Introduction to the Oxford Handbook of Digital Technology and Society: Terms, Domains, and Themes

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Abstract and Keywords

This chapter summarizes the main themes associated with relationships between digital technology and society. It first proposes four central characteristics of digital technology that differentiate this concept from the more general term “information society.” Then it maps the growth of the use of terms associated with digital technology in articles in academic databases from 1972 through 2018, and in books from 1967 through 2008. However, the main focus is on summarizing the emergent themes associated with 89 recent books on digital technology society: (A) theory and conceptualization of this vast social change; (B) technology (venues and characteristics), (C) issues (content, creation; big data; civic issues; participation, engagement; inclusion, exclusion, discrimination; ethics, ethical issues; and managing the digital experience), (D) contexts (digitization of self and others; health; relationships; user groups; culture, everyday life, education, learning; work and organizations; and law, policy, regulation), and (E) effects (negative; positive; societal; contradictions, paradoxes, tensions, unintended). Finally, it describes the origins and motivations for this handbook and its main themes.

Keywords: academic databases, books on digital technology, digital technology, digital technology society, information society, social change

Introduction

MANY developed countries have become *information or knowledge societies*, whereby cognitive activities, symbolic and data analysis, and information resources are replacing agriculture and manufacturing as the primary sectors of developed countries’ economies. This idea of the information society or economy has been identified, discussed, and analyzed since the 1960s. For example, Machlup’s (1962) analysis of the US economy identified an information sector, primarily devoted to information activities necessary to produce physical goods and services. Porat (1971) reanalyzed Machlup’s data to define the key components of the growing information society. Bell (1973) explained the post-indus-

trial economy, whereby knowledge becomes the primary resource, allowing freedom from constraints of labor, land, and machines.

But we can argue that the concept of an information society does not, in itself, require computers or digitization (Beniger, 1989). The extensive collection and analysis of information, especially about transactions and inventory, but also about local and regional administration, has existed from early civilizations (Egypt, Mesoamerica, Mesopotamia). Nevertheless, it can be argued that the information society as we see it now has roots in the growth of the British Empire and systematic organizational management (Yates, 1993); the need to control and market industrial revolution technologies and products (p. 4) (Beniger, 1989); and even the development of dictionaries, maps, and classification schemes during the "age of enlightenment" (Headrick, 2002). The core argument is that the basis of wealth is shifting to the collecting, management, analysis, and application of data and information (Daley, 2015; Nonaka & Takeuchi, 1995). This shift is also a manifestation of the rise of information capitalism and the exploitation of knowledge labor (Castells, 2000; Curtin & Sanson, 2016; Fuchs, 2014). Thus, information is a crucial aspect of modern economies, as well as everyday life, in most countries, although with considerable disparities across countries and even within regions, cities, and towns.

But the *digital society* involves additional dimensions. While mainframe digital computers had played major roles in WWII and after in telephone switching, office automation, and manufacturing in the 1960s and 1970s, the advent of end-user computing, widescale social uses of computing, and networked communication such as email and the Internet required the interaction of several factors. Although literature on the history of computing, transmission networks, the Internet, and programming is vast, we need to note only four basic components that underpin the transformative nature of the digital world.

The first is *digitization*, or more specifically, the encoding of information into bits (binary digits). Negroponte (1995) was an early (but not the first) popularizer of the understanding that "being digital" was the foundation for widespread, pervasive, and unique changes in our social, economic, and political world. He articulated the main difference between the analog and digital world: the first, traditional, world was based on atoms (physical material), while the second, digital, world was based on *bits*, standing for "binary digits": symbolic or electronic signals indicating presence or absence, "on" or "off," or more colloquially, "0s" and "1s." By converting information from analogue to digital representation the information contained within or collected about a process or artefact (Zuboff, 1985), one could "free" the information from its material "packaging." For example, in the analog world, a *book* means the paper-based bound set of pages on which words and images are printed. However, in the digital world, the content becomes independent of any particular physical form. So digital information is freed from the analog, material world. In 1987 (though he had earlier raised this point in a 1984 Hacker's Conference; http://www.rogerclarke.com/II/IWtbF.html), Brand (1987) claimed that "Information wants to be free," in a slightly different way. First, its cost approaches zero because it is freed from material resources and so is easily storable, copyable, and distributable—although today we can recognize the infrastructural and environmental costs of moving

data around. He also noted at the same time that information wants to be expensive because it may require exceptional resources to create initially, and can be extremely valuable if held privately or used in combination with other information. Importantly, he noted that there seemed to be a tension between these two tendencies, which may rise or fall in different contexts. He also noted that information sought to be politically free as access to high-quality information and free speech fosters political freedom—though we might today note that propaganda and misinformation are just as easily distributed. The key point is that digitizing information—converting frequencies, symbols, material dimensions, etc. to bits in a flow of information—means that content (p. 5) in general is wholly or partly independent from the material used to convey the information (such as a the text in a printed book). This is one of the foundations for digital convergence: the same or different portions of content can appear via multiple devices, at the same or different times; and all digital media can partake of the same content in different forms.

The second component is *computing*. Digitization also means that this content can now be treated as data by computer processes, vastly increasing what can be done with, or by, that content. For example, instead of one or two "see also" cards in a library's card catalog associating a given book with other books, now almost any content in a digitized source can be searched and associated with similar or related content in the same or other sources. At present it is not perfect for all content (such as images, sounds, smells) but iterations of improved computing power and algorithms make this easier and easier. Thus, any kind of content (information in various forms) can be processed through computing programs. Information becomes a powerful raw resource and can be transformed, combined, integrated, and analyzed. This is the essence of datafication and digitization: anything that can be formally and systematically represented in a digital form can then be processed, combined, and analyzed, for a vast and growing range of purposes.

Practically related but conceptually distinct, the third component is *microprocessors via integrated circuits*, the increasingly small and powerful devices for performing a wide array of computer processes. The integration of basic computing functions into one chip increased computing functionality, speed, and power, yet reduced computing size and computing power cost, leading to the ability to embed computing power into ever smaller objects. Current smartphones and games consoles easily outperform super computers of the 1980s and early 1990s (as measured by calculations per second). Recent developments in massive multiprocessing and quantum computing, and embedding of computing power onto and into tiny devices and our bodies, will extend this growth in power and decrease in size.

The fourth component is *digital networking*, or transmission of digitized information among nodes that are themselves computers. Information can be conveyed in analog form, through material carriers (books, photographs), and amplitude or frequency modulation (pre-digital radio, television). But digital networks allow much faster, more error-corrected, more distant, and more robust ways of processing, accessing, and distributing information (content of any form). Digital networks can interconnect with local, "last-mile" analog transmission lines. The Internet is a vast interconnected set of subnetworks,

using various protocols to standardize and facilitate exchange of digital information from source to receiver. Wireless networking allows devices and people to communicate with each other without constraints of physical wiring, also enabling computing power to be distributed throughout space (such as in the Internet of things, radio-frequency identification [RFID], and mobile phones).

The transformative power of the digital comes from combining these elements. If we put these together, we can move artefacts and ideas around the globe, and at increasing speed. We can undertake a 3D scan of a contemporary artwork or new product, send the data around the world, and print it out on a 3D printer minutes later. Citizen journalists (p. 6) can live-stream news events as they happen. Doctors can diagnose patients from thousands of miles away. Consumers can watch almost any film or listen to almost any music ever recorded. Grandparents can see and talk to the grandkids in Australia. Politicians can directly message followers to their heart's content. The examples are ever expanding.

Terms and Growth of These Developments

The smart mobile phone has become the most general exemplar of the integration of these four transformative components in one device. However, our focus in this book is not on these four crucial components of digital technologies, or any one technology, but, rather, on how their integration shapes, and is shaped by, social factors. Hence the title is the *Handbook of digital technology and society*. While technology has developed, and continues to evolve over time, we become more aware of the implications of these changes—positive and negative, intended and unintended, short-term and long-term, individual and collective, and straightforward and contradictory—for digital technology, individuals, groups, communities, organizations, societies, nations, and the world. So along with increasing mention of the technologies in the academic and general literature, ways of characterizing the role and implications of digital technologies have also arisen.

The four primary terms that have been used to refer to such changes are *digital age, digital era, digital society,* and *digital technology*. In the spirit of some of the literature analyses to follow that utilize digital tools to extract and evaluate academic discussions about the social impacts of *digital*, we have used databases to explore how these terms were first used. Tables 1.1 through 1.4 show the first entries that used these terms in major academic reference, news, and periodicals databases (Web of Science, Science Direct, Nexis Uni News, and Proquest Periodicals Index Online, respectively). While in general all four terms began being mentioned in publications covered by these four sources between 1972 and 1983, the earliest terms used were "digital technology" (1967) and "digital society" (1968), followed by "digital era" (1970) and then "digital age" (1982). Naturally, most were mentioned in reference to the growth and development of computers and digitization. For example, "digital technology" typically referred to computers, computerized control, data flow, and the computer-based telephone switching network. "Digital society" noted the diffusion of technology use in everyday contexts. "Digital era" highlighted the

introduction of the personal computer, digital satellites, and industrial automation; while the “digital age” referenced the transition of technology to digital forms, and twice with specific reference to analog models. However, not all mentions of these terms related only to new technological developments at the time. Both “digital technology” and “digital society” were associated with new training and education, and the first discussion of “digital technology” (in 1967) specifically emphasized its potential social and economic impacts. Some of these (p. 7) (p. 8) (p. 9) impacts of the “digital age” were quite novel: for example, an early concern about the switch to digital clocks was that people would no longer know what “clockwise” meant. So we see that right from the beginning that social aspects and implications (both positive and negative) were part of the discussion, even though the very first uses of these four terms were stimulated by technological developments.

Table 1.1 First Appearances of Four Major Digital Terms in Web of Science

Term	First-year entries
digital age	Zenman, M. J. (1982). Even in a **digital age**, scopes remain the instrument. *Electronic Design, 30*(18), 129ff.
digital era	Electronics. (1970). Bold new inroads for computer as **digital era** gets under way. *Electronics, 43*(1), 105 ff.
digital society	Cazes, B. (1984). The **digital society**: New technologies in everyday use. *Quinzaine Litteraire, 421*, 8–9.
digital technology	Fenik, F., & Stopper, H. (1968). Rapid switching circuits in **digital technology**. *Elektrotechnische Zeitschrift B-Ausgabe, 29*(7–8), 229ff. Ulrich, G. (1968). Comparison between analogue and **digital technology** in information flow. *Periodica Polytechnica Electrical Engineering, 12*(2), 145ff.

Note: Based on Topics (in title)

Table 1.2 First Appearances of Four Major Digital Terms in ScienceDirect

Term	First-year entries
digital age	Geballe, T. H. (1984). Materials: Analogue answers in a **digital age**. *Physica B&C, 172*(1–3), 50–58.
digital era	Dement, D. K. (1980). Developing the next phase in NASAs satellite communications program. *Acta Astronautica, 7*(11), 1275–1286. “In the coming **digital era**, maximizing the use of frequency spectrum allocations will require special techniques for transmitting television signals within allowable bandwidths …” Latour, P. R. (1980). S2: Requirements for successful closed-loop optimization of petroleum refining processes. *IFAC Proceedings Volumes, 13*(9), 11–23. “**DIGITAL ERA:** Adequate Hardware and General: Software for Automation of Industrial Plants. Costs are still Dropping. …”
digital society	Delorme, J-C. (1985). Education in a digital world. *Education and Computing 1*(2), 117–124. “These questions not only have pertinence from the perspective of or as a consequence of the emergence of the **digital society** …”
digital technology	Beaverstock, M. C. & Bernard, J. W. (1977). Advanced control: Ready able accepted? *IFAC Proceedings Volumes, 10*(16), 335–341. “Further application of more advanced control systems to industrial processes is limited by acceptance of the newer **digital technologies**.” Rony, P. R. & Larsen, D. G. (1977). Teaching microcomputer interfacing to non-electrical engineers. Euromicro Newsletter, *3*(2), 57–62. “Rather, we are providing them with specific training in digital **technology that may be useful to them professionally.”** Benvenuto, F., DiTomaso, C., Donati, L. F., Sbragia, D., & Valcada, A. (1977). Digital control system for uninterruptible power supply. *IFAC Proceedings Volumes, 10*(10), 973–979. “The most peculiar characteristic of the system just described consists in the fact that the control has been carried out using the **digital technology** in almost every part of it.”

Newstead, A. (1977). Australia's telecom 2000. *Telecommunications Policy, 1*(2), 158–162. "Continue network studies on optimum rate of transition to **digital technologies** in transmission and switching ..."

Schnieder, E. (1977). Control of DC-drives by microprocessors. *IFAC Proceedings Volumes, 19*(10), 603–608. "The current signal is the only analogue variable requiring A/D conversion, since speed measurement can be performed by **digital techniques** thus disposing of analogue transmitters such as DC tachometers."

Fujii, K., Takeda, N., Kogure, Y., Neda, T., ... Abe, M. (1977). Recent computerized power generation plant automation and advanced man-machine interface system. *IFAC Proceedings Volumes,10*(1), 16–20. "In the future, their reliability will have to be highly improved using microcomputerized **digital technology** for example."

Nyborg, P. S. (1977). Computer technology and US communications law. *Telecommunications Policy, 1*(5), 374–380. "Significant technologies, among others, are large-scale integration, software control of switching devices and terminals, **digital technology**, and new services and techniques relating to audio transmission (including satellite)."

Owen, E. W. & Moseley, E. C. (1977). A user-compatible terminal for medical applications. *Computers in Biology and Medicine, 7*(2), 165–176. "He is currently working on the application of microprocessor and related **digital technologies** to these fields."

Note: Based on Abstract, Title, Keywords, Text in Research Articles

Table 1.3 First Appearances of Four Major Digital Terms in Nexis Uni (News)

Term	First-year entries
digital age	Williams, E. (1982). Comdial system ready for switch to the **digital age**. *Financial Times*. Mulligan, H. A. (1982). [no headline]. *The Associated Press*. "Urchins raised in this **digital age** do not know which direction is clockwise." Safire, W. (1982). Watch what you say. *The New York Times*. "… moving finger has written that we are now in the **Digital Age**."
digital era	Heine, C. (1970). This diabolical hipster hoodwinker almost sold a bag of Brooklyn air for $20,000. *Adweek*. "… scenario could be that it was modern art for the **digital era,** an existential exhibit, if you will."
digital society	Salisbury, D. F. (1983). Life in the computer age: Social choices in a futuristic world. *The Christian Science Monitor*. "In its extreme form, a '**Digital Society**' would become simply a giant, clean, well-ordered Disneyworld, Vallee warns …"
digital technology	Chapman, W. (1978). High stakes race: Japanese search for breakthrough in field of giant computers. *The Washington Post*. "It [Japan] took transistors and **digital technology**, added automation and superior quality control, and transformed those innovations into profitable exports." Anon. (1978). Scientific and technical exchanges in China. *Xinhua General Overseas News Service* (China). "… the first conference on **digital technology** was recently held in Kochiu in Yunnan province." Ostry, B. (1978). The Mermaid Inn: The wiring of Canada: A danger, a challenge, a certainty. *The Global and Mail* (Canada). "One writer insists **digital technology** will turn the international telephone network into the biggest blooming computer the world has ever seen."

Table 1.4 First Appearances of Four Major Digital Terms in Proquest Periodicals Index Online

Term	First year entries
digital age	Julesz, B. (1983). The role of analog models in our **digital age**. *The Behavioral and Brain Sciences, 6*(4), 668–669.
digital era	Stauffacher, J. (1985). The Transylvanian Phoenix: The Kis-Janson types in the **digital era**. *Visible Language, 19*(1), 61–76.
digital society	Bixby, J. L. (1968). Public opinion and school music. *Music Journal, 26*(3), 48–53. “Effects of reduced privacy, restrictions on individualism (in a computerized **digital society**; shall we tattoo the Social Security number on the newborn?)”
digital technology	Baran, P. (1967). The future computer utility. *The Public Interest, 8*(summer), 75–87. “These new developments in **computer technology** are of such significance as to affect materially the nature of our economic and social life.”

Table 1.5 lists the earliest mentions of these same four terms in books that Google has digitized and indexed, and that were retrieved through their Ngram Viewer (https://books.google.com/ngrams). For some of these, the plots do indicate entries before 1967, but either those do not retrieve an entry, do not retrieve a book entry, or are snippets from journals whose starting publishing date was in that time range, but the document with the term occurred in a much later issue. Ngram Viewer provides results through 2008. Figure 1.1 shows the trends in these four sets of terms over time. In books, the “digital technology” focus is the most frequently mentioned over time, really increasing during 1975–1995. However, the terms “digital society” (1965) and “digital era” (1969) appeared a bit earlier. The term “digital age” was the last to be introduced, around 20 years later, but quickly became the most used term indicating the societal aspects of digital technology.

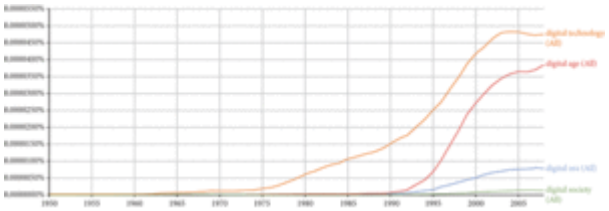

Figure 1.1 Trends over time in mention of four major digital terms in books through 2008, based on Google Ngram Viewer.

Table 1.5 First Substantive Entries of Four Major Digital Terms in Books, from Google NGram

Term	First substantive entry	Percentage of all Ngram entries that year; in 2008; and times greater
digital age	Watkinson, J. (1990). *Coding for digital recording*. Focal Press. https://books.google.com/books?id=cjBTAAAAMAAJ “Perhaps some future historian will classify this as the ***digital age***, when everyday processes increasingly came to be performed using discrete numbers.” Unites States. Congress. Senate. Committee on Commerce, Science, and Transportation. Subcommittee on Communications. (1990). *Hearings on … Digital Audio Tape Recorder Act of 1990*. U.S. Government Printing Office. https://books.google.com/books?id=DTGqJhRf4jsC With the passage of S. 2358, such synergy will extend into the ***digital age***, to the benefit of everyone.”	.00000040; 0.00000770; 18.25
digital era	Parrish, L. (1969). *Space flight simulation technology*. H. W. Sams. https://books.google.com/books?id=k7NZAAAAYAAJ “… the accomplished simulation designer … will, of necessity, have qualified as a digital-computer programmer (this latter accomplishment being a forced requirement of the ***digital era***).”	.00000002; 0.00000140; 69

digital society	White, T. H. (1965). *The making of the president 1964*. Antheneum. https://books.google.com/books?id=NIVkmNgX7_UC “The emotions of normal people resist the general condition of a ***Digital Society***—digits for the boys who are drafted, digits for Social Security and income-tax people, digits on credit cards and union cards, digits replacing familiar telephone exchanges, the electronic recordings that answer the telephone at airports and railway stations.”	.00000000; 0.00003800; 3800+
digital technology	Canada. Department of Communications. (1971). *The future of **communications technology***. Department of Communications. https://books.google.com/books?id=lBe4AAAAIAAJ “6.5 ***DIGITAL TECHNOLOGY*** The evolving carrier network will be composed mainly of digital sub-systems, which can offer the complete range of digital and analogue capability required by any user on a switched network basis.”	.00000100; 0.00004700; 46

Main Digital Technology and Society Issues and Contexts in Recent Books

Method

Presuming that books integrate and distill considerable prior work, and represent topics that are important, salient, and likely of broad and timely concern, we turn to recent (p. 10) books for indicators of the main issues and contexts about digital technology and society. Using the same four sets of terms, we searched Amazon Books for relevant titles, and relevant recommended titles, in the past decade. We ended up with 89 books, from 2009 to 2018 (M = 2015.2). There are of course many more books related to various aspects of digital technology and society, both those retrievable through other terms and from earlier (p. 11) years, but this seems a reasonable sample (in both size and source) to represent the most frequent and important issues and contexts. Within this sample 77

were (co)authored, and 12 were edited (including one encyclopedia); 16 were general (i.e., textbook, overview or coverage of many issues), and 73 were specific (about an identifiable issue or topic; e.g., youth and media, or Internet governance). Again, as our goal was to identify main issues and contexts, we did not analyze the text of each book; rather, we collected information about each book, including summaries, reviews, prefaces, and table of contents; that is, what do the authors and others think the book is "about," or what topics do they emphasize? We combined all those materials about each book into a file for each book. The total text across all books constituted around 29,000 words. We read each file, compiling a list of possible issues and contexts from each one. We then reviewed that compilation, reorganizing, regrouping, and combining terms into an alphabetized list of main codes and subcodes. This grouped list provided our initial a priori coding scheme. Needless to say, others might have developed a more or less different list, many of the subcodes could have been included with other main codes, and more or less different main codes could have been developed. We will return to a possible different grouping of the main codes later on. The purpose of the following overview is to identify some of the primary themes and topics of recent books in this domain.

We entered those 89 book summary files and the initial coding taxonomy into NVivo 11. Then we re-read each book file and coded the materials using the initial codes, as well as adding new codes as they arose. After coding all files, we revisited the coding taxonomy and again reorganized, regrouped, and combined terms, and then re-coded the book files. For the following overview of the issues and contexts covered in these books, we re-organized the main codes by general themes: (A) Theory and Conceptualization, (B) Digital Technology, (C) Issues, (D) Contexts, and (E) Effects. Table 1.6 lists the general themes, their main codes and their subcodes, along with the number of sources that used that code and the number of times (references) that code was used.

Table 1.6 Themes, Main Codes and Subcodes Used to Identify Issues and Concerns in Recent Books on Digital Technology and Society

Theme, Code, and Subcodes
A. Theory and Conceptualization
A1. Theory [17]
Actor-network theory (48)
Critical studies, theory (9,22)
Diffusion (39)
Digital divide (38)
Digital media & social change (51)
Mediation theories (23, 31, 33)
Model of digital coping with illness (68)
Network theory (35, 39, 51)
Public good (23)
Science & technology studies (33)
Social capital (54)
Sociological (4, 21)
Socio-technical (4, 10, 26)
Various (51, 53)
A2. Names for new digital technology and society era [49]
Age of big data (56)
Attention economy (89)

Culture of connectivity (85)
Digital age/society/revolution (6, 7, 9, 51)
Digital natives, immigrants (12, 64)
Ecosystem of connective media in a culture of connectivity (85)
Fourth industrial revolution (77)
Fourth wave (digital health) (79)
Global information society (58)
Global network society (17, 48)
Information society (14, 38)
Integrate technological, social, political, cultural, economic dimensions (4, 9, 13, 17, 18, 21, 26, 28, 33, 39, 41, 47, 57, 58, 69)
Marketplace of attention (86)
Mass surveillance society (75)
Media ecologies (44)
Mediation (interrelated technical, social, biological processes) (4, 22, 23)
Network as “defining concept of our era” (20)
New mobile age (49)
Next Internet (59)
Participatory condition (5)
Second machine age (13)
Softwarization of society (9)
Superconnected society (18)

Third wave of computing technologies (25, 32)
B. Technology
B1. Technology venues [68]
3D printing, fabrication (32, 77)
Algorithms (10, 19, 24, 29, 33, 51, 63, 84)
Artificial Intelligence (13, 30, 49)
Blockchain (81)
Cloud computing (4, 11, 39, 42, 59)
Constant change and development of technology (4, 11)
Data storage (24)
Drones (59, 77)
Gaming (57, 69, 71, 82)
Internet of things (11, 15, 26, 56, 59, 81)
Mobility (11, 26, 51, 84)
Robots & social robots (30, 49, 59, 82)
Search engines (63)
Smart homes, cities, e-government (5, 11, 37, 39, 41, 77, 81)
Social media-networking sites (4, 11, 39, 51, 57, 79, 80, 85)
Ubiquitous computing (26, 59)
Wearable computing, devices, sensors (26, 59, 77, 79)
B2. Technology characteristics [9]
Affordances (68, 71, 82)

Habitual, updating (20, 82)
Materiality (33, 42)
Mediation vs. objects, devices, apps (47)
C. Issues
C1. Content, creation [33]
Art, performance (5, 10, 23, 40, 52, 54, 81)
Collective intelligence (70)
Creative production, industry, digital media production (44)
Crowdfunding (7)
Design (5, 71)
Humor & memes (46, 66, 78)
Online expression (66)
Producers, users, produsers (2, 5, 28, 43, 69, 76)
Public, online debate (66)
Storytelling (5, 7, 66)
C2. Big data, data mining, data storage, analytics, user data [56]
Attention industry, marketplace, merchants, customers (2, 13, 24, 39, 50, 75, 83, 84, 86, 89)
Audience behaviors and meaning changing, fragmentation, overlap (7, 33,62, 86)
Big data, data mining, data analytics (5, 11, 14, 29, 39, 51, 56, 59, 71, 84)
Data user, personal, online, digital traces (22, 35, 51, 55, 61, 73, 75, 83, 84)

Privacy, surveillance, security, anonymity (5, 10, 12, 15, 18, 19, 26, 39, 40, 45, 48, 53, 59, 61, 64, 69, 82, 84, 87)

C3. Civic issues [50]

Civic media, citizenship, democracy, public sphere, the news press (3, 4, 5, 7, 11, 29, 33, 39, 40, 51, 59, 65, 69, 81, 87)

Digital countercultures, underground (52)

Engagement, participation civic (3, 5, 27, 37, 46, 53, 59, 65)

Political, politics (17, 21, 25, 39, 55, 69)

Power (5, 7, 21, 42, 51)

Social movements & digital activism (incl. feminist activism, play as resistance), collective action (5, 17, 25, 31, 37, 39, 51, 69, 87)

C4. Participation, engagement [7] (5, 12, 27, 45, 48, 70)

C5. Inclusion, exclusion, discrimination [26]

Digital divide (6, 38, 39)

Disability (22, 69)

Discrimination (19, 29, 63)

Gender (25, 39, 63, 69)

Inclusion, exclusion; equality, inequality (7, 18, 37, 53, 54, 59, 69, 81, 88)

Race (39, 63, 69)

C6. Ethics, ethical issues [6] (28, 29, 45, 47, 64)

C7. Manage digital experience [8] (23, 29, 35, 38, 39, 41, 53, 57, 60, 79, 81)

D. Contexts

D1. Digitization of self & others [13]
Biosensing, quantified self & animals (5, 10, 47, 49, 52, 55, 59, 61, 67, 84)
Qualified self (45)
D2. Health [12]
Digital health (13, 30, 61, 71, 79)
End of life (68)
Healthspan and lifespan (49)
Online information, interventions (68)
Support, coping (68, 82)
D3. Relationships [40]
Community (4, 51)
Families (38, 44, 54, 72, 80)
Friendship (44)
Identity, selfhood (12, 18, 19, 22, 38, 40, 43, 44, 51, 54, 64, 65, 82, 87)
Individual, collective; public, private (35, 70, 87)
Intimacy (44, 82)
Sex, sexuality (69)
Social (interactions, relationships, networks (6, 18, 35, 46, 54, 70, 72, 82)
D4. User groups [19]
African-Americans (38)
College students (72)

Elderly (68, 71)
LGBTQ (31, 37)
Worshippers (8)
Youth (6, 12, 39, 44, 45, 53, 54, 64, 69, 80)
D5. Culture, everyday life, education, learning [35]
Culture (6, 10, 25, 37, 39, 51, 69, 88)
Domesticity (26)
Education, learning (5, 13, 30, 37, 41, 44, 53, 54, 64, 69)
Everyday life, practice (4, 9, 21, 26, 38, 39, 53, 54, 58, 80)
Literacy (46, 53, 70, 88)
D6. Work and organizations [37]
Business models (7, 24, 49, 81, 89)
Innovation (11, 27, 37, 71, 77, 79)
Labor, creative, digital, employment (7, 13, 30, 33, 39, 76, 77)
Organizations & business (10, 21, 24, 39, 41, 57, 71, 79, 81)
Work, work-life boundaries (1, 44, 46, 71, 77, 82)
D7. Law, policy, regulation [12] (23, 29, 35, 38, 39, 41, 53, 57, 60, 79, 81)
E. Effects
E1. Effects negative [25]
Addiction (1, 82)
Attention, brain, overload (6, 16, 64, 70, 82)

Cyberbullying (6, 12)
Danger, harm, risk (6, 12, 46, 53, 56, 82)
Disconnection (among people) (54)
Multitasking (82)
Online hate and shaming (72)
Pressure for access, connectedness, response (82)
Wasting time (34, 82)
E2. Effects positive [13]
Collaboration, cooperation, sharing (5, 12, 13, 34, 70, 71)
Connectivity, connectedness (1, 2, 38)
Creativity (34)
Safety (12, 82)
Social capital (38)
E3. Effects societal [23]
Crime (36)
Economy, economics (13, 30, 39, 41, 58, 71, 81, 87)
Environment implications of digital media (23, 42, 59, 69)
Global impacts (17, 18, 22, 58, 69, 71)
ICTs for development (41, 57, 87)
Institutions (18, 41)
E4. Effects contradictions, paradoxes, tensions, unintended [21] (1, 6, 9, 10, 31, 32, 34, 35, 36, 41, 48, 50, 52, 66, 69, 82, 86)

Note: [# times code was referenced], aggregated from # times each subcode was referenced (number of the specific publication referenced); see References of Books for Issues and Contexts Analysis for correspondence between number and reference.

(p. 12) (p. 13) (p. 14) A. Theory and Conceptualization

A1. Theory. Theoretical perspectives are not likely to be highlighted in book summaries or reviews, especially in edited books. However, of those mentioned, several appear multiple times. A socio-technical approach appears in Athique's (2013) overview of digital media and society; Beyes, Leeker, and Schipper's (2017) analysis of digital performance: and Dourish and Bell's (2011) discussion of ubiquitous computing. Network theory is an obvious framework for considering digital technologies due to their networked nature and the rise of a global network society, and how they connect people through social networks and social networking sites (González-Bailón, 2017; Graham & Dutton, 2014; Krieger & Belliger, 2014; Lindgren, 2017). Similarly, as digital technologies provide mediated communication, representation, and interaction, mediation and materiality theories are relevant (Cubitt, 2016; Fotopoulou, 2017; Gillespie, Boczkowski, & Foot, 2014). Other specified theoretical approaches include critical studies, sociological theories, and others ranging from public goods and social capital to diffusion of innovations and digital divide. Several books emphasize multiple theories, related to areas such social media, cyber-optimism, social interaction, social change, identity, development, education, and participation (Lindgren, 2017; Livingstone, 2009).

Names for new social era. Based on the article and NGram analysis, we might refer to the emergence of relationships between digital technology and society as the "Digital Age." Indeed, several books use some variant of that (Bauerlein, 2011; Bennett, Chin, & Jones, 2015; Berry, 2015; Lindgren, 2017). However, in recent books authors have used a wide variety of terms. Some refer to a broad phenomenon (culture of connectivity, digital age/society/revolution, ecosystem of connective media in a culture of connectivity, fourth industrial revolution, global information/network society, the familiar term (p. 15) information society, next Internet, the participatory condition, second machine age, super connected society, and third wave of computing technologies). Several of these emphasize the increased opportunities for connecting, communicating, and networking (Barney et al., 2016; Castells, 2015; Chayko, 2017; Chun, 2017; James, 2014; Van Dijck, 2013).

Barney et al. (2016) refers to this as the "participatory condition," whereby participation has become the theme for most everyday activities; similarly, Van Dijck (2013) shows how social media in particular have created a "culture of connectivity," and Chayko (2017) argues that the Internet and digital media in general have made social life "superconnected." Others indicate more specific aspects (age of big data, the attention economy, mass surveillance society, new mobile age, and the "softwarization" of society; Berry, 2015; Kvedar, Colman, & Cella, 2017; Lynch, 2016; Schneier, 2015; Wu, 2017). Note that all but one of these are concerned with how large-scale collection of user behavior both fuels the

economy as well as enables individual, corporate, and government surveillance. More common, however, is a general reference to the integration of biological, cultural, economic, environmental, political, psychological, social, and technological dimensions. Athique (2013) and Berry (2015), for example, discuss how digital systems pervade all aspects of our lives, especially given vast global information and communication networks (Castells, 2015). Many of these broader approaches emphasize how the technological and the social are interrelated (e.g., Graham & Dutton, 2014).

B. Digital Technology

B1. Technology venues. Many other books explain and study specific digital technologies, but those mentioned in the context of societal concerns in these books range from 3D printing/fabrication to online gaming and ubiquitous computing. More frequent are associations with algorithms, cloud computing, Internet of things, mobility, robots (including social robots), smart homes and cities, social media, and wearable computing devices/sensors. Algorithms are both based on, and influence, our search behaviors, news viewing, online friends, and shopping (Cheney-Lippold, 2017; Turow, 2017), shape who gets access to social services (Eubanks, 2018), and affect how race and gender are portrayed in search engine results (Noble, 2018). Cloud computing seems abstract and ethereal, yet requires massive infrastructure and energy (Hu, 2015), and raises issues of privacy (Graham & Dutton, 2014). The miniaturization of computing power and the increasing reach and strength of wireless networking provide the foundations for the Internet of things (Bunz & Meikle, 2017), ranging from interactive refrigerators to worldwide tracking of shipping containers (Dourish & Bell, 2011), as well as “smart” cities and governments (Barney et al., 2016; Hanna, 2016). Robots have already replaced many manufacturing jobs (Ford, 2015), while social robots can provide physical, and emotional support to patients, the elderly, and coworkers (Mosco, 2017). Turkle (2011) argues that mobile phones *are* social robots.

(p. 16) **B2. Technology characteristics**. While not much mentioned at the general level of our source documents, some work does approach digital technologies not from their purely physical or technical aspects, but, rather, from their main functions or capabilities, the ways in which they mediate. The argument here is that particular technologies and their manifestations are always changing, so a more conceptual approach is more enduring and generalizable. This approach is variously labeled here as affordances, habit, materiality, and mediation. For example, from a patient’s or a physician’s perspective, persistent awareness of the patient’s condition is more crucial than a particular medical device (Rains, 2018), or from a project team’s perspective, searchability of a database in order to share knowledge is critical independent of the system used (Rossignoli, Virili, & Za, 2017). Continuing, everyday use of a digital technology may, however, make these capabilities and affordances become taken-for-granted, habitual, and invisible (Chun, 2017).

C. Issues

C1. Content, creation. Digital technologies make it possible for all kinds of people to find, create, share, reshape, and link a dizzying array of existing and unforeseeable content. Familiar content issues include produsage, crowdfunding/sourcing, digital media production, and online expression. Yet less common topics are discussed as well. Software, computing, devices, and networks enable new kinds of and ways of presenting, art, performance, dance, music, and design (Beyes, Leeker, & Schipper, 2017; Gronlund, 2016). New kinds of digital images (from space and the deep sea) may foster more engaged responses to environmental threats (Cubit, 2016). A major motivation for creating, viewing, and sharing online content is its humorous nature (Phillips & Milner, 2018), while considerable research attempts to understand the power and rapid diffusion of certain memes (Shifman, 2014). Digital storytelling can be multi-modal, collaborative, and interactive (Barney et al., 2016).

C2. Big data, data mining, data storage, analytics, user data. Transforming information and communication from analog to digital has a major, inherent implication: the content is (potentially, depending on the context and laws) now easily captured, stored, analyzed, associated, separated, (re)combined, transmitted, and networked. Thus, there is considerable recent coverage of issues relating to both specific and very large scale (big) user data. Such data capture and mining provide the economic model for much digital media, marketers, and vendors (think social media and search engines, especially), leading to terms such as the attention economy or the attention market, and fundamental changes in the nature of media audiences (Anand, 2016; Daley, 2015; Napoli, 2011; Schneier, 2015; Turow, 2012, 2017; Webster, 2014).

But big data, from personal biosensors to Google searches, also allow both scientific and commercial analyses of topics otherwise not possible (González-Bailón, 2017; Graham & Dutton, 2014; Lupton, 2016; Rudder, 2014). For example, Webster (2014) argues that the expansion of multiple media sources and content allows audiences to (p. 17) both concentrate attention on, as well as overlap with other audiences across, some outlets and content. The generation, access, analysis, and selling of such personal data also lead to concerns about anonymity, privacy, and surveillance. Several have noted the irony in the fact that while digital technology inspires so much participation and sharing, that very participation generates information that may be used to control, influence, or otherwise shape us and our possibilities (Barney et al., 2016; Bunz & Meikle, 2017). As Turkle (2011, p. 243) wrote, “Facebook looks like ‘home,’ but you know that it puts you in a public square with a surveillance camera turned on.”

C3. Civic issues. For some, civic issues are at the heart of debates about digital technology and society. Awareness, participation, freedom of speech, and exposure to diverse ideas are crucial for the practice and maintenance of democracy. The public sphere is now online, but not necessarily civil. Digital and online technology can both facilitate and constrain, improve and harm, these activities. It provides opportunities for political engagement and citizen marketing as well as tools for political message targeting, and opin-

ion control by both governments and corporations (Anduiza et al., 2012; Athique, 2013; Penney, 2017; White, 2014), but increasingly also by interest groups and individuals. Offline divides by class, disability, ethnicity, gender, and race potentially may be overcome online, but often are reinforced (Reed, 2014). Online spaces provide meeting ground, support, and solidarity for countercultural communities (Lingel, 2017), and citizen and political activism and collective action, from small towns to governments, and from nations to global regions, sometimes successful, sometimes not (Castells, 2015; Graham & Dutton, 2014). Online citizen engagement also represents opportunities for and means of identity expression (Penney, 2017). Some work discusses implications of site and system design, accessibility, and use on the nature of civic engagement (Godron & Mihailidis, 2016). Underlying these civic issues are questions about power and politics shape and are shaped by new forms of participation and their actors (Barney et al., 2016; Hu, 2015).

C4. Participation, engagement. As noted in the overview about labeling this changing social condition, a central underlying theme is the increased amount, diversity, forms, and actors in online participation in general (i.e., other than civic or political). Social media in particular enable people to engage in communication and activities in multiple ways, continuously (boyd, 2014), often leading to over-dependence and disconnection from ethical and moral behavior (James, 2014). Yet features and designs, as well as online attitudes and behavior, still limit participation by those with disabilities (Ellcessor, 2016).

C5. Inclusion, exclusion, discrimination. Thus an explicit or implicit thread running throughout much of the discussions about digital technology concerns inclusion, exclusion, and discrimination, both in terms of accessing and using these technologies, as well as in how designs, data mining, site features or policies, and other users affect which people and what content are allowed online. The major throughline here is about the general digital divide (Graham, 2014, discussing African Americans' digital practices; Graham & Dutton, 2014); but other specific distinctions appear too, such as disability, ethnicity, gender, and race (Ellcessor, 2016; Reed, 2014). And a wide variety of factors (p. 18) affects forms of inclusion and exclusion, including algorithms shaping data mining and search engine results (Cheney-Lippold, 2017; Eubanks, 2018). Noble (2018), for example, shows how algorithm design, commercial interests, and oligopolies of search engine and social media companies serve to privilege whiteness while discriminating against people of color (especially women). Young users, while nearly continuously online, nonetheless experience exclusion and disconnections due to their pre-existing networks, digital literacy, and attitudes (Livingstone, Sefton, & Green, 2016; Wiesinger & Believau, 2016)). However, online communities and social media provide opportunities for digital activism on the basis of gender, feminism, LBGTQ, among others (Dey, 2018; Fotopoulou, 2017; Gordon & Mihailidis, 2016), and are empowering people around the world (Mosco, 2017). Blockchain technology may both increase and circumvent exclusion (Tapscott & Tapscott, 2018), by concentrating wealth and increasing energy demands, while bypassing control by financial institutions and intermediaries.

C6. Ethics, ethical issues. As most commenters note, ethical issues receive limited coverage in digital technology discussions. The online environment provides extensive and new challenges to professional journalism ethics (Elliott & Spence, 2017), data mining and algorithms distance consequences from ethical criteria (Eubanks, 2018), and youth users seldom make connections between their online behaviors and more general moral ethical implications, experiencing ethical blind spots (James, 2014). The very process of mediation often distances awareness or knowledge of ethical implications (Palfrey & Gasser, 2016), and the beneficial use of social robots nonetheless has ethical implications such as emotional dependency and privacy (Kvedar, Colman, & Cella, 2017).

C7. Managing the digital experience. While nearly all books on digital technology and society have sections on policy, implementation, and individual recommendations, some specifically focus on advice, based on research, on how to manage and improve one's digital experience. James (2014), for example, explicates the concept of conscientious connectivity, which involves both ethical thinking as well as awareness of and sensitivity to online dilemmas. Other approaches include exercises for mindful technology use (Levy, 2016), and thriving online (Rheingold, 2012). Johnson (2015) develops the idea of an information diet, or how to evaluate and balance one's online behaviors and use of information. Other guides are designed for parents interested in protecting their family from the negative aspects of the digital age (Steiner, Adair, & Barker, 2013), attempting to protect your online data and identity (Schneier, 2015), and reducing online shame and hate (Scheff & Schorr, 2017). Rowan-Kenyon, Aleman, and Savitz-Romer (2018) specifically honed in on how universities can improve the experience and retention of first-generation college students through their engagement with digital technology.

D. Contexts

D1. Digitization of self and others. As devices become smaller, and more powerful, wireless, and connected, very personalized uses have developed, creating the *quantified* *(p. 19)* *self* movement. People use biosensors (such as fitness trackers, smartphones, eye- and face-scanners, and even implants) to record their activities and responses, both for personal interest and health monitoring (Kvedar, Colman, & Cella, 2017; Lupton, 2016), but also for advertising and consumer user behavior (Turow, 2017). Interestingly, while in one way this allows people to develop a more detailed sense of their own identity, shared quantified self data creates online communities who compare and even compete (including, for example, brain scans; Barney et al., 2016). To some extent, this is one form of the *cyborg* or *the singularity*, or the melding of humans and machines (Beyes, Leeker, & Schipper, 2017; Kember & Zylinska, 2012; Mosco, 2017). Further, large-scale collection of such data can be used for medical diagnoses, genetic and epidemiological analyses, and possible threats to insurance and employment. As a form of the *Internet of things*, these applications extend to animals as well, for tracking their diet and health, as well as provenance, ownership, location, and migration, from cats to cattle to whales (Pschera & Lauffer, 2016). As a complement to this digital data collection via bodily devices and social media, Humphreys (2018) shows how people have been recording and commenting on

their personal information for ages, through baby books, photo albums, pocket diaries, and postcards, to account for their everyday lives.

D2. Health. Health is another major context for digital technology, including computerized medical instrumentation, digital device implants, data collection and analysis, health information monitoring, digital records, network sharing of medical information, online health information seeking, and mediated communication within support communities and between patients and caregivers (Rains, 2018; Turkle, 2011). Such technologies can be used for large-scale as well as personalized health interventions, improve one's lifespan and health-span (Kvedar, Colman, & Cella, 2017), as well as help manage end-of-life and bereavement (Rains, 2018).

D3. Relationships. From a communication and interaction perspective, personal and social relationships are a major context for the use and implications of digital technologies. A frequent focus is on how people create, manage, promote, and try to protect, their (multiple) online identities and selfhood (Lindgren, 2017). This is especially salient for youth users (boyd, 2014; Ito et al., 2009; Palfrey & Gasser, 2016; Turkle, 2011), in their social and classroom lives (Livingstone, Sefton, & Green, 2016). Other central foci are about online ethnic, gender, racial, and sexual identities (Graham, 2014; Reed, 2014), and about how data mining entities construct and constrain our online and even offline identities (Cheney-Lippold, 2017). Online communities and services also hold the promise for bringing together individual identities to create a more powerful and positive (or negative) collective identity (González-Bailón, 2017; Rheingold, 2012), but also blur the distinctions between public and private, and offline and online, identities (White, 2014).

Digital technology and society of course involve far more than just individual-level identity. More relational contexts include engaging in online intimacy even though the content may be public (Ito et al., 2009). Yet our technologies may be distorting intimacy; as Turkle (2011) notes, immersion in social media and mobile phones may create an illusion of intimacy while distancing actual personal relationships. The mobile phone (p. 20) and social media may help maintain family relationships, especially when children move away to college (Rowan-Kenyon, Aleman, & Savitz-Romer, 2018), but also serve to wrest control away from parental monitoring and socialization (Graham, 2014; Ito et al., 2009; Livingstone & Green, 2016), both by youth and by their peers and marketing companies (Steiner, Adair, & Barker, 2013). And, of course, much work concerns the nature, engagement in, and effects of online communities, ranging from political to health and culture (Lindgren, 2017).

D4. User groups. Different kinds of audiences, groups, or users have different motivations for and experiences with online and digital technology, so some books focus on specific user groups. These include how African Americans use such technologies to deal with inequalities (Graham, 2014), how students engage with technology to manager their transition from home to their first year at college (Rowan-Kenyon, Aleman, & Savitz-Romer, 2018), how the elderly can manage the end of their lifespan (Rains, 2018), how LGBTQ members engage in media activism, promote visibility, and work to combat sui-

cide (Fotopoulou, 2017 Gordon & Mihailidis, 2016), and how worshippers participate in mediated liturgy practices, such as digital prayer chapels and live-streaming of religious services (Berger, 2017). Much work looks at how youth use digital media, with both positive and negative implications (Bauerlein, 2011). For example, boyd (2014) considers why youth share so much online and why they are so obsessed with social media, Graham and Dutton's book (2014) includes chapters on children's Internet use and next generation digital divides, and Steiner, Adair, and Barker (2013) consider how the digital age is significantly affecting childhood.

D5. Culture, everyday life, education, learning. More general daily concerns include the ways in which ubiquitous computing might affect the form and meaning of domesticity (Dourish & Bell, 2011) and everyday life practices, such as how society is becoming embedded in software (Berry, 2015), the digital experiences of African Americans (Graham, 2014), and how the Internet is interwoven throughout children's lives at home, school, and play (Livingstone, 2009). Research investigates the role of digital technology in education and learning, such as the participatory potential for education (Barney et al., 2016; Brynjolfsson & McAfee, 2014), the need for greater civic education (Gordon & Mihailidis, 2016), how young people do, or do not, learn through digital media within their daily class contexts (Livingstone, Sefton, & Green, 2016), the need for greater digital literacy (Johnson 2015; Rheingold, 2012) and ways in which educational technologies such as MOOCs and scholarly publishing are changing the nature of teaching and research (Reed, 2014). Concerns about digital culture include how digital technology shapes and is influenced by broad societal culture (Wiesinger & Beliveau, 2016), artistic and creative culture (Reed, 2014), and the culture(s) associated with particular media, such as mobile phones (Lindgren, 2017).

D6. Work and organizations. Another major context, work and organizations, is considered much more in the management and information systems literature. However, recent digital technology and society books discuss how business models, industries, and economies are being transformed, such as through crowdsourcing, crowdfunding, (p. 21) and microcelebrity (Bennett, Chin, & Jones, 2015); the "gig" economy such as Uber and Airbnb (Daley, 2015); and the ability to identify and monetize attention (Wu, 2017). They also discuss how the very nature of organizations and industries is changing, towards more networked, virtual, and distributed forms (Graham & Dutton, 2014).

Note that these opportunities and challenges also apply to not necessarily commercial or for-profit contexts, such as health provision and caregiving (Kvedar, Colman, & Cells, 2017), and smart cities and technology parks (Hanna, 2016). Not only are innovation processes crucial to the development and diffusion of new digital technologies, but such technologies are also necessary for implementing other innovations. For example, innovations in medical technologies can transform experiences and possibilities for the disabled (Ellcessor, 2016), patients (Sonnier, 2017), and caregivers (Rossignoli, Virili, & Za, 2017), and innovative designs for egovernment (such as ways to visualize data, involvement in open policymaking, engaging young and feminist activists) can foster greater civic engagement (Gordon & Mihailidis, 2016). Digital innovations are making work-life bound-

aries more permeable (Alter, 2017; Schwab, 2017), increasing the ability to share and manage knowledge (Botto & Resende, 2017), and threatening the loss of traditional and even knowledge work through artificial intelligence, algorithms, blockchain technology, and robots (Ford, 2015; Tapscott & Tapscott, 2018).

D7. Law, policy, regulation. As many have noted, technology develops and diffuses faster than laws, policy, and regulation can keep up with. Should the Internet and social media be regulated as a common carrier, or subject to the same regulations and liabilities as other publishers (Graham & Dutton, 2014)? Who should govern what aspects of the Internet (Mueller, 2010)? What are the effects of supporting or removing net neutrality? Should algorithms affecting search results and service provision be regulated and made explicit (Eubanks, 2018)? What policies and regulations best stimulate public ICT provision (Hanna, 2016)? Is a HIPAA sufficient to protect personal digital medical records (Sonnier, 2017)?

E. Effects

E1. Negative effects. An enduring research, policy, and popular topic is the extent to which digital technologies are associated with negative or positive effects. The list of possible implications is endless. The books included here refer to just a few. Addiction is at the top of many people's list, both alphabetically and behaviorally (Alter, 2017). As Turkle (2011, p. 154) notes, "Always on and (now) always with us, we tend the Net, and the Net teaches us to need it." But she argues that addiction is not inherent to the technology; rather it's to how we practice the use of that technology. For example, social pressures to be constantly accessible and to respond quickly create stress and reinforce dependencies (Turkle, 2011). Excessive use also ends up wasting considerable time, often fostering feelings of guilt (Goldsmith, 2016). Watching YouTube music videos, and endlessly scrolling friends' text messages, do not strengthen personal relations or get one's (home) work done.

(p. 22) As noted in the terms associated with digital technology and society, attention has gained a lot of attention, not only in regard to the commercial focus on collecting and analyzing user attention, but also about the cognitive effects of excessive screen use and multitasking on attention span (Bauerlein, 2011; Carr, 2011). Further, excessive attention to our devices reduces our attention to those people around us (Turkle, 2011, p. 268). Research has identified a wide array of possible dangers, harms, and risk, including cyberbullying (Bauerlein, 2011), information overload (Johnson, 2015), threats to children (Livingstone, 2009), and loss of control over one's identity in the present and the future. Turkle (2011), for example, notes people's vulnerability is not just limited to their communication or site content, but also to anyone taking a photo of them or posting comments about them. There is thus a constant worry about one's offline behavior being recorded and distributed. This leads some to self-censor and self-surveil both their online and offline comments and behavior. Another kind of harm is online harassment, shaming, hat-

ing, and trolling (Scheff & Schorr, 2017), negatively affecting everyone from children to CEOs and celebrities.

E2. Positive effects. Needless to say, digital technologies are associated with many positive benefits. Chief among these is the ability to connect and communicate with others, from family and friends to fellow group members, and with people and organizations otherwise unknown and inaccessible, allowing the co-creation of meaning and sharing of resources, from emotional support to complex information (Barney et al., 2016). Computing and networking support new and distributed forms of collaboration and cooperation, increasingly between humans and machines, necessary for accomplishing tasks, creating content, and generating innovative ideas (Brynjolfsson & McAfee, 2014; Rheingold, 2012; Rossignoli, Virili, & Za, 2017). Tools such as mobile phones and GPS also improve one's safety (boyd, 2014), and keep others aware of your locations and activities (Turkle, 2011). This support for connectivity and relationships also develops social and cultural capital (Graham, 2014).

E3. Societal effects. More societal negative effects include the uses of digital technologies for crime, including hacking and identity theft, fomenting hate crimes, and drug and sex trafficking, among many others (Goodman, 2015). Also, little understood is the increasingly devastating environmental implications of digital technology, including cloud computing (with its need for massive server farms consuming increasingly more energy) and toxic materials recycling (Cubitt, 2016, Hu, 2015, Mosco, 2017). Digital, networked ICTs have a wide range of negative and positive implications for economies and economics, such as facilitating rapid and global financial crises, and threats to particular industries and jobs, but also making information and transactions more transparent and efficient, and supporting micro-economic and entrepreneurial activities and produsage (Graham & Dutton, 2014; Hanna, 2016; Martin, 2017). ICTs have held great promise for the developing world, from markets and health, to farming and education (Hanna, 2016; White, 2014). Other global impacts include occasions for (more or less successful) citizen participation (Castells, 2015), and broader intercultural communication (Cover, 2015).

(p. 23) **E4. Contradictions, paradoxes, tensions, and unintended effects**. Interwoven throughout discussions of effects of digital technology is the awareness of contradictions, paradoxes, tensions, and unintended consequences. The very concept of *online expression* is ambivalent, indicating helpful as well as harmful intent and content (Phillips & Milner, 2018). Both positive and negative implications may be associated with a particular technology or use, often simultaneously, and paradoxically. Online feminist and queer activist communities can use the same technologies that mis-portray or exclude them as ways to construct and promote valued identities (Fotopoulou, 2017). Digital technologies are both highly useful and entertaining, but also create stress, overload, and complications (Levy, 2016); they blur boundaries between work and home, private and public (Krieger & Belliger, 2014). Online and social media communication can strengthen relationships and promote intimacy while also generating user data that are processed by other digital technologies and software around the world to group, categorize, and target audiences

(Beyes, Leeker, & Schipper, 2017). For example, Turkle (2011) identifies the following paradoxes (p. 176, 280):

- Connectivity brings us closer, but some use technology to hide from others
- In order to feel like themselves, users must be connected to their devices and others
- It is easy to find others to interact with, but also to become tired by demands to perform
- It is possible to make many new connections, but they are often tentative and temporary
- Mobile phones enable as well as inhibit separation from parents, partners, work
- Nonstop connection also means limited attention by self or others
- People can play with identity but are less free from their past
- People like online linkages and features that are based on knowledge about one's use, but they are also concerned about the loss of privacy and are constrained by externally created online identity
- People reject real-time phone but get lost in real-time online gaming
- Providing online content may be available to immediate and broad audiences, but the content is often depersonalized and abbreviated
- The ability to work from anywhere means one cannot escape work
- Users develop expectations of instant connections to and response from others, but they themselves are then expected to always be available and respond ourselves
- Users themselves acknowledge tensions between good and bad aspects, and often say they are resigned to this condition.

What some researchers or users may perceive as a positive aspect may be considered negative by others. For example, increased ability to participate online may take the form of reading and posting only to groups with the same interest or political position, thus limiting exposure to diverse ideas and strengthening polarization (though Webster, 2014, argues that audiences are fragmented, but also participate in various venues, (p. 24) creating overlapping audiences). By accident or user intent, technology may be used in ways that designers, vendors, or implementers did not intend, expect, or imagine (Lingel, 2017). For example, González-Bailón (2017) shows how data mining and network analysis can reveal unintended consequences of individual behavior for collective outcomes. Even use of digital technology that might be critiqued as "wasting time" can provide a context for allowing thoughtfulness and creativity (Goldsmith, 2016). The same systems and features can promote support and caring (Rains, 2018) as well as international crime and terrorism (Goodman, 2015), democratization as well as authoritarianism (Berry, 2015), learning as well as fragmented attention (Bauerlein, 2011), empowerment as well as addiction (Alter, 2017). ICTs may increase the pace of development and economic growth, but also increase inequities, work dislocation, and environmental degradation (Cubitt, 2016; Gershenfeld, Gershenfeld, & Cutcher-Gershenfeld, 2017; Hanna, 2016).

Summary

The preceding sections reviewed the main arguments and concerns about digital technology and society, organized by the emergent coding of subthemes and then the main codes of Theory and Conceptualization, Technology, Issues, Contexts, and Effects. This provides a subjective conceptual framework for identifying the most noted and discussed topics of 89 recent books. Another way to identify general arguments and concerns is to assess how those coded themes co-occur across the material about the 89 books. Figure 1.2 shows the hierarchical clustering of the coded themes, based on the Jaccard similarity coefficients derived from the co-occurrence of the codes in each source text (provided through NVivo 11). What constitutes a cluster, or main theme, depends on the cutoff between sets of codes one wants to use. The most general distinction is among three primary clusters.

Figure 1.2 Hierarchical clustering of main codes based on co-occurrence (correlation) of main and subcodes within each source text.

The first cluster includes Content, creation; Digitization of self & others; Ethics, ethical issues; Participation, engagement; and Manage digital experience. Given that many of the Ethics, ethical issues have to do with personal data privacy, much of the Content, creation material has to do with individual use or production of content, and Manage digital experience emphasizes how individual can (more, or less, effectively) attempt to manage their own digital usage, this cluster could be considered to represent a major general theme of *Individual uses*.

The second cluster contains two subclusters. The first subcluster consists of Theory; Culture, everyday life, education, learning; Relationships; and User groups. This as a somewhat diverse grouping, but seems to represent the central social and theoretical contexts of digital technology: groups, relationships, culture. The second subcluster reflects more societal issues, such as policy, societal effects, civic and public sphere behavior, inequalities, organizations and technology, and very broad issues of the nature of the developing

societal changes, along with big data. Thus, the entire two-fold cluster might be labeled *Societal and technological issues*.

(p. 25) The third cluster is mostly about *Effects*, notably in the health arena, as well as aspects of technologies that might shape or influence those effects. Note that specific negative or positive effects are subsumed within the more complex topic of contradictory and unintended effects.

Related Work

A detailed analysis of the full content of these books would provide a comprehensive review of topics associated with digital technology and society, to say nothing of what individual articles and chapters discuss. There is, of course, a huge range of review articles, chapters, books, and handbooks on the many aspects of digital media and society. There are journals in specific disciplines that publish reviews, and there are handbooks in a wide variety of related research areas. Almost all of those, however, focus on one discipline (e.g., management, information systems, sociology), or one dimension (organizational communication, privacy, identity), or one technology (e.g., Internet, social media, videogames). Further, edited books or handbooks in these areas bring together diverse, expert authors who contribute on the topic of their own specialty, often without an underlying integrative foundation. Finally, many books on the "digital age" are more popular, applied, or oriented toward marketing, technology, management, or consulting practice.

(p. 26) For example, Salganik's *Bit by bit: Social research in the digital age* (2017) is about the conduct and design of research in the digital environment, such as using big data, experiments, and collaborative studies. Baym's *Personal connections in the digital age* (2015) emphasizes the communication discipline and relationships. Similarly, the book edited by Wright and Web, *Computer-mediated communication in personal relationships* (2011) exclusively focuses on relational communication. Other books, such as Noble and Tynes' (2016) *The intersectional Internet: Race, sex, class, and culture online* do take a more interdisciplinary and multi-dimensional approach, applied to a range of digital media, platforms, and infrastructures, in more global and social contexts, but is primarily focused on the issue of intersectionality instead of on more general life in the digital age. Perhaps the single best overview is that of Mansell et al. (2015) *International encyclopedia of digital communication and society*, which covers 150 topics, ranging in length from 2,000 to 10,000 words.

More relevant to this book, there are also handbooks on specific topics and media such as *The Oxford handbook of Internet studies* (Dutton, 2014); *Routledge handbook of Internet politics* (Chadwick & Howard, 2009); *Oxford handbook of Internet psychology* (Joinson & McKenna, 2009); *Internet studies* (Consalvo & Ess, 2012)–their book's chapters do cover a number of similar topics, such as society, and culture, but again focus on the Internet; and *Economics of the Internet* (Bauer & Latzer, 2016). The two-volume *Handbook of research on computer-mediated communication* (Kelsey & St.-Amant, 2008) also covers some similar areas, such as identity (though from a credibility perspective), community

and information exchange, and culture, but also different areas, such as instruction, design, discourse, and libraries, as well as chapters on specific technology contexts. Similarly, more handbooks on the mobile phone are appearing: *Handbook of mobile communication studies* (Katz, 2008) and *Research on human social interaction in the age of mobile devices* (Xu, 2016); as well as for related new media, such as *Handbook of digital games* (Angelides & Angus, 2014), and *Sage handbook of social media* (Poell & Marwick, 2018). Some handbooks are focused on particular populations, such as *Handbook of children and the media* (Singer & Singer, 2011). Sundar's (2015) *Handbook of the psychology of communication technology* covers a wider array of digital contexts than many of the other books but does take a primarily individual and group perspective (reasonable, given the title), though also includes health issues. However, our book does not in any way overlap with the intriguing *Handbook of porous media* (Vafal, 2015).

The only recent book that provides a similar multi-dimensional, interdisciplinary, and thematic review of recent research on life in the digital age is Graham and Dutton's (2014, Oxford University Press) edited book *Society & the Internet: How networks of information and communication are changing our lives*. That excellent book frames the work as a major foundation for the new field of Internet studies (along with Dutton's 2014 *Oxford Handbook of Internet studies*). Somewhat similar to the UK Economic and Social Research (ESRC) project theme chapters in our book (see the next section), the chapters in Graham and Dutton's book evolved from research work and a lecture series at the Oxford Internet Institute. Their 23-chapter book covers some of the same main areas as (p. 27) our book (with main sections called: Internet studies of everyday life; Information and culture on the line; Networked politics and governments; Networked businesses, industries, and economics; and Technological and Regulatory histories and futures). That book complements this book, but is primarily focused on the Internet, and does not have the organizing framework of the ESRC project reviews.

Purpose and Origins of This Book

Purpose and Domains

The purpose of chapters in this handbook is to provide detailed reviews of central topics about digital technology and society within our seven domain sections. It includes interdisciplinary, comprehensive reviews on central aspects of the current digital age. After the following chapter on project methodology, the next sections move from more individual and relational domains (Section 2: Health, Age, and Home; Section 3: Communication and, Relationships) to more organizational, community, and citizenship domains (Section 4: Organizational Contexts; Section 5: Communities, Identities, and Class; Section 6: Citizenship, Politics, and Participation), and then to more societal and governance domains (Section 7: Data, Representation, and Sharing; and Section 8: Governance and Accountability). It ends with Section 9: Synthesis. The chapters within each section provide a solid foundation for understanding the current state of research and theory in each of these areas and for grounding future research, theory, and practice. They also bring to bear lit-

erature from a wide variety of disciplines, necessary for understanding the interrelationships between digital technology and society.

Origins

How did these chapters come to life? In 2016, the UK Economic and Social Research Council (http://www.esrc.ac.uk/) noted that

> "[t]he 21st century has witnessed significant changes due to digital technological advancements, which impacts the way we communicate, receive, consume and process information, travel, shop and do our work. The presence of digital technology mediates our perceptions, behaviours and practices across these areas and influences our ways of living, learning, sharing, engaging and seeing the world around us. This raises a number of fundamental questions about our ways of being in a digital age, the risks and opportunities associated with digital living, and our understanding of the individual, community and society [. …] It is apparent that there is a real need for meta-analytic work to synthesise and interpret the existing literature and data, to refine and consolidate existing understanding of the social, cultural, economic, political, psychological and other effects of digitalisation. This (p. 28) will enable the development of new insights, ideas and methods to be applied to a practical context. This approach will facilitate the exploitation of existing research, but also build new knowledge on synthetic work" (p. 2).

The University of Liverpool, in collaboration with a core project team, and 17 other partner Universities and organizations from the UK, EU, USA and Singapore, lead the UK Economic and Social Research Council (ESRC) scoping review on *Ways of Being in a Digital Age* (see https://waysofbeingdigital.com/ for details on the project, people, events, and reports). That scoping study developed a multi-domain holistic view of how digital technology mediates our lives, and of the way technological and social change co-evolve and shape each other. The project involved an interdisciplinary research team across the social sciences, arts and humanities, engineering, physical sciences and health. The final report included reviews and analyses in six domains: Communication, community, and identity; Citizens, politics, and governance; Understanding the platform economy; Data and digital literacies for engaged and included citizens; Everyday digital health and well-being; and Digital inequalities.

Conclusions and Recommendations from the ESRC Project

The final ESRC report recommended funding initiatives to emphasize these six core areas. The work should have a strongly social science focus, even where it is interdisciplinary. The topics should avoid areas that are already well researched or have been supported by recent or current funding programs. Research efforts need to look more holistically at the social, economic, political, cultural, and community impacts and roles of digital technologies. The ESRC report proposed the following six areas, each with associated

research topics derived from the literature reviews and analyses, the Delphi surveys and discussions, and the stakeholder workshops and discussions.

Communication, community, and identity

- The norms and values of digital communication and relationships
- The “affordances” different platforms provide for digital communication and relationships
- The quality of relationships and communication supported by digital media and technologies
- The management of relationships via digital media and technologies
- Social and community aspects of everyday digital technology use
- Digital community exclusion/inclusion
- Digital community participation, action and social change
- Power in online communities
- Understanding global diaspora as digital communities
- Understanding function of aspects of identity online (Gender/Race/Ethnicity/Sexuality)

(p. 29) ### Citizens, politics, and governance

- Digital technologies, radicalization, mobilization and political action
- Digital technologies and the disruption of current political institutions
- Digital technologies and new forms of citizenship
- Digital technologies, political communication, debate and media
- Digital technologies and state control–especially in non-democratic regimes
- Impact of social media on governance
- Success factors in digital governance at local, national and international level
- Privacy, citizenship, the state and surveillance in the digital age
- Regulation and governance of automated systems

Understanding the platform economy

- Role and impact of major corporate digital platforms (Impacts on firms of digital platforms, Role of digital monopolies and large corporations)
- Forms of digital labor (Impacts of digital labor on people’s life experience, Gig economy, linked to platforms)

Data and digital literacies for engaged and included citizens

- Citizen and community use of data

- Citizen interaction with data and algorithms
- Data literacy in everyday life
- Power and accountability for data and algorithms
- Social construction of data and algorithms
- Citizens/everyday life experiences and uses of data
- Understanding open data/algorithm transparency/accountability
- Digital identity and data
- Data Exclusion/Inclusion/Divides

Everyday digital health and well-being

- Understanding and addressing the governance of digital health technologies.
- Need for detailed systematic evidence of the impact and lived experience of everyday health technologies (e.g., fitbits).
- Questions of health and well-being in the digital workplace.
- Digital technologies and health communication and health behavior change.

Digital inequalities

- Digital community exclusion/inclusion
- The two-way interaction between digital inequities and other areas of social inequity
- Data exclusion/inclusion/divides
- Digital cultural capital and cultural exclusion/inclusion
- Digital governance, policy and inclusion
- Digital health inequalities

(p. 30) For this book, these have been reorganized into the following seven ESRC domain chapters:

- Chapter 3. ESRC Review: Health and well-being
- Chapter 8. ESRC Review: Communication and relationships
- Chapter 11. ESRC Review: Economy and organizations
- Chapter 14. ESRC Review: Communities and identities
- Chapter 16. ESRC Review: Citizenship and politics
- Chapter 18. ESRC Review: Data and representation
- Chapter 22. ESRC Review: Governance and security

Beyond the ESRC Project

As culmination of this project, a conference to present project findings and provide a context for debate was held on October 10 and 11 2017 at the University of Liverpool (https://waysofbeingdigital.com/conference/). To complement and critique the work of the ESRC project reviews, a call was publicized (through association email lists and websites, and the conference website) to invite others to submit their extended abstracts for presentation at the conference. Each presentation was attended by at least one of the editors. After the conference, the editors went through the program and decided which of the other researchers to invite to prepare their abstracts, presentations, or papers as full reviews for the edited book. We were particularly interested in papers that built on reviews to offer analysis of research gaps and challenges for social research in the digital age. Contributions come from established, early career, and PhD scholars who systematically reviewed a research issue within one of the seven foci of the ESRC project.

Two further workshops developed a closer focus on issues of work and automation. The joint UK ESRC and Defence Science and Technology Laboratory workshop held on 7th and 8th of October 2016 at University of Liverpool in London considered the topic of *The Automation of Future Roles*. This meeting brought together 33 academics, policy makers, and industry stakeholders to explore the likely future impact of digital tools in the workplace, in particular the possible implications of the continued “automation” of human tasks, roles, and jobs; knowledge, skills, and attributes; organizational structures, cultures, and development; workforce training, recruitment, engagement, and motivation; and decision-making in organizations. A joint UK ESRC and US National Science Foundation workshop was held on October 12 and 13 2017 at the University of Liverpool on the topic of *Changing Work, Changing Lives in the New Technological World*. This brought together 35 experts from the academic and professional community, as well as top executive and program directors from the U.K. Economic and Social Research Council and the U.S. National Science Foundation to discuss shared programmatic research. In both cases the two days consisted of intensely interactive group activities, generating extensive information about issues, research programs, and timelines for possible impacts. The write-up (p. 31) and analysis of these insights provided the basis for chapter 24, which synthesizes the implications of the domains for research and practice.

Thus, two primary contributions of the book’s review chapters are their unifying approach and review focus, as well as the diversity of the authors’ expertise and disciplines. The central ESRC domain reviews are the product of extensive, multi-method, cumulative work, and provide a macro context for the associated more focused reviews of specific areas within that section. The non-ESRC chapters hone in on more specific topics within each of the domains, bringing to bear multi-disciplinary reviews and analyses. Overall, the sections and chapters provide a multi-dimensional perspective on one of the most consequential aspects of contemporary times: relationships between digital technology and society.

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