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## **Introducing Digital Geographies**

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### **Digital Geographies**

It is now somewhat of an obvious point to state that digital phenomena have radically transformed almost every aspect of human life. From economies, to cultures, to politics, there is almost no area that remains untouched by digital techniques, logics, or devices. For instance, economies are now based upon the production of digital goods and services, and the global stock market is managed via high speed algorithmic trading and digital networks that communicate faster than humans can directly perceive or respond to. Many aspects of cultural life, including how we identify and socialize with others, express ourselves, and consume popular content and entertainment, are now highly mediated through platforms and social media platforms such as Facebook, Twitter, and Instagram. Governments fear cyberattacks, develop digital strategies for international development, and utilise digital technologies to enable new logics of governance based on highly dynamic and individualised modes of spatial segregation and control. These shifts across political, economic, and cultural spheres of everyday life are tied to a whole range of objects, processes, practices, and materialities. From consumer PCs to commercial server farms, and from smartphones to apps, the ubiquity and pervasiveness of digital technologies and their effects are of immediate concern to geographers, underwriting transformations of the space economy and economic relations; modes of the

management and governance of cities and regions; the production of space, spatiality and mobilities; the processes, practices, and forms of mapping; the contours of spatial knowledge and imaginaries; and, the formation and enactment of spatial knowledge politics (Elwood and Leszczynski, 2011; Graham and Marvin, 2001; Kitchin and Dodge 2011; Rose et al., 2014; Wilson, 2012). Digital presences, practices and effects are characterized by uneven geographies of underlying infrastructures, component resources, and sites of creation and disposal (Lepawsky, 2015; Pickren, 2016; Zook, 2008) ). Similarly, there are distinct geographies of digital media such as the internet, games, and social, locative, and spatial media (Ash, 2015; Leszczynski, 2015; Kitchin et al., 2017).

At the same time, digital technologies also alter how we, as geographers, go about engaging with and researching this digital world. Digital devices (computers, satellites, GPS, digital cameras, audio and video recorders, smartphones) and software packages (statistics programmes, spreadsheets, databases, GIS, qualitative analysis packages, word processing) have become indispensable to geographic practice and scholarship across sub-disciplines, regardless of conceptual approach. Current modes of generating, processing, storing, analysing and sharing data; creating and circulating texts, visualizations, maps, analytics, ideas, videos, podcasts and presentation slides; and, sharing information and engaging in public debate via mailing lists and social and mainstream media are thoroughly dependent on computational technologies (Kitchin, 2013). Digital platforms are changing what constitutes 'the field'; the rise of digital content comprises new forms of evidence with which to approach longstanding geographical concerns; and, digital presences and praxes are provoking new questions and opening up new lines of geographical inquiry (Leszczynski, 2017).

In the context of these profound shifts, this collection charts a diverse range of digital geographies, identifying the conceptual, theoretical, and empirical axes along which geographers are engaging with the digital, addressing how and why digitality matters to geography, and highlighting the insights that geography can offer to the study of digital phenomena. This short introductory chapter provides some important definitions and maxims that frame ‘digital geographies’ and which situate the contributions which follow. We begin by discussing and defining the key term ‘digital’. We suggest that rather than a sub-discipline unto itself, digital geographies are best understood through the lenses of extant as well as emerging fields of geographic inquiry. It is along these axes of inquiry that we have organized this collection, and the contributions brought together herein trace how digital phenomena, practices, and presences inflect and reconfigure geographical thinking about and approaches to questions of epistemology and knowledge production, space and spatiality, methods and methodologies, culture, the economy, and politics.

### **Defining the Digital**

The term ‘digital’ has a variety of meanings across a range of literatures from geography (Ash et al. 2016), to media and cultural studies (Manovich, 2013), and software studies (Fuller, 2008). As such, we espouse a broad definitional position that incorporates a range of engagements with the digital, which we suggest may be understood variously as ontics, aesthetics, logics, and/or discourses (Ash et al. 2016). Digital in the sense of ontics designates the ways that digital systems ‘translate all inputs and outputs into binary structures of 0s and 1s, which can be stored, transferred, or manipulated at the level of numbers, or ‘digits’ (Lunenfeld, 2000: xv). Thought of as the universe of physical literals (Coyne, 1994), ontics simultaneously emphasizes an understanding of digitality as comprised of material digital objects: the hardware, software, devices, content, code, and algorithms that underwrite access

to digital phenomena and mediations, which comprise the artefacts of our digital praxes, and which structure our experience of digitality. These digital technologies have recoded – or remediated (Bolter and Grusin, 1999) - multiple other technologies, media, art forms, and spatialities in ways coincident with the binary nature of computing architectures. Digitality, then, is also an aesthetics, capturing the pervasiveness of digital technologies and shaping how we understand and experience space and spatiality as always-already ‘marked by circuits of digitality’ that themselves irreducible to digital systems (Murray, 2008: 40). As we adopt and seamlessly embed networked digital technologies throughout the fabrics of our landscapes, they come to enact progressively routine orderings of quotidian rhythms, interactions, opportunities, spatial configurations, and flows (Franklin, 2015). Alongside these ontics, aesthetics, and logics, a whole set of digital discourses have arisen which actively promote, enable, secure, and materially sustain the increasing reach of digital technologies in the spaces and practices of our daily lives.

This multi-faceted definition is not, however, intended as an overarching rubric under which anything may be characterized or engaged with in terms of the ‘digital’. We seek to avoid this key pitfall of academic discussions of digital technology, which is related to generality. The term ‘digital’ can easily be deployed vaguely, as a kind of discursive label or blanket that is thrown over a series of quite different things. In doing so, this label can obfuscate more than it reveals about what are highly heterogeneous sets of objects, practices, and processes. Avoiding this generality requires that the term ‘digital’ always be qualified in relation to specific objects, techniques, logics, processes, practices, and affects. These qualifications are important because they force us to focus on the empirical specificities of the phenomena of study. The first of these specificities is that while ‘digital’ designates a genre of social, cultural, technological, and economic productions historically associated with the advent of digital computing, digital

computing technologies are necessary to, yet insufficient for, 'the digital.' Following Horst and Miller (2013: 4), 'digital' designates objects and artefacts that are ultimately compatible with or which arise from binary code and architectures, yet which produce further "proliferation[s]" that exceed the binary logics and materialities of digital systems. For instance, digital maps on smart phones encourage new forms of navigational practice and spatial movement, but these practices exceed the software itself, creating new cultures of movement that cannot be anticipated in advance (Verhoeff, 2012).

Second, these proliferations arise from the empirical ability of digital systems to differentiate and mark at speed, which produces new capacities to act. For instance, a LIDAR (Light Detection and Ranging) sensor on an autonomous vehicle shines light and measures the time it takes the light to return, in order to differentiate between objects and empty space. This information is then differentiated according to machine learning algorithms to determine whether an object is moving or still, human or non-human. In this case, such differentiations allow the machine learning algorithms to navigate around obstacles and so enable the vehicle to travel safely without a human driver. From this position, the emphasis becomes examining how digital code, algorithms, and binary architectures construct the thresholds between these differentiations through a whole variety of factors. In the case of autonomous vehicles, these could include the industrial design and manufacture of LIDAR sensors; the broader market forces and governmental rationales and techniques that dictate where and how autonomous vehicles can be tested and public fears around whether such vehicles can mark and differentiate between human and non-humans quickly and accurately enough (Ash, 2017). In turn, one might understand how the differentiations digital technologies enact feed into and alter human sensory capacities (Ash, 2015), cognition (Hayles, 2017) and decision making more broadly.

This begets a third empirical specificity, which is that there is no monolithic ‘the digital’, only a variety of differently materialised objects, subjects, spatialities, effects, and affects that arise from varied practices and processes of digital production, circulation, use, and mediation. In making reference to ‘the digital,’ then, we are accordingly invoking ‘digital’ in its myriad and non-mutually exclusive senses of the term. This is commensurate with the impetus for this collection, which is to name, empirically and conceptually frame, and theorise digital geographies. In the same way that we maintain that there is no singular ‘digital,’ there is no singular or monolithic digital geography. As the contributions in this collection attest, engagements with the digital in geography inform and are informed by a range of intellectual positions, philosophical commitments, epistemologies, subjects and objects of study, and methodological practices across the breadth of human geography’s disciplinary foci and research communities.

### **The digital turn**

In understanding the digital as a set of ontics, aesthetics, logics and discourses that mark and differentiate at speed by way of the designator ‘digital geographies’ we, as editors of this collection, are not suggesting that a new sub-field of digital geography be established to study these processes. Such attempts have been underway in anthropology (Horst and Miller, 2013) and sociology (Lupton, 2014) for a number of years. In both cases, the focus is broad, encompassing the anthropology and sociology of, produced by, and produced through the digital. The consequence, we believe, is to recast nearly all of anthropology and sociology as ‘digital anthropology’ and ‘digital sociology’ to some degree, especially given the pervasive reliance on digital technologies in all aspects of scholarly knowledge production. The result is that there is no sociology or anthropology that is not ‘digital.’ We adopt a different track. Rather

than subsuming all of (human) geography to ‘digital geography’ or proclaiming digital geography a new distinct subdiscipline, we instead advance ‘digital geographies’ to signal a fundamental disciplinary turn that has inflected epistemological and scholarly communities of geographic praxis (Ash et al., 2016). Referring to digital geographies in this way avoids issues of generality that come with recasting all of disciplinary practice as ‘digital’. While we do maintain that there is a need to think critically about the relationship between geography and the digital, thinking of ‘digital geographies’ as a turn *towards* the digital as object and subject of inquiry in geography, and as a simultaneous inflection of geographical scholarship *by* digital phenomena, is more meaningful in that it allows us to think about how the digital reshapes many geographies, mediates the production of geographic knowledge, reconfigures research relationships, and itself has many geographies.

By framing the digital in this way, we avoid the decontextualization of digital approaches, methodologies, and research studies from their subdisciplinary domains such as urban geography or geographies of development. Instead, the emphasis remains on how an engagement with the digital develops our collective understandings of cities and development, as well as health, politics, economy, society, culture, and the environment, amongst others. It also allows for ‘the digital’ to function as a site and mode for intersectional research that cuts across research foci and leverages methodologies from multiple geographical subdisciplines, intellectual traditionals, and epistemological communities. Attending to the geography of rare metals used in the production of digital technologies, for instance, raises questions in the fields of resource and development geographies, postcolonial studies, as well as geopolitics. This enables the differences the digital makes to research, epistemology, and knowledge production to be contextualized within a broader knowledge base and history of theory, concepts, models, and empirical findings within and across geographic sub-domains. For example, we feel it

makes sense to frame smart city developments within debates around the long history of urbanization and urbanism, rather than to set them apart within a separate field of digital geography. Building on this commitment to geographical intradisciplinarity, this collection is organized around five themes that capture the key axes of inquiry along which the digital has been taken up most directly in geography: the theorization of space and spatiality, geographical methods and methodologies, and cultural, economic, and political geographies. This allows us to capture the diverse ways – epistemological, theoretical, and methodological - in which the digital has been explicitly engaged in geography, and areas of scholarly praxis where digital objects, subjects, and mediations are anticipated to continue to inflect geographical theory, praxis, and method.

### **This book**

The chapters in each of the five sections – spaces, methods, cultures, economies, and politics – attend to the myriad ways that digital technologies feed into, alter, and are altered by a range of activities, practices, objects, and aesthetics. While the contributions to each section are unified by their engagement with ‘the digital’ in its myriad senses, they are diverse in their methodological orientations, subjects/objects of concern, the intellectual traditions on which they draw, as well as their ontological and epistemological positionings. The title of each chapter signals a key concept that constitutes a lens through which to begin to distil the relationship between the digital and space, methods and methodologies, culture, the economy, and politics. In each instance, this key concept could be prefaced by ‘the digital’ – for instance, (digital) labour, (digital) mapping, and (digital) governance. In keeping with our commitment to geographical intradisciplinarity and to avoiding recasting all geographies as always-already ‘digital’ geographies, however, we omit the ‘digital’ prefix. In so doing, the individual contributions organized around the five themes speak to the ways in which geographical

inquiry has *turned to* and been pervasively inflected by the digital across human geography's subdisciplines and axes of inquiry.

As geographers, we are affiliated with one another by our concern and engagement with spaces, places, and spatialities. As such, we lead this collection with a section devoted to digital spaces. In the first contribution to this section, Agnieszka Leszczynski outlines a range of theories and approaches to understanding the relationship between spatiality and digital technologies. While these positions are diverse, all provide different ways of attending to the processes by which different digital technologies produce, co-constitute, and generate the appearance of socio-spatial relations that alter how space is perceived, known, used, and experienced. Moving beyond theories of digital space in general, Chapter Three discusses the specific spatialities of the digitally-mediated urban environment. Here, Andres Luque-Ayala points to the transformations in cities such as Rio de Janeiro brought about by the introduction of a range of digital technologies such as screens in control rooms and smart sensors in the environment, illuminating how these digital technologies enable distinct forms of real time governance. The following chapter turns to rural spaces, which have generally been understudied in relation to digital technologies. Martin Dodge usefully points out that digital technologies, from sensor enabled combine harvesters to automated milking machines, have transformed rural space at least as much as, or perhaps more than, urban spaces. Mapping is a key technology that has always been central to the production and knowledge of space, and in Chapter Five Wilson demonstrates the importance of the shift associated with the digitisation of mapping for both professional geographers and well as movement through space in everyday life. Closing the section, Tim Schwanen provides an important reminder that access to digitally mediated transport technologies is unequal and unevenly affects mobilities.

How we know and make sense of digital spaces raises questions about geographical methods and methodologies while simultaneously provoking new methodological developments. Beginning the second section on methods, Jim Thatcher's chapter on epistemologies suggests that utilising digital technologies in geography – specifically GIS – is part of a longer history of knowledge in which the visual is prioritised. In turn, digital methods should be critiqued with this occularcentrism in mind, while recognising the new possibilities brought with these technologies. In Chapter Eight, Rob Kitchin and Tracey Lauriault point to the changing nature of data underwritten by the emergence of digital techniques, and how this allows new forms of analysis utilising data infrastructures. The following chapter expands debates around data and digitality, with Meghan Cope demonstrating how digital technologies can be used in the generation of new qualitative methods that can attend to the complexity of human experience. Hilary Geoghegan continues a focus on ground level digital data collection in Chapter Ten, detailing that digital technologies provide an important opportunity for the development of participatory methods, while cautioning against the idea that digital technologies are themselves the solution for the generation of a properly citizen-led science. Following this, David O'Sullivan provides an account of cartographic practice in relation to GIScience and suggests that critique of this field must be more than theoretical and instead work with these technologies to generate critically engaged GIScientific practice. In the final chapter of the section, Dani Arribas-Bel focuses on the use of spatial statistics, emphasizing how digital techniques and developments in data science are transforming this important field.

The third section of the book shifts to focus on digital cultures. James Ash's contribution leads this section by suggesting that popular culture is now fundamentally mediated by digital platforms, which shape the type of content that is produced, how it is experienced, and which amplify the circulation of affects and emotions associated with this content. Next, Sam Kinsley

demonstrates how a range of digital technologies, from Twitter to the US VISIT visa programme, mediate and produce different modes of subjectivity. Finally, in Chapter Fifteen, Gillian Rose interrogates the concept of representation in relation to digital media and suggests that the term mediation may be more useful to get at the complexity and specificity of digital content as it is translated across multiple interfaces, servers, websites, and platforms.

Section four moves from cultural engagements to examine digital economies. In the opening chapter, Mark Graham and Mohammad Anwar argue that digital labour complicates the relationship between labour and place, enabling new forms of exploitation but also the potential for digital workers to generate their own modes, conditions, and sites of working. Chapter Seventeen provides an account of digital industries. Here, Matt Zook suggests that it is important to locate these industries physically while also understanding how these industries produce their own forms of digital spatiality. Lizzie Richardson then focuses attention on the sharing economy, which has elsewhere also been termed the 'on-demand', 'gig', and more recently 'platform' economy. She demonstrates how ride hailing services such as Uber are based on problematic discourses of sharing and the fundamental role that digital platforms and interfaces play in the existence and power relations of this economy. Closing out this section, Bruno Moriset usefully outlines the way that so called non-digital or traditional industries, such as banking and retail, have been altered by digital technologies, driving the globalization of value and blurring the boundaries between different sectors of the economy.

The last section of the book turns to digital politics and the political geographies of the digital. The first chapter by Dorothea Kleine provides a helpful summary of the role that digital technologies are playing in global development and how issues such as gender inequality and environmental sustainability are reflected in digital technologies and attendant policies, while

also being potentially transformed by these technologies, at time with unintended – and not necessarily positive - outcomes. Next, Rob Kitchin demonstrates how digital technologies have led to new modes of governance. Through a discussion of CCTV, smart phone tracking, and a range of other technologies, Kitchin points to a shift from disciplinary governance to a society of control. Taylor Shelton then discusses digital civics, using examples from smart cities such as Atlanta to discuss how digital civics are both spatialized and corporatized. In Chapter Twenty Three, Linnet Taylor discusses the relationship between data and ethics and uses the example of the commercialisation of public space to understand how ethics are changed under regimes of datafication. Jason Young then examines the knowledge politics of geospatial media, focusing on issues of access, bias, and the material effects of this inequality in relation to indigenous knowledges. Closing out the collection, Jeremy Crampton's chapter charts digital geopolitics, specifically in relation to military and surveillance practices, with a focus on technologies such as Google Earth. He highlights the ways in which academic, commercial, and military practices may be more closely tied than many would be comfortable with.

While covering a huge range of empirical objects, situations, events, and approaches, and bringing together scholarship from across a range of intellectual traditions, this collection offers a starting point and guide to studying digital geographies. Exploring the chapters, we hope readers gain insight into a variety of phenomenon while also being inspired to interrogate how digital technologies are altering their own areas of study.

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