The Digital Modern

In this chapter I position the digital humanities in their wider context. My goals are to provide a starting point for more detailed subsequent discussions of cultural and technical issues and to acknowledge the complex background conditions that inform digital scholarship. The approach was influenced by Scott Lash's comment that in contemporary society 'the accumulation of capital is at the same time (increasingly) the accumulation of information'.[1] I suggest that the rapid accumulation of digital information in the late twentieth and early twenty-first centuries has had an important impact on contemporary economic, cultural, political, legal, technical, philosophical, and, ultimately, scholarly experience. If we are to understand the nature and purpose of the digital humanities, we have to appreciate these background conditions. I refer to it as the digital modern, but use that term with caveats. The concept of the digital modern is a resonant but inadequate identifier. I use it here as shorthand for a set of cultural, political, social, economic, and aesthetic influences that most readers will recognise, but it should not be considered a singular and uniform mechanism. The digital modern is experienced in different ways in different places, and is in no sense ubiquitous. It is presented here as a heuristic device, a trope, a contemporary myth, a technical reality, and a context of action.

The concept of the digital modern offers a critical frame that we can use to understand the impact digital technologies are having on cultural and intellectual activity generally, and on digital humanities research in particular. Its power lies in its very brittleness: its tendency to highlight flaws in our thinking about the 'digital', exposing our fascination with digital

culture, our assumptions about technological progress, and our distorted attitude towards computing technologies. As Thomas Haigh notes, regardless of the hype surrounding digital technology '[m]y unmistakably analog windows [still] show me what is immediately outside my house'.[2] The approach is self-reflexive, designed to accept the power of the digital over our imagination, economy, and culture, but to refuse to view it as an intellectually sophisticated category. To achieve this, it is necessary to walk a fine line between positivist and relativist interpretations and assume that: '[o]bjective meaning, that is, meaning to be grasped by objective interpretation, is rooted in the structural laws of the object itself; certain elements and phases of sensible reality here become necessary stages in the progressive realization of meaning'.[3] To understand the digital humanities we have to apprehend the structural nature of digital culture and society, and we must remember that the field is unavoidably influenced by postindustrial capitalism and its associated sociopolitical machinery. When articulated in this manner, the digital modern has implications for the humanities as a whole: it refers to the historical conditions that inform contemporary scholarship.

That wider story is outside the scope of this book, but is worth remembering. A full analysis of the digital modern would require an act of thoroughgoing historicisation, exploring the onset of modernity in post-Enlightenment Europe and North America, the prehistory of computer engineering in the nineteenth century, innovations in mathematics and logic in the first half of the twentieth century, and their successful implementation in the 'electronic brains' of the 1940s and 1950s. The development of silicon chips and the effects of exponential growth (Moore's law) from the 1960s to the present day are equally significant, as is the development of the Internet, the World Wide Web, and networking from the 1970s to the turn of the century. The emergence of mobile computing, artificial intelligence, virtual reality, and the Internet of Things brings us to the current day. This conceptual and technological base, and its relationship to the culture of the digital modern, is described herein but primarily in relation to the humanities and the digital humanities. A richer treatment would analyse it with a wide-focus lens as a global zeitgeist intersecting with and influencing everything from science to science fiction, economics to politics, and media production to identity politics.

The digital modern affects researchers regardless of their primary disciplines, just as systems of royal patronage or the Cold War influenced previous generations, but it offers an obvious frame of reference for the

digital humanities—the primary interest of the present book. When humanists use and develop digital tools and methods they are immediately implicated in a wider intellectual and sociocultural domain of an undeniably technical nature. This domain includes digital prosopographies, 3D representations of ancient ruins, and scholarly editions. But it also includes social media, the dark web, and shifting alliances of hackers and misogynistic trolls. It is a forlorn task to try to separate the practice of digital humanities from the historical context that gave rise to it. As discomforting as it might be, digital scholarship entangles humanists within a quotidian cultural reality. That reality includes, alongside teenage script kiddies and *Wikipedia* editors, multinational corporations aware of the financial gains to be had by controlling information flows and governments eager to extend their strategic concerns into cyberspace. These interests threaten to cause what Alan Liu refers to as '… the death of knowledge in the information age …'.[4]

The digital modern has little interest in the humanist tradition. It is brittle, contradictory, heterogeneous, networked, hierarchical and non-hierarchical, elitist and democratic. As with many technologically inspired visions, it is also characterised by a 'startling, unselfconscious lack of originality' that would be better suited to 1950s narratives about flying cars and the possibility of becoming *Lost in Space* than traditional humanities research.[5] It informs daily life as much as scholarly practice, which makes intellectual engagement with it troublesome. Humanists interested in experimenting with digital tools and methods must walk a fine line if they are to avoid complicity with its negative aspects. Their work has to be informed by sustained reflection on the relationship between contemporary experience and scholarly practice.

This is complicated by the opaque nature of the digital modern. Like the death of the author, it is closer to an 'epistemological metaphor … than an ontological truth'.[6] To be sure, it affects our experience of the world, but we should not be so naïve as to present it as a moment in time '[in] which one era comes abruptly to an end and a new one begins'.[7] As disappointing as it might be to those seeking surety about their place in the world, the digital modern is best conceived as a heuristic device that can help us create more robust forms of meaning and act more effectively in the world. It exists in our collective imagination as a projection (often only aesthetic) onto contemporary experience. The very notion of a hegemonic digital world is, after all, an absurdity. Despite disruption of everything from education to economic markets, decades of hype from such magazines as

Wired,[8] and deep penetration into cultural, political, and economic discourses, our lived experienced remains resolutely analogue.

The idea that we are living in a Silicon Valley inspired utopia (or dystopia) is compelling but affronting to the human spirit and any sophisticated sense of history or place.[9] The impulse to believe otherwise is merely evidence of the power the digital modern holds over the contemporary imagination. Hanna Landin has suggested that it is probably best to view the digital world '… as something close to a fabrication, something that we can read and demystify'.[10] This is nowhere more apparent than with the promulgation of 'fake news' associated with the election of Donald Trump to the presidency of the United States in 2016.[11] The digital tools and methods that we use to identify, control, and discourage fake news will continue to evolve, but the critical approaches that we employ to critique it are already perfectly well formed and have been taught in humanities and social sciences classes for decades. Deconstructing the digital modern and understanding its impact on our use of research tools and methods is important, but hardly alien, work.

In the remainder of this chapter I locate the digital humanities in relation to the digital modern. This requires some preliminary framing in order to set up key concepts before proceeding to 'read' the digital modern and explore its boundaries. The digital humanities are given a brief overview below. That is followed by a discussion of reflexive modernity and ubiquitous computing, which are concepts that are crucial to a robust understanding of the digital modern. They protect it (as it needs to be protected) from being subjected to what Matthew Kirschenbaum has referred to as 'a kind of flattening—a sweeping of all nuance and distinction, all attention to the minute material particulars of individual circumstance—under the banner of epochal terms like the Information Age'.[12] That kind of approach would offer only the basest articulation, ignorant of the reflexive nature of contemporary experience and taken in by the discourse of ubiquitous computing promulgated in Silicon Valley.

2.1   THE DIGITAL HUMANITIES

The digital humanities are a response to and a product of the digital modern. They evolved from the 1960s to the 1990s out of disciplines as diverse as humanities computing, history, electronic literature, library and archival science, media studies, and cultural studies. They experienced significant growth after 2006, when the United States National

Endowment for the Humanities (NEH) established the Office of Digital Humanities (ODH) and began directing funding towards digital projects. They grew in popularity through the use of Twitter and other social media tools, and have a chameleon-like ability to appear differently to different audiences. Their complex nature is well explained by Tom Scheinfeldt's 2010 comment (referring to them in the singular):

> In as much as digital humanities is an Internet-based social network, it should come as no surprise that digital humanities looks a lot like the Internet itself. Digital humanities takes more than tools from the Internet. It works like the Internet. It takes its values from the Internet.[13]

In this conception, the digital humanities are perhaps rhizomic (in the Deleuzian sense) but without doubt deeply entangled with the logic of contemporary digital culture. Brett Bobley, CIO and Director of the Office of Digital Humanities, has offered a broad definition that illustrates its capaciousness:

> I use 'digital humanities' as an umbrella term for a number of different activities that surround technology and humanities scholarship. Under the digital humanities rubric, I would include topics like open access to materials, intellectual property rights, tool development, digital libraries, data mining, born-digital preservation, multimedia publication, visualization, GIS, digital reconstruction, study of the impact of technology on numerous fields, technology for teaching and learning, sustainability models, media studies, and many others.[14]

Defining the digital humanities, both for their own sake and to fend off criticism, has developed into a genre in its own right but is not the aim of this chapter, or this book, in which I prefer to position them as a floating signifier and move on. It is enough to note that articles in the *The New York Times*, *Ars Technica*, *The New Atlantis*, *The New Republic*, and *The New Criterion*[15] point to them becoming something of a *cause célèbre* for the current generation of humanities scholars.

2.2   REFLEXIVE MODERNITY

I use the concept of the digital modern to isolate an aspect of 'reflexive' or 'second' modernity for further examination. According to sociologists Ulrich Beck, Anthony Giddens, and Scott Lash, the world's first modernity

was prompted by rationalist thinking inaugurated by Enlightenment philosophy and found full expression after the industrial revolution of the nineteenth century. It was characterised by the extension of instrumental reason over the social and natural worlds, the development of welfare states, factory labour, and total war. Standard undergraduate historical narratives teach that modernity destroyed tradition, replacing religion and inherited values with large bureaucracies and global capitalism spread through nineteenth-century colonialism. In this telling, the locus of human identity shifted from the village to the nation and from the community to the nuclear family, buttressed by patriarchy and Western heterosexual identities.

As the twentieth century progressed, loyalty shifted from church to employer, and an expectation developed that jobs would last for life. In a perverse way, although often pointed to as a period that reacted against tradition and sought to 'make it new' (in the poet Ezra Pound's phrase), first modernity merely remade traditional human culture with new forms of normative behaviour and new institutions tailored for contemporary conditions. Although lauded as an era of outstanding cultural, intellectual, and artistic innovation—and one in which many sectors of the community gained important new civil rights—modernity cannot be interpreted in simplistic terms. Not only was it experienced as little more than brutal repression in many non-Western cultures, but it remained resolutely elitist and hierarchical.[16]

The reasons for its emergence and growth are complex. Contradictions at the heart of modernity prompted frequent crises of sometimes massive proportions, but growing nation-states provided systemic shock absorbers in the form of new institutions and formalised education systems that were capable of resolving tensions in society and culture.[17] Although revolutionary movements flourished and the world witnessed unprecedented levels of state-to-state conflict, the general trend was towards a reduction in violence and social dislocation and a relatively stable (if sometimes deadlocked) geopolitical environment. This situation was buttressed by increasing mastery over society and nature, enabled by science and technology. Experts augmented the leadership of religious and political figures with authoritative pronouncements about everything from health care to economics and atomic energy; evidence for their sagacity was provided on a regular basis by remarkable reductions in mortality, eventual recovery from even the worst financial crises, and increasing order in civil society. Western liberal democracy appeared as the ultimate expression of modern

aspirations, to the extent that Francis Fukuyama famously proclaimed 'the end of history' to suggest there was no need to seek alternative forms of sociopolitical organisation.[18] It is difficult to be as optimistic about the Global South, but they also have narratives of success.

The certainties of first modernity have been overturned with the emergence of reflexive modernity. It has begun to transform 'for a second time, not only the key institutions but also the very principles of society'.[19] This has been catalysed by the logic of global informational capitalism, which has dissolved previously robust boundaries between nation-states, increased migrant flows, and led politicians to reduce the scope of the welfare state. Crucially, Anthony Giddens claims that '[r]ather than entering a period of post-modernity, we are moving into one in which the consequences of modernity are becoming more radicalised and universalised than before'.[20] In this conception of contemporary life, modernity turns inward and begins to radicalise itself, breaking up 'the premises and contours of industrial society' and replacing them with uncertainty and chaos. Old staples of first modernity remain with us, including 'nationalism, mass poverty, religious fundamentalism of various factions and faiths, economic crises, ecological crises, possibly wars and revolutions…' but stability is never found, and human existence takes on fundamentally different shades of meaning.[21]

The implications of this extend through the warp and weft of society. Reflexive modernity replaces 'the vertically and horizontally integrated, functionally departmentalised mesa-economic firm' with 'flexible disintegration into networked districts of small, relatively autonomous knowledge-intensive forms'. It inverts the social rights conferred by the upheaval of the European enlightenment and managed through government bureaucracy with 'client-centred co-production' and 'decentralized citizenship'. It replaces the 'blue-print Marxism' of twentieth-century Eastern Europe and the 'combination of capitalist state bureaucracy and abstract procedural parliamentarianism' favoured elsewhere, with 'radical, plural democracy, rooted in localism and the post-material interests of the new social movements'.[22] This, rather than a narrowly conceived technical domain, is the context for contemporary digital scholarship.

The impact of these developments on individual and group identity has been profound. Instead of deriving identity from the stable 'We' of communal structures such as church, state, and the nuclear family, people are left to form their own in a process of 'genuine individualization', which can occur in relation to any number of 'natural, social and psychic environments'.[23]

According to Nicos Mouzelis, under such conditions, traditional and collectivist certainties decline or disappear. Such basic developments as the globalisation of financial markets and services, instant electronic communication, and, more generally, the drastic 'compression of time and space' have led to 'detraditionalization'.[24]

Given that detraditionalisation extends through all institutions in society, individuals have to make a whole range of life decisions that were taken for granted in first modernity, from 'whether or not to marry and have children, to what life-style to adopt and what type of identity to form (even what type of physical makeup to aim for via dietary regimes, aesthetic surgery, etc.)'.[25] Although this offers an enormous degree of freedom from normative values, it places considerable psychic pressure on people, who have to find ways to survive economically in radically globalised cultures with diminished state safety nets. They must form their identities from an effectively infinite range of possibilities and (particularly for those of us living in the West) remain open to ongoing personal and professional development.

Like the digital modern, reflexive modernity is not an innate or natural feature of the world. Rather, it should be conceived as a carefully considered but still fictive category, deployed as a heuristic device to help us understand the meaning of human experience and the world we inhabit. Its utility can only be measured by its ability to contribute to meaning and understanding. Such an interpretation of the world is '*neither* foundationalist *nor* relativist';[26] it fits well with the postfoundationalist ideas that are being explored by philosophers of science.[27] The attitude is becoming increasingly common across the digital humanities (Alan Liu terms it 'light anti-foundationalism'), including writers like Matthew Jockers, who advocates a post-Popperian stance somewhere 'between strict positivism and strict relativism'.[28]

Epistemological flexibility is crucial when dealing with modernity. As S. N. Eisenstadt noted, the modern age has always been multifaceted, and expressed differently in different regions and periods. It is important to deploy critical approaches that can account for the multiplicity of the phenomenon:

> The idea of multiple modernities presumes that the best way to understand the contemporary world – indeed to explain the history of modernity – is to see it as a story of continual constitution and reconstitution of a multiplicity of cultural programs. These ongoing reconstructions of multiple institutional

and ideological patterns are carried forward by specific social actors in close connection with social, political, and intellectual activists, and also by social movements pursuing different programs of modernity, holding very different views on what makes societies modern.[29]

2.3 UBIQUITOUS COMPUTING

In their discussion of 'ubiquitous computing', Paul Dourish and Genevieve Bell present a concept with similarities to 'the digital modern'. In order to distance themselves from Silicon Valley marketing, they position 'ubicomp' as a 'technological imaginary—something to think with, an idea that invites new sorts of speculation about what information technology might and could be'.[30] Their arguments are penetrating, but slightly at odds with the notion of the digital modern presented here. Crucially, although they artfully deconstruct the discourse of ubiquitous computing, they present computing as boundaryless. By focusing on examples that point to the growing spread of digital technology, whether in Europe, North America, Asia, or Africa, their narrative solidifies the very processes they set out to critique. The problem is that, as Haigh points out, '[d]etails of the utopian new age get filled in according to the interests, obsessions, and political beliefs of the people depicting it', and ubiquitous computing is the brainchild of Silicon Valley.[31]

As Dourish and Bell are well aware, claims that we have entered an era of ubiquitous computing are reminiscent of previous technological eras that appear quaint with the benefit of hindsight. The digital visions emanating from research centres such as Xerox PARC from the 1950s onwards created new research agendas, but also seeped into cultural consciousness. They '… prefaced new realities and new promises, and in so doing they echoed previous technology visions—the electrical age, the radio age, the television age, and even the atomic age'.[32] And this is exactly the point: electricity, water, atomic energy, and countless other technologies are now ubiquitous but entirely unremarkable. Labelling an era based on the rapid diffusion of a single technology immediately indicates a lack of self-reflexivity—and a lack of regard for the conditions of second modernity. The notion of ubiquitous computing is useful, especially when handled in a sophisticated way, as Dourish and Bell do, but its conceptual roots are in first rather than second modernity. It is not self-reflexive enough to explain the complex conditions of life in the digital modern.

Bruno Latour approaches this problem in *We Have Never Been Modern.* We use terms such as ubicomp to locate ourselves in time, in opposition to what we think came before, but the notion of a stable archaic past with which we can compare and contrast ourselves is as much a myth as that of a cohesive present.[33] To declare the onset of an era of ubiquitous computing is to invoke a regime that claims newness, difference, rupture (this, indeed, is its major claim), but it cannot capture the radically self-reflexive and splintered nature of life in the twenty-first century. Contentions that computing will create ruptures leading to new eras have been with us as long as the technology itself, yet it seems as unlikely now as it ever has. Rather than dissolving them in ubiquity, reflexive modernity multiplies boundaries. 'This is also true for the boundaries between society and nature, between knowledge and superstition, between life and death and between Us and the Others. Each of these boundaries *becomes pluralized*'.[34]

The rhetoric of ubiquity is, of course, difficult to resist. There can be little doubt that computing will continue to impact our lives in new and unexpected ways and this makes it easy to fall prey to totalising discourses. A scan of trade journals and newspaper articles presents an exciting vision of the future: in decades to come an Internet of Things might link together everyday devices in a 'second machine age'[35] that will extend to robots in the home and workplace; it is no longer radical to suggest that some people are likely to choose to have computational devices embedded in their bodies for ease of use; artificial intelligences based on algorithms derived from the natural world could develop currently inconceivable new computing paradigms for us, possibly running on computers powered by chemical, quantum, or biological processes. IBM researchers funded by DARPA[36] are already building neurosynaptic supercomputers modelled to function like a mammalian brain with 'hundreds of thousands of cores, hundreds of millions of neurons, and hundreds of billions of synapses'.[37] The journal *Biologically Inspired Cognitive Architectures* (*BICAs*) is devoted to extending this type of research.[38] Tools have been created that are capable of self-generating hypotheses from massive corpora of scientific documents.[39] In 2014 researchers at the Niels Bohr Institute developed an emitter that will enable single-photon transistors and quantum-logic gates, solving another of the major hurdles in bringing quantum computing to market.[40] The longer the time horizon is extended the more radical the predictions become, but even the most prosaic of them suggest the increasing centrality of computing to our lives and work.

This technology will have a profound impact on the humanities. As the final report of the Digital Futures working group, funded by the European Commission, noted in 2014: 'The challenges facing humanity are increasingly global and highly interconnected. Creativity will be the key to harnessing the new possibilities offered by science and technology, and the hyper-connected environments that will surround us. Art, science and humanities will connect to boost this wave of change and creativity…'.[41] It is important to acknowledge the enervating effect that boundless Silicon Valley discourse has on intellectual activity, but pointless to deny the likelihood that technology will continue to increase its impact on culture and society and the researchers who study it. Understanding the digital modern is a necessary step towards managing that impact.

2.4   Reading the Digital Modern

In this book I accept the significance of the cultural moment marketed by Californian multinationals and encapsulated in the concept of 'ubicomp', but encourage myriad readings of it. As Karl Popper noted, it is quite possible to reject the 'idea of a society manipulated by the technologists' (and even to believe that the 'dangers inherent in these technologies are comparable to totalitarianism') while embracing the positive potential of technological change.[42] Bruno Latour might simply point out that 'techniques are not fetishes':[43] they present us with complex extensions of the analogue world rather than its subjection.[44] Historians of technology remind us of the importance of alternative readings of technology because they foster constructivist views of culture capable of 'stressing the possibilities and the constraints of choice in technology', helping ensure that the public does not 'turn their backs on the possibility of participatory decision making, with the result that technology will really slip out of control'.[45]

It is easy to forget that the digital modern affects aesthetic, philosophical, and political sensibilities as well as cultural ones. We might say that it is more than the sum of its parts. It is all the things that modernity was to the Dadaists—mechanized and alienating—but with the addition of a spectral technological space described by postmodernism. In his cyberpunk novel *Neuromancer* (1984), William Gibson imagined this space as a 'consensual hallucination'.[46] Katherine Hayles suggests that information technologies create '*flickering signifiers*, characterized by their tendency towards unexpected metamorphosis, attenuations, and dispersions'.[47] Critics of the

digital humanities are blinded to the vast creative potential of this aesthetic domain by their overdetermined fear of computational rationalism; advocates for boundaryless narratives of the digital world succumb to a related and equally unproductive myth of digital ubiquity, which gives far too much agency to corporate interests.

There are in fact myriad ways to read the digital modern. If we want to interpret it as a reflexive phenomenon—and a heuristic device—we should splinter it into multiple shards:

> In reflexive modern society, however, there is not a limited array of already available options. Instead, the boundaries have to be created along with the decisions. The more various and divergent the recognized and accepted justifications for inclusion or exclusion are ... the more they become fictive boundaries that are understood as such but which are handled as if they were true under the circumstances at hand. This can serve as a litmus test for the existence of reflexive modernity as opposed to postmodernity: the existence of boundaries whose artificial character is freely recognized, but which are recognized as legitimate boundaries all the same.[48]

We should expect there to be 'a multiplication of the plausible ways in which boundaries can be drawn, as well as the ways they can be brought into doubt'.[49] For example, assertions that rampant computationalism infects contemporary government, business, and culture might be understood to point to a political as much as to an epistemological boundary. Viewed in this way, the philosophical nature of computational thinking is less important than the willingness of civil society to accept its penetration (via computational devices) into their homes and working lives. This is indicated in sociopolitical critiques identifying regressive modes of factory labour used by Chinese companies contracted to American hardware vendors,[50] the carving out of the middle-class by the rise of widespread free labour on the Internet, and the loss of collective bargaining power by people working in the so-called 'gig' economy for micropayment marketplaces such as Amazon's Mechanical Turk.[51] Whereas these have been less effective in prompting change than many would have wished, partly owing to issues thrown up by globalisation and an attendant decrease in the power of trade unions, the possibility that the digital modern suffers from underlying class relations points to quotidian struggles best resolved at the shop counter and on the street.

It is also possible to read the digital modern in terms of networks: complex human communities enabled by online services such as Facebook and Twitter but underpinned by tangled technical systems of servers, routers, and protocols. These digital networks act as prosthetic enhancements to traditional human networks, but reorient them in fundamental ways (some democratic, others clearly regressive) by presenting virtual worlds of greater or lesser ubiquity and power. Alexander Galloway and Eugene Thacker connect networks to existing structures of power and control, claiming that instead of being a matter of merely technical or cultural interest '*the juncture between sovereignty and networks* is the place where the apparent contradictions in which we live can be best understood'.[52] According to this conception, the primary boundary of the digital modern becomes the interface between networks (technically enabled as well as analogue) and local geopolitics.

Other boundaries are primarily legal. Although less contested now, software and video piracy dominated early twenty-first century discourse. Fuelled by disruption to traditional economic models used by old media companies, many people proclaimed a radical new era of free and freemium products and services supported by a long tail of globalised mass consumption.[53] The appearance of subscription-based streaming services such as Pandora, Spotify, Hulu, and Netflix has reduced the focus on piracy but grey areas still exist, including the consumption of products that allow users outside the United Kingdom and United States to access services in those countries despite contravening copyright agreements. Similarly, although initiatives such as the Creative Commons licensing scheme and several much longer-standing open software licensing systems have gone some way towards upgrading copyright laws, it is still broadly acknowledged that the system inherited from the eighteenth century is incapable of supporting digital modes of production, distribution, and exchange. Lawrence Lessig[54] and Jonathan Zittrain[55] from Harvard's Berkman Centre for the Internet and Society have suggested that it might not even be capable of supporting existing levels of cultural or technological creativity.

Legal and political boundaries to the digital modern coalesce on the seamier side of the Internet, including the dark web of illicit pornography, sites that enable the buying and selling of drugs and sex, cyberbullying, black-hat hacking by networked organisations such as Anonymous, and state-led espionage and cyberwarfare against countries, corporations, and individuals. Many people are starting to use this hidden network to engage in legal activities as well, including social networking, merely as a way to

avoid the prying eyes of surveillance agencies and advertising companies. The appearance of difficult to trace digital currencies, enabled by distributed ledger technology (DLT), might encourage significant growth in this area in the coming years. The revelations by ex-National Security Agency (NSA) contractor Edward Snowden of mass surveillance by security agencies of the United States and the United Kingdom and the intentional undermining of security protocols and hardware standards to enable that surveillance came as a shock to many observers. But perhaps it should have been expected given the tendency of the Internet to foster a variety of transgressive (and outright illegal and antidemocratic) behaviours.[56] Regardless, this is a culturally vibrant boundary, which should remind us of the intellectual milieu of Chaucer or Shakespeare as much as law and politics.

What source material future historians will be able to access to explore those worlds is uncertain, however. It would be premature to assume that the long-term historical record has been permanently fragmented by the onset of the digital modern, but it is clear that researchers will have to navigate a wider range of accessibility issues than they do at present. Rather than visiting the local or national archive or library (which, we should remember, will still control access to certain kinds of material), they might well have to negotiate with commercial companies such as Facebook or Google to build a picture of the past. Although Twitter has indicated a willingness to open up access to historical content by depositing massive amounts of content with the Library of Congress (LOC), it seems unlikely that Facebook and Google as well as other such companies will be as generous. This archival limit to the digital modern is profound, given that it maps to an associated epistemological boundary. The situation is common to all eras, of course (history has never offered up perfect information, and never will), but without access to source material our ability to learn new things is fundamentally constrained.

Although the discourse of ubiquitous computing suggests equal access, the composition of the digital record is skewed by any number of factors, from lack of Internet access to personal dislike of a particular service, and technical constraints related to storage, search, and access. This is nowhere more obvious than in governmental attempts to ban digital tools outright, as occurred during the Arab Spring of 2010–2012.[57] Of course, future humanities researchers might be disappointed even if the historical record is not diminished through political interference. The sheer scale of the problem, ranging from technical issues to simple selection bias, means that

it is being skewed by an extraordinarily wide range of issues. The Internet Archive, national libraries, and local cultural heritage agencies are working hard to preserve what they can, but it is a difficult undertaking.

In many ways the archival boundary to the digital modern, and thus its range of potential readings, shrinks in relative terms as the Internet expands. The task of future researchers will be made more difficult by the fact that '… we are in the midst of a worldwide effort, organised by many different companies and governments in many different ways, to make computer communication a transcendent spectacle …' resistant to robust interpretation.[58] The discourse of ubiquity, along with problems of scale and lack of technical understanding, intersects with political efforts to use the Internet as a platform for social control. This is most clearly the case with the promulgation of fake news by state actors and individuals aiming to destabilise elections or undermine dominant political ideologies (or merely generate advertising revenue) or with countries that ban access to certain services or surround their populations with firewalls, but it is also expressed in positive ways, such as by enacting laws prohibiting child pornography or the sale of illicit drugs.

Discursive boundaries to the digital modern offer a different vector of analysis. They are highly complex and constantly evolving, informed by everything from terrorist organisations to mothers' groups.[59] The episode of hacking and subsequent release of nude photos of female celebrities in 2014 provides a good example of how this boundary functions. The theft and subsequent public dissemination of private images, quickly nicknamed 'The Fappening' (to 'fap' means to masturbate),[60] prompted a flurry of tweets by people determined to frame the event in feminist terms and portray the hackers as sex offenders rather than as the digital revolutionaries (or perhaps anarchists) they aspired to be.[61] Opposing them, misogynistic men filled message boards with the 'verbal orgies of faceless hatred, virtual cloacas of defecation on others, and unparalleled displays of human insensitivity' described by Leonidas Donskis in his introduction to *Moral Blindness*.[62] The effect (as with the later appearance of 'fake news') was to show that language on the World Wide Web is contested and remains subject to many of the same pressures we experience in our offline lives. In this case, the feminist argument was highly effective, shaping public opinion in profound ways.

Rather than being boundaryless or ubiquitous, the digital world provides a showcase of reflexive modernity in action: fragmented, contradictory, and productive of multiple interpretations depending on context.[63]

The discursive boundary has violent aspects exemplified, for example, in the brutal reaction of Islamic State (IS) jihadists to the announcement that the US military would begin aerial bombing of their military positions in August of 2014: they flooded Twitter and other social media services with images of mutilated American soldiers and the attack on the World Trade Center in 2001. This was accompanied by threats that a new round of violence would be visited on the American homeland in retaliation and comical responses by Americans who chose to use Twitter to mock the insurgents rather than to incite more violence: cultural warfare waged using digital tools.

Luciano Floridi points out that the IS tactics are as old as warfare itself, even as information technology creates 'kinetic aspects unknown to past generations'.[64] If the real horrors of war remain decidedly analogue, the digital modern bombards us with recycled, faked, and confusing images of conflict in a way not experienced by previous generations. The global community is subjected to an ongoing framing and reframing of events, 'from one milieu of circulation to another, back and forth, from sensational to insensate, back and forth from an appeal for ongoing war to an appeal for a humanitarian response to war's effect'.[65] Behind the struggle for media dominance, nation-states are developing and engaging in cyber-warfare, instantiating not so much a boundary as a series of new fronts. The development of closed national networks, where citizens are forced to view only state-approved areas of the Internet, as has taken place in Saudi Arabia, China, Iran, and to a lesser extent Russia, illustrates this well.

According to *The New York Times* even the hermit state of North Korea has developed 'formidable' capabilities after investing heavily in cyber-warfare technologies.[66] It seems likely (although the details remain unclear) that the incongruities of digital modernity are such that this weak, paranoid country succeeded in one of the most damaging known cyber-attacks in contemporary history, on Sony Pictures in 2014.[67] It will be difficult for historians to determine the American response to that event: either the US military implemented presidential orders for the United States to exact a 'proportional'[68] response involving a cyberattack, forcing the North Korean Internet offline, or a group of hackers took it upon themselves to do it.[69] While we move on to the next instalment in the growing narrative of digital warfare, future historians have been bequeathed a difficult and highly technical job.[70]

The digital modern is delimited by challenging issues at the intersections of imagination, ethics, politics, law, discourse, and culture, but it is crucial

to remember that it is also affected by the 'organization of physical space'.[71] The widespread diffusion of mobile computing devices provides a case in point, symbolised in the Seoul subway system (the largest in the world). A result of the 'miracle on the Han river', which saw the Republic of Korea's gross national product rise from $25 million in 1955 to[72] $1.305 trillion in 2013,[73] the system services a population of 10 million people, which includes technology workers in Seoul's answer to Silicon Valley—Digital City. Massive global technology brands Samsung and LG ensure significant tax dollars to keep the system maintained at extremely high levels in the inner city, and in 2014 it was ahead of all other subway systems in the world for its penetration of 4G and LTE high-speed cellular networks. Its level of technological maturity is such that Dourish and Bell cite it as 'an instance of infrastructural ubiquity and of public/private sector cooperation to achieve it'. The Korean government has explicit plans to develop a ubicomp future, and has made significant progress towards it: 84.4% of Korea's 17.3 million households have computers and almost all of them have high-speed broadband connections.[74] We can only assume that South Korean plans intersect with wider strategies related to their neighbours to the north.

Yet, as David Edgerton reminds us, it is important to shift our narrative of modernity away from centres of innovation.[75] Even the most digitally advanced nations in the world only represent oases in an analogue world. Some 2,230 miles to west, at the Poipet border between Thailand and Cambodia, mobile phone coverage has been a matter of international dispute. In 2004 Thailand banned residents on the Cambodian side of the border from using the Thai domestic telephone network, which they were doing to avoid international calling charges. Antennas were set up as relay stations and the practice became commonplace until a crackdown by Thai authorities.[76] It is perhaps remarkable that the digital modern now reaches from the gleaming carriages of the Seoul Metro to the blistering heat and dust of the Poipet border, but the latter is hardly an environment where the phrase 'ubiquitous computing' springs to mind.[77] Indeed, the current lack of ubiquity is evidenced in Facebook and Google's efforts to expand their markets into Africa by pushing common sense to its limits (using high-altitude balloons and massive drone aircraft) in an attempt to increase Wi-Fi coverage.[78] Those giant corporations are as aware as anyone that the digital modern still represents little more than a sliver—a curiosity—next to the great swathe of analogue reality that comprises our daily life.

Geographic boundaries of the digital modern map to its temporal limits in interesting ways: the gap between Seoul and Poipet is not only one of space, but of time as well. Although the instantaneity of time enabled by digital technologies deepens the *sense* of ubiquity, the technological gaps between the two locations point to a more fundamental historical disjuncture: new cars running on-board computers versus frankensteined wooden carts with wheels repurposed from trucks. Communities can experience the digital modern in incommensurable ways even within countries and city suburbs, where access to the Internet and digital devices can vary significantly.[79] The problem, if it is one, renders the term 'digital divide' into little more than a useful oversimplification.[80] As Manuel Castells has noted, the Internet 'redefines distance but does not cancel geography'.[81] In technical terms, it is 'global in its reach, but territorially uneven in its layout in terms of capacity'.[82] This stark infrastructural reality provides a healthy counterpoint to the discourse of ubiquity, which elides more prosaic issues related to wealth, technology, and power.

Temporal boundaries to the digital modern take on strange aspects with legacy IT systems. Even as there are temporal differences between experiences of the digital modern from place to place, it is common to experience different generations of digital technology in exactly the same place at exactly the same time. During the course of our day we might go to a physical or virtual bank, access our account information using a brand new ATM, PC, or mobile device, and make transactions recorded in a database system that is a decade or more old: even such mundane experiences as doing our personal banking are likely to involve temporal shifts between old and new technologies. The transcendent sheen to the digital modern so beloved of and nurtured by technology companies masks path dependencies exerted by older technologies that are proving very difficult to migrate away from. Anthropologist Ian Hodder reminds us that this kind of entanglement with digital culture reflects a broader and more fundamental co-dependency of humans on material culture. 'The dependence of things on humans means that humans are always busy along the strings or cables of entanglement mending things, putting fingers in dykes, fixing holes in buckets and so on'.[83] It is a case of inertia bedevilling the new.

Luciano Floridi suggests the terrain outlined above amounts to an 'infosphere' of data that exists within the technical and geographic boundaries of our global cyberinfrastructure and can be interpreted in aesthetic but more appropriately constructivist terms. Read this way, the digital modern is less a narrative trope than an ontological reality, one that is increasingly

being fed by web pages and structured databases filled with Facebook posts, government policy, and search data:

> From this perspective, the infosphere is the authentic reality that underlies the physical world, and as such it has a normative or a *constructionist* function: a clear design of the structure of a particular domain in terms of a data model or information system is either a *conditio sine qua non* for any implementation or, when the implementation is already available, an essential element that contributes to the proper modification and improvement of the conceptualised reality in question. Thus, the infosphere comes first in the logical order of realities, and it is the necessary conceptual environment that provides the foundation for any meaningful understanding of the surrounding world, one of its many possible implementations.[84]

This reading of the digital modern, articulated in terms of informational structural realism or the infosphere, would dismay many cultural materialists. It presents the sum of the digital modern in terms of a fundamentally mathematical reality expressible in logic.

In this book I make the simpler claim that humanities researchers work in the context of a highly reflexive 'second' modernity, and that its digital component is an important part of it. Whether we like it or not, its boundaries provide researchers with a dominant paradigm that they can either struggle against or experiment with and analyse. It seems unlikely that it can be entirely ignored. As with other conceptual prisons, the only way to move beyond it is to confront it in all its variety. At some stage the relationship between context and meaning will develop, boundaries will shift, and new insights will arise. In accord with Anthony Giddens, this book is based on a conviction that it is possible to articulate and defend traditions 'in a universe of plural competing values'. Reflexive modernity in fact demands such an approach, lest 'tradition becomes *fundamentalism*'.[85]

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