# Introduction

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## Grasping the grounds of digitalization

Digital technologies are inextricably interwoven with our everyday lives and cultures. Currently, ubiquitous computing, machine learning and artificial intelligence are increasingly shaping the ways we know, think, and interact. At the same time, broader processes of digitalization are reconfiguring our social worlds, changing economic structures and democratic participation and making cities and living environments 'smart.' Such transformative power of digital technologies proceeds alongside the multifaceted ways through which they are produced, designed, and formed by cultural values, imaginaries, and institutions and according to the differing ways in which people perceive, use, and work with them in their everyday lives.

The societal implications of digitalization – such as the potential loss of jobs due to AI or possible misuses and dangers of digital media – have been controversially discussed by both researchers and the public, even though the benefits of digital transformation, such as apparently easy access to knowledge and communication, are both widely acknowledged and appreciated. *Critical algorithm studies* have pointed out software programs' lack of transparency, thereby making it difficult for lay users to understand precisely how algorithms work (e.g. Gillespie 2014, 2024; Seyfert and Roberge 2016; Ziewitz 2016; Seaver 2017, 2024). Algorithmic biases – the ways in which various social categories are built into the construction of algorithms – have been criticized for re-stabilizing cultural norms, particularly those of gender and racial prejudices (e.g., Noble 2018; Benjamin 2019). *Critical data studies* have raised issues of privacy and data protection, have examined the implications of digital data for human autonomy, and have critically examined the ways in which datasets are both constructed and processed (e.g., Boyd and Crawford 2012; Kitchin 2014; Orr and Crawford 2024). The politics of big data, pattern-recognition and predictive analytics, and the impacts of the new digital gig economy on precarious working conditions have also been investigated (e.g., Schneider and Green 2018; Jarke et al. 2024). *Feminist technoscience* has shown how digital transformations are intertwined with social and economic inequalities, often re-enforcing digital divides

and differences of access to and use of digital technologies across ages, genders, and races (e.g., Wyatt et al. 2000; Browne et al. 2023; Wajcman and Young 2023). *Digital science and technology studies* have opened the black box of digital technologies and digital change by revealing their sociomaterial aspects and undermining the accounts in this domain concerning inevitable progress (Vertesi and Ribes 2019; Horn and Felt 2025). Far from being a unilinear transformation, digitalization is discontinuous and fragmented and consists of both heterogeneous and asynchronous processes; however, it is increasingly pervasive.

Digitalization is commonly accompanied by major transformations in the economic and political sphere. The rise and power of a few, mostly Silicon Valley-based 'big tech' companies, has made it possible to both track and control the lives of people all around the globe. Collecting and processing individual data is central to surveillance capitalism's market logic (Zuboff 2019). In their pursuit of profit, big tech companies are turning users of digital technologies into data sources, allowing them to interfere with citizens' everyday lives, with various implications for both their autonomy and identity. The monopolization and concentration of big tech's power, coupled with a lack of transparency and accountability, has given rise to the emergence of big tech oligarchs and new forms of techno-authoritarianism (Roberts and Oosterom 2024) that involves the use of digital technologies by companies and/or governments to monitor and control people, potentially restricting their civil rights. At the same time, the boundaries between data protection laws, their enforcement, free communication, and information are all the subject of (increasingly complicated) political and social debates. The omnipresence of 'fake news' and misinformation further endangers democracy (Burton, Chun et al. 2023). False information is both strategically disseminated by authoritarian governmental actors around the world and cultivated primarily by right-wing citizens on social media. Widely spread by digital technologies, it impacts upon people's opinions, interferes with elections, and undermines democratic participation. What is at stake here are the ways of interacting with each other in democratic cultures and in everyday life and the role that materializations and spatializations of digital practice play therein.

Digitalization has, thus, been seeping into our everyday lives. Such datafication is rooted in a secular belief in objective quantification and in a trust in corporate platforms – "dataism" has become an ideology (van Dijck 2014) and "smartness" has become a "mandate", i.e., a new way of governing politics, economics, and the environment (Halpern and Mitchell 2023) and of governing ourselves in everyday life.

## Grounding digitalization – an analytical lens

Digitalization is still often framed in both academic and public discourses as a largely technical and often invisible process, despite the intertwining of digital technologies and culture, and this has the result of neglecting not only its cultural embeddedness, but also its material, spatial, and environmental grounding. However, digital technologies and transformations are shaped by cultural values, practices, and imaginations and are sociomaterially produced. They include computer hardware, data centers, network infrastructures, fiber optic and copper cables, routers, wires, and electrical plugs. They consume raw materials, environmental resources and electric energy, and cause high carbon dioxide emissions and electronic waste. These materialities intervene in spaces, thereby reconfiguring socio-spatial arrangements and changing the ways in which spaces and environments are both experienced and produced. At the same time, spatialities also impact upon digital infrastructures. Human-environment relationships and their cultural effects are increasingly becoming the subject of scientific considerations of the digital (Vonderau 2018) in the face of the Anthropocene. Perspectives on the relationship between natural resources and digital technologies, as well as socio-environmental dimensions, are also increasingly coming into focus (Westerlaken et al. 2023; Gabrys 2022).

We point to such socio-technical, socio-material, socio-spatial, and socio-environmental aspects of digitalization as cultural processes by suggesting to use the "grounding" of digitalization as an analytical lens. "Grounding" digitalization refers, first, to the cultural analysis of materialities, technologies, and spatial requirements and the implications of digitalization. This involves recognizing that these are deeply intertwined with epistemic and cultural values, imaginaries, and practices. This analysis includes asking questions about how digital technologies, platforms, and infrastructures are co-constructed with spatial arrangements as well as social and epistemic orders.[1]

Second, "grounding" digitalization adopts a critical perspective on digital transformations. It aims to reveal power relations, implicit values and norms, inscribed biases, and inequalities that accompany current forms of digital transformations. Applying the lens of "grounding" reveals the often-invisible, underlying, intangible, and taken-for-granted processes of digitalization; in so doing, it also reveals much of the human labor that is required to maintain the digital infrastructures that are involved in these transformations. Addressing the implicit and invisible allows us to both re-imagine digital futures and to shape them otherwise.

1 Such an analysis builds upon previous work on how technologies and society are co-produced (Jasanoff 2004); however, the "grounding" approach includes more explicit reflections about the spatial dimensions involved in this process.

Third, such an analysis places a particular emphasis on cultural practices. Whereas digitalization transforms all societal dimensions and domains, it re-configures the material, spatial, and environmental relationships according to people's everyday experiences and practices. A "grounding" analysis explores the cultural practices that are involved in the production, circulation, and use of digital technologies. It can also study potential emancipatory moments in digital transformations – e.g., infrastructural hackings, territorial negotiations, critical imaginaries of futures, and the cultural repair of relationships – by tracing critical practices of cultural productions, enactments, and the inventions of everyday life.

This edited volume critically questions the intricate entanglements between digital processes and material, spatial, and cultural realities while also developing new perspectives through which to understand both the present and future worlds through multifaceted and interdisciplinary engagements with digitalization.

## Thematic sections

The contributions examining digital transformations in this edited volume are divided into four sections – infrastructures, imaginaries, territories, and work and repair. The thematic sections have served, and continue to serve, as a means of structuring and focusing this collection's subject matter. At the same time, they reveal empirical and epistemological approaches that are inextricably linked. It is, thus, difficult to consider repair practices, for example, without also addressing the infrastructures involved. Questions of access to infrastructures and the barriers within them will, in turn, always open up territorial perspectives. Moreover, both imagining and repairing are future-oriented activities that shape not only spatial and territorial futures, but also infrastructural ones. All of this edited volume's sections are, thus, in dialog with each other.

Digitalization is a global process that plays out differently in various cultural contexts. Most of the chapters in this collection share a European perspective, with many of the contributions studying cases in Germany and placing them in dialogue with international debates and approaches. While aware of the limitations of such a geographical and thematic focus, the chapters in this volume nevertheless invite reflection on digitalization's broader cultural implications.

### Infrastructures

The chapters in the first section, *Infrastructures*, analyze how digital infrastructures – which are indispensable to processes of digitalization – are deeply grounded in cultural practices as well as techno-material and spatial arrangements that shape infrastructural developments, while simultaneously being reconfigured by them.

Digital sociomaterial infrastructures require constant repair and attention; they are politically negotiated, aligned with local routines and practices, and are sometimes resisted. The chapters in this section show how digital infrastructures work in practice and how they simultaneously re-organize social, material, and spatial relations – an insight that can be used for critical urban design.

Based on research into the digitalization of the planning system in Ireland, Juliette Davret, Danielle Hynes, and Rob Kitchin show how data infrastructures that are implemented in planning are fragmented and used differently by local authorities, due to scarce resources and/or institutional resistance to change. Despite being fractured, data infrastructures are 'good enough' to work in planning practice and, thus, represent a form of situated functionality that is supported by the cultural and political contexts that are shaped by austerity. Sophia Leipert examines the Port of Hamburg as a testbed for "smart port" technologies that aim to improve efficiency, sustainability, and data-driven decision-making. Applying a governmentality perspective to analyze the Hamburg Port Authority's smartPORT initiative, she argues that smart port technologies are not merely technical enhancements, but are instead mechanisms of power that reshape spatial, economic, and social relations. By analyzing recent design initiatives in Hamburg and Utrecht, Timo Kaerlein reflects on urban dashboards as digital infrastructures, which are often posited as the pivotal interface through which to access the city as an information space that is governed from a central point. He suggests re-framing the dashboard as a critical interface by practicing collective "critical dashboarding" in order to articulate alternative "urban intelligences" (Mattern 2021) that are grounded in city dwellers' lived realities.

## Imaginaries

Understanding how digitalization is envisioned as a sociomaterial and spatial transformation is crucial. Imaginaries, technologies, and social orders are co-produced (Jasanoff 2004), while always remaining grounded in both cultural practices and spatial contexts. The chapters in this section explore imaginaries from different perspectives. They examine, for example, dominant Western, global, and supranational visions and contrast them with local, counter-hegemonic, and alternative imaginaries and visions, some of which stem from the Global South. The imaginaries examined in this section are collectively held and inscribed in economic, political, and technological rationalities or they may take the form of more individual and small groups' avant-garde visions. They can also be (re)produced by machines.

By considering the global supply chains of autonomous vehicles, Fabian Namberger delves into the data work practices of people in the Global South, with a focus on annotation labor in Kenya. He claims that research on autonomous vehicles should shift the focus from local consumption to global production. His analysis includes social counter-imaginaries of autonomous driving based on film documen-

taries concerning AI data labelers and further inquiries collected by a Berlin-based initiative. Mascha Gugganig explores how the digitalization of future farming is envisioned by EU agriculture policymakers and small- and medium-scale farmers in Germany. While policymakers view digitalization as an inevitable fixture for sustainable agriculture, for farmers – as became apparent in a speculative design workshop – it is only one aspect of agriculture, albeit a helpful one, given that it supports their ability to communicate and network at a local level. Exploring imaginaries in the world of big tech, Sebastian Wucherer examines publicly available communications from Google's CEO to its employees, thereby revealing the company's vanguard visions of technology, knowledge, and global AI futures. He argues that although digital technologies are viewed as "tech that helps," by supporting public services for example, the business orientations underlying these visions tend to bring about superficial, rather than profound, sociotechnical change. Regula Valérie Burri engages in a conversation with ChatGPT about AI generated images, asking the large language model, for example, to generate an image, to interpret it and to describe the imaginaries emerging therefrom. The AI program's responses touch on topics such as data sources, 'truth,' aesthetics, authorship, and responsibility, thereby revealing the imaginaries that are (re)produced by the machine and that are based both on previous prompts and on large data sets that already contain critical analyses of sociotechnical imaginaries.

## Territories

Digitalization and the territorial organization of spaces and materialities are deeply intertwined processes. Territories are a spatial category through which the power, related to forms of control, becomes visible alongside digital mechanisms and through which geographical conflicts about territories are turned into data-based affairs that are negotiated within digital infrastructures. The cultural qualities of territories become mapped, measured, calculated, and normalized based upon digital knowledge forms and through this transformation. The cultural effects of these intertwined processes also impact democratic processes of negotiation and spatial contestation.

Igor Dalla Vecchia and Boris Michel develop a critical inquiry of territorialization processes relating to the phenomena of delivery workers and digital platform urbanism in three Brazilian cities. The authors argue for the concept of re-territorialization by ethnographically studying how workers organize themselves with critical cartographic mappings. The mappings produce community knowledge on the grounds of the workers' urban experiences that exceed the delivery companies' territorializing logics. The hybridization of social media and territorialization processes is the topic of Zita Seichter's contribution on the normalization processes of the far-right in extremists' accounts on the platform TikTok. She analyzes how the

experience of ordinary urban spaces of particular cities become instrumentalized in reels, images, and in audio-visual materials in order to normalize the ordinary as an ordered, whitened, and racialized territorial quality. In an interview with Jason Luger on hybrid territorializations and far-right mobilization in social media, Zita Seichter and Michael Krell explore the potentialities of platforms as creative spheres and contrast this with the current affective contestations and undermining of territorial qualities and values. Jason Luger identifies a dominant logic of utilizing the digital sphere for the purposes of economic and political control of cultural life-styles and of mobilizing neoliberal performance cultures on platforms by means of racialized and self-exploiting mechanisms.

## Work and Repair

The final section critically examines forms, places, and practices of work that are under the influence of digital infrastructures. Various concepts of work are juxtaposed and discussed in this section's chapters and include unpaid care work for other humans or for infrastructures (Mol, Moser, and Pols 2020) that is contrasted with paid work in digital sociomaterial environments (Tischberger 2026; Oechslen 2023). Each chapter addresses the (in)visibility of work on and in the digital and focuses on the practice of repairing as a continuous process of care and maintenance in different settings. In the broad conception of work, as a practice used here, it always goes hand in hand with the linking of present action and the designing and shaping of futures and/or counter communities, as the contributions collected in this volume also reveal.

In her chapter on the production of online DIY repair advice, Ronja Trischler focuses on a specific form of voluntary work within the sociomaterial entanglement of an online repair advice platform. She describes giving repair advice on concrete material problems online as a process that requires both translation and intermediation and that is facilitated by voluntary moderators. Inga Reimers analyzes and discusses the materializations of digital-based work in rural coworking spaces. In her chapter, she describes the practice of coworkers and coworking hosts as a matter of care and repair for both the working spaces and the rural areas in which they are located. While the invisibility of repair and work processes is often a matter of social "blindness," Johanna Fischer examines the self-perception of programmers who often make their own work and repair services disappear behind automation processes in machine learning. She combines the concepts of labor, work, and action (according to Hannah Arendt) with current perspectives from science and technology studies in order to describe the material and epistemic practice of programmers. The challenges of access to digital spaces, such as video conferences for deaf and/or blind disability communities are the primary subject of Hanna Göbel's contribution. She uses a pre-enactment of access to discuss time-intensive forms of

translations and develops repair scenarios through which to enable data-intensive environments based on research related to smart solutions for disability communities.

## Context

The idea for this edited volume, and the accompanying analytical perspective, were collectively developed at HafenCity University Hamburg (HCU) during the transformation of the study program "Metropolitan Culture" into a more digitalization-oriented degree program. The contributing authors in this edited volume are both junior and senior scholars, formerly or currently researching, teaching, and working at HCU, as well as a few research scholars who were invited in order to enable a dialog between various disciplines, such as cultural anthropology, sociology, science and technology studies, media studies, and geography. This collection can also be seen as a continuation of a critical tradition in the HCU study program, which is located at the intersection of urban spatializations, digital transformations, and cultural productions.

Many people have contributed to this collection. Raphael Schwegmann, who teaches in our study program, participated in early meetings and discussions about this project. Doctoral students Sophia Leipert, Zita Seichter, and Sebastian Wucherer, who all present their research in this collection, initially served as section editors. Sebastian Wucherer also provided valuable support during the review process by providing additional feedback on several chapters. Students Luise Brandt and Michelle Ciesla, as well as doctoral student Maja-Lee Voigt, helped us to adapt the references of the manuscripts. A Master's student, Alexandra Knapke, also generously allowed us to use a photo for the book cover. Thank you all for the great collaboration.

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## References

Benjamin, Ruha (2019) *Race after Technology: Abolitionist Tools for the New Jim Code.* New York: Wiley.

Boyd, Danah and Crawford, Kate (2012) Critical Questions for Big Data: Provocations for a cultural, technological, and scholarly phenomenon, *Information, Communication & Society*, 15(5), pp. 662–679.

Browne, Jude, Cave, Stephen, Drage, Eleanor, and McInerney, Kerry (eds.) (2023) *Feminist AI: Critical Perspectives on Algorithms, Data, and Intelligent Machines.* Oxford: Oxford University Press.

Burton, Anthony Glyn, Chun, Wendy Hui Kyong, et al. (2023) *Algorithmic Authenticity.* Lüneburg: Meson Press.

Gabrys, Jennifer (2022) Programming Nature as Infrastructure in the Smart Forest City, *Journal of Urban Technology*, 29(1), pp. 13–19.

Gillespie, Tarleton (2014) The Relevance of Algorithms. In Gillespie, Tarleton, Boczkowski, Pablo J., and Foot, Kirsten A. (eds.) *Media Technologies: Essays on Communication, Materiality, and Society.* Cambridge, MA: MIT Press, pp. 167–194.

Gillespie, Tarleton (2024) Generative AI and the politics of visibility, *Big Data & Society*, 11(2), pp. 1–14.

Halpern, Orit and Mitchell, Robert (2023) *The Smartness Mandate*. Cambridge, MA: MIT Press.

Horn, Carsten and Felt, Ulrike (2025) Collateral transitions: Reassembling societies, data centers and the twin transition, *Environmental Science and Policy*, 170.

Jarke, Juliane, Prietl, Bianca, Egbert, Simon, Boeva, Yana, Heuer, Hendrik, and Arnold, Maike (eds.) (2024) *Algorithmic Regimes: Methods, Interactions, and Politics*. Amsterdam: Amsterdam University Press.

Jasanoff, Sheila (ed.) (2004) *States of Knowledge: The Co-Production of Science and Social Order*. London and New York: Routledge.

Kitchin, Rob (2014) *The Data Revolution: Big Data, Open Data, Data Infrastructures & Their Consequences*. London: SAGE Publications.

Mattern, Shannon (2021) *A City Is Not a Computer: Other Urban Intelligences*. Princeton, NJ: Princeton University Press.

Mol, Annemarie, Moser, Ingunn, and Pols, Jeannette (eds.) (2020) *Care in Practice: On Tinkering in Clinics, Homes and Farms*. Bielefeld: transcript.

Noble, Safiya Umoja (2018) *Algorithms of Oppression: How Search Engines Reinforce Racism*. New York: New York University Press.

Oechslen, Anna (2023) *Global Platform Work: Negotiating Relations in a Translocal Assemblage.* Frankfurt a.M. and New York: Campus Verlag.

Orr, Will and Crawford, Kate (2024) The social construction of datasets: On the practices, processes and challenges of dataset creation for machine learning, *New Media & Society*, 26(9), pp. 4955–4972.

Robert, Tony and Oosterom, Marjoke (2024) Digital authoritarianism: A systematic literature review, *Information Technology for Development*. Available at: https://doi.org/10.1080/02681102.2024.2425352.

Saetnan, Ann Rudinow, Schneider, Ingrid, and Green, Nicola (eds.) (2018) *The Politics of Big Data: Big Data, Big Brother?* Abingdon, UK and New York, NY: Routledge.

Seaver, Nick (2017) Algorithms as Culture: Some Tactics for the Ethnography of Algorithmic Systems, *Big Data & Society*, 4(2), pp. 1–12.

Seaver, Nick (2024) Living with Algorithms: Agency and User Culture in Costa Rica, *Journal of Anthropological Research*, 80(1), pp. 82–83.

Seyfert, Robert and Roberge, Jonathan (eds.) (2016) *Algorithmic Cultures: Essays on meaning, performance and new technologies*. Routledge Advances in Sociology. Abingdon, UK and New York: Routledge.

Tischberger, Roman (2026) *Fragile Verbindungen. Erwerbsarbeit, Unternehmenskultur und Konnektivität in der Software-Entwicklung*. Frankfurt a.M. and New York: Campus Verlag.

van Dijck, José (2014) Datafication, dataism and dataveillance: Big Data between scientific paradigm and ideology, *Surveillance & Society*, 12(2), pp. 197–208.

Vertesi, Janet and Ribes, David (eds.) (2019) *digitalSTS: A Field Guide for Science & Technology Studies*. Princeton, NJ: Princeton University Press.

Vonderau, Asta (2018) Scaling the Cloud: Making State and Infrastructure in Sweden, *Ethnos*, 84(4), pp. 698–718.

Wajcman, Judy and Young, Erin (2023) Feminism Confronts AI: The Gender Relations of Digitalisation. In Browne, Jude, Cave, Stephen, Drage, Eleanor, and McInerney, Kerry (eds.) (2023) *Feminist AI: Critical Perspectives on Algorithms, Data, and Intelligent Machines.* Oxford: Oxford University Press, pp. 47–64.

Westerlaken, Michelle, Gabrys, Jennifer, Urzedo, Danilo, and Ritts, Max (2023) *Unsettling Participation by Foregrounding More-than-Human Relations in Digital Forests.* Available at: https://doi.org/10.17863/CAM.87777.

Wyatt, Sally, Henwood, Flis, Miller, Nod, and Senker, Peter (eds.) (2000) *Technology and In/Equality: Questioning the Information Society*. London and New York: Routledge.

Ziewitz, Malte (2016) Governing Algorithms: Myth, Mess, and Methods, *Science, Technology & Human Values*, 41(1), pp. 3–16.

Zuboff, Shoshana (2019) *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. New York: Public Affairs.