able to classify it as either 'well-kept' or 'not'. She notes this classification is based on her own pre-existing subjective association of garden maintenance with degrees of scruffiness. That is, if the preview showed gardens that Kelly deemed to be 'scruffy', she assumed the area would not be 'well-kept' and therefore excluded it from her shortlisting. Kelly's account demonstrates that, when individuals engage with digital map views, they ascribe meaning to the places represented in them by drawing on pre-existing associations and classifications that are stored in personal memory traces. In Kelly's example, her choice of home was anchored in the sense of place that she gained by engaging with Google StreetView for preview and the pre-existing classificatory scheme show ascribed to its representation.

Pete presents a similar account (also discussed in 6.5.2). Like Kelly, he applies a pre-existing classificatory scheme to a digital map preview, and thus ascribes meaning to the places represented within it, developing a sense of place. He also explains how that sense of place relates to his performance of a practice (he chooses not to walk through the town centre at night):

*…You can tell if somewhere is run down, a bit rough, the kind of
place maybe you wouldn't want to be walking through… I'm glad I
looked on StreetView, because it's not a brilliant place…not awful,
not horrendous…it is a bit run own in the centre at night, and that
affected my decision not to walk through.*

(Pete)

Here, Pete describes a personal classificatory scheme in which places interpreted as 'run-down' or 'rough' are associated with a negative practice performance; as areas to avoid. On the particular route he previewed, Pete depicts his classification of the place as 'not awful', 'not horrendous', but 'a bit run-down'. By association, he chooses *"…not to walk through it…"* (Pete) and takes a different route instead.

Kelly and Pete both draw on digital maps as standalone resources. However, digital maps are hypermediate and centring, and often entangled with various other media resources (7.5.1). For example, when searching for a home to buy, Pam does not draw solely on a digital map preview to gain a sense of place. Instead, she combines the photo-realist imagery of Google's StreetView with data on council tax banding and police crime statistics (hypermediated within Google Maps). She does, however, note that it is the digital map imagery (preview) that most firmly anchors her sense of place and her idea of *"…what it was about…"* (Pam). Subsequently, she considers the digital map preview as the centring resource that frames her selection of properties to shortlist:

> *…more sort of StreetView than the map… [I] go up and down the street… look at just the general state of the place, or you know, the people, the vehicles… get an idea of what's around… Once I had kind of zoomed in on a place then I would often go on and go down the actual street, and look around the local areas as well, to see what was about… get a feel for it… obviously there was nice areas and bad areas, things like that… because it's out of, you know, the county, I don't know anything about it… You look at the tax and the crime, and things like that, but numbers don't necessarily tell you how good the street is, so it was useful to have a look and see what sort of area it was.*
>
> *(Pam)*

She explains that the digital map preview, combined with other hypermediated datasets (e.g. council tax banding and local crime rates) allow her to assess whether to classify an area or street as 'good' or 'bad'. This portrays the digital map as anchoring her choice of home to a greater extent than the embedded dataset of crime statistics, adding that *"…numbers don't necessarily tell you how good the street is…"* (Pam). However, it is important to note that Pam's sense of place is

steeped in a hypermediate preview, in which the digital map is accorded a high degree of centrality. That is, the digital map anchors her sense of place as a central resource - not as a peripheral one.

Extending an earlier argument (8.2.2), the senses of place that map-users ascribe to digital map views not only anchor their performances of embodied practices, but their immaterial practices too. For example, when Sarah portrays her perception of Japan as being informed by a digital map preview, she describes the preview as anchoring her imaginative geography (sense of place) without any connection with her physically going there:

> *I looked at a map of Japan… a lot of it is completely empty, because it's mountains and you just have these massively densely populated coastal areas, and I can just imagine it's all huge, tall, and sky-scrapery, and you can just tell, like for me anyway, because it's just a blob of grey, squares...*
>
> *(Sarah)*

In this, Sarah associates the formal thematic representational scheme of a digital map (Google Maps' use of greyscale for buildings) with a complex sprawling urbanism composed of skyscrapers. However, Sarah's assertion that *"…you can just imagine… you can just tell…"* suggests that while she does ascribe meaning to place by drawing on digital map preview, she does so in a state of practical consciousness. She can articulate her classificatory scheme and describe how the preview relates to specific associations, but she cannot fully articulate what it is that structures those classifications and associations. To better understand how digital map views and ascribed meanings interrelate to anchor various practices and orientations, the next subsection explores digital map sharing to address how the meanings ascribed to place through engagement with digital map views are distributed and circulated.

8.3.3. Realist imagery as a base: how veracity underlies shared anchorages

When individuals share digital maps, they often do so to inform or persuade others (7.4.2). By strategically sharing a digital map view, an individual can anchor another's practice performances or orientations. For instance, when Michelle shares a digital map with students, she frames it as an informative act performed as part of her social position as a student-facing member of university staff:

The maps that the university has created themselves are just the specific [campus] area... I use those maps particularly when I'm trying to direct students… [and] larger maps like Google, for a conference say, or for much further away from the university, directing them to restaurants or a conference or whatever it is…

(Michelle)

When Michelle shares a digital map view to direct students about how to navigate the university campus, she differentiates between two approaches. First, by sharing the university-produced digital map, she recursively legitimates the social position (and authority) of the university as the central provider of geographical information around the campus, maintaining it as an established default (7.4.2). Moreover, by sharing the university map, Michelle engages with it as an authoritative resource that anchors her own social position as a central facilitator in informing students' navigation around the campus. In contrast, when Michelle directs students in their choices of site or route away from campus *"…to restaurants or a conference..."*, she shares Google Maps as an established default instead. In this way, Michelle harbours an underlying assumption that others will be able to understand and interpret both digital maps in a way that is comparable with her own interpretation; that each map will be understandable as an accurate portrayal of an existing reality.

When digital maps are shared in order to inform or persuade others, individuals do not only draw on the previews they offer, they also draw on postview in much the same way. For example, Dawn regularly engages with a digital map to explain to her mother and/or stepfather where she has been, or where she intends to go. In doing this, she does not differentiate between preview and postview, holding both as equally informative:

…Mum or my stepdad is always asking about somewhere we've been or we're going, I will always pull a [digital] map up and show them, like on my iPad or something…

(Dawn)

When Dawn shares a digital map, like Michelle, she draws on the view it offers to inform others. Likewise, she assumes that others will ascribe a set of meanings to the places represented in the digital map view that are comparable to her own. Extending

this to her shared shortlisting of homes, Dawn explains that her partner routinely draws on and shares digital map views to inform her sense of place. He draws on memory traces from his personal experience of the local area, and uses the digital map preview to share his pre-existing sense of place specifically to anchor Dawn's – as part of a collaborative decision on which home to buy:

…my other half knows it better and he was using it to point things out to me like, "That's where that is… That's where the pub is…", things like that. Um. So, yeah, we found it quite helpful.

(Dawn)

In this way, Michelle and Dawn both describe a digital map view being shared by one party to inform or persuade another by anchoring their sense of place. Both assume that the indexicality of digital map content will be universally treated as a truthful representation (between sharer and recipient). Dawn goes even further in her portrayal of a realist understanding that the meanings ascribed to places represented in a digital map view will be commensurable between the individuals sharing a digital map.

Similarly, when Beth describes how her friends and family gained an orientation to her new home, she describes a digital map as the centring resource engaged with by her social group which anchored their shared senses of place:

…our family and friends have been on, and they used StreetView and um, after saying this is where we're moving to, and had a look at what the area might be like…

(Beth)

However, unlike Michelle and Dawn, Beth does not directly share a digital map with her friends and family. Instead, she assumes they will gain a comparable sense of place by deferring to the same (established) default digital map to view (preview and/or postview) the same place. She assumes they will ascribe a similar set of meanings to the same view, and therefore gain a similar understanding of *"…what the area might be like…"* (Beth). Similarly, when Claire describes students' sharing of digital maps to inform their parents, she assumes the meanings ascribed to places through digital map postview will be commensurable between them:

…with [digital] maps, you've got like, if people do a campus tour or an open day, the student will come with one of the, or two parents. Sometimes, like, Mum will come, but Dad can't make it because he's working, and I wonder how much they use maps as kind of virtual open days, to say "This is what we saw". So when they are talking to Dad about "Oh, it's Sheffield", and "Oh, I really like this…" and "This is part of the...", or 'The nightlife looks amazing…', and they are able to actually back that up these days by using digital resources to say "This is what it is, this is what it looks like".

(Claire)

In her description of digital map views as a form of 'virtual open day', Claire holds postview comparable with being physically present at a site. She assumes that the representation of places on digital map views is directly commensurable with the embodied reality of physically being there. Like Beth and Dawn, Claire's account attributes a degree of veracity or truthfulness to digital maps; that they are universally believed to faithfully represent reality (by parents and students alike) as realist representations. In this way, the basic meaning that people ascribe to digital map views is that "*…this is what it is, this is what it looks like…*"' (Claire). In conceptual terms, this mirrors Wood and Fels' (2008, p. 189–190) understanding of maps' indexicality; that the reality presented (signified) on a map can be verified. That is, digital map views are engaged with and shared as empirically verifiable representations of a physical reality. The next section addresses the extent to which digital maps anchor, exploring how accurate or complete digital map views are considered to be.

8.4. Situating rough guides: the extent to which digital maps anchor things

This section moves beyond considering *what* (8.2) or *how* (8.3) engagement with digital maps serves to anchor practices, social positions, and orientations. Instead, it addresses *the extent* to which they do so. First, it explains how digital maps garner trust, arguing that trust in digital maps views stems from an understanding that their content is iterative, revised, interoperable between maps, and veracious (8.4.1). Next, it observes that, while people engage with and trust digital maps views as veracious representations, they are often able to identify errors and omissions, at times developing practice hacks to work around them. It then argues that digital

maps are engaged with as 'rough guides' and that the degree to which they anchor differs between individuals engaging with them, and the contexts in which they are engaged with (8.4.2).

8.4.1. Constructing veracity: what garners trust in digital maps?

One of the findings from the scoping survey suggested that individuals trust digital map to accurately represent place e.g. when asked "*Are digital maps reliable (trustworthy)?*", 80.23% of the respondents answered "*Yes*". Whilst the survey draws on a non-representational sample, and therefore cannot warrant any claim to statistical significance (5.5.1), the suggestion matches the accounts of interview and focus group participants, who often go further to locate their trust in digital map views within the apparent veracity of the representations they offer. For example, Glenn (discussed in 7.4.1) and Francis both explain that they place their trust in digital map views because they consider the content to always be up to date:

> *…where they've built new houses, Google Maps is usually quite up to date and sharp with them.*
>
> *(Glenn)*
>
> *Um, they make life a lot easier. They are always up to date.*
>
> *(Francis)*

Both attribute the accuracy of digital maps to their continual revision of content, acknowledging that digital maps' veracity is maintained through a continuous and iterative process of revision. Likewise, Estelle and Gary (below) also locate their trust of digital maps in a process of ongoing revision. However, they both demonstrate an awareness that such iterative revision of content is carried out in aggregate by other map-users, e.g. through volunteered geographic information (VGI):

> *So many people use them that problems are quickly detected. They are more reliable than paper maps because they are more up to date.*
>
> *(Estelle)*
>
> *There is a sense that they are more up-to-date. Also, people are using the same data often and errors are therefore more likely to be highlighted in a timely manner.*

In this, Estelle and Gary follow Glenn and Francis to situate the veracity of digital maps within a process of continual update. Their understanding that iterative revision is carried out through VGI depicts digital maps as emergent resources that are enacted and brought into being through use (2.4.4). However, neither Estelle nor Gary specify whether they consider VGI to be volunteered knowledgably or not. In contrast, earlier this thesis argued that people generate content both directly and indirectly (7.2) when deferring to default digital maps. Following that argument suggests map-users tend to defer to the existing content of digital maps whilst indirectly contributing towards the revision of their content (through indirect VGI), rather than knowledgeably revising it – given that the latter would require map-users to possess a relatively high level of ICT competence and to find it meaningful to do so. In either case, Glenn, Francis, Estelle, and Gary all suggest that digital map content is not constructed by any map-maker, e.g. Google, Bing, OS, or OSM. They may host the base reference map, but the digital map itself is portrayed as a cumulative and participatory construction that is iteratively revised in use. Also, that it is the collective and ongoing iterative revision of content that garners trust. In conceptual terms, this matches the understanding of digital maps provided by McConchie (2015, p. 886; see 2.4.4); the content generated by VGI *is* the map. That is, the base reference map is a starting point (a blank canvas), while VGI brings a digital map into being.

In contrast, Sharon places her trust less in the up-to-datedness of digital map content, and more in the centrality of a digital map within a hypermediated combination of resources:

> *I'm still not digital – except that I do use Google Maps... I just consider it far easier to use the OS Maps to plot the main route. I then use Google to see what the mileage is, and it tells me roughly how long it's going to take… then I use Google occasionally to see a street map with pictures, whatever it is, StreetView.*

> *(Sharon)*

While Sharon uses Ordnance Survey (OS) paper-based maps to plan walks, she also draws on Google Maps to calculate walk times and on Google StreetView for a photorealist preview of specific places. In this, she follows Estelle and Gary in

uncritically trusting the digital map to provide an accurate preview of a place, without questioning either its veracity or sources. However, she does not assume that digital maps are made any more accurate through an iterative process of VGI. Instead, she trusts that the walk times and mileage on Google Maps will *match* those on OS Maps. Sharon places her trust in the empirical basis of cartography as science – and in the interoperability of information on digital maps in general, rather than in any one map alone. She believes that any digital map (irrespective of vendor) will truthfully and accurately represent an empirically observable reality; that the representation will be veracious. Epistemologically, therefore, Sharon's position on where to locate the source of digital maps' veracity directly opposes those of Gary and Estelle. They locate it in an iterative and constructive process of collective VGI (the map is constructed and collectively brought into being). Instead, Sharon perceives the objectivity of cartography as science, and the indexicality of the medium as the basis for her trust in digital map content. While it is outside the remit of this thesis to make any claim for either approach being any more correct than another, the plurality of understandings in important to note. Instead, the next section investigates how trust in the veracity of digital maps is negotiated.

8.4.2. Situating rough guides: how trust in digital maps is negotiated

The trust people place in digital maps can involve a complex negotiation between deferral toward the assumed accuracy of a digital map and an awareness of minor errors or omissions. For example, when Sarah describes engaging with a digital map in her initial orientation to the university campus, she explains that a lack of topographical detail and minor discrepancies on building entrance details led to her disorientation:

> *...it really throws you, because it's all just flat, and there are buildings where things are on hills. Or if the entrance isn't where the map says it is… it's really easy to get disorientated…*
>
> *(Sarah)*

Following her earlier depiction of Google Maps as the 'go to' default that she defers to (6.3.2), Sarah's account here suggests that she trusts the digital map to provide an accurate (veracious) preview. Moreover, she trusts the preview to anchor her sense of place and orientation to the university campus. When she finds that the information it presents is incorrect, she becomes disorientated. In short, Sarah depicts an implicit

assumption that the digital map preview will be correct. Elsewhere, she notes that digital map content can be *incomplete* rather than incorrect, lacking the full detail of a local knowledge of place:

> *….alleyways and jitties are often missed out… my house is on a road that's on top of a hill, and all maps will tell you: "You need to go around the hill to get to a parallel road." But you don't… [I]f you're walking there is a green that has a path… you can walk between these two roads. Walking directions will never tell you that, they will always tell you: "You have to go around", even though everyone knows the path is there and everyone uses the path.*

> *(Sarah)*

To work around the errors and incomplete previews, Sarah draws on memory traces and familiarity with the local area. In contrast, when Mike engages with a digital map to orientate himself to the university campus, he circumvents any potential disorientation by asking other people for directions:

> *When I got there, I needed to ask people where the actual entrance was because the map is not always that good… some of the building is only two floors, but the other half has a lower floor, so a map is not always that good when you have to get to a meeting place.*

> *(Mike)*

Although Sarah and Mike work around minor errors in digital map content in different ways, they both trust a digital map to provide and reliable overall preview of place. That is, while both trust digital map previews as veracious representations of place, they also both remain open to the potential for error or omission in local detail, such as local paths or building entrances being omitted or mislabelled.

Local detail error or omission is not the only issue found with digital map content. As Matt notes, there can be problems with routing details too. He explains the travel times suggested by digital maps are often incorrect. Interestingly, Matt presents these as consistently (and therefore predictably) incorrect, which allows him to circumvent errors with a practice hack by routinely adjusting his travel times:

> *…I have the Sat-Nav on my phone as well as Google Maps. I use*
> *the Sat-Nav if I'm driving, Google Maps if I'm walking and Google*
> *Maps if I'm just checking how long it will take, because it's quicker to*
> *load up than the TomTom… I add on at least 15 minutes… to all of*
> *them... walking time is at least half. Driving time is the other way*
> *around… the walking times are usually half as long as it says…*
> *when it offers official routes you have to take that with a pinch of salt*
> *and change the route.*

> *(Matt)*

Together, Sarah, Mike and Matt demonstrate that, while they do trust the information presented on digital maps, they often adapt their own practice performances to circumvent errors and/or omissions. In turn, this requires an openness to error and a degree of reflexivity in taking the information that digital maps present "*…with a pinch of salt…*" (Matt). Extending this point, Josh notes that, while that he trusts a digital map to anchor his choice of route, he does not accept the view it presents uncritically:

> *…trustworthy in the sense that I have eventually found the route*
> *given by them. Their problem arises from the fact some people*
> *interpret them completely at face value, which is a bad idea!*

> *(Josh)*

He observes that some map-users trust and defer to digital maps as comprehensive and veracious representations. However, he does not. Instead, like Sarah, Matt and Mike, he remains open to their potential for error by not taking digital map content 'at face value'.

Another limitation found with digital maps is their inability to represent the full richness and embodied reality of 'being there' within a place. For example, when Beth is shortlisting properties to buy, she explains that the digital map only provides a basic (instrumental) understanding of the physical layout of roads and streets. It fails to offer a sense of what the place might be like at different times (the temporality of place). For example, the ease with which she might be able to park her car on football match days:

…you can do the map and get a StreetView… but the parking situation on Saturday… compared to when the [football] match was on and then when the map was taken, you realise how busy some roads can be… You get the odd car driving down but you don't see all the cars parked outside the houses with no garages and stuff, and you don't realise you couldn't actually turn into the drive because there's too many cars in the way... you can look at the roads online, but then to actually go and view it…

(Beth)

In this, Beth demonstrates that some of the aspects of everyday life that constitute place cannot be represented through a digital map view, e.g. differences in how easily residents can park their cars on different days of the week. In that sense, Beth demonstrates that not only are map-users often open to errors and inaccuracies in digital map content, they also appear to be aware of digital maps' limited capacity to represent the lived complexity of place – or, as Marie succinctly notes, "*… it's just a map of space, not of people walking through it….*" (Marie). Following this, what Beth demonstrates above is that, although she trusts a digital map to anchor her sense of place, she only trusts it to do so partially – as a rough guide (8.4.1).

When Kelly recounts her search for a new home, she describes finding errors in the exact location of properties. Her estate agent provided details of potential properties, but they were often incorrectly geocoded on digital maps. As a workaround, Kelly used different digital map views for corroboration:

…a few property listings on the map, where they said it was, they hadn't pinned it right… going to somewhere and going "I can't see the house"… I then kept sort of looking at the photographs and then going, "Well there is a tree there" and "They have a got a view of the garden" and "Next door is white"… I would use the map to try and piece it together… if I couldn't find it, because some were tucked away down a sort of side street, I would use StreetView… "It's got white on that side, and the neighbour has got a garage there. So, it must be this one"… sometimes the ones they give are bit off…

(Kelly)

In this, Kelly treats the digital map as a rough guide (9.8) that affords access to various other hypermediated resources. She consults a digital map (Google Maps) to obtain an approximate location based on the information provided by her estate agent. She then uses Google StreetView for a different view – to cross-reference the information from her estate agent and Google Maps. In doing this, Kelly places her trust in a corroborative preview. That is, digital maps provide her with two corresponding previews of the same place: Google Maps provides a base reference map with detail on building and roads, while Google StreetView provides photorealist imagery at street level. However, like Beth above, Kelly treats each standalone view as a rough guide that provides only a partial sense of place. Instead, her trust lies in a comparison and cross-referencing (corroboration) of views.

As well as noticing errors, omissions, and limitations in digital map content, people are also often able to identify errors that arise from external and hypermediated datasets. For example, when Joe started working as the website manager for a large Peak District tourism organisation, he found that the Peak District National Park was poorly represented on Google's base reference map. As a workaround, he drew on OS maps as an authoritative resource to persuade the Google Maps development team that it was an important site to represent[87]:

> *…the Peak District didn't really exist on it up until about two years ago… I was like "fucking hell, where's the Peak District!" So, I got onto it and it took about six months to get around because the development team for Google Maps is all in Florida or something… they were all like, "Oh, well, we, we'll sort something out"… I sent them an Ordnance Survey map actually. I sent them something that was like: "Here you go, here's the proof! The Peak District is a place, it's a thing!" It had the green shade, but there was no labelling or anything… it had possibly just been missed off their list because I think they kind of just broad-brush things first and then drill down into the detail…*
>
> *(Joe)*

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[87] This is interesting omission given the Peak District's cultural significance as the first national park established in the UK and "*…one of the world's most visited national parks with over 22 million visitors a year…*" (Dougill et al., 2006, p.260).

Joe's account demonstrates that not only can individuals amend and generate digital map content through VGI; they can also bring about changes to the base reference map itself (as Kelly does when she effects a change to the Land Registry record – see 8.2.3). It also problematises some of the claims of early critical cartographers (3.5) – that map-makers purposefully inscribe political agendas onto maps (Crampton, 2002). Instead, Joe believes Google made an error in their initial mapping, a point he attributes to their broad-brush approach rather than any purposive data politics. However. Joe takes it for granted that Google rectified their error after being notified. In turn, when institutions such as Google or Land Registry update their maps based on an individual's information (such as with Joe or Kelly) they demonstrate an implicit trust in cartography as science. In Joe's example, when Google amend their map, they treat the OS map as a legitimate authority, placing their trust in the interoperability and veracity of the geospatial data that it provides. Similarly, when Kelly creates a map mashup to bring about a change to a Land Registry record (8.2.3), her success rests on Land Registry's treatment of Google's map content as a legitimate authority that presents an interoperable and veracious representation. What both examples demonstrate is that trust in digital maps is often placed in an underlying assumption that the information a digital map offer is an accurate (indexical) portrayal of a physical place. Interestingly, what Joe's and Kelly's accounts suggest is that there is a potential for an emerging consensus between digital maps.

At other times, awareness of errors, omissions, or limitations on digital map content leads to little anchorage or change. For example, Kelly notes that her recently purchased home is close to a retail park. She asserts that, as a result of its location, her road is often assigned a higher crime rate on digital maps than experienced when living there. In turn, Kelly believes this leads her car insurance broker to increase her premium:

> *…You get a few different views and then you can go in and see what kind of area it is… we found there was a fair bit of crime on the street… but it's actually mislogged. It's actually at the edge of a boundary for districts, and behind the house there is like a B&Q and a Toys-R-Us… the crimes are all shoplifting or getting stuff out of cars in the car park, but there is no street to attach the crime to, so they have attached the crime to our street… we knew it was safe, but*

the car insurance company were like, "Oh there is car crime", so they
put the insurance price up.

(Kelly)

This demonstrates that while individuals may be able to identify limitations and errors in digital map content, they may not always be able to adapt their practices accordingly to work around the error, or to persuade others, or to bring about any amendment to the map. In Kelly's case, knowledge of an error does not enable her to reduce her car insurance costs. Instead, she believes that her car insurer's sense of place remains anchored in the same crime statistics dataset presented to her on a digital map. Whilst this raises a question about the centrality or importance of digital maps (addressed below), it also reiterates the point that trust can be placed in digital maps despite an awareness of error.

Digital maps are often engaged with in hypermediation with other resources and within situated contexts. For example, above, Pam described searching for a home to buy. In her account, she notes that she engages with several different digital maps (and views) at the same time to gain a corroborative preview. This later informs her choice of site (which house she buys). However, the digital maps she engages with include various hypermediated (and spatialised) external datasets:

…Zoopla who use their own map, and I use Google Maps… I did a
general search of the area, doing within 10 miles of where I would be
working… then I would look on Google Maps and Google Earth… to
have a look around the area… on Zoopla, so they've got links for…
education, they have got the crime rate, local tax, employment, all
sort of different useful guides… I did use StreetView as well if I didn't
know the area very well…

(Pam)

In short, Pam engages with digital maps as a centring resource to collate and spatialise different datasets on the same preview. For example, Zoopla provides her with information on OFSTED reports, council tax banding, and the local Police crime statistics, all in one place.[88] She also engages with different Google Maps' different

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[88] Whilst Pam differentiates between her engagements with Zoopla and Google Maps, they are broadly commensurable. Zoopla is a property search site that embeds Google Maps on a webpage as

views (in corroboration) to gain a sense of place with the areas with which she was less familiar (e.g. StreetView and standard reference view). When Pam adds that *"…without digital maps I wouldn't have actually viewed them. I wouldn't have put them on my list…"*, her assertion follows that the digital map was central to anchoring both her choice of home and the sense of place that informed it.

Similarly, when Tom describes his choice of OS Streetmap when planning his walking routes, he compares it with Google Maps. Tom notes that Streetmap costs less in mobile phone data when walking outdoors than Google Maps, adding that it outputs his planned routes in an OS compatible format (BNG), thus making it interoperable with the established default for sharing mapped routes with other leisure-walkers (6.5.1):

> *…Google Maps is just handy, and it's just there… click here and click there and it draws it up for you nicely… [on some] walks that we are doing… I use Streetmap here, not Google. And the reason I use Streetmap for this – well, it's cheaper – but it's got every type of zoom, from StreetView, through to OS Maps, through up to road maps… it's the only one I have found that accepts OS grid references as an output. Um, various people set the programme up, publish it and they publish it with a grid reference… I can just cut and paste that into the search box, and that does two things… it gives me the map, and secondly it checks that they have got it right. But every now and then, they put a grid reference in and it's about 30 miles from where they think it should be…*
>
> *(Tom)*

Tom's account demonstrates an engagement with digital maps as hypermediate resources (in so far as Streetmap incorporates various reference systems). The digital map not only anchors his own performance of walking practices, being able to submit walks in the preferred (established default) BNG format also serves to anchor his social position as a walk leader (and provider of walking routes). Therefore, for Tom, the digital map is not just a centring resource that allows him to collate different datasets (such as the route and the specific BNG reference for each point on that

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a core feature (Zoopla, 2018a) and hypermediates various external datasets (using GeoJSON). When Pam draws on Zoopla, she indirectly defers to Google Maps as media-scripted default (6.3.1 and 9.3).

walk). It also centres his practice performances as a walk leader by allowing him to distribute a route (as a central facilitator) in the established default format (BNG). In comparison, while Pam trusts the hypermediate digital map to provide a veracious preview that will anchor her choice of home, Tom holds an acute awareness of its potential for error, commenting that a grid reference can be incorrect by as much as thirty miles. Whilst Tom does not specify whether he sources these errors in other people's VGI or in the information generated by a map vendor, he does describe his corroboration of Google Maps, OS maps, and Streetmap as a workaround. That is, while digital maps centre his performance of walking practices as a hypermediate resource, he engages with the standalone views they offer as rough guides. As such, digital maps anchor his practices far less extensively than they do for Pam. Thus, the extent to which digital maps anchor things is tied both to the context (or specific practice bundle in which the engagement is anchored) and the specific individual involved.

Digital maps are not the only material elements that anchor individuals' practices. They are engaged within situated contexts that involve various other materials, often as resources that only partially anchor as rough guides. For example, when John described his initial orientation to the university (in 8.3.1), he described his in situ engagement with Google Maps to preview a place whilst there:

> *…in intro week, we had this timetable in, so I would find out what the building was and go on Google Maps to see where that building was… approximate how I could get there from where I live… then I sort of have my bearings, so I could be walking and know where I am and be like, "Oh this is that building I saw there, and I have to turn here and…" …I can relate then what I've seen on the map to my physical bearings…*

> *(John)*

Initially, the digital map preview gave John a sense of place that influenced his choice of route when travelling across campus. However, whilst travelling, he also compared the embodied experience of 'being there' in the represented place with digital map preview. In this way, Tom's overall sense of place was developed in corroboration between drawing on the digital map preview and physically 'being there'. Therefore, the centrality of a digital map in anchoring his practices is dynamic

and contextually situated. To clarify, before John visits each site along the route, the preview he gains by looking at a digital map in advance anchors his sense of place. Whilst there, the preview only partially anchors his sense of place - in corroboration with first-hand experience. Following Pam and Tom then, what John's account demonstrates is that the *extent* to which map-users' engagement with digital maps anchors their practices, social positions, and orientations (senses of place and senses security) is tied to the context in which they are engaged.

8.5 Conclusion

This chapter investigated the influence that engagement with digital maps has on everyday life and the practices that constitute it. The chapter explored *what* digital maps anchor and *to what extent*, also *how* the process of anchorage works and how trust in digital maps is negotiated. This chapter extended arguments presented in chapters 6 and 7 by addressing the extent to which people trust the veracity of digital maps, and by exploring how engagement with digital maps anchors individuals' performances of practices and senses of place and security i.e. how it anchors the movement and distribution of bodies in space and geographical imaginations.

Overall, the chapter developed a theory of how digital maps anchor practices. Earlier, the thesis opened a theory that engagement with digital maps anchors various practices e.g., choices of walking route and choice of home to buy, alongside the performance of various social positions. It added that engagement with digital maps also anchors immaterial geographical imaginations. While earlier chapters argued anchorage operates through map-users' assumptions that digital map views offer veracious representation of place, the process of how was not fully articulated. This chapter extended that theory by arguing that digital maps anchor the movement of bodies and things in space, senses of place and senses of security (orientations), and the performance of social positions through views. However, such views do not directly anchor. Instead, it is the meanings that map-users ascribe to digital maps – both as material elements of practice (whether as latent resources or in active use) and as media resources that provide various 'views' (whether understood as fully veracious or as rough guides) that act as the mechanism by which anchorage operates. The chapter also notes that where digital maps anchor practices, orientations, and social positions through an assumed veracity, the process of anchorage opens possibilities for some people to strategically amend, and/or curate the content available to others via a digital map view – and to selectively share it – in

order to persuade or inform others. In turn, this opens a risk of inequality where some map-users may draw on digital maps to anchor the practices of others. Extending this, the chapter notes that by the same mechanism, digital maps can also accord individuals an ability to bring about change to institutional and state records, altering state-citizen relations. Likewise, the chapter identified potential for an emerging consensus between digital map vendors that risks a homogenisation of spatial representations on the web.

9. A practice-orientated digital sociology of maps

9.1 Introduction

This chapter addresses the central research question: To what extent, and in what ways does engagement with digital maps feature in the constitution of social practices? It presents seven concepts generated throughout the research, comparing each to discussions within the contextual background and conceptual framework chapters (2, 3, and 4). It also refers to the findings chapters (6 to 8) for illustration.

First, the chapter argues that digital maps are *engaged with*, not just *used*. It treats non-use as a type of engagement, arguing that digital maps are engaged with both directly and indirectly as ready-at-hand resources. Also, that engagement often involves a process of *deferral* towards a digital map established as the *default* for a specific context. Next, the chapter argues it is the apparent veracity of digital map *views* that entices engagement and garners trust. Furthermore, that it is the trust map-users place in the apparent veracity of digital map views that serves to *anchor* their various senses of place and security, alongside their performances of social positions and wider sets of social practices. Next, the chapter argues that digital maps are *centring resources*: as hypermediate resources they act as centring loci for external datasets; at the same time, they are also drawn on as authoritative resources that enable some people to legitimise their social position as a central facilitator of spatial knowledge for others. Extending this, the chapter argues that some people draw on digital maps to inform or persuade others – and at times to *strategically curate* their practices – opening potential for inequality. The chapter notes however, that digital maps do not fully structure social practices. Rather, despite engaging with and trusting digital maps, people often remain aware of their potential for error and inaccuracy, treating them as *rough guides*; they only partially anchor social practices. Together, the concepts presented in this chapter (figure 11) constitute an empirically informed practice-orientated digital sociology of maps – the primary contribution that this thesis makes.

9.2. Engagement: moving beyond use

Cartographic theory tends to focus on active use, leaving a dearth of literature on purposeful non-use and indirect engagement (3.8). To contextualise this scarcity, Perkins (2008) argues that objectivist research on map use has led to an understanding framed by studies of consumption and production. He adds that its

counterpart (constructivist research) has led to a focus on how maps are entangled within culture. The latter often foregrounds map use within specific map-related case-studies, e.g. how maps are transferred and exchanged (circulated) amongst antique map collectors, or within map design practices of golf course simulation game players (Perkins, 2008). As noted earlier (3.3.6), Perkins (2009) and Lammes (2015) have recently started to expand the scope of cartographic thought by exploring how more instrumental forms of map use for navigation or location merge with less formal modes of map play, such as storying past experiences. Likewise, Wilmott (2016) explores the importance map-users place on digital maps at different moments when navigating place, including a focus on the poignancy of moments of purposeful non-use that resonate well with this research. However, despite cartographic thought moving beyond how map use features within, and relates to, navigation and spatial understanding, and instead onto how maps and map-knowledges are experienced, interpreted, and embodied (e.g. via mapping) in a diverse array of ways, there remains a lack of sociologically-focussed cartographic theory on how digital map use features within wider sets of social practices. For example, how digital maps and their affordances are engaged within the wider practice complex of buying or selling a house, leading a group walk in the Peak District, or gaining orientation to a new University campus – also on what level of importance is placed upon digital maps within such social practices. To address this, the thesis demonstrates that people engage with digital maps in three distinct ways:

(1) *Active use*

When people engage with a digital map, they often do so purposefully and knowledgeably, i.e. they remain aware that they *are* using a digital map and tend to draw on it as a resource for a specific purpose. For example, Pam recalled using Google Maps to plan a route between properties (6.5.1). In doing so, she described an active type of use that involved an awareness that she was using a digital map, and an awareness of the affordances it offered that led her to do so. Similarly, people often describe active use when discussing their generation or amendment of content. For example, when Kelly and Phil described their respective amendments of digital map content, both framed it as a purposeful and knowledgeable activity (7.2.1).

(2) Purposeful non-use

Some people purposefully reject digital maps – while remaining fully aware of their rejection. That is, their non-use is not based on any lack of access to material resources, nor is it necessarily linked to any limited competence. Instead, it is the meaning ascribed to digital maps that lead to their purposeful non-use. For example, when Terry described his rejection of digital maps and continued use of paper-based ones, he framed OS paper-based maps as a material element routinised within the practice of countryside leisure-walking (6.2.1). He also connected it to a shared limit of competence steeped in past experience (a lack of ICT training through formal education at school). However, Terry added that walkers engage with similar technologies from which common competencies could have been transferred (4.3.3 and 6.2.1). In short, he explained that digital maps can be routinely rejected based on the shared meanings ascribed to them. Similarly, when asked if they had ever generated or amended digital map content, participants often explained that it was the meaning ascribed to digital maps that stopped them from doing so, not a lack of material access or competence. For example, Matt explained that there is little reason for him to amend a digital map, while Sarah described an uncertainty on whether she would be 'trusted' to do so (both 7.2.2). Despite their differing rationale, Matt and Sarah both demonstrated that non-use of digital maps is often not due to any lack of material access to relevant software of devices, or a lack of relevant competence required to use them. Instead, it is purposive non-use based on the meanings ascribed to digital maps.

(3) Indirect engagement

At times, people engage with digital maps indirectly – without being aware that they are doing so. For example, Pam described using Zoopla to gain information about properties, but remained unaware of her indirect engagement with Google Maps through Zoopla (8.4.2). Similarly, people indirectly contribute towards digital map content whether they are aware of doing so or not. For example, Dave and Dawn have both added reviews to TripAdvisor (7.2.1). Dave described an awareness that his volunteering of geographic information (VGI) could amend the relative ranking (and thus prominence) of reviewed sites on TripAdvisor's map. However, Dawn was

not aware that her review could amend the digital map content in any way. As well as being unaware of their VGI, people often engage with digital maps indirectly as ready-to-hand *latent resources*. For example, Claire described feeling reassured that she would not get lost in unknown places having a digital map 'just there' (as a smartphone app in her pocket) (6.5.3). Her account portrayed a digital map anchoring her sense of security (9.5) whilst being indirectly engaged, suggesting that at times it is the (latent) potential to use a digital map that anchors.

In short, digital maps may be engaged directly or indirectly, as may their affordances for generating content. They may also be purposefully rejected as a form of non-use or drawn on indirectly as taken for granted (Throop and Murphy, 2002; Ling, 2012b) and ready-to-hand 'latent' resources that are embedded within everyday life (4.2.4). Furthermore, what the research demonstrates is that in practice theory terms, not only are people's engagements with digital maps tied their access to relevant materials or competences, but also to the meanings they ascribe to digital maps.

9.3. Deferring to defaults: the uncritical selection of digital maps

For people to engage with a digital map, they must first select one. Cartographic theorists often posit specific maps as more prominent than others without clarifying *how* they are selected or what anchors such prominence. For example, Plantin (2018) asserts Google Maps is equal to a 'knowledge infrastructure' – as both a platform and a service – in a way that other digital maps are not, a point he attributes to Google's early provision of an Application Programming Interface (API) for end-users. Likewise, in their case-study of a housing estate, Power et al. (2012) argue that digital maps stigmatise place by connecting their content with national and local policy discourses. However, they refer only to Google StreetView (no other digital map) without clarifying a rationale for their narrowed focus. Similarly, Shapiro (2017) asserts place identities are abstracted and equated with specific social characteristics through digital map algorithms. However, he sidesteps any discussion of map selection by using the term "*Street-level imagery platforms like Google Street View…*" (Shapiro, 2017, p. 1204) in the first instance before going on to refer only to Google StreetView throughout the remainder of his article. In this, Plantin (2018), Power et al. (2012), and Shapiro (2017) suggest that Google Maps is relatively routinised as the primary digital map vendor for media studies scholars and policymakers alike. However, there remains a critical gap in cartographic thought in

theorising how digital maps are selected. Instead, Google Maps is assumed to be the most commonly engaged – and therefore imbued with having the greatest impact by proxy – without any basis in end-user figures, or consideration of how or why specific digital maps are selected over others; a point that the scoping survey appears to support, with 96% of its respondents having used Google Maps (Appendix F).

This research demonstrates that rather than actively considering and selecting specific digital maps, people tend to be uncritical in their choice, opting instead to engage with the most commonly used digital map for a specific context. That is, they *defer* to the digital map that has been established as a *default* in one of two ways:

> *(1) Direct deferral*
>
> > At times, people defer directly the established default for a specific context. For example, when Tom described his selection of OS maps for countryside leisure-walking (6.3.1) he depicted it as part of a routinised deferral towards the established default material element shared by others with the same context e.g. the OS is meaningful as the default map for walkers. Likewise, Beth explained that after buying a new house, she did not need directly share a digital map when discussing the location of her new home with family and friends. Instead, Beth assumed that others would look at the same default digital map as her (Google Maps) – as the established default for the context (7.4.2).

> *(2) Indirect deferral*
>
> > The research also demonstrates that deferral to a default digital map can be less direct. For example, when Pam described her use of digital maps to shortlist potential homes to buy, she engaged with RightMove and Zoopla as the default applications for viewing and shortlisting properties and a routinised deferral towards them (6.4.1). In this, Pam demonstrated an uncritical and indirect deferral to Google Maps – as the base reference map she encountered within her use of RightMove and Zoopla.

In short, this thesis argues that people tend to select digital maps uncritically, deferring instead to the established default for a specific context. It is worth noting however, that people are not always uncritical in their selection of digital map. Kelly was clearly knowledge in her selection of both Land Registry and Google Maps to bring about change to a state record (8.2.3, also 9.5). However, examples of

knowledgeable selection tend to refer to specific instances of active use, where digital maps are drawn on to inform or persuade others (9.7) in ways that differ from more common and mundane forms of engagement routinised within everyday social practices.

In terms of *how* the digital maps deferred to within each context become established as defaults, the research demonstrates that this tends to occur in one of two ways:

(1) Media-scripted defaults

At times, default digital map selection is scripted by other media. For example, Beth and Mandy both portray their selection and active use of Google Maps as an uncritical direct deferral to the pre-installed map application on their smartphones (6.2.1). In this, it is the introduction and affiliation of a new material element (the smartphone) into existing practices that led to its establishment and routinisation as a default. When Beth later went on to explain that her media-scripted deferral is "*…not a conscious choice…*" (6.3.1) her account echoed Giddens (1984) in suggesting that when digital maps are established and routinised as defaults, they are deferred to in practical consciousness (4.2.2) in ways that may not be fully acknowledged by participants. In turn, Beth and Mandy both suggest that media-scripted defaults may cross contexts (both use their smartphones for social practices other than choosing a home).

(2) Hypermediated defaults

At other times, digital maps are scripted through their connection with other media, e.g. defaults are transposed from one practice entity onto another by cross-referenced media. For example, when Pam described her deferral to Google Maps, she explained that it was established as the default for the context (Home Choice) through routinised interactions with estate agents, adding it was not established directly, but through her estate agents sharing hyperlinks to properties on Zoopla and RightMove (7.4.1). In this, the digital map selected and shared by her estate agent is transposed into her home-buying choices as a hypermediated default. Returning to the practice theory ontology (4.4.2), this suggests that defaults may be stablished at a practice entity or complex level, and not just within an individual's performances.

By arguing that people select digital maps by deferring to established defaults, this thesis extends existing cartographic thought by explaining the process by which specific digital maps are selected, and how some digital maps become more prominent within a context than others. It adds that digital maps tend to be established and deferred to as either media-scripted or hypermediated defaults, and that such defaults can be deferred to either directly or indirectly.

9.4. Views: temporalising the visual representations that digital maps offer

Digital maps are engaged with and selected in various ways (9.2 and 9.3). However, the rationale behind such engagement is usually less diverse. People tend to engage with digital maps as resources that provide seemingly veracious representations of place (views). Meanwhile, digital maps provide a myriad of different views, i.e. those based on satellite imagery, streel-level photographic imagery, or topographies of specific landscapes (2.4). Cartographic theorists have tended to focus on either the 'hidden agendas' (Harley, 1989) and embedded politics of representation that lie behind *"…the apparent accuracy, and objectivity of maps…"* (Black, 2002, pp. 9–10), or the increasing 'verticality' offered within the representational strategies of digital maps (Dodge, 2017b, p. 5). Less focus has been placed on *how* people engage with digital map views – beyond an interactionist focus on the material interfaces of screens (3.6.2 and 3.6.3). This research demonstrates that people tend to engage with digital map views in one of two ways (6.5); either to gain a sense of what a place 'might be like' before physically going there (preview), or for memorialisation of past places visited (postview):

(1) *Preview*

People often engage with digital maps to gain a sense of what a place might be like before physically going there, or to plan routes (either in advance or for in-situ routing decisions). That is, they 'preview' place through digital map views. For example, to plan a route between properties before physically going to view them, Pam "…*just put the postcodes in and sort of planned a route to go through each one*" (6.5.1). Similarly, albeit at a different temporal scale, when Becky planned a walking route for herself and her partner – she did so immediately prior to heading out, drawing on a digital map preview to assess the viability of her intended route, and its accessibility via public transport (8.2.1). She actively engaged with a digital map to preview *"…the area, zoom in, get a bus stop and then see, then look at the blue lines…"*

(Becky). At other times, people draw on digital map previews for immediate (non-planned) in-situ routing. For example, Francis explained that when *"…out and about…*[he uses the]*…'Search Nearby' feature…*[to].. *search whether I'm near a McDonald's or whatever"* (Francis). He previews his relative location via a digital map in real-time (6.2.2). In combination, the research demonstrates that digital maps are engaged with at varying temporal scales to preview place prior to visiting it.

(2) *Postview*

Although people often preview place through digital maps, they also draw on them to 'look back' at places visited in the past in postview. At times, such postview facilitates reflection on past personal life experiences, helping people to maintain a sense of ontological security (Giddens, 1990, p. 92, Hanchard, 2018, also 4.2.2). For example, when Sharon described her plans to (re)visit places she had previously lived at with her sons and recently deceased husband, she explains that directly engages with Google Maps for its StreetView and Satellite imagery of Zambia and Tanzania (6.5.1) as a form of memorialisation. In doing so, Sharon described drawing on digital map postview to aid in her reflection (and memory) of her past life there (as a family unit) during a period of recent bereavement (6.5.1, footnote 99). In addition, by comparing the poor range of data available on Google Maps coverage of Zambia and Tanzania with the UK, and then comparing the former with the poor range of spatial data available on when living there (in the 1970's), Sharon also suggested that a legacy of colonialism persists in the unequal provision of geospatial data infrastructures, adding that this is made visible via digital map postview. For example, she notes Zambia *"…had been a British colony…but the quality is poor…I still couldn't find our house* [or] *those significant qualities…* [yet] *I can get good quality of our house, or somebody else's* [in England]" (Sharon).

What this thesis argues then, is that when digital maps are drawn on for their affordance to offer views of place – they are drawn on both in advance of visiting and whist there (preview), and after having been there (postview). Below, the chapter sets out the process by which trust in such views is garnered and maintained (9.8).

9.5. Anchorage: how digital maps and their views anchor social practice

Alongside its discussion of how people select and engage with digital maps, the research also demonstrates that digital maps anchor people's practices and orientations. That is, when people engage with digital maps, the views of place they engage with, and the veracity they ascribe to information presented on it (MacEachren and Kraak, 1997) can influence their sense of a place (c.f. Power et al., 2012; Shapiro, 2017), their overall sense of security, and their performances of practices and social positions:

(1) *Senses of place*

When people engage with a digital map preview, their sense of the represented place can be anchored by that view. For example, when Kelly (6.5.2) recalled directly engaging with Google Maps to "…*look at people's gardens…to see if they were scruffy or not* [and to assess] *how well the street was kept*", she described a process of drawing on a pre-existing set of associations and classifications (meanings) and applying those the preview (8.5.3) to make the place meaningful to her. Likewise, Stacey noted that after moving into her new home, she engaged with Google Maps for orientation and to make sense of the local area as seen through her flat window (6.5.2). For both, the digtal map preview anchored their senses of a physical place. By contrast, Sarah noted that previewing Japan through a digital map (a place she has never visited) anchored her sense of what the country *might* be like, drawing on memory traces of past experiences in other urban places to make the preview meaningful (8.3.2). In this, Sarah's account related to an immaterial sense of place – or geographical imaginary (8.5) – while Kelly and Stacey both referred to a more material understanding of place. However, both illustated an argument running throughout the thesis – that engagement with digital map views anchors people's senses of place.

(2) Senses of security

Alongside senses of place, digital map views also anchor various senses of security. For example, when Pete described his direct engagement with Google StreetView to evaluate a walking route across a town centre at night, he drew on a preexisting set of associations and classifications to develop a sense of the place as "…*run down, a bit rough, the kind of place maybe you*

wouldn't want to be walking through…" (Pete). In turn, he chose an alternative route. In this, his sense of place was anchored by a digital map preview. Pete's account also highlighted that his sense of (physical) security was anchored in the digital map preview. That is, his choice to avoid a route through a place that he perceived as 'rough' or 'to be avoided' was anchored by a preview of that place. As well as senses of physical security, engagement with digital maps can also anchor people's sense of ontological security. For example, when Claire when described her engagement with digital maps, she portrayed them as ready-to-hand latent resources (6.5.3 and 9.2) that make her *"…more confident using buses in areas I'm not familiar with…",* primarily because it provides *"…reassurance of knowing I know where I am, or I know how far I am from where I need to be, or if I miss the stop I know how to get to where I want to be…"* (Claire). She later added that alongside providing confidence in not getting lost (physical security), they enable her to carry out travel practices that better adhere to her employer's policies; therefore the ability to preview place through a digital map anchors her sense of ontological security in maintaining continuity of employment (6.5.3).

(3) Practice performances

While senses of place and sense of security may loosely be understood as 'orientations' towards the world, engagement with digital maps also anchor various practices carried out within it. For example, the research demonstrates that digital map previews anchor choices of route and site at various temporal scales. To clarify, when Kelly (above and 6.5.2) depicted her sense of place as anchored by a digital map preview, she also explained that it anchored her shortlist of homes, and by extension - ultimately the range of properties from which she selected to buy. In this, it is the practice performances that constitute home buying (shortlisting, viewing, putting an offer in etc.) that are anchored in digital map preview. Likewise, when Matt described using *"…Sat-Nav if I'm driving, Google Maps if I'm walking and Google Maps if I'm just checking how long it will take…",* he depicted his performance and timing of various day-to-day travel practices being anchored by specific default digital maps (8.4.2). To that end, what the research has demonstrated throughout is that practice performances are anchored by engagement with digital map

views. The extent to which they anchored is covered in below (9.8).

(4) Social positions

Alongside demonstrating that engagement with a digital map can anchor people's practice performances, the research also argues that the social positions tied to those practices are equally anchored. For example, when Pam described the introduction of digital maps into her home-buying practices as a new material element, she noted it had led to a shift in the relative social positions of home-buyers and estate agents (8.2.3). In describing her interaction with estate agents while searching for a home to buy, Pam explained that that she had experienced *"…the old-fashioned way where everybody sent paper copies of everything to each other…"* and contrasted this with more recent experiences where her estate agent just e-mailed "*…a link to Zoopla, RightMove, things like that…'*" (Pam). In this, Pam portrayed digital maps as resources that allow her to compare estate agent's suggestions with other properties in a way that being sent paper files could not. In this, Pam demonstrated that the import or weight of the estate agents' authority in the home-buying process has shifted (8.2.3); their social position has changed from expert gatekeeper of information on available properties to an administrative role of providing information on the home-buying process. Extending this, Kelly depicted a similar shift in her generation of a map mashup to effect change in an erroneous Land Registry record (8.2.3). In doing so, she highlighted a shift in the relative social positions of state and citizen; anybody with the relevant competence and material access to draw on a digital map can bring about change to a state record. In turn, Kelly's account highlighted a potential for networked individualism in so far as it presents a shift from a hierarchical social order where state bodies held greater agency and legitimate authority than individuals, towards a more horizontal form of social organisation where individual citizens and the state are equal (4.5.2). Interestingly. when Kelly succeeds in effecting change to a Land Registry record, she does so by drawing Google Maps – a private company's map, amended through VGI. This reiterates the earlier discussion (see 2.4.4) that digital maps are continually emergent (apparently even state legitimated ones). It also raises a debate around a potential risk of homogenisation of spatial data through an emerging consensus between map-makers (8.4.2)

In summary, if *"…everyday map use is probably more common now than at any time in human history…"* (Perkins, 2008, p. 151), then the anchoring of people's senses of place, sense of security, practice performances, and social positions through their engagement with the views offered by a set of default digital maps (which map be moving towards and emerging consensus) suggests that engagement with digital maps features in the constitution of social practices that extend far beyond the localised contexts of individually bounded case-studies.

9.6. Centring resources: digital maps as hypermediate and legitimating media

This chapter has argued that people select and engage with digital maps uncritically, drawing on them for the views of place they offer, which in turn anchor various senses of place, sense of security, practice performances, and social positions. Extending this beyond individuals, the research also demonstrated that when digital maps are shared, they are drawn on either as media that act as central loci in connecting or representing other data (hypermediation and remediation), or as tools that legitimise the social position of a central facilitator e.g. the role of walk leader within a group walk (7.3.1). To that end, digital maps are engaged with as centring resources in one of three ways:

> *(1) Hypermediate centring resources*
>
> A times, digital maps are engaged with as resources that bring together and hypermediate external datasets (4.5.1). For example, when Scott generated his own map to shortlist homes to buy, he incorporated data from Market Oracle, Zoopla, RightMove, and word-of-mouth recommendations from family and friends (7.4.1). To do so, he drew on Google Maps to visualise the various data because *"…it was very difficult to reconcile it without having some sort of graphical display…"* (Scott). In this, Scott drew on Google Maps for its GUI, and as a hypermediate resource that centred a plethora of data within one view. Similarly, when Pam (7.5.1) was assessing properties to shortlist, she drew on Zoopla because it had *"…links to show you the local area… a breakdown by school… council tax, crime rate, employment…"*. That is, it acted as hypermediate centring resource that allowed her to combine various external datasets together and view them together holistically via the same digital map.

(2) Remediate centring resources

At other times, digital maps are engaged as centring resources in remediation of other possible media. For example, when Tony discussed the information available to peak district tourists and walkers, he compared digital maps with paper-based leaflets that have a section of a map printed on them (7.5.1). He explained that leaflets have a fixed amount of data (whatever is printed), requiring users to go to other resources for further information (e.g. websites, telephone numbers), whereas digital maps provide direct and dynamic access to a wider range of data within a continuous 'slippy' view (2.4.4). For Tony, (like Pam) digital maps are hypermediate centring resources in as far as they centre and make available various datasets via a single view. However, they are also remediating centring resources in as far as they provide continuous access to external datasets in a way that previous media could not (there is no need to 'leave' the view). However, to reiterate an earlier point (4.5.1), digital maps do not replace older media. Instead, remediation involves *"…a process of cultural competition between or among technologies"* (Bolter, 2010, p. 23) that is *"…cyclic and dynamic whereby older media and practices always infuse the new"* (Hjorth, 2016, p. 175) – a point Sharon made clear in her use of Google StreetView to locate car parks as the start points for walks (6.5.1). For Sharon, the OS paper-based map remains the default map for her walking practices. However, she draws on Google StreetView in remediation of OS maps because it affords her an ability preview and gain a sense of place (notably in choosing car parks as the starting point of walks. In addition, she treats that the view Google StreetView provides as fully veracious, sharing it as a default with the walkers she will go on to lead. Thus, a digital map anchors both her choice of site and social position as walk leader when engaged as a remediating centring resource.

(3) Legitimating centring resources

Alongside centring data from other sources and media (hypermediation and remediation), in their anchoring of social positions (9.5) digital maps are also centring of legitimate authority. For example, when Jenny described the ongoing amendment and generation of (Google Maps based) Walk4ife map content (7.3.1) she portrayed it as collaborative project that is *"…open for anybody else to use…*[on which]*…volunteers…have uploaded their walks,*

and I have uploaded my walks…" (Jenny). However, rather portraying the generation of Walk4Life content as stemming from any horizontal form of social organisation (4.5.2), she clarified that volunteers and walk leader tend only to upload walking routes *"…if we've shown them how to use it…"* (Jenny). In short, Jenny presented a duality: her job as the local forestry centre manager afforded her a central social position in distributing the comptence required to amend Walk4Life content; in turn, the legitimacy of her social position as the local expert for walking routes was routinised (reproduced) through repeat performances of training walk leaders and volunteers within her job. Likewise, when Mike explains that the University strategy is to only present information assumed to be useful for students' needs, he noted that the University strategy might be at odds with students' wants or the advice of the students' union (7.3.3). In this, Mike portrayed the University to be drawing on a digital map to self-legitimate their own social position as the central information provider for anything on the University campus (7.3.3).

Overall then, what this research demonstrates is that not only are digital maps emergent, slippy, and spreadable (2.4.4), they are also centring resources (9.6) – either as: (1) hypermediate centring loci for external datsets; (2) as remediate centring resources that provide affordances older media could not whilst also incorprating those older media; or as (3) legitimating centring resources - drawn on by some people as allocative resources to anchor their own social position (9.5).

9.7. Strategic curation: informing and persuading others through digital maps

Following Perkins' call for a cultural approach to "…*explore different aspects of the ways in which our society deploys the map*" (2008, p. 150), this research draws on a praxaeological lens (4.2.1) to demonstrate that when people amend or share digital maps, they tend to do so purposively and selectively in order to inform or persuade others. By extension, this provides an opportunity for some people to anchor the senses of place, senses of security, practice performances, and social positions of others (9.5). In short, digital maps provide an opportunity for some users to strategically curate the social practices of others – in one of two ways:

(1) Informing others

Some people share digital maps (or amend content) to provide information for others. For example, when Dawn shared a digital map preview of her new home with her stepfather (7.4.2), she aimed to provide information on a driving

route from his house to hers, and to anchor his understanding of how the two places relate to one another. Rather than drawing on the digital map to anchor her stepfather's sense of place, Dawn simply "*…showed him so he now knows the way to drive to our new house, and to him, that helped him picture where it is…*" (Dawn). She did not attempt to persuade him to ascribe any specific meaning to the place. Likewise, when Tom described his use of digital maps to plan walking routes, he described placing his trust in the information (walking route detail) provided by unknown others (as VGI), and in his assumption that the information would be interoperable between OS streetmap and Google Maps (8.4.2).

(2) Persuading others

At other times, people share digital maps specifically to persuade others. As the research demonstrates, this can range from relatively small-scale person-to-person micro interactions to citizen-state relations. For example, when Dawn shared a digital map with her partner in their search for a new home, she drew on Google Maps for legitimacy when persuading her partner that some of the properties he had suggested fell outside the areas of their agreed search criteria (7.3.3). Dawn also drew on Google Maps (to generate a map mashup) to effect change to an erroneous Land Registry record. Again, she drew on Google Maps to legitimate (and lend authority) to her claim (8.2.3); she drew on Google StreetView imagery to persuade Land Registry to amend their records. Similarly, when Joe described his use of OS maps to effect a change to Google's base reference map, he depicted an institution-to-institution form of persuasion through a digital map (8.4.2). To that end, the research demonstrates that digital maps can be drawn on to legitimate claims and to persuade others at varying scales. Interestingly, while the accounts of Kelly and Joe both suggest potential for an emerging consensus between maps – and with it the construction of an interoperable (across maps) – Joe goes further in highlighting how maps are amended and generated selectively to persuade others. As the website manager for an organisation that is part funded by the local chamber of commerce, Joe is fully aware that his selection and omission of local business detail on the digital map framed within the website presents local chamber of commerce members far more prominently than others (8.4.2). To that end, Joe describes a curation of content by his

own organisation. In this, he echoes concerns raised by Harley (1989) over the hidden agendas and political import of silencing and omission through map content. Alongside being engaged to curate the content available to others, or to lend authority to a claim, digital maps can also be drawn on to reassure others. For example, when Dawn described sharing a digital map with her mother (8.2.2), she depicted an attempt to persuade and reassure her mother that they would not get lost on their trip to London, abating her mother's anxiety and thus anchoring another's sense of security (9.5).

What the research demonstrates then, is that map-users draw on digital maps purposively (both directly and indirectly), and at times selectively to generate content in order to inform and persuade others; that is, to strategically curate (anchor) others' senses of place, sense of security, practice performances, and social positions.

9.8. Digital maps as 'rough guides'

This chapter has argued that digital maps tend to be engaged for the views they offer, and that people treat are treated as veracious (and indexical) representations of place (9.4). It has also argued that people's engagement with such views serves to anchor their senses of place, senses of security, practice performances, and social positions (9.5). Likewise, when shared to inform or persuade, such views can also anchor the social practices of others (9.7). However, rather than following an a priori assumption that digital maps *do* anchor (c.f. Power *et al.*, 2012; Shapiro, 2017) the research demonstrates that people are often aware of errors and omissions in digital map content (8.4.2). Likewise, the research demonstrates that digital maps are trusted to varying degrees, and only ever partially anchor:

(1) *Trusted as verbatim*

Some people fully trust the content of digital map views to provide accurate verbatim representations of place (8.4.1). At times, this follows from map-users ascribing digital maps a meaning of being *"…more reliable than paper maps because they are more up to date."* (Estelle). Moreover, this notion of accuracy through up-to-datedness is sometimes attributed to the speed with which errors can be corrected through VGI (8.4.1). For example, Gary noted that because lots of *"…people are using the same data often and errors are therefore more likely to be highlighted in a timely manner"*. At other times, when people described their deferral to a default digital map, they also described an implicit trust entangled within that deferral. For example, when

Tom described his deferral to OS maps (6.3.1), he portrayed it as a deferral towards the established default digital map for walking that continued when a remediated (digital) version became available "…*because we're always using OS, the actual information on there is always the same*" (Tom). To some extent, this echoes Wood and Fels (2008) notion of 'posting' (3.4.2) in as far as Tom suggests the information on the map is a truthful topographical (indexical) representation of a physical place. In short, some people place their trust in the apparent veracity of digital map views and treat those views as fully verbatim representations of an objective material reality (8.4.1).

(2) *Trusted as rough guides*

Other people trust digital maps but remain aware of their potential for error. For example, when Sarah explained that Google Maps provided a view veracious enough for her to plan a route and to trust it (8.4.2), she also knew from past experience that "*...alleyways and jitties are often missed out…*" (Sarah). By contrast, it was not error in local spatial detail that Matt described being tolerant towards, rather it is the route timings digital maps offer that he needs to adjust for (8.4.2). In this, Matt uses Google Maps to plan walking routes but finds that real "*...walking times are usually half as long as it says…*[noting that]*… you have to take that with a pinch of salt…*". Alongside a tolerance for minor discrepancies or errors in digital map content, people also trust digital maps while remaining aware of errors hypermediated content. For example, when Kelly used Google StreetView to preview houses before choosing one to buy, she found that it allowed to "…*see what kind of area it is…*" (8.4.2). At times, Kelly found the sense of place anchored in her preview to be at odds with the street also being portrayed as having a high crime rate in statistics hypermediated within the map (8.4.2). In this, Kelly trusted the digital map view to anchor her sense of place and choice of home, whilst becoming aware of an assumed error in how the local crime statistics had been logged and hypermediated into Google Maps. To that end, what the research demonstrates is that people often trust digital map views as veracious representations of place, but only as rough guides. The digital map does not have to be complete (it can lack local level detail) nor fully accurate (it can hold errors in route timings, or present mislogged hypermediate datasets) to garner trust, or to be treated as veracious.

*(3) Trusted as situated resource*s

Although the research argues that people's engagement with digital maps anchors their senses of place, senses of security, social positions, and practice performances (9.5), the research has also demonstrated that such anchorage is not all-encompassing. Instead, digital maps are engaged with and trusted as situated resources that only partially anchor. For example, when John described his in-situ engagement with Google Maps to navigate his way around a (new to him) University campus (8.4.2), he trusted it to provide a veracious view of the place, but only needed it to provide an "…*approximate how I could get there from where I live…*" (John). That is, he only needs the digital map to provide a rough guide whilst on the move; so that he could relate to what he saw *"…on the map to* [his] *physical bearings…".* In this, he also drew on digital map postview to draw out memory traces of being in the place, to gain an orientation that…*"Oh this is that building I saw there", and "I have to turn here…"* (John). In short, digital map views can be trusted and engaged as verbatim representations or as rough guides. They can also be engaged as situated resources, and cross-referenced with memory traces and the physical embodied experience of 'being there' in place represented within the view.

What this thesis argues then, is that digital map views are not simply trusted as truthful realist representations (although they certainly can be). Instead, they are often engaged and trusted as rough guides. That is, digital map-users are tolerant and adaptive to error and omissions, drawing on digital maps as situated resources that only partially anchor.

9.9. Conclusion

One motivation for undertaking this research stemmed from an underlying frustration at the dearth of theory on digital map use and users (Chapters 1 and 3). The findings chapters (6-8) each addressed a substantive research question. This chapter built on those findings to address the overarching research question – and with it – the critical gap in cartographic thought on digital map use and users. The chapter provided an understanding that rather than being 'used', digital maps are engaged. It added that engagement can be direct or indirect, and it can involve either active (use), rejection (purposeful non-use), or just the potential to actively use a digital map (as a latent

resource). In this, map-users are argued to be knowledgeable of their engagement with digital maps to various degrees, not passive recipients of information.

In exploring the process of engagement further, the chapter argued that map-users tend to be uncritical in their selection of digital map, deferring instead to the default for a specific practice bundle or context. Furthermore, such defaults tend to be established either via hypermediation or scripted through other media resources. It added that when digital maps are engaged, it is the views they offer that map-users draw on. While this remains commensurable with Dodge (2017b), the chapter added a temporal dimension in separating digital maps views into two modes - postview and preview. It then argued that such views serve to anchor people's senses of place (including imaginary geographies), senses of security (physical and ontological), performance of practices, and social positions. In this, views are central to understanding how digital maps feature in the constitution of social practices. However, rather than taking a media effects approach to assuming a priori that digital maps views *do* anchor (c.f. Power et al., 2012; Shapiro, 2017), the chapter has argued instead that views only partially anchor, requiring map-users to ascribe meanings (based on their personal memory traces) to places viewed through digital maps.

To that end, understanding how digital maps anchor led the chapter to argue that digital maps are engaged with as centring resources. Whether they are drawn on as central loci for hypermediate resources, or as allocative resources that legitimise the centrality (and authority) of an individual's social position, digital maps are treated as anchoring resources at the centre (not the periphery) of digital map related practices. This extended the definition of digital maps as emergent, slippy, spreadable media to define them as centring too (see 2.4.4). In turn, this led the chapter to argue that that digital maps are often amended strategically (both directly and indirectly) in order to inform or persuade others, and to purposefully anchor their social practices. This opens a potential for inequality, where some map-users can strategically curate the practices of others. It also highlights potential for an ontological shift in the mode of social organisation from vertical to horizontal (4.5.2) – although the chapter does not attribute this to any shift towards an emergence of a network society (Castells, 2002, 2010) or networked individualism (Wellman et al., 2006; Rainie and Wellman, 2012). Instead, it argue that while transformations in social organisation may be taking

place, such changes cannot be attributed directly to digital maps, the web, or the internet (Webster, 2014b).

After presenting a process of how digital maps are engaged, ranging from how they are selected through to how they are strategically curated to anchor others' practices, the chapter moved on to argue that they often feature within the constitution of social practices as rough guides only. That is, digital map views are often engaged and trusted as verbatim and veracious representations of place. Meanwhile, map-users often remain aware of (and adaptive towards) error and omission in digital map content. Similarly, digital maps tend to be engaged alongside the situated experience of 'being there' in the represented place or alongside memory traces of being in comparable places.

10. Conclusion

10.1. Introduction

As a theoretical contribution towards the literature surrounding digital maps and map-users, this thesis has generated a practice-orientated digital sociology of maps composed of seven inductively generated and empirically-informed concepts (Chapter 9):

Concept	Category
Engagement	Active use Purposeful non-use Indirect Engagement
Deferral to defaults	Direct deferral Indirect deferral Media-scripted defaults Hypermediated defaults
Views	Preview Postview
Anchorage	Sense of place Sense of security Practice performances Social Positions
Centring Resources	Hypermediate centring resources Remediate centring resources Legitimating centring resources
Strategic curation	Informing others Persuading others
Rough Guides	Trusted as verbatim Trusted as rough guides Trusted as situated resources

Figure 11: Table of concepts and categories

Each concept was developed through a qualitatively-driven research design that borrowed heavily from constructivist grounded theory (Chapter 5). As noted in the introduction (Chapter 1), the impetus for this research was my personal frustration at witnessing people engage with digital maps in various contexts and observing how it influenced their various practices – whilst being keenly aware of the lack of criticality with which they did so. That is, despite witnessing family, friends, colleagues, and even strangers drawing on digital maps to select hotels, restaurants, holidays, to plan driving and walking routes, to assign property boundaries, or to locate specific access points when maintaining railway track, they rarely considered their choice of map, the politics behind its data sources, or the extent to which it influenced the

conduct of their day-to-day practices. To that end, this research sought to address a central research question about how people engage with digital maps, and what influence (if any) their engagement might have on their wider sets of social practices. Rather than treating digital maps solely as static resources, the research explored how people also engage with the web-based affordances they offer. Drawing on a practice theory ontology and framework (Chapter 4), the research also sought to address how people's engagement with such affordances feature within the constitution of their wider social practices.

Overall, the thesis argues that people tend to engage with digital maps uncritically (both individually and socially) as mundane resources, deferring to the established default that has been routinised within a specific practice bundle or complex. However, people do not treat digital maps as totalising resources, but as rough guides that are prone to error, engaging with them in situated contexts. In this, the research demonstrated that digital maps (partially, but not fully) anchor people's daily practice performances (for example, choosing a route to travel), alongside their performances of social positions, their senses of place (physical and imaginary), and their senses of physical and ontological security. To that end, the thesis has argued that digital maps influence (but do not fully inform) the movement and distribution of bodies in space, and knowledges of places.

10.2. Contributions

This thesis has generated several terms and concepts (Chapter 9) that extend existing knowledge about digital maps and people's engagement with them. In doing so, the thesis primarily contributes towards a narrow range of cartographic theory literature surrounding digital map use (Chapter 3). However, the thesis also provides a smaller set of contributions towards digital sociology, practice theory, and media studies literatures. Taken together, the terms and concepts generated in this thesis constitute a practice-orientated digital sociological framework which may later be abstracted, adapted/modified, and applied as a lens to sensitise studies of other digital technologies.

Cartographic theory has evolved through various stages – from functionalist models that reduce people to a status of passive recipients of information, to contemporary interpretivist theories drawing on actor-network theory to explore (at times playful) circulations and exchanges of maps and mappings within local contexts (see Chapter 3). However, cartographic theory does not offer a suitable sociological explanation of

how digital maps feature within people's social practices. For example, how – and/or to what extent – does an individual's engagement with a digital map might serve to anchor their choice of home, walking route, or general sense of place. By arguing that digital maps are engaged with both directly and indirectly the research explained that map-users do not treat them as solely instrumental tools to be actively used in a functional sense. Rather, the thesis has argued that engagement with digital maps is far more nuanced and complex. For example, at times people reject specific digital maps (purposeful non-use) as part of the shared rules or practice performances of a context-specific social group (e.g. leisure-walkers' rejection of Google Maps in favour of OS). While at other times, individual's senses of ontological security can be anchored by having a digital map web application available on a smartphone as a latent resource (even if unused). By grappling with this nuance and complexity in people's engagement with digital maps the research provided a new understanding of digital map use that extends contemporary cartographic thought to consider non-use and engagement with digital maps as latent resources as well as active use.

By exploring people's process of engaging with digital maps the research identified direct and indirect deferral to 'defaults' as key forms of digital map selection. It also identified media-scripting and hypermediation as the means by which such defaults are established and maintained (9.3). In doing so, the thesis extended cartographic thought on how digital maps are selected without reducing it to map-users' rational or constrained choice. Instead, the thesis has provided a digital sociological understanding that the specific digital map engaged by one person may be scripted (or framed) by other media (e.g. AJAX/JSON elements embedded within website frames), and thus subject to potential inequalities in power-relations – both over who defers to, and who sets such defaults. Likewise, by exploring what it is that people engage digital maps for, the research demonstrated that people tend to engage with digital maps for the views they offer, which highlighted a temporality in so far as some map-users preview place through a digital map before visiting it, while others postview places afterwards to reminisce or to reaffirm memory (9.4). In this, the thesis speaks directly to contemporary cartographic debates about deep mapping and verticality (3.6.3) and the politics of storying place through digital map views (Dodge, 2017a). What the thesis has contributed this is an argument that it is the apparent veracity of such views that garners map-users' trust. Also, that such trust is not totalising. Instead, map-users approach digital map views as rough guides (9.8).

Furthermore, the research found that map-users draw on personal memory traces (and thus past experiences) for stocks of associations and classifications they might ascribe to the places represented in digital maps views – as part of their interpretive work of making sense of place. That is, map-users' engagement with digital map views involves an ascription of meanings that serve to anchor their practice performances, performance of social positions, senses of place (physical and imaginary), and senses of security (physical and ontological).

While the thesis has provided a useful set of terms and concepts to extend cartographic theory literature, it has also contributed towards digital sociological thought. For example, it has highlighted a potential for inequality in setting and deferring to defaults. It has also evidenced a digital technology anchoring more than material practice (e.g. the mobility or movement and distribution of bodies and things in space). That is, people's knowledges of place (orientations towards it) and affective states and ways of being (e.g. feeling secure) may be anchored through their engagement with digital maps.

In assessing the social dimensions of people's engagement with digital maps, the thesis explained that digital maps are treated as centring resources (9.6). That is, digital maps are engaged with both as a locus for external datasets and (when shared or collaborated on) as resources that may be drawn on to inform or persuade others, or to legitimate social positions. Furthermore, the research argued that the centring potential of digital maps can be drawn on strategically. That is, while some people draw on digital maps uncritically, others engage with them purposively for legitimation and/or to curate the practices of others. While this further extended the digital sociological contribution (discussed above), on the potential for an inequality in power-relations when sharing digital maps, it also provided a small contribution towards practice theory. That is, for Schatzki practices are *"…materially mediated arrays of activity.."* (2001, p. 11), and thus materials are held to be central to practices. Meanwhile, Shove et al. (2012) decentre materials as elements of practices equal to competence and meaning (4.3). By contrast, this thesis has argued that digitals maps (as material elements) are both *centring* and (at times) *central to* practices. For example, the research has demonstrated that when people draw on digital maps as authoritative resources to legitimate the centrality of their social position, they treat digital maps as central to their practices until their social position is established. However, they also carry out other practices from that

position which do not centre digital maps. Likewise, the research also demonstrated that digital maps can be engaged with as centring resources that hypermediate external datasets whilst being located as central to a practice performance. For example, Zoopla was central to Pam's shortlisting of potential homes (6.2.2). However, when Pam moved on to view properties (a performance within the same practice bundle) the centrality of digital maps shifted to become a periphery resource for geolocating sites. To that end, the research has provided a contribution towards practice theory in its argument that materials can shift; they need not be epistemically fixed to the centre of practices (Schatzki, 2001), or located at the periphery (Shove et al., 2012). Instead, digital maps (as materials) slip in and out of centrality.

Alongside its contribution to cartographic thought, and its contributions towards digital sociology and practice theory (discussed above), the thesis has also provided a contribution to the understanding of digital map use in media studies. It has demonstrated that the anchoring potential of digital maps is not totalising. Instead, map-users take digital map content with a pinch of salt and often remain aware of their potential for inaccuracy, and at times anticipate and work around errors with practice hacks. That is, the research found that people tend to treat (and trust) digital maps as rough guides (9.8) and engage with them within situated contexts – as resources that partially (not fully) anchor their practices. In turn, this problematised an argument presented by media scholars - that digital map imagery directly stigmatises place (c.f. Power et al., 2012; Shapiro, 2017). That is, while media studies that focus on digital maps tend to argue that digital maps influence people's senses of places and their practices, they often do so without fully accounting for *how*. By contrast, this thesis drew on primary empirical research to demonstrate that although the meanings map-users' ascribe to place in their engagement with a digital map view can lead to their formation of specific senses of place, it is not totalising; different people ascribe different meanings, and approach digital maps views as rough guides that may be combined with other media resources and past knowledges.

10.3. Limitations and opportunities for further research
While the rationale for the methodology behind this research was justified in Chapter 5, one of its limitations is that the small-scale sample means it is unable to scale-up its findings to a larger statistically significant scale. That is, while the methodology it employs is well-suited to address the research questions, it draws only on qualitative

data. This is not problematic in the context of exploratory research. However, it does mean the research is unable to offer any insight on the volume or extent to which digital maps are used, which specific digital maps are most/least popular, or when and by whom they are used. By extension, a quantitative study of digital map vendor prevalence could usefully supplement this research and address various queries e.g. how many websites is Google Maps embedded within compared to Bing or OpenStreetMap, or how many times year are digital maps engaged, and by whom (demographically), and for what reasons? Furthermore, this research was steeped in qualitative data from British contexts only, whereas research from elsewhere could extend this research to provide a far richer understanding of the extent to which engagement with digital maps anchors ontological security in places where map-users are confronted with less familiar terrains and languages, e.g. a study with tourist engagements with digital maps as latent resources. To that end, a quantitative study of digital map use and a follow-up project on holiday-maker/tourist engagement with digital maps would be useful extensions of this research.

Beyond its methodology, the research also held limitations in its account of cartographic thought. While the research was conducted at a time when digital maps and GIS could be clearly demarcated, the former as freely open public resources and open, the latter as specialised technologies tied to a legitimisation of authority (3.6.1). While this demarcation still stands, ongoing advances in web-based GIS packages and advances in GUI design are moved towards challenging it, and thus may lead to the research to become less relevant over time. Similarly, while the thesis has contributed towards a practice theoretical understanding that digital maps (and media more broadly) move and in and out of centrality as material elements of practices (10.3), it has not fully identified how to treat materials (epistemically) in a way that might be scaled up to other technologies. That is, digital maps remediate and hypermediate other media – and are therefore centring of them in a way that other media are not. To that end, this research opens an avenue for future practice theorists to take in exploring how media are practised, and what influence differing media have.

10.4. Concluding comments

Overall, this thesis has contributed usefully to our knowledge about digital maps. It has addressed its research questions and abated my personal frustration at the limited range of sociologically focussed literature on digital map use and map-users

by providing a new theoretical approach. However, it has not fully abated my personal frustration at people's lack of criticality in their engagement with digital maps. To clarify, this research has demonstrated that digital maps influence both the temporal and spatial distribution of bodies – from anchoring where people choose to live (landed capital acquisition and investment) to influencing their decisions on what time to leave the house for their morning commute. The research has also identified a potential for inequality, both in terms of how some people strategically curate the information available to others on digital maps or views, and in the potential for an emerging consensus between map-makers based on error-prone and inaccurate data. However, despite the research identifying the influence of digital maps on social practices and their potential as sites of inequality, people remain uncritical in their engagement with them. To that end, this research closes with suggestion that more must be done to engage with and inform a wider public on the potential risks of uncritically deferring to the existing content of digital maps, and media resources more broadly, e.g. through public workshops and potentially by informing planning policy. Similarly, more must be done to engage with and inform a wider public on the data politics at play, both where some users may strategically curate the information available to others, and on the increased potential for agency - where individual citizens may bring about change (e.g. for individuals to effect change in official records held by state-level entities) – potentially as part of larger digital sociology project informing publics on the social consequences of digital technologies.

Appendices

Appendix A – Interview Consent

Name: [**Participant**]   Interview: [**Date**]

Consent to film:

This interview will be filmed on a video recorder. The recording will be used to help me develop theory on the ways that people use digital maps. The video content will be typed up/transcribed into text. This transcription will appear in the final thesis, which will be publicly available at the British Library and the University of Sheffield/White Rose Consortium eTheses repository. Video content and the transcribed data may be used for lectures, conferences, and future research. For example, I may use a still shot from the video content. In this form, you are being asked to provide consent for video recording to be used. At the end of the research you will be offered a list of places where this content might appear e.g., at the British Library. You may retract your consent at any time in the future by contacting any institution that holds a copy of the data.

Yes [   ] I give full consent to interview video content being used in this research

Yes [   ] I consent to interview video content being used for the audio (sound) aspects only. I do not want the visual aspect to be publicly used.

Yes [   ] I consent to interview video content being used in this research, provided I am made anonymous, and cannot be identified.

Yes [   ] I consent to interview video content being used in this research, provided I am not named.

No [   ] I do not consent to interview video content being used in this research, either to help the transcription or for later public use.

[NAME]

[SIGNATURE]

[DATE]

Appendix B – Interview Topic Guide

Basic

>Types of digital map used

>Types of digital map preferred

Q1: Which digital maps have you used?

Q2: Why did you choose those maps in particular maps?

General everyday

>Examples of digital maps use

Q3: What did you use them for?

Q4: How did you use the map for [**Q3**] – how did using the digital map fit in with other activities.

Specific

>Examples of digital map use in [**CONTEXT**]

Q5: When and how have you used digital maps in [**CONTEXT**]?

Q6: How did your use of digital maps fit with other activities in [**CONTEXT**]?

Effect of map digital map use

>Importance of digital maps in [**CONTEXT**]

>Other factors involved in [**CONTEXT**]

Q7: Are digital maps an important part of [**CONTEXT**]?

Q8: Why are they/why are they not important in [**CONTEXT**

Maps and experience:

>Experiences of digital map use informing the feel, or sense of a place

>Experiences of digital map use informing choice of route taken

>Experiences of digital map use informing choice of place or site

Q9: Do digital maps have an effect on the way you feel, or the sense you have of a place or location?

Q10: Do digital maps have any effect on the places or sites you decide to go to?

Q11: Do digital maps have any effect on the choice of how you get from place to place, or the route you take?

Appendix C – Focus Group Statements

Context 1: Home-Choice (3 x attendees) Leopold Hotel, Sheffield 16-Oct-2014	Context 2: Leisure-walking (4 x attendees) Derbyshire County Hall, Matlock 21-Jun-2015	Context 3: University Orientation (4 x attendees) Hicks Building, University of Sheffield 24-Apr-2014
Google is my 'go to'	We reject digital maps and use OS ones instead	Google is my 'go to'
Digital maps help me choose which home to rent/buy	Digital maps help me plan where to go and how to get there	Digital maps gave me a good orientation to the campus and how to get about
I have the digital map as a back-up	Digital maps go everywhere	I have the digital map as a back-up
I use digital maps to 'look back' at places I've been to before.	I have the digital map as a back-up	I use digital maps to 'look back' at places I've been to before.
I use digital maps to show people things – to explain	. I use digital maps to show people things – to explain	I use digital maps to show people things – to explain
I use digital maps to persuade people	I use digital maps to show people things – to explain	I use digital maps to persuade people
Digital maps mean I interact with estate agents and buyers/sellers differently	I use digital maps to show people things – to explain	Digital maps let you see 'exactly what place is like
Digital maps let you see 'exactly what place is like		I take what the map says with a pinch of salt
I take what the map says with a pinch of salt		I don't amend digital maps, but I know how to
I don't amend digital maps, but I know how to		

Appendix D – Focus Group Topic Guide

Group: [**PARTICPANT**]

Focus Group: [**DATE/CONTEXT**]
Subgroup: [**PARTICIPANT TYPE**]

Pre-interview briefing (5 mins)

- Briefing
- Explain/gain consent
- Introductions
- Explain research and outline focus group method

1. Basic questions (10 mins)

- Types of digital map used within [**CONTEXT**]
- Other factors that affect decisions within [**CONTEXT**]

2. Discussion of statements (~10 mins per statement)

- Focus group statements

3. Further discussion (10 mins)

- Clarification questions and open discussion

4. Summary (5 mins)

- Summarise points of discussion
- Expand on open discussion

5. Post-interview de-brief (5 mins)

- Re-iterate consent
- Provide contact details for further questions/information

Appendix D (continued) – Focus Group Consent form

Consent to use of visual materials:

This focus group session will be filmed on a video recorder. The recording will be used (alongside interview content) to develop theory on the ways that people use digital maps. The video content will be transcribed (typed up) into text. This transcription will appear in the final thesis, which will be publicly available at the British Library and the University of Sheffield/White Rose Consortium eTheses repository. Video content and the transcribed data may be used for lectures, conferences, and future research. Below, you are being asked to provide the level of consent you want to provide. At the end of the research, you will be offered a list of places where this content might appear, and you may retract your consent at any time in the future.

Yes [   ] I give full consent to video content being used in this research,

and publicly in future.

Yes [   ] I consent to video content being used for audio (sound) only, both in this research and publicly. I do not consent to visual aspects being used.

Yes [   ] I consent to video content being used in this research, provided I am made anonymous, and cannot be identified e.g. my face must be blurred on any still images used and I must not be named.

Yes [   ] I consent to interview video content being used in this research, provided I am not named, or a pseudonym (flake name) is given.

No [   ] I do not consent to video content being used in this research or

Publicly .

[PARTICIPANT NAME] - G[**X**] _S[**Y**]_ P[**Z**]_FG [**Location**]
[PARTICIPANT SIGNATURE]
[DATE]

Appendix E – Survey Questions

>Basic participant data [Classifying]

      Name/Age/Gender/Occupation

>Contact details:

      E-mail address/Location

Q1: *How often do you use digital maps?*

      Daily/Weekly/Monthly/Occasionally (once a year or more)/Rarely (<once a year)/ Never

Q1a: [**IF Q1 = 'Never':** "*Have you ever used a digital map e.g. Google Maps, Bing Maps, Yahoo Maps etc?*"

      Yes/No

      [**IF Q1a = '**No**': CLOSE SCREEN**

      [IF Q1a = 'Yes**': Q2**

Q2: *Which digital maps have you used?*

      Bing/Google/Ovi/OpenStreetMap/Yahoo/Other

Q2a: **[IF Q2 = 'Other']** *Please state which digital maps you have used*.

Q3: *How do you use digital maps (which platform)?*

      Desktop computer/Laptop/Tablet/Smartphone/Other

Q3a: [IF Q3 = 'Other'] *Please state how you use digital maps (which platform)*

Q4: *When do you use digital maps?*

      Home/Work/Leisure-time/Other

Q4a: **[IF Q4 = 'Other']** *Please state where you use digital maps*

Q4b: **[IF Q4 = Home/Work/Leisure-time**], *do you use digital maps before, during or after an activity?*

      Before/After/In-situ(same time)/Unsure

Q5: *Have you ever chosen to use another type of map e.g. a paper-based map, when a digital map has been available?*

      Yes/No/Unsure

Q5a: **[IF Q5 = 'Yes']** *Which type of map did you choose to use instead?*

     Paper-based/Sat-Nav/GPS/Other

Q5ai: **[IF Q5a = 'Other']** *Please state which type of map you chose to use instead of a digital map?*

Q5b: [IF Q5 = 'Yes'] *Why did you choose to use another type of map?*

Q6: *Have you ever added content to a digital map? e.g., a review, photographs, or information?*

      Yes/No/Unsure

Q6a: [IF Q6 = 'Yes'] *Which digital map did you add content to?*

      Bing/Google/Ovi/OpenStreetMap/Yahoo/Other

Q6ai: [IF Q6a = 'Other'] *Please state which digital map you added content to?*

Q6b: *Please describe the content you added to the digital map?*

Q6c: [IF Q6 = 'No/Unsure'] *Do you know how to content to a digital map?*

      Yes/No/No, but I know where to find information on how to

Q6ci: [IF Q6c = 'No, but I know where to find information on how to'] *Please state where you would get information on how to add content to digital maps?*

Q7: *How do you access digital maps?*

      Digital map providers website/Mobile/smartphone app/Computer app/Other

Q7a: [IF Q7 = 'Digital map providers website/Mobile/smartphone app/Computer app'] Which *digital map app/website do you use?*

Q7b: [IF Q7 = 'Other'] *Please state how you access digital maps*

Q8: **[IF Q7 = 'Yes']** *Do digital maps have any effect on the feel, or sense you have of a place?*

      Yes/No/Unsure

Q8a: *Please provide an example a digital map having an effect on the way you feel or felt about a place?*

Q9: *Do digital maps have any effect on the route you choose to travel?*

      Yes/No/Unsure

Q9a: [IF Q9 = 'Yes'] *Please provide an example a digital map having an effect on the chosen route to travel*

Q10: *Do digital maps have any effect on the places you choose to go to?*

      Yes/No/Unsure

Q10a: [IF Q10 = 'Yes'] *Please provide an example a digital map having an effect on the place you chose/choose to go to*

Q11: *Are digital maps reliable (trustworthy)?*

      Yes/No/Unsure

Q11a: [IF Q11 = 'Yes'] *What makes digital maps reliable?*

Q11b: [IF Q11 = 'No'] *Please state why digital maps are not reliable*

Q12: *Do digital maps show everything you need to know about a place?*

   Yes/No/Unsure

Q12a: [IF Q12 = 'No/Unsure'] *What do digital maps <u>not</u> show about places?*

Q13: *What <u>do</u> digital maps show you about a place?*

Q14: *Are you willing to take part in more research?* This will be private and confidential, your details will **<u>not</u>** be passed on to any third party, and you will be only be contacted by Matthew Hanchard (the researcher of this project) at the University of Sheffield: <u>m.hanchard@sheffield.ac.uk</u>

   Yes/No

Q14a [IF Q14 = 'Yes']: *Please provide your preferred contact details*
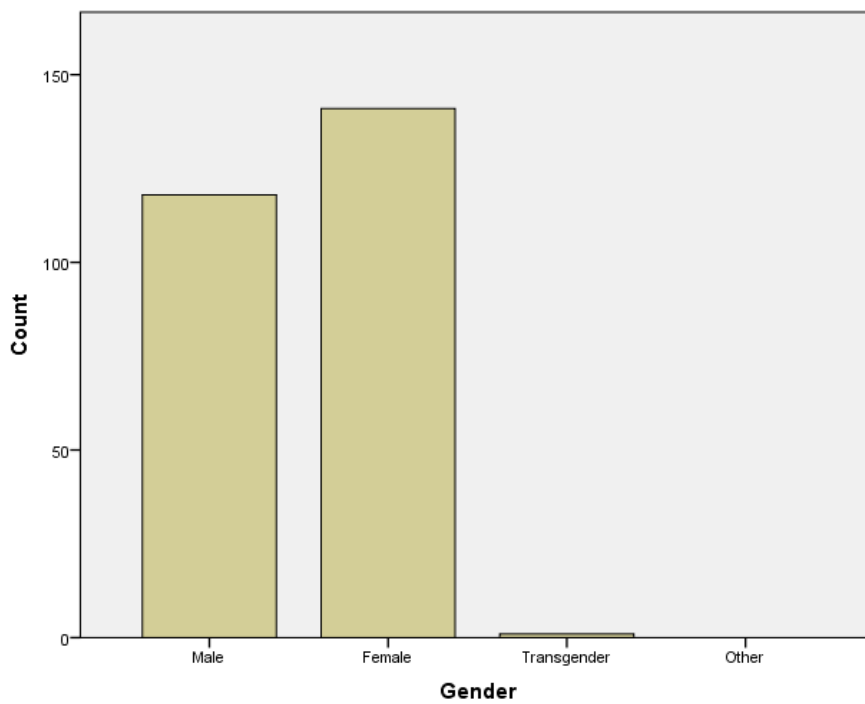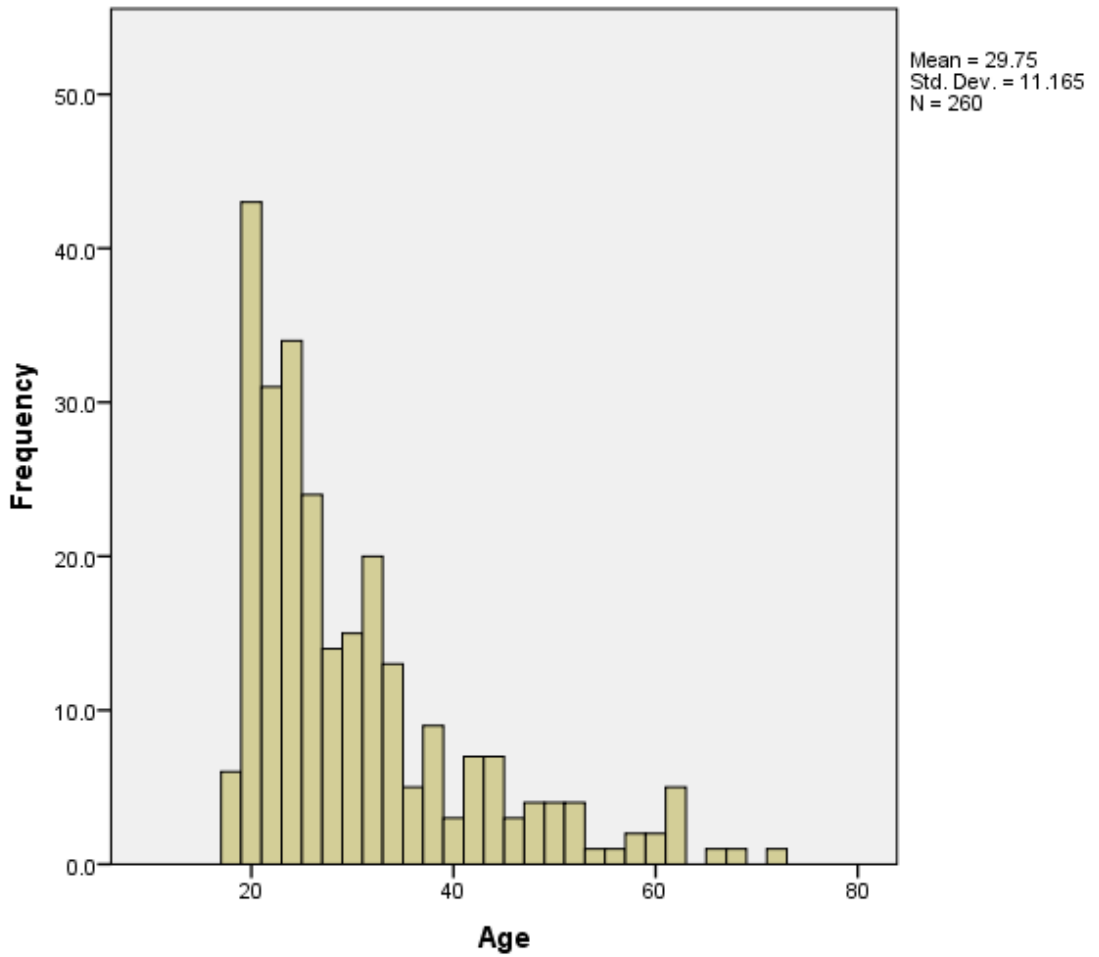
Which digital maps have used - Bing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	78	**30.0**	100.0	100.0
Missing	System	182	70.0		
Total		260	100.0		

Which digital maps have used - Google

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	259	**99.6**	100.0	100.0
Missing	System	1	.4		
Total		260	100.0		

Which digital maps have used - OSM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	69	**26.5**	100.0	100.0
Missing	System	191	73.5		
Total		260	100.0		

Which digital maps have used - Yahoo

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	25	**9.6**	100.0	100.0
Missing	System	235	90.4		
Total		260	100.0		

Which digital maps have used - Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	75	**28.8**	100.0	100.0
Missing	System	185	71.2		
Total		260	100.0		
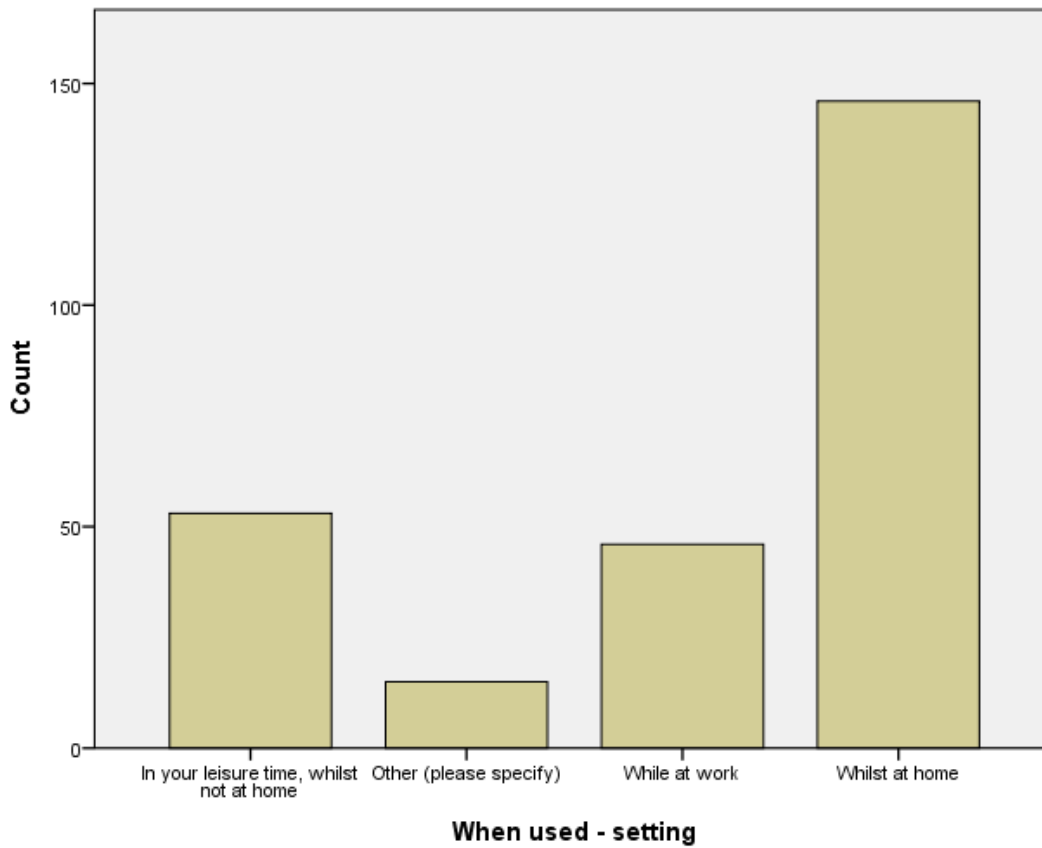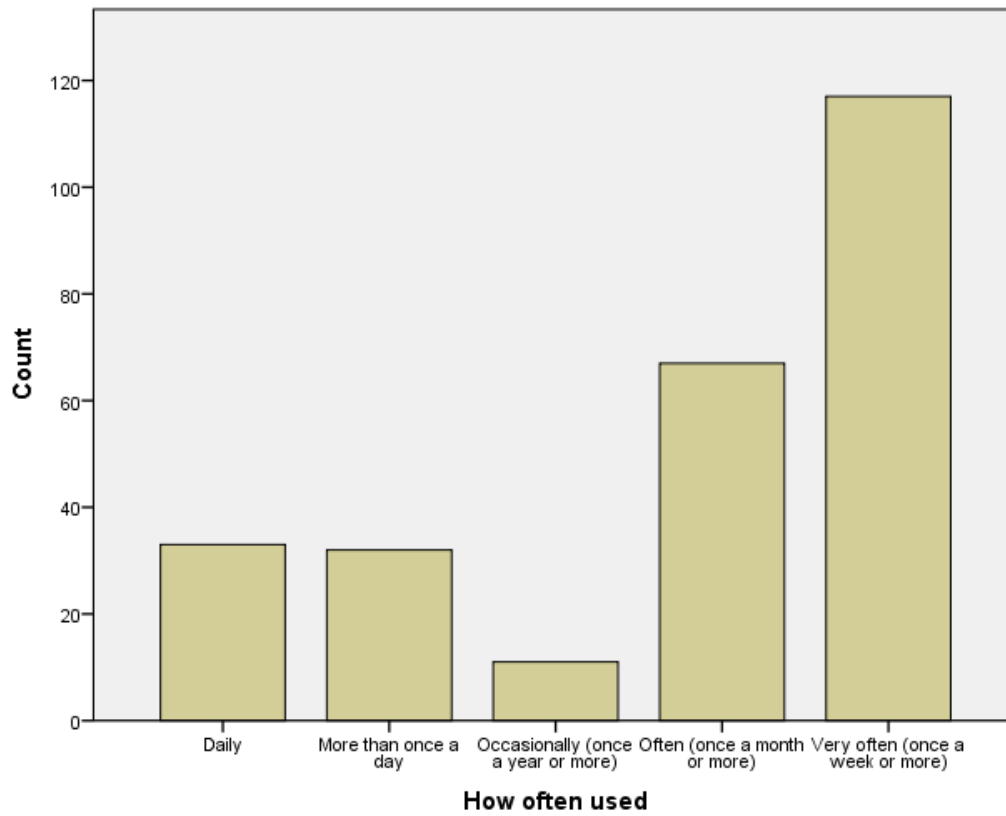
Ever added or amended digital map

Use before, during, or after activity

Know how to add or amend

Do digital maps show everything about places
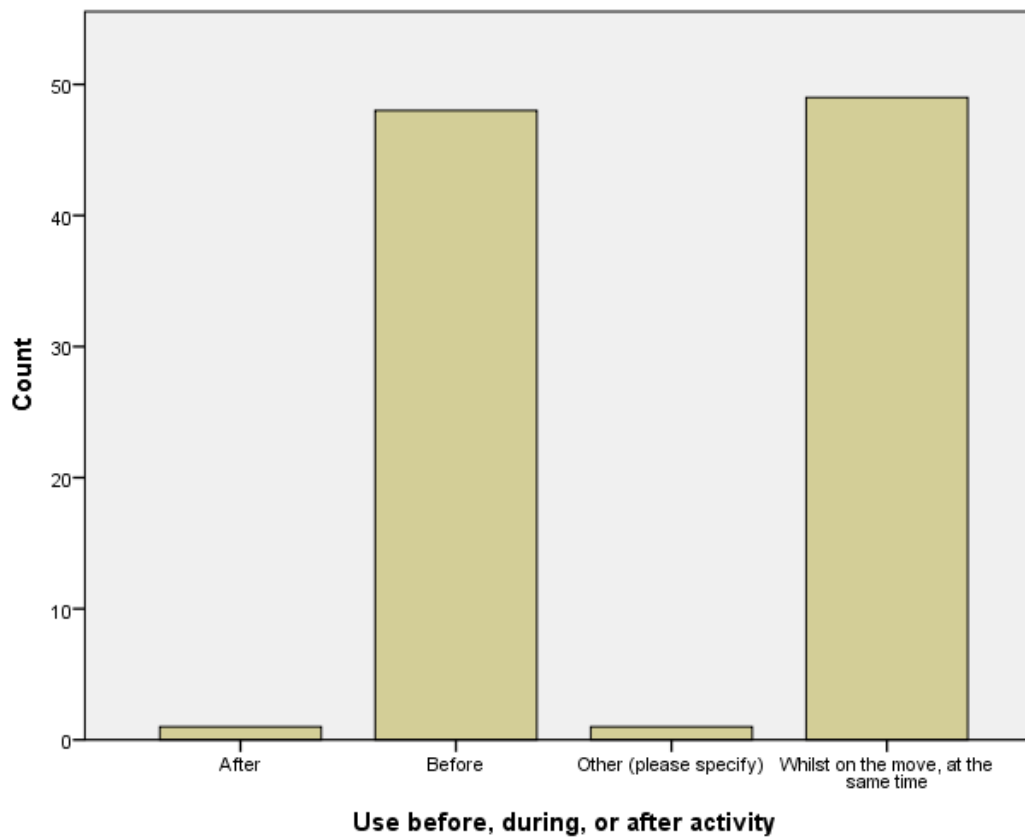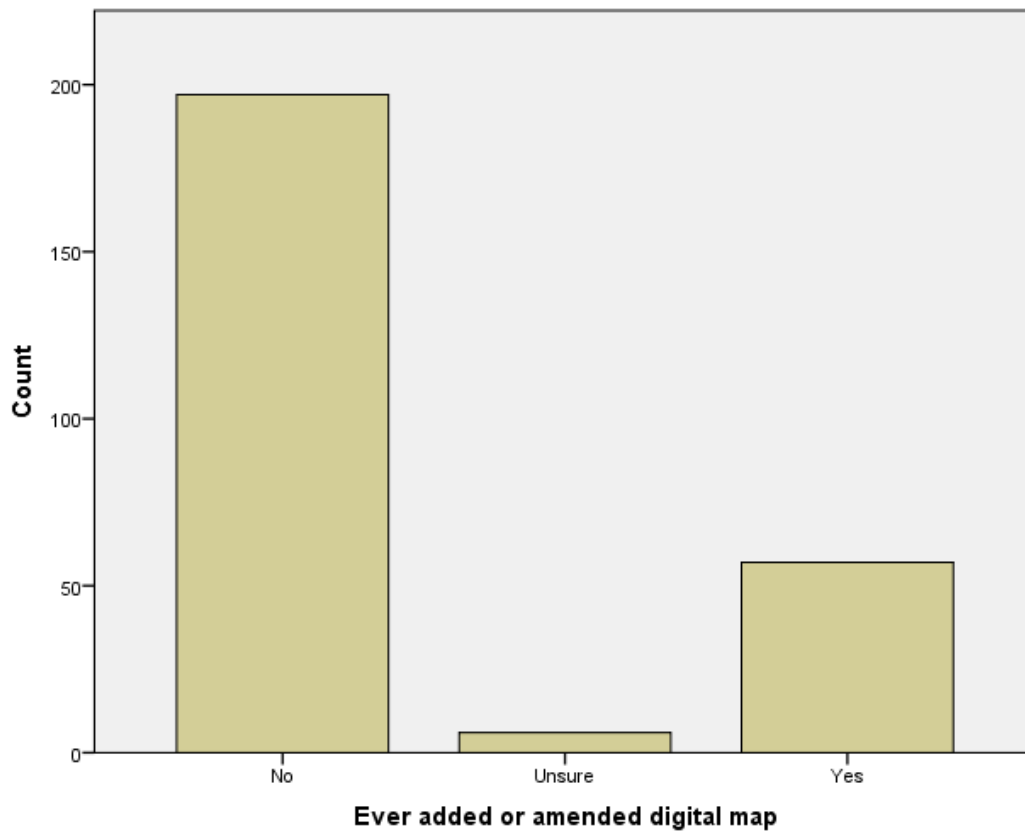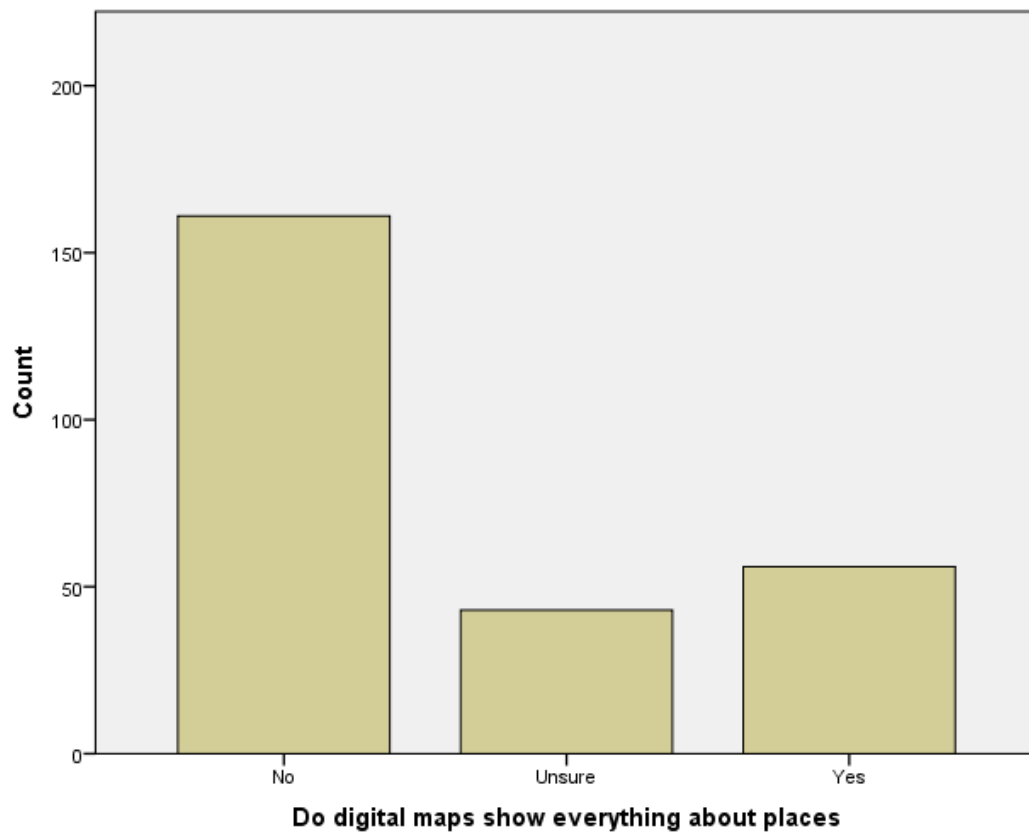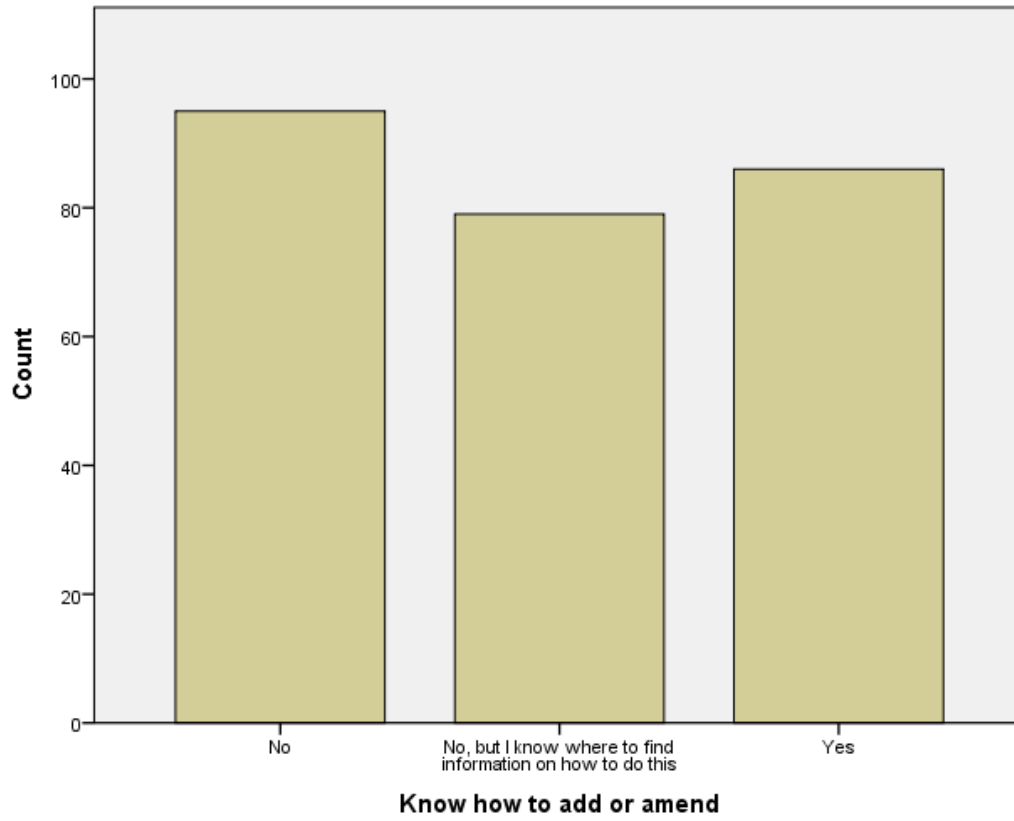
Appendix G – Survey Invitation (for University Choice)

Have you ever used a digital map?

You might have used one on a smart/mobile phone, or a computer. For example, Google Maps, Bing Maps or Yahoo Maps.

Hello,

I am Matthew Hanchard (a PhD student supervised by Dr. Bridgette Wessels). I am currently researching digital maps, and how people use them. In part of the research, I am using a survey. I would be very grateful if you could complete this. It should only take around 5 minutes.

You can complete the survey – here.

Alternatively, you can use the hyperlink at the bottom of the page.

Your answers will be completely confidential, and your details will not be passed to any other party.

The research has received ethics approval from the University Research Ethics Committee and is supervised by Dr. Bridgette Wessels, Dept. of Sociological Studies, University of Sheffield: b.wessels@sheffield.ac.uk

If you have any questions about this research, please contact me:

E-mail: m.hanchard@sheffield.ac.uk
Twitter: @ondigitalmaps
Survey: https://www.surveymonkey.com/s/MappingStudents[89]

Kind Regards,

Matthew Hanchard
Postgraduate Researcher/PhD Student - Department of Sociological Studies.
m.hanchard@sheffield.ac.uk

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[89] The prefix section of the URL address was amended for each context (e.g. '/MappingStudents', '/Mapping Walkers','/MappingHomeChoice'). All three URL addresses led to the same survey.

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