Digital Transformations

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Digital Transformations

Social and Ethical Consequences of Rapid Technological Change

Edited by

Cathrine E. Tømte
Professor, Department of Information Systems and CeDiT – Center for Digital Transformation, University of Agder, Norway

Jarle Trondal
Professor, ARENA Centre for European Studies, University of Oslo, Department of Political Science and Management and CeDiT – Center for Digital Transformation, University of Agder, Norway, and Senior Fellow, Institute of European Studies, University of California, Berkeley, USA

Alexander Ruser
Professor, Department of Sociology and Social Work and CeDiT – Center for Digital Transformation, University of Agder, Norway

with
Gloria Ziglioli
Researcher and Lecturer, CeDiT – Center for Digital Transformation, University of Agder, Norway

Cheltenham, UK • Northampton, MA, USA

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

© The Editors and Contributing Authors Severally 2026

Every effort has been made to trace all the copyright holders but if any have been inadvertently overlooked please notify the publisher.

This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license. Without limiting the author's and publisher's exclusive rights, any unauthorised use of this publication to train generative artificial intelligence (AI) technologies is expressly prohibited.

Published by

Edward Elgar Publishing Limited
The Lypiatts
15 Lansdown Road
Cheltenham
Glos GL50 2JA
UK

Edward Elgar Publishing, Inc.
William Pratt House
9 Dewey Court
Northampton
Massachusetts 01060
USA

Authorised representative in the EU for GPSR queries only: Easy Access System Europe – Mustamäe tee 50, 10621 Tallinn, Estonia, gpsr.requests@easproject.com

A catalogue record for this book is available from the British Library

Library of Congress Control Number: 2026937631

This book is available electronically in the Elgaronline Sociology, Social Policy and Education subject collection
https://doi.org/10.4337/9781035361229

ISBN 978 1 0353 6121 2 (cased)
ISBN 978 1 0353 6122 9 (eBook)
ISBN 978 1 0494 0704 3 (ePub)

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Contents

List of contributors vii

Introduction to digital transformations 1
Cathrine E. Tømte, Jarle Trondal, Gloria Ziglioli and Alexander Ruser

1 A sociological theory of media and digitalisation 16
Dirk Baecker

PART I DIGITAL GOVERNANCE

2 Digital transformation readiness: evaluating Dutch municipalities' compliance with the AI Act 38
Willem Bantema, Trix Mulder and Soner Korucu

3 Navigating waters and algorithms: lessons from ships in developing a liability regime for AI 56
Rufat Babayev

4 Artificial intelligence and the governance of smart cities in Africa: possibilities and constraints 76
Alhassan Yakubu Alhassan and Abdul-Rahim Abdulai

PART II DIGITAL CITIZENSHIP

5 When public servants need to help non-digital and partially digital citizens 100
Carl Erik Moe and Margunn Aanestad

6 The interplay of blockchain technologies and citizenship 112
Martin Rolf Herbers

7 Challenges of citizen e-participation in shaping urban mobility policy: state of research 126
Bernardo Valente

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

8 Creation and captivation: analysing professional agency among teachers utilizing immersive technology in SEN education 161
Martin Smith-Gahrsen

PART III RESPONSIBLE AND ETHICAL DIGITAL TRANSFORMATION

9 The ethical dilemmas of building a safe society 184
Jaanika Puusalu

10 Assistive robots in Italian and Norwegian healthcare: how do contextual conditions shape the path of innovation, and what implications does this have for policy? 202
Ivan Galligani and Gloria Ziglioli

11 Artificial intelligence, professions and the meaning of work 222
Mateja Vodiškar and Caroline Ruiner

12 Artificial intelligence and inclusive education: a critical look from a pedagogical perspective 244
Silvia Zanazzi and Cathrine E. Tømte

Index 266

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

List of contributors

Margunn Aanestad is Professor at the Department of Informatics at the University of Oslo, Norway and also affiliated with the Department of Information Systems, University of Agder, Norway. She is interested in how digital technologies impact organizations and societies. Based on extensive empirical research, primarily in the healthcare sector, she has addressed the sociotechnical complexity of information infrastructures.

Abdul-Rahim Abdulai is a post-doctoral fellow at the Alliance Bioversity International and CIAT, Cali-Columbia. His research interests center on governance and political economy of food systems, digital agriculture, socio-technical transitions, and rural-urban planning. Abdul-Rahim has written extensively on the digitalization of smallholder agriculture in Africa. His work has informed and shaped the early discourse of smallholder digitalization, especially in areas of the political economy of emerging digital technologies.

Alhassan Yakubu Alhassan is Lecturer at the Department of Global Development and Planning at the University of Agder. He holds a PhD from the University of Agder, where he examined how actor networks shape urban decision-making. His research interests span multiple fields, including political ecology, sustainable development, climate change, digitalization, and social change.

Rufat Babayev is Lecturer in Law at the University of Leicester. His research interests include the intersection of emerging technologies and traditional legal frameworks, particularly in relation to liability and regulatory adaptation.

Dirk Baecker is a sociologist and professor emeritus for Culture Theory and Management at the University of Witten/Herdecke. He studied systems theory with Niklas Luhmann and received his doctorate and habilitation at the University of Bielefeld. He has written numerous publications in the fields of sociological theory, culture theory, economic sociology and organisation research. His most recent publications are: *4.0 or Die Lücke die der Rechner*

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

lässt (Merve, 2018*), Intelligenz, künstlich und komplex* (Merve, 2019), *Wozu Wirtschaft?* (Metropolis, 2020).

Willem Bantema is Professor (lector) of Public Administration in a Digitalising Society at NHL Stenden University of Applied Sciences (the Netherlands). His work explores both the risks and opportunities posed by emerging technologies for public policy, enforcement, and service delivery. Through multidisciplinary research at the intersection of law, governance, and public safety, he aims to support public institutions in strengthening societal (digital) security through effective and responsible governance.

Ivan Galligani is a postdoctoral researcher in sociology at the University of Bergamo. He is currently studying digitalization processes in healthcare and welfare.

Martin Rolf Herbers is the head of the Centre for Political Communication and the lead researcher of the international and interuniversity network of political communication (netPOL) at Zeppelin Universität, Friedrichshafen, Germany. His research focusses on the transformative interplay of democracy, technology, and public communication.

Soner Korucu is a lecturer-researcher in IT Law & Legal Tech at the Hanze University of Applied Sciences in Groningen, the Netherlands. He conducts research within the research group Legal Aspects of Entrepreneurship. His work focuses on the legal dimensions of digitisation, particularly at the intersection of technology and law. He specializes in areas such as data protection, AI regulation, and the legal consequences of digital transformation in (government) organisations.

Carl Erik Moe is Professor at the Department of Information Systems, University of Agder. He served as department head for a number of years, but stepped back in 2024, to focus on research. His research interests cover digital government, e-health, implementation of information systems, and digital divide.

Trix Mulder is Professor of Legal Aspects of Entrepreneurship at Hanze University of Applied Sciences in Groningen, the Netherlands. Her research delves into the dynamic interface between ICT and law, addressing key issues such as data exchange, privacy, and the growing influence of artificial intelligence (AI).

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Jaanika Puusalu obtained her PhD in philosophy from the University of Exeter (UK) and is a Researcher at the Research Centre of the Internal Security Institute at the Estonian Academy of Security Sciences. Her current research focusses on analysing the challenges that digitally enhanced states are facing in terms of providing security and well-being for their residents. Her research is also more generally concerned with new technology and data use in relation to internal security.

Caroline Ruiner is Professor of Sociology and Prorector for Digital Transformation and Sustainability at the University of Hohenheim in Germany. She received her doctorate at the University of Augsburg and habilitated at Ruhr University Bochum in Germany. Her research focuses on the effects of digitalization on individual and organizational levels as well as the interrelation of digitalization with sustainability.

Alexander Ruser is Professor of Sociology at the Department of Sociology and Social Work and Director of the Centre for Digital Transformation (CeDiT) at the University of Agder, Norway. He holds a PhD from the Max-Weber-Institute of Sociology at Heidelberg University and was a Dahrendorf Postdoctoral Fellow at the Hertie School of Governance in Berlin, the London School of Economics and Political Sciences, a visiting fellow at Punjab University, Chandigarh and the Indian Institute of Advances Studies. Current research projects focus on the role of think tanks, the impact of scientific expertise on climate politics and the emergence of digital and hybrid networks.

Martin Smith-Gahrsen is a PhD candidate and Assistant Professor at the Department of Religion, Philosophy and History, the University of Agder (UiA). His research interests include the use of immersive technologies in religious and special education and its epistemological implications, as well as action-study methodology and digital competence.

Cathrine E. Tømte is Professor at the Department of Information Systems at the University of Agder, and Deputy Director of CeDIT, Centre for Digital Transformation. She is also visiting Professor (Professor II) at SLATE, Centre for the Science of Learning and Technology, University of Bergen. Her research interests include digital technologies, society, and education.

Jarle Trondal is Professor of Political Science at the University of Agder, Department of Political Science and Management and at the University of Oslo, ARENA Centre for European Studies. He is also a Senior Fellow at University of California, Berkeley, Institute of European Studies. His research

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

interests focuses on theories of governance, decision-making, public policy and administration, European multilevel governance, international bureaucracy, and crisis and turbulence in public affairs.

Bernardo Valente PhD candidate, Institute for Governance and Public Policy (IGOP) at the Universitat Autònoma de Barcelona (UAB) with research interests related to innovation policy to improve democracy, public participation in decision-making and Public Policy Evaluation. He is also a Lecturer and Research Fellow at the Centre for Administration and Public Policy at the University of Lisbon, where he develops his research on how the digital transition in urban environments might enhance or hinder the levels of democracy.

Mateja Vodiškar is a doctoral candidate, researcher, and lecturer at the University of Hohenheim in Germany. Her research focuses on digitalization, artificial intelligence and professions as well as the meaningfulness of work.

Silvia Zanazzi has a PhD in Educational Research from Sapienza University of Rome, Italy. She has worked as a Researcher and Adjunct Professor at Sapienza University of Rome, University of Rome Tor Vergata, University of Salerno, and University of Ferrara, where she is currently an Associate Professor of Education. Her main research interests are inclusive education; experiential learning; metacognition and reflective practices in educational contexts.

Gloria Ziglioli is a doctoral candidate in sociology, researcher, and lecturer at the University of Agder in Norway. Her research focuses on digitalization processes in the context of welfare state innovation on policy and organizational levels.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Introduction to digital transformations

Cathrine E. Tømte, Jarle Trondal, Gloria Ziglioli and Alexander Ruser

> Success in creating AI would be the biggest event in human history. Unfortunately, it might also be the last, unless we learn how to avoid the risks. (Stephen Hawking, 2016).

Technological advancement and digital transformation are ubiquitous topics in public, political, and academic debates. Moreover, the prospects, promises, and pitfalls of new technologies provoke strong responses. Enthusiasts emphasize new business opportunities, innovative potential for addressing urgent social challenges, and a spirit of 'progress' associated with new digital technologies and artificial intelligence (AI) (Goralski and Tan, 2020; Stahl, 2021). Pessimists warn of the dawning of a new age of surveillance, and shifting power imbalance (Zuboff, 2022); they lament the risk of large-scale job loss (Aubert-Tarby et al., 2018; Bergfeld, 2024), and concentration of wealth and influence in the hands of a small elite of tech-entrepreneurs (Brockmann et al., 2021); and debate the erosion of democratic culture under the onslaught of bites and bots and an out-of-control digital space that breeds 'fake news' and leads to ever more political polarization (Ruffo et al., 2023). The intensity and polarization of these debates are perhaps more evident in the current discussions on AI. Despite being often vaguely defined, AI is subject to heated debates: optimists point to the innovative possibilities of AI in societal transformation and the prospects for scientific research and knowledge production (Grossmann et al., 2023); others, including the 'godfather of AI', Geoffrey Hinton, warm that AI could 'wipe out humanity' (Egan, Gosh and Kim, 2025).

Regardless of which perspective one shares, it becomes increasingly apparent that thorough, concise, comprehensive and interdisciplinary analyses of the social and ethical consequences of digital technologies are academically interesting and necessary for helping decision-makers and citizens to seize opportunities and navigate evolving and unforeseen risks.

This book is an attempt to respond to this growing academic curiosity and practical need for social science research on digital transformation. It brings together scholars and scholarly perspectives from a variety of social

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

science disciplines to address selected problems and consequences of digital transformation.

We invited scholars across Europe to contribute with original manuscripts addressing emerging issues on various societal impacts caused by digital technologies. We were particularly interested in contributions that explore topics that touch upon governance, citizenship, and responsible and ethical perspectives. Drawing on the submitted contributions, this Introduction outlines and specifies key concepts that frame the overall aim and scope for the book. These include a general understanding of transformation as fundamental changes that typically emerge and evolve over time in which units of analysis substantially shift essential parametres. This does not require entire systems, institutions or policies to fundamentally change all of these, but that sufficient changes occur in some of them, leading to significant, observable and recognized alternations in how they work overall. Such changes may occur swiftly and abruptly, as typically driven by crisis-induced transformation; or slowly, as may be driven by multiple incremental changes that co-evolve and accumulate over time into transformative change. Transformations are thus seen as evolutionary rather than revolutionary, and both possibilities remain open to empirical scrutiny. Moreover, transformation may be conceived of both as a process and as an outcome, and the book aims to cover both usages of the concept. Finally, transformation may happen at different levels of aggregation and analysis: micro-level (agential-level) changes among decision-makers and citizens, meso-level (institutional or policy level) changes among governing institutions and within varieties of policy domains, and macro-level (polity-level) change that involves changes to the overall governing system. We also assume that changes at one level are likely to lead to changes at other levels, leading to transformative co-evolution across levels (for example, digital transformation within specific policy domains or institutions is likely to modify the behavioural practices among individual decision-makers). Returning to the case of AI presented earlier as an illustrative example, the rise of institutional capacities within national governments to handle the emergent European Union AI Act is likely to attract the attention of government decision-makers to the need to modify and change established governing practices and administrative institutions governing AI (Novelli et al., 2025).

A general understanding of digitization involves converting analogue information into digital form (Bloomberg, 2018; Osmundsen et al., 2018). This process focuses on transforming specific output into digital data. Digitalization, on the other hand, refers to how digital tools and platforms influence social and organizational interactions (for example, moving from 'snail mail' to email), with automation being a key aspect (Osmundsen et al., 2018). Digital transformation (DT) encompasses broader organizational changes and the implementation of digital solutions, and based on a literature review, Vial suggests that

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

it can be approached as follows: 'where digital technologies create disruptions triggering strategic responses from organizations that seek to alter their value creation paths while managing the structural changes and organizational barriers that affect the positive and negative outcomes of this process' (Vial, 2021: 118).

FROM PROMISES TO PROBLEMS (AND BACK)? MAKING SENSE OF DIGITAL TRANSFORMATION, DIGITAL GOVERNANCE AND DIGITAL CITIZENSHIP

Digital technologies come with many promises: digital communication brings people together, simplifies workflows, allows for 'remote working', helps to sustain personal relationships, and dramatically contributes to democratizing access to and the distribution of information. Digital platforms can make life easier and more inclusive. People can book travel, do their shopping and access a vast variety of entertainment options without leaving their home. Digital technologies also allow older people and persons in need of care, information and support to access these remotely, hence allowing them to stay in their familiar contexts and reducing the burden of modern welfare states. Moreover, digital technologies may impact upon education in terms of how and when we learn (Fevolden and Tømte, 2015), by flexible online offerings, independent of time and space. In this way, students in remote areas or with limited access to university campuses may participate in online courses and access their higher education institution via online learning platforms (Pinheiro et al., 2023; Wang et al., 2024). Industries are believed to be becoming more innovative, greener and leaner by implementing digital processes (Wei and Sun, 2021), and democratic participation should equally benefit from an abundance of information freely available to citizens tasked with making informed decisions (Fuchs, 2022).

All these promises are to a certain extent coming true. Nevertheless, the initial enthusiasm that could for example be found in early research on digital citizens (Kirschner, 1991; Ogden, 1994) has been replaced by more cautious and at times pessimistic accounts. Rather than strenghtening democracy, digital technologies and particularly AI are seen as potential threats. This is partially connected to the emergence of new 'techno-feudal' structures that facilitate the concentration of power in the hands of a small elite (Gilbert, 2024) and the transformation of capitalism into a data-driven economy that commodifies personal information at an unprecedented scale (Zuboff, 2022), and is partially intertwined with the social adoption of technologies themselves. Social media platforms could serve as reliable switchboards for information and peer-to-peer communication; however, they can also be echo-chambers and hotbeds for 'alternative facts', conspiracy theories and political propaganda (Geiß et al.,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

2021). Likewise, remote learning can be a powerful tool for inclusion, but it can also further increase the standardization of education and impoverish learning experiences (de Andrade et al., 2023). Companies can use digital technologies to offer more flexible, sustainable jobs, but they can also invest in surveillance technologies, cut jobs and contribute to less secure jobs (Cousineau et al., 2023).

These shifts in perspective are highly consequential for social research on digital technologies, since they affect which aspects or questions are deemed worthwhile of scholarly attention and which approaches and concepts should be utilized. Early research on democracy and digital citizenship focused on the aspect of digitalization understood as the process of converting analog material into digital sources (Osmundsen et al., 2018). This rather limited conceptualization of how processes (for example, the acquisition of knowledge or the sharing of information) change in and through digital resources echoed an understanding of digital technologies that could not fully grasp their transformative potential. Michael Ogden's 'netizens' (Ogden, 1994) – an early term for 'digital citizens' – for example, were hardly different from their grandparents. They tried to obtain politically relevant information by consulting 'reliable sources'. In contrast to their ancestors, though, they had access to the internet and instead of writing letters to the editors of national newspapers, they dared to set foot in a rudimentary chatroom. The difference was mainly quantitative: netizens could access information quicker and more easily. Sharing information was cheaper, less cumbersome and more direct. What Ogden's (1994) early study largely ignored and could not foresee was the transformative potential of digital technologies. Social media, for example, did not make it easier to access 'reliable information', but they changed our very understanding of reliability and information.

To capture the more comprehensive and reflexive nature of digital technologies, researchers therefore increasingly refer to concepts such as digital transformation (Mergel et al., 2019; Vial, 2021; Verhoef et al., 2021) and seek to apply it to a variety of social challenges. Initial studies show that digital technologies can have far-reaching consequences for organization and management (Plekhanov et al., 2023), affect educational policies and learning (Mukul and Büyüközkan, 2023; Tømte et al., 2019), transform public healthcare in both the diagnostic process and the provision of services (Greenhalgh et al., 2017), and pose new challenges for public administration and governance in differentiated multilevel governance systems (Novelli et al., 2025). Moreover, research is increasingly uncovering the ambivalent role of digital technologies in the pursuit of social and ecological sustainability (Selwyn, 2025).

Extant social science research on digital transformation has demonstrated that digital technologies cannot be understood without considering the specific, socio-historical context in which they are operating (Pinheiro et al., 2023). Nor

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

can we assume that digital technologies effectively transform societies and societal sectors without friction and inertia based on pre-existing institutional legacies and policy path-dependencies (March and Olsen, 1989). Digital transformation is hence a complex and intertwined social, economic and political challenge to individual actors, institutions and societies. The process of digital transformation is riddled with uncertainties and unpredictabilities, and plausibly shaped by competing preferences, public and private resources, institutional rules and path-dependent layering, organizational capacities, and pre-existing norms and beliefs. It can thus be deemed both a success and a failure, subject to democratic debate or clandestine lobbying.

Transformation thus exceeds the simple introduction of new technologies. It has the potential to alter social practices, for instance the way in which people collect and process information, communicate and distribute information, and draw boundaries between their private and public speres. Moreover, digital transformation includes large-scale changes to the economic and political structures and can have profound implications for states, labour markets and educational systems. To capture the range and the intricacies of comprehensive transformation processes it is indispensable to develop an interdisciplinary understanding of and to create cross-disciplinary research perspectives on digital transformation. This book aims to contribute to this challenging and emergent agenda.

The book further expands our understanding of digital transformation by looking into how various areas of society are impacted upon by various digital technologies and AI. In so doing, three key pillars of society are studied, namely governance of the digital transformation, digital citizenship, and responsible and ethical digital transformation. In the following, we provide a short introduction to these elements.

GOVERNANCE AND DIGITAL CITIZENSHIP

This book conceives of governance as the process through which the steering of society takes place (for an overview of various conceptualizations of governance, see Ansell and Torfing, 2016). Most cases of governance presumably aim at steering society directly though government regulations and budgeting. However, some governance steers society indirectly by reforming the government apparatus itself; its structure, recruitment and location. 'Meta-governance' denotes deliberate attempts at governing by (re)organizing, thereby governing societies indirectly (Jacobsson et al., 2015). (Meta-)governance is not only about making formal decisions, but also about agenda-setting, development of alternative policy directions, implementation and learning. In practice it consists of legislation, budgets, policy programmes and the application of law ('governance'), as well as (re)organizing, (re)staffing and (re)

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

locating the machinery of government ('meta-governance') (see Egeberg and Trondal, 2018). Governance thus encompasses more than the formal decisional cycle consisting of the adoption of laws and regulations to steer society, and involves all aspects and phases of actual decision-making, from agenda-setting to formal vote and final learning from experience. In short, governance encompasses endless streams of premises from which choices occasionally happen (Simon, 1965).

The concept of digital citizenship has evolved significantly over the past two decades. Early understandings focused on access, skills and responsible behaviour online, whereas more recent studies emphasise civic engagement, identity, ethics and the structural dimensions of digital life. For example, an initial framing, Mossberger et al., (2007), described digital citizens as those who use the internet regularly and effectively, linking such participation to civic engagement and economic opportunity. Around the same period, Ribble and Bailey (2011) introduced the widely cited 'nine elements' of digital citizenship: digital access, commerce, communication, literacy, etiquette, law, rights and responsibilities, health and wellness, and security. These frameworks conceptualized digital citizenship in terms of what individuals must be able to do to participate in the digital environment, with strong emphasis on bridging the digital divide, ensuring access, and promoting responsible or safe behaviour online. In recent years, the notion of digital citizenship has expanded beyond functional skills. Scholars have highlighted dimensions of civic agency, democratic participation and social justice. For example, Heath (2018) argues that digital citizenship should encompass responsible technology use and critical engagement with societal issues. This shift has also brought attention to ethical and political concerns, such as digital rights, privacy, identity and the governance of online platforms.

More recent research acknowledges that digital infrastructures, datafication and algorithmic systems shape how citizenship is practiced and experienced. The increasing entanglement of online and offline life, the so-called post-digital condition, has further blurred traditional boundaries, positioning digital citizenship as a holistic practice across contexts rather than a separate 'online' domain (Villar-Onrubia et al., 2022; Webster, 2024). Another development is the multidisciplinary effort to conceptualize and measure digital citizenship. While early approaches often approached digital citizenship in terms of quantitative instruments measuring access and skills, more recent studies employ mixed methods to capture the complexity of digital participation and its socio-cultural dimensions (Choi, 2016). In other words, 'digital citizenship' has developed from a narrow focus on access and responsible use into a richer concept that encompasses civic engagement, ethics and critical awareness of digital infrastructures. This evolution reflects the growing embeddedness of digital technologies in everyday life, raising new questions about inclusion,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

rights, power, and the responsibilities of both individuals and institutions. This book further elaborates on these matters.

RESPONSIBLE AND ETHICAL DIGITAL TRANSFORMATION

Perhaps the most important, and certainly the most challenging, task for governing digital transformation is to develop and justify its normative foundation. A typical policy response to this challenge is to call for 'responsible' and 'ethical' digital transformation. Digital technologies should be 'inclusive' rather than deepening existing digital divides and contributing to social inequalities. AI should be 'human centred' rather than putting pressure on jobs and privacy rights. It should also be 'sustainable' at all scales of aggregation. Societies are faced with the difficult task to develop legally binding regulations and, more importantly, to debate ethical standards and limits for the use of digital technologies. Incidents such as the Cambridge Analytical scandal (Hinds et al., 2020) exposed the vulnerability of contemporary democracies and highlighted the potential to use algorithms for nefarious ends. Calls for a responsible and ethical digital transformation should not blind us to the fact that any socially acceptable use of digital technologies will be contested, and visions of ethical and responsible governance of digital technologies involve and provoke disagreement about what is acceptable and desirable (Mager and Katzenbach, 2021).

Research on 'responsible digital transformation' arguably must take into account that public debate is inevitably coloured by competing interests, informed by potentially conflicting normative convictions. Moreover, social science research must probe into the contexts of these debates and raise questions of agency and power (who is responsible?), conflicting practical and normative goals (what are we responsible for?) and the legitimacy of conflict and disagreement (is it always possible to demarcate responsible from irresponsible use of technology?). Moreover, equally complex is the ethical dimension. Ethical standards are notoriously contested, hard to implement and often closely related to collective interests. Achieving ethical digital transformation therefore requires not a mere and generalist appeal to ethics but rather a debate about the philosophical foundations, the reach and, most importantly, the codification of ethical principles into (binding) law.

This book challenges and perhaps also expands our understanding of these concepts. As noted, the concepts can be grounded in disciplinary traditions and may have different interpretations and understandings linked to them. While we set our shared understanding of digital transformation – and selected key dimensions of it – as a guiding definitional frame for each chapter in the book, the book allows contributors to engage with these aspects through their

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

respective disciplinary lenses, therefore fostering dialogue across disciplines, approaches and methodologies.

STRUCTURE OF THE BOOK

The book opens with Chapter 1 on 'A sociological theory of media and digitalization' that explores the interplay between digital transformation and communication. The chapter raises the question of how digital context can prompt or prevent new ideas, and hence sets the tone for the book that conceives of digital transformation as a comprehensive and multifaceted process which can affect individual behaviour and social and political structures, and demands new empirical insights and fresh theoretical thinking.

Following this conceptual groundwork, the book has 11 chapters grouped in three fields of observation: Part I: Digital governance; Part II: Digital citizenship; Part III: Responsible and ethical digital transformation.

Part I includes three chapters studying digital governance from the complementary perspectives of public administration, law and sociology. Overall, these chapters focus on the structure and major elements of public governance of AI from the experiences of European and African countries. Chapter 2, 'Digital transformation readiness: evaluating Dutch municipalities' compliance with the AI Act', addresses the readiness of Dutch municipalities for integrating AI into their operative working practices by 2026, as a compliant effort to the AI Act issued by the European Commission. Combining survey data with interviews with municipal representatives, the authors identified a symbolic form of compliance reflecting a fragmented governance of AI across municipalities, hindered by limited legal expertise, disparities in digital infrastructure, and ethical uncertainties. They propose initiatives targeting AI literacy and intermunicipal collaboration to generate substantive compliance and meaningful institutional change. Chapter 3, 'Navigating waters and algorithms: lessons from ships in developing a liability regime for AI', offers a conceptualization of a liability regime for AI by drawing from maritime law. In particular, the chapter argues that principles such as maritime lien, personification and mutual insurance can serve as a blueprint for a liability regime for AI, as both ships and AI systems share multirisk, multiparty and multijurisdictional operational frameworks. Chapter 4, 'Artificial intelligence and the governance of smart cities in Africa: possibilities and constraints', proposes a comparative analysis of AI in the governance of smart city initiatives in several African cities: Accra (Ghana), Nairobi (Kenya), Praia (Cape Verde) and Johannesburg (South Africa). The chapter demonstrates that while AI has the potential of enhancing transparency and accountability in the governance of smart cities, several issues limit its integration into existing urban governance structure. Beside the technical challenges, the chapter identifies infrastructural deficits,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

strategic management, ethical concerns such as spatial and socio-economic digital divide, and privacy risks as significant barriers. The study stresses the requirement for governance models that are inclusive and responsive to local contexts, guaranteeing an ethical development of AI that respects Africa's rich cultural diversity and historical backgrounds.

Part II focuses on digital citizenship and includes four chapters on the transformation of citizenship in the digital age, and relationships and interactions between the state and the citizens due to the digitalization process. Chapter 5, 'When public servants need to help non-digital and partially digital citizens', looks to Norway and how the concept of 'digital citizens' relates to the actual work done by public servants while securing access and utilization of health and welfare digitalized services to 'non-digital' and 'partially digital' citizens. The chapter analyses survey data from health personnel in primary healthcare showing nurses to be involved in providing basic technical help to 'non-digital' and 'partially digital' citizens, often responding to requests that go beyond strictly care-related issues, simply because they are seen as accessible and trusted points of reference. It is also argued that, in order to realize the benefits associated with the use of digital public services, nurses need training, and clearer guidelines should be provided. Chapter 6, 'The interplay of blockchain technologies and citizenship', studies how three European countries (Liechtenstein, Switzerland and Estonia) have integrated blockchain technologies in their civic frameworks, and the implications for citizens within these nations. The chapter introduces the concept of 'ledger-based citizenship', referring to the changes brought in by blockchain technology on cultural citizenship: political participation becomes decentralized, and individual agency, identity expression and self-sovereignty is enhanced. Yet, both at the level of single citizens and in the interactions between citizens and institutions, the implementation of blockchain technology entails security, privacy and other ethical risks to be carefully considered. Chapter 7, 'Challenges of citizen e-participation in shaping urban mobility policy: state of research', discusses the challenges and bottlenecks of citizens' e-participation experiences in urban mobility policy development. Based on a systematic literature review, the chapter identifies three main bottlenecks, namely transparency, tensions in citizens–government interactions, and barriers emerging from the use of technology itself. Therefore, the chapter suggests that policymakers develop context-sensitive strategies which account for regional, technological and social diversity, rather than simply adopting advanced digital platforms. Success of these initiatives also depends on the training of both citizens and civil servants, an aspect that should receive more attention and investment. Chapter 8, 'Creation and captivation: analysing professional agency among teachers utilizing immersive technology in Special Education Needs, SEN, education', discusses the results of a qualitative thematic analysis of teachers-in-training

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

reflection papers about virtual and augmented reality in education (special education needs), in the context of a Norwegian university. Teachers in training created immersive virtual scenes and reported a perception of having successfully developed these digital products, leading to positive impacts on student engagement and development of teachers' professional agency. However, despite these positive outcomes, the author discusses teachers' concerns for technological barriers, particularly related to the complexity of the tools, and the significant demands on time and resources required for an effective implementation and utilization.

Part III focuses on responsible and ethical digital transformation. This part includes four chapters contributing to the discussion from both conceptual and empirical perspectives while addressing processes of (different kind of) technology implementation in various sectors of society. Chapter 9, 'The ethical dilemmas of building a safe society', adopts Habermas's theory of communication to elucidate ethical dilemmas in using (also automated) data-driven technologies for internal security. The chapter discusses such dilemmas from the perspectives of society, the state and individuals. The implementation of these technologies in the context of internal security forces the state to balance the pursuit of greater societal safety through mass data collection with the protection of individual privacy rights, generates social tension between collective and personal security and freedom benefits, and exposes individuals to choosing whether to trust the state as data collector and manager or to resist forms of data sharing in an increasingly surveilled public space. Chapter 10, 'Assistive robots in Italian and Norwegian healthcare: how do contextual conditions shape the path of innovation, and what implications does this have for policy?', offers a comparative analysis of socio-technical dimensions shaping the implementation of robots in Italy and Norway, similarly exposed to technological innovations and having the healthcare systems organized around universal coverage and public funding, but with different institutional and cultural orientations. By comparing these cases, the chapter highlights enabling and constraining factors associated with both of these governance frameworks, the prevalent design and adoption model, and the professional practices. It also anticipates which preconditions might be built, reformulated and considered for a more responsible and more effective uptake of rehabilitation robots. Chapter 11, 'Artificial intelligence, professions and the meaning of work', explores the impact of AI on professional identity and the meaningfulness of work, showcasing the attitudes and perceptions of physicians and lawyers, both characterized by high-stakes decision-making processes. The chapter identifies similarities in the perceptions of professionals concerning AI integration and meaningful work. However, they adapt differently to AI, with physicians relying on it for enhancing clinical decision-making, whereas lawyers seek to boost operational efficiency through AI systems. These differences result in

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

various concerns about professional identities and roles: physicians fear losing human connection with patients, while lawyers fear the reduction of human oversight in legal judgments. Chapter 12, 'Artificial intelligence and inclusive education: a critical look from a pedagogical perspective', examines the role of AI in the context of inclusive education. Through a configurative review of scientific literature and initiatives covering AI for social and educational inclusion, the chapter prospects a research agenda consisting of theoretical reflections and empirical research of any kind wherein teachers gain a central, active role to substantiate educational policy decisions and reforms. The chapter particularly emphasizes the value of human–AI collaboration as a practical strategy that resists reductionist models and mitigates the risk of authoritarian dangers accompanying the use of digital technologies in educational settings.

SUMMARY OF FINDINGS AND AVENUES FOR FUTURE STUDIES

The book presents a multidisciplinary investigation into the societal implications of digital transformation, with a particular focus on governance, citizenship and ethical responsibility. Across its three main parts, the chapters reveal a range of critical concerns and propose future research directions that are essential for shaping inclusive and accountable digital futures.

Taken together, the chapters point to several key concerns: the prevalence of symbolic compliance in digital governance, unresolved ethical and legal ambiguities in AI and blockchain implementation, the persistence of digital inequality, the burden on public servants to bridge the digital divide, and the risks of surveillance and declining trust in state–citizen data relations.

In the domain of digital governance, the findings highlight a gap between symbolic and substantive compliance with regulatory frameworks. For example, Dutch municipalities demonstrate fragmented readiness due to limited legal expertise, infrastructural disparities and ethical uncertainties. Similarly, while AI holds promise for enhancing transparency in African smart cities, its implementation is hindered by infrastructural deficits, socio-economic divides and privacy risks. These challenges underscore the need for governance models that are both inclusive and responsive to local contexts. Moreover, the proposal to draw on maritime law as a conceptual basis for AI liability regimes opens new avenues for cross-sectoral legal innovation, particularly in addressing the multijurisdictional and multiparty nature of AI systems.

The section on digital citizenship explores how digitalization is reshaping the relationship between citizens and the state. In Norway, the ideal of the 'digital citizen' is problematized by the hidden labour of public servants, such as nurses who support digitally excluded individuals in accessing welfare services only offered to them as digitalized avenues. This reveals a broader issue

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

of digital inequality and the unacknowledged burden placed on frontline workers. Meanwhile, the integration of blockchain technologies in countries such as Liechtenstein, Switzerland and Estonia introduces the concept of 'ledger-based citizenship', which decentralizes civic participation but also raises ethical and security concerns. A systematic review of e-participation in urban mobility policy further identifies transparency issues, citizen–government tensions and technological barriers as key bottlenecks. In the educational context, teacher educators in Norway report positive experiences with immersive technologies, though concerns remain about the complexity and resource demands of such tools.

The final part, focused on responsible and ethical digital transformation, addresses the socio-technical and normative dimensions of emerging technologies. Using Habermas's theory of communication, one chapter examines the ethical dilemmas posed by data-driven technologies in internal security, particularly the tension between collective safety and individual privacy. A comparative study of robotics in healthcare in Italy and Norway reveals how institutional and cultural factors shape the responsible adoption of technology. The impact of AI on professional identity is also explored, with physicians and lawyers expressing differing concerns about the erosion of human connection and oversight. Finally, a review of AI in inclusive education advocates for teacher-centred, human–AI collaboration models that resist reductionist approaches and promote democratic values.

To address these challenges, the book identifies several future research avenues. These include the development of mechanisms for fostering meaningful institutional change in AI governance, the exploration of cross-sectoral legal frameworks for regulating complex digital systems, the design of inclusive models of digital citizenship that account for socio-technical inequalities, the sustainable integration of emerging technologies in education and healthcare, and the formulation of ethical frameworks that promote human–AI collaboration while safeguarding democratic accountability and professional agency. The book also demonstrates how interdisciplinary approaches to digital transformation enable us to capture the diverse challenges and dilemmas that such developments entail. Moreover, it suggests that future efforts to understand the complex issues which we face may increasingly require both multidisciplinary and interdisciplinary perspectives.

REFERENCES

Ansell, C., and Torfing, J. (eds) (2016). *Handbook on Theories of Governance*. Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Aubert-Tarby, C., Escobar, O.R., and Rayna, T. (2018). The impact of technological change on employment: the case of press digitisation. *Technological Forecasting and Social Change*, *128*, 36–45.

Bergfeld, M. (2024). Winners and losers of digitalisation of work. In C. Forson, G. Healy, M. B. Öztürk, and A. Tatli, *Research Handbook on Inequalities and Work* (pp. 355–369). Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing.

Bloomberg, J. (2018). Digitization, digitalization, and digital transformation: confuse them at your peril. *Forbes, 29*(4).

Brockmann, H., Drews, W., and Torpey, J. (2021). A class for itself? On the worldviews of the new tech elite. *PLoS One*, *16*(1), e0244071.

Choi, M. (2016). A concept analysis of digital citizenship for democratice citizenship in the internet age. *Theory & Research in Social Education*, *44*(4), 565–607. https://doi.org/10.1080/00933104.2016.1210549.

Cousineau, L., Ollier-Malaterre, A., and Parent-Rocheleau, X. (2023). Employee surveillance technologies: prevalence, classification, and invasiveness. *Surveillance and Society*, *21*(4), 447–468.

de Andrade, L.H.A., Thomas, D.A., and Laterza, V. (2023). The rise of EdTech platforms in higher education: mapping themes from emerging critical literature. In *Digital Transformations in Nordic Higher Education* (pp. 27–51). Cham: Springer International Publishing.

Egan, T., Ghosh, R. and Kim, S. (2025), Ethical AI in Social Science Research: The Need for Responsible Design, Reporting, and Review for HRD and Beyond. *Human Resource Development Quarterly*, *36*, 237-242. https://doi.org/10.1002/hrdq.70003

Egeberg, M., and Trondal, J. (2018). *An Organizational Approach to Public Governance*. Oxford: Oxford University Press.

Fevolden, A.M. and Tømte, C.E. (2015). How information and communication technology is shaping higher education. In *The Palgrave International Handbook of Higher Education Policy and Governance* (pp. 342–358). London: Palgrave Macmillan UK.

Fuchs, C. (2022). *Digital Democracy and the Digital Public Sphere: Media, Communication and Society Volume Six*. London and New York: Routledge.

Geiß, S., Magin, M., Jürgens, P., and Stark, B. (2021). Loopholes in the echo chambers: how the echo chamber metaphor oversimplifies the effects of information gateways on opinion expression. *Digital Journalism*, *9*(5), 660–686.

Gilbert, J. (2024). Techno-feudalism or platform capitalism? Conceptualising the digital society. *European Journal of Social Theory*, 27(4), 561–578. https://doi.org/10.1177/13684310241276474.

Goralski, M.A., and Tan, T.K. (2020). Artificial intelligence and sustainable development. *The International Journal of Management Education*, *18*(1), 100330.

Greenhalgh, T., Wherton, J., Papoutsi, C., Lynch, J., Hughes, G., A'Court, C., ... and Shaw, S. (2017). Beyond adoption: a new framework for theorizing and evaluating nonadoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies. *Journal of Medical Internet Research*, *19*(11), e8775.

Grossmann, I., Feinberg, M., Parker, D.C., Christakis, N.A., Tetlock, P.E., and Cunningham, W.A. (2023). AI and the transformation of social science research. *Science*, *380*(6650), 1108–1109.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Hawking, S. (2016). 'Exploring the impact of Artificial Intelligence'. Speech at Cambridge University. https://www.cam.ac.uk/research/news/the-best-or-worst-thing-to-happen-to-humanity-stephen-hawking-launches-centre-for-the-future-of

Heath, M.K. (2018). What kind of (digital) citizen? A between-studies analysis of research and teaching for democracy. *The International Journal of Information and Learning Technology*, *35*(5), 342–356.

Hinds, J., Williams, E.J. & Joinson, A.N. (2020). 'It wouldn't happen to me': Privacy concerns and perspectives following the Cambridge Analytica scandal. *International Journal of Human-Computer Studies*, 143, 102498. https://doi.org/10.1016/j.ijhcs.2020.102498.

Jacobsson, B., Pierre, J., and Sundstrom, G. (2015). *Governing the Embedded State*. Oxford: Oxford University Press.

Kirschner, Bruce (1991), Electronic democracy in the 21st century. *National Civic Review*, *80*(4), 406–412.

Mager, A., and Katzenbach, C. (2021). Future imaginaries in the making and governing of digital technology: multiple, contested, commodified. *New Media and Society*, *23*(2), 223–236. https://doi.org/10.1177/1461444820929321

March, J.G., and Olsen, J.P. (1989). *Rediscovering Institutions*. New York: The Free Press.

Mergel, I., Edelmann, N., and Haug, N. (2019) Defining digital transformation: results from expert interviews. *Government Information Quarterly*, *36*(4), 101385.

Mossberger, K., Tolbert, C.J., and McNeal, R.S. (2007). *Digital Citizenship: The Internet, Society, and Participation*. Cambridge, MA: MIT Press.

Mukul, E., and Büyüközkan, G. (2023). Digital transformation in education: a systematic review of education 4.0. *Technological Forecasting and Social Change*, *194*, 122664.

Novelli, C., Hacker, P., Morley, J., Trondal, J., and Floridi, L. (2025). A robust governance for the AI Act: AI office, scientific panel, and national authorities. *European Journal of Risk Regulation*, *16*(2), 566–590.

Nureen, N., Sun, H., Irfan, M., Nuta, A.C., and Malik, M. (2023). Digital transformation: fresh insights to implement green supply chain management, eco-technological innovation, and collaborative capability in manufacturing sector of an emerging economy. *Environmental Science and Pollution Research*, *30*(32), 78168–78181.

Ogden, Michael R. (1994). Politics in a parallel universe. Is there a future for cyberdemocracy? *Futures*, *26*(7), 713–729.

Osmundsen, K., Iden, J., and Bygstad, B. (2018). Digital transformation: drivers, success factors, and implications. MCIS 2018 Proceedings. 37. https://aisel.aisnet.org/mcis2018/37.

Plekhanov, D., Franke, H., and Netland, T.H. (2023). Digital transformation: a review and research agenda. *European Management Journal*, *41*(6), 821–844.

Pinheiro, R., Tømte, C.E., Barman, L., Degn, L. and Geschwind, L. (2023). *Digital transformations in Nordic higher education.* Palgrave Macmillan.

Ribble, M. and Bailey, G.D. (2011). *Digital citizenship in schools*. Washington, DC: International Society for Technology in Education.

Ruffo, G., Semeraro, A., Giachanou, A., and Rosso, P. (2023). Studying fake news spreading, polarisation dynamics, and manipulation by bots: a tale of networks and language. *Computer Science Review*, *47*, 100531.

Selwyn, N. (2025). *Digital Degrowth: Radically Rethinking Our Digital Futures.* Cambridge: John Wiley and Sons.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Simon, H.A. (1965). The logic of rational decision. *The British Journal for the Philosophy of Science*, *16*(63), 169–186.
Stahl, B.C. (2021). *Artificial intelligence for a better future: an ecosystem perspective on the ethics of AI and emerging digital technologies*. Springer Nature.
Pinheiro, R., Tømte, C., Barman, L., Degn, L. and Geschwind, L. (2023). *Digital transformations in Nordic higher education*. Palgrave Macmillan.
Tømte, C. E., Fossiand, T., Aamodt, P.O. and Degn, L. (2019). Digitalisation in higher education: mapping institutional approaches for teaching and learning. *Quality in Higher Education*. https://doi.org/10.1080/13538322.2019.1603611
Verhoef, P.C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J.Q., Fabian, N., and Haenlein, M. (2021). Digital transformation: a multidisciplinary reflection and research agenda. *Journal of Business Research*, *122*, 889–901.
Vial, G. (2021). Understanding digital transformation: a review and a research agenda. *Managing Digital Transformation*, 13–66.
Villar-Onrubia, D., Morini, L., Marín, V.I., and Nascimbeni, F. (2022). Critical digital literacy as a key for (post) digital citizenship: an international review of teacher competence frameworks. *Journal of e-Learning and Knowledge Society*, *18*(3), 128–139.
Wang, C., Dai, J., Zhu, K., Yu, T., and Gu, X. (2024). Understanding the continuance intention of college students toward new E-learning spaces based on an integrated model of the TAM and TTF. *International Journal of Human–Computer Interaction*, *40*(24), 8419–8432.
Webster, J. (2024). Updating digital citizenship education for a postdigital society. *New Zealand Journal of Educational Studies*, *59*(1), 109–124.
Wei, Z., and Sun, L. (2021). How to leverage manufacturing digitalization for green process innovation: an information processing perspective. *Industrial Management and Data Systems*, *121*(5), 1026–1044.
Zuboff, S. (2022). Surveillance capitalism or democracy? The death match of institutional orders and the politics of knowledge in our information civilization. *Organization Theory*, *3*(3), 26317877221129290.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

1. A sociological theory of media and digitalisation

Dirk Baecker

INTRODUCTION

Any sociological theory of digitalisation must address three fundamental questions. The first concerns the adequacy of sociology's existing conceptual framework. Are the established categories of roles, norms and institutions sufficient to capture the transformations brought about by digital technologies? Or do the specific architectures of electronic networks – their nodes, links and flows – fundamentally alter the production and reproduction of action, experience and communication in ways that call for new conceptual distinctions and more fine-grained descriptions of social relations? The second question is whether the prevailing concepts used to characterise the basic structures and dynamics of modern society can adequately describe a digitalised society. Should digitalisation be understood as a continuation of the social order shaped by the printing press, or does it constitute a qualitatively distinct mode of societal reproduction; one that might be considered a fourth form of human society, a next society, following the tribal, feudal and modern formations? The third question concerns the relationship between digitalisation and other large-scale processes that define the present era. How does digitalisation interact with tendencies toward economisation, with the escalating ecological crisis, with the resurgence of populist movements, and with the proliferation and diffusion of practices of valuation? A robust sociological theory must account not only for digitalisation in itself but also for its entanglements with these broader transformations.

These three questions contribute to the broader problem of whether dealing with the processes of digitalisation – that is, the introduction of computers, the internet and artificial intelligence into all kinds of social processes, both daily and professional – is comparable to the three former catastrophes in the development of human society. Can the introduction of electronic and digital media be compared to the introduction of language, writing and the printing

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

press – all of which, according to the mathematical notion of 'catastrophe' (Thom, 1983), forced society to seek new ways of reproduction? Are digitalisation processes merely technologies that help society to manage new forms of complexity, raising perhaps some ethical questions, or are they problems that society does not yet know how to deal with? And will modern institutions and theories suffice to address the social issues raised by digitalisation, or is Peter Drucker (2001) right to call for 'new institutions and new theories' to handle and understand the changes that computers are about to bring to a society that is no longer modern, but 'next'.

A SOCIOLOGICAL FRAMEWORK TO ADDRESS QUESTIONS OF DIGITALISATION

As there is no 'natural' framework within the sociological tradition with which to address these questions, analytical decisions and empirical evidence must be used to deal with them, let alone answer them. As 'digitalisation', or the introduction of digital media into social processes, is a social issue arising from technical 'digitisation', that is, the transformation of analogue data into digital form, we might turn to sociological technology studies for insight. However, since the phenomenon of digitalisation concerns all aspects of human perception, action and communication, we would need to ask for the full impact of sociological theory and align these technology studies with interaction theory, organisational theory, theory of protest movements and theory of society, including its subsystems of politics, the economy, mass media, law, religion, science, the arts and education.

We cannot start examining questions relating to the human body and its access to digital keyboards, displays and virtual reality glasses; to human action and communication via electronic platforms; to human encounters that are enriched or impoverished by digital gadgets; to organised decision-making processes that are supported or pared down by automation; to protest that is enhanced or dampened by electronic media; or to any form of societal communication relating to political dedication, economic choice, mass media information, legal consequences, religious unrest, scientific insight, aesthetic impact or pedagogical concern; without realising that they all depend on each other in some way. Perhaps the first phenomenon to consider when examining digitalisation is its pervasiveness, or its peculiar ability to affect every aspect of human society, changing them openly or subtly.

Even the term that we start with needs clarification. The distinction between 'digitisation' and 'digitalisation', as already emphasised, is not always clear (Gradillas and Thomas, 2023). Overall, 'digitisation' seems to refer to the conversion of analogue phenomena into digital formats, including encoding, listing, recording, computing and displaying data and documents. In contrast,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

'digitalisation' refers to the use of digital technologies adding to analogue ones in social processes of interaction, organisation and communication. Therefore, 'digitisation' concerns technical questions of information processing, whereas 'digitalisation' describes how digital media interferes with social processes. The latter seems to require sociological observation and description.

But where should we start? We need a concept that takes into account the pervasiveness of digitalisation and that can be applied equally well to situations involving interaction, organisation, protest movements and societal subsystems. The notion of 'media' itself would be such a concept. Media are a kind of communication infrastructure which prefigure communication without necessarily determining it. As Marshall McLuhan (2001 [1964]: 8) wrote, the 'message' of any medium is 'the change of scale or pace or pattern that it introduces into human affairs'. The relationship between media and society is not linear, but complex. This is exactly what we need.

In sociology the term 'media' encompasses a variety of phenomena. Talcott Parsons (1977) identified the 'symbolic media of interchange' as a means of selecting and motivating both action and experience. In terms of love, power, money or truth, action and experience may be successful precisely because they avoid being confused with the terms of other media. Parsons defined these media according to their symbolic quality, institutionalisation, meaning specificity, circulation and non-zero-sum quality. Niklas Luhmann (1981) further developed this concept into 'symbolically generalised communication media' or 'success media' (Luhmann, 2012 [1997]: 187–238) and moreover introduced a concept of 'dissemination media' which includes language, writing, print and electronic media (Luhmann, 2012 [1997]: 120–186), following the Toronto School of Communication (e.g., Innis, 1986 [1950]; Goody and Watt, 1963; Ong, 1977, 1982; McLuhan, 2001 [1964]). Luhmann also adopted Fritz Heider's (1959 [1926]) idea of media as 'loosely coupled elements', which was originally developed for sensory media such as light, sound, smell, taste and touch. Thus, sociological theory offers a concept of 'medium' that could inform a theory of digitalisation. This concept could even inform a theory of 'digitisation', as media often deal with complex analogue phenomena by applying binary (or multi-valued) distinctions to them. But this is not my focus here. Data certainly qualify as 'loosely coupled elements', acquiring their 'thingness' or 'form' only through the codes and programs that produce and apply them.

My focus is on digitalisation, meaning that we can look for a sociological theory of electronic media that carries processes of digitisation within various social processes. Electronic media, to be sure, encompass the telegraph, broadcasting, film and television, but I focus on their digital enhancement, that is on computers, the internet and artificial intelligence. Radio, film and television are important because they bring instantaneity of communication to society,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

prompting new ideas about space and time (McLuhan, 2001 [1964]). However, digital media introduce data processing to society, marking the beginning of both digitisation and digitalisation. Data processing can be seen as both exploiting the instantaneity of electronic media, and taming or controlling it by channelling it into specific forms.

Thus, sociological theory provides three ways to discuss digitalisation as a medium for social processes. We can consider it to be a medium of perception, a medium for disseminating communication, or a medium for symbolically generalised communication, that is, a medium for achieving success. All three approaches are informative, although I believe that the concept of a dissemination medium is the most appropriate.

Of course, we can ask how keyboards, displays and visual reality glasses as digital media change our perception of the world. Text, sound, images and moving pictures are brought instantaneously to our attention, creating a horizon of human consciousness and corporeality that, in terms of colour, speed and selective focus, is incomparable to language, writing and print. The screens on the tables of traders, architects, officers, physicians and researchers, and the displays on tablets and mobile phones in everybody's hands, together with keyboards, mice, sticks and finger movements to navigate the data they show, connect us with a world of data, data memory and data networks unlike anything we have ever experienced before; although some forms of spiritual, religious and aesthetic imagination dealing similarly with a dazzling surface hiding inscrutable depths (Luhmann, 2012 [1997]: 182) may be similar.

There is also no question that we can look at electronic media in terms of 'success media' of communication, since indeed it is their very selectivity in chosen networks which is motivating their use. We have moreover the symbolism of electronic media calling up a whole world of connectivity. We have their institutionalisation in social networks and platforms. There is their circulation of messages, news, posts and likes. There is their meaning specificity in terms of online communication, not to be confused with offline communication even though this very distinction is far from evident. And there is its non-zero-sum quality, since any one communication within electronic media is a point of connection for further communication even though practices of exclusion work hard to make sure that boundaries apply.

Thus, although there are aspects of perception media and success media in electronic media, they seem to be secondary with respect to their role in disseminating communication. Just as language, writing and print electronic media do, electronic and digital media extend the accessibility and availability of communication. This very fact undoubtedly changes our perception of the world, captivating us and prompting us to explore and exploit them. However, it is as dissemination media that they trigger the changes which fascinate us. They disseminate text, sound, pictures, moving images and entire programs

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

faster than writing and print. They empower readers and viewers to become authors, enabling them to select and combine content according to their preferences. Depending on the program being run, they register how they are being used and change what they display. They process the data they receive, compare it with their vast memories, and generate new information for the user. They facilitate collaborative modes of work and play, in which the machine not only connects the users, but acts as a partner itself. Last but not least, they come with sensors and effectors that allow applications to blend with the physical world.

The design, computing and dissemination of electronic and digital media changes our physical and social world. A sociological theory can use the well-established concept of 'medium' to address issues of digitalisation. This approach can consider electronic and digital media that produce a world which, in many ways, is different from the modern world of the printing press and traditional societies based on writing and earlier oral cultures.

'MEANING OVERFLOW' BY NEW MEDIA OF COMMUNICATION

The next step in a media theory of digitalisation is therefore an attempt to assess the impact of specific communication dissemination technologies on different social spheres and society as a whole. Which of McLuhan's 'scales, paces or patterns' of human affairs are about to change, and how will a new medium of communication achieve this?

The Toronto School of Communication discussed the different media epochs of human society, distinguishing between societies and cultures of orality, literacy, alphabetisation and electronic media. Parsons (1977) advanced the hypothesis that the most successful forms of communication in structuring how individuals participate in society replace the traditional order of rank and stratification, even though 'stratification bundles' such as the university persist at organisational levels.

Luhmann took these ideas a step further, asking just how the new media of communication dissemination wield their influence. He answered that they unleash a 'catastrophe' in the mathematical sense (Thom, 1983), forcing a change in the way that society produces and reproduces communication. 'Communication' has a double meaning here. On the one hand, it denotes any action or event involving communication (or 'contact') between more than one person, ranging from interpersonal interaction to organisational decision-making and communication within broader societal spheres, including mass media. On the other hand, it denotes the overall state or condition of a system – here, society – that is the imaginary sum of all possible communication. The general idea is that any communicative event is framed by a horizon

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

of possible communication, which is defined historically and regionally by the kind of communication with which a specific society is familiar.

If, by historical chance or technological development, a new medium for disseminating communication appears as society passes certain levels of complexity in communication, it will not only change certain social situations in which it is used, as well as many other situations in which it is refused, but it will also change the overall condition of society. The catastrophe occurs when the new medium is used in certain situations and overwhelms the rest of society. Thus, when language became possible, societies that were coordinated by bodily perception had to develop ways of dealing with lies and talking about absent people and things. They had to invent morality and religion to control how people spoke to each other and how they dealt with absent things. Or when writing became possible, and words could suddenly be stored, examined and recalled, society had to invent ways to distinguish the present from the past and the future. It also had to invent 'philosophy' to control the meaning of words, which were no longer controlled by the people interacting with them when they were uttered and listened to. Most dramatically of all, the invention of the printing press changed society so that almost everyone could read and write, and almost everyone developed an inclination to use what they had read to 'critique' people who seemed to deviate from 'authorised' practices. Society therefore had to develop means to 'rationally' distinguish spheres where certain kinds of critique were welcome and could be dealt with productively. The so-called functional subsystems of society, such as polity, economy, law, science, arts, religion and education, are the product of their own specific way to attract, encourage and channel a criticism which they can productively – if not 'autopoietically' – deal with. Modern society is dynamic and reproduces itself according to the rationalities of entrepreneurial, democratic, academic, aesthetic and liberal critique.

These are, of course, caricatures (to elaborate, see Luhmann, 2012 [1997]: chap. 2; Baecker, 2007a, 2018). The important point is that the introduction of any new medium for disseminating communication unleashes a catastrophe that can only be resolved if society finds ways to: (1) distribute communication using that medium; and (2) condense communication into a meaningful structure of redundancy with respect to the 'overflow of meaning' (Luhmann, 2013: 248) produced by, and constituting, that medium. This involves distinguishing between a structure of differentiation 'distributing' communication, on the one hand, and a culture of condensation producing redundancy or even the 'unity' of a perspective on society (Baecker, 2011a), on the other. The distribution of communication depends on the differentiation of society (Luhmann, 2013 [1997]: chap. 4): the invention of language was addressed through segmentary differentiation, which distinguished communities of language from one another. The invention of writing was addressed through stratified

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

differentiation, which distinguished how different social classes used, or were excluded from, writing. The invention of the printing press, meanwhile, led to the functional differentiation of society into different spheres such as politics, religion, the economy, law, the arts and science, each with their own rationalities and media, such as power, belief or money.

Luhmann (2012 [1997]: 248) mused that the function of culture is to condense communication into a meaningful structure of redundancy. Culture informs any social situation about the values that apply to it by linking it to other situations within the same society, and to society as a whole. The meaning produced and evoked by new media of dissemination overloads existing societies with a surplus of possible actions, experiences and communications to which they are not accustomed. Society must build structures, as differentiation requires, and convey ideas or values that frame new situations as bearable, if not desirable. Luhmann (2012 [1997]: 248f.) suggests considering the idea of *telos* (Greek for 'aim', 'place', and most importantly 'decent place', such that 'monsters' can be said to have precisely no place) as the cultural form of ancient writing societies; 'equilibrium' or 'restless self-reference' as the cultural form of modern printing press societies; and 'accelerating control' as a possible cultural form of the next electronic media society (see also Baecker, 2006, 2007b).

Thus, we have two sociological concepts with which to deal with the phenomenon of digitalisation. One is the idea of viewing digitalisation as the introduction of digital media as a means of disseminating communication. The other is viewing digitalisation as another catastrophe of human society, introducing a new overflow of potential communication and requiring a 'structure form' to differentiate and a 'culture form' to condense this new surplus into an overall communicative condition that can be dealt with by any specific system of communication, be it interactive, organisational, protest or functional.

BUT WHAT IS A MEDIUM ANYWAY?

Considering digitalisation as a medium for disseminating communication is not just a way of finding an appropriate term for a difficult phenomenon in order to label it with respect to sociological theory. The concept of a medium itself has analytical value. A medium not only enables communication with partners who would otherwise be inaccessible, this time involving the use of machines to transfer, store, compute, combine and disseminate new information, but also provides a basis for further experience, action and communication. This is why it can amount to a catastrophe in the first place. It unleashes a potential to act upon and experience the world and human society in a way which nobody is used to at first.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

The term 'medium', a Latin translation for the Greek words *periechon* and *metaxy*, not only denotes a tool for transferring utterances, information and understanding, but also describes the milieu or ambiance of experience, action and communication (Spitzer, 1949), as introduced by Aristotle in *Peri Psyches/De anima* (419a). According to McLuhan (2001 [1964]: 7), the message sent by the medium refers to a kind of potentiality evoked by any actual use of the medium. Any actual use of the medium involves meaning which, at the same time, transcends that use. Note that both Alfred North Whitehead (1979 [1929]: 185f.) and Niklas Luhmann (1995 [1984]: 65f.) interpret meaning as a relationship between the actual and the potential or possible. This means that any actual use of the medium, as defined by Heider (1959 [1926]) as a 'thing', and by Luhmann (2012 [1997]: 113–120) as a 'form', suggests or prompts alternative 'things' or 'forms'. There is no medium that is not infected by the inherent restlessness of meaning.

Let me explain. When you see a tree (a thing) in some specific light (a medium), you know that by changing your perspective, the tree will look different. Similarly, when you hear a word or proposition, you know that the same medium of language or truth could carry many alternative words or propositions. Luhmann's notion of 'form', borrowed from George Spencer-Brown's (2008 [1969]) book on the *Laws of Form*, is useful for understanding this distinction between the actual and the potential. Any 'form', having two sides, an inside and an outside, thereby consists of a distinction which includes what it excludes on the outside. Experience, action and communication necessarily use forms to convey meaning and thus call up the medium in which those forms are imprinted, constitutively to switching to alternatives (White et al., 2007; Godart and White, 2010), whether for confirmation or critique, ambage or ambiguity (White, 1992: 17f.).

Describing digitalisation in terms of a sociological media theory enables us to explore the different forms that it takes, such as computer screens and displays, keyboards and sticks, apps and algorithms, platforms and networks, and allows us to examine the medium that is being explored, exploited and developed, and which has a wealth of potential uses that can be identified by observing what is already possible and being done. Remember Vilém Flusser (2000 [1983]), who considered cameras to be searching for photographers to explore their potential. Also recall Gilbert Simondon (2017 [1958]), who discussed technologies as insinuations of correlations between them and humans. Examining these technologies, and digitalisation in particular, in terms of media that carry or invoke actual and potential meaning, opens up a kind of social phenomenology, through which you can learn about these media and the social fields that implement them, simply by observing the selectivity built into a digital device; which, to be sure, may be the outcome of controversies.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Note that, due to our approach, digitisation – the conversion of analogue phenomena into digital formats – may also become a subject of sociological research. Data are forms obtained from electronic sensors, algorithms, programs and effectors, and they also act as media that monitor social interactions, gatherings, consumer behaviour, production processes, price movements and natural events. Different forms of control can then be applied to these data. Neither digitisation nor digitalisation is self-evident, but rather an ever-moving field of possibilities that are confirmed, explored, forgotten, hidden, revealed, assumed, feared and dreamt of. The notions of medium and form inform sociological research that treats electronics and the social as variables in an ongoing search for solutions to more or less well-understood problems.

A STRUCTURE OF NETWORKS AND A CULTURE OF COMPLEXITY

Returning to the media catastrophe of the invention and introduction of electronics into the technologies of human society we can ask how 'structure form' and 'culture form' can handle the meaning overflow of experience, action and communication that are implemented through fast connections, vast memories, synthetic intelligence and, not least, opaque modes of monitoring and surveillance.

Once again, such a question concerns two complementary research perspectives. One concerns the use of digital technologies, while the other concerns how society deals with the overflow of meaning. The use of digital technologies can initially be categorised as I just did: by emphasising speed of connections, storage capacity, synthetic intelligence and monitoring of human, social, technical and natural processes in increasingly granular detail.

It is more difficult to speak about society's possible range of responses. However, we have examples of how human society has survived, and even shaped, earlier media catastrophes, such as the introduction of language, writing and the printing press. There is a wealth of ethnological, historical and sociological data that we can consult for insights into societal responses to the introduction of new communication technologies, as I have attempted to do elsewhere (Baecker, 2007a, 2018). There are at least two insights that are valid for all of these examples. First, there is no successful introduction of new media that is not accompanied by significant rejection and avoidance, a process that often takes centuries, decades or at least years. As any social technology study knows, invention and introduction differ (Hughes, 2004). Therefore, it is necessary to say 'no' to new technologies in some parts of society, even when they have already been applied and tested in other parts, in order to gain time and try out different perspectives in order to learn about their possible uses. A catastrophe involving a change in the modes of production, reproduction,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

experience, action and communication unfolds not only incrementally, but also in a delayed way, allowing different areas of society to adapt to it and reinvent themselves in response.

The second insight is that society is indeed able to survive such a catastrophe and find a new level of autopoiesis, but there is no way to predict how this will happen. This is not only because historical and regional data reveal a wide range of responses, such that talking about a coherent way of 'the' society responding is highly speculative. More importantly, venturing into such speculation, even to speak of coherent media epochs of human society – let alone just four of them – tells us that the development of tribal society dealing with language, of ancient cultures of stratified society dealing with writing, and of modern society of functionally differentiated subsystems dealing with the printing press, reveal no common pattern that we could identify. Segmentary differentiation refers to distinct, but similar units, stratified differentiation to distinct, but ranked units; core and periphery, a further differentiation principle, to one case of inequality, and functional differentiation to units which are similar with respect to overall society and dissimilar with respect to their respective function (Luhmann, 2013 [1997]: 12f.).

Luhmann (2013 [1997]: 13) concludes that 'there is obviously no theoretical justification for this catalogue' (of forms of differentiation). No obvious principle remains that could be employed by a new form of differentiation that might emerge in response to digitalisation. Instead, we can expect all four principles to persist and simply 'grow old' (Luhmann, 1995 [1984]: 379; Lehmann, 2015). Considering nations as reborn tribes cherishing their cultural identities; dying empires forcefully imposing themselves; not only tenacious but widening inequalities and new kinds of inclusion and exclusion by stratification; and new 'economies of worth' or 'modes of existence' in their 'regimes of justification' (Boltanski and Thévenot, 2006 [1991]; Latour, 2013), which resemble the functional subsystems of the (not really past) past, it is indeed easy to imagine society using its combined intelligence and chaos of differentiation to deal with digitalisation.

However, if there is a new form of differentiation slowly coming to the fore, we already know that it would have to be able to deal with a kind of electronic communication which is fast, connected beyond control, surprising in its selective use of memories, references and addresses, and aggressive in its prompting and exploiting of cognitive bias. Both structure form and culture form that are able to reproduce would have to be idiosyncratic in order to select what they need and reject what would compromise them. We also know that recursiveness applies in any case, since structure and culture must rely on themselves to be recognisable and provide redundancy. Moreover, we can apply Luhmann's (2017: 172) suggestion that any differentiation in a social system must obey the rule to be able to reconstruct contingency and to account

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

for complexity gradients between systems and their environments. However, perhaps the most revealing aspect of our search for candidates for structure and culture forms is the sensibility already apparent in sociological theory and societal semantics.

Regarding sociological theory, I would argue that the recent surge of interest in networks is no coincidence. Manuel Castells (2010 [1996]) explicitly referred to the 'rise of network society', and, with the exception of systems theory, no other sociological theory is as analytically strong or fruitful as network theory, as demonstrated by both Harrison C. White (1992, 2008) and Bruno Latour (2005). Networks are the perfect units with which to structure the 'next' society of electronic media, since they (net)work by inclusion and exclusion. Networks take shape by offering identity to the elements they draw upon, and consist of heterogenous elements that can connect to sites, stories, individuals and organisations, as well as practices and conventions. Nevertheless, they remain restless with respect to members and non-members. Unlike systems, they have no boundaries but deal with closure at an ever-uncertain level. Networks double as control projects, and produce, and rely on, their specific data domain, algorithmic programming and electronic communication.

Regarding societal semantics there are some indications that the modern view of semantics, which insists on clear distinctions between, for example, nature and culture, maintains a Kantian vision of reason that can dominate not only the sensual but also the irrational, and privileges liberal, democratic and capitalist society, is giving way to a more complex view of common criteria in nature and culture. This view recognises the self-organisation of systems out of noise or negentropic decay, and considers affect to be of similar value to cognition and reason. It also recognises the existence of a post-colonial world that offers a variety of ways of living among humans in different ecologies. Indeed, the advent of artificial, or rather synthetic intelligence (Smith, 2019), and the search for its 4E (embodied, embedded, enactive and extended) cognitive and perceptual processes, reveals that so-called 'human' intelligence is also highly complex in its synchronisation and occasional disintegration of organic, neuronal, mental, social and emotional intelligence. In fact, none of these intelligences has the lead. This improbable and surprising synchronisation is no longer taken for granted but has become a key issue in the rediscovery of the body and of emotions in wellness cultures, performance theatre (replacing traditional spoken theatre) and medical research into psychosomatics.

The discovery of complexity – that any natural, human, social or technical phenomenon capable of self-organisation relies on incomplete self-descriptions that depend on case-to-case supplements and complements (Pattee, 2008), where any supplement or complement is as indispensable as it is contrary to that which it supplements and complements (Lotman, 2001) – may well qualify as the culture form of the next, that is, the digital media society.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

While the world of the printing press condensed its meaning overflow into the idea that all human relationships on Earth ultimately obey some form of reason, however often falsified, the world of electronic media verges on the idea that everything is complex. As trivial as this idea may sound at first, it is far-reaching and, more importantly, consistently capable of recognising any phenomenon as both inherently different and reliably complex. John von Neumann (1956) formulated a principle of self-organisation for any living, social or synthetic phenomenon, stating that it is reliably built out of 'unreliable components'. A fascination with complexity may be the defining feature of the next societal culture, even though fundamentalist and identitarian movements seem to suggest otherwise.

A 'NEXT' SOCIETY SINCE THE 1880S?

Let me reiterate my main point. In understanding digitalisation as a process that relies on electronic media to produce a surplus of meaning for experience, action and communication within society, I argue that we are in fact witnessing a new media catastrophe. This catastrophe forces the social system, as the advent of language, writing or the printing press did before, into a new mode – or disequilibrium state – of reproduction or autopoiesis. This surplus reference must be distributed within certain structures to enable, differentiate and reintegrate the ways in which we experience, act and communicate, with reference to fast electronic connections, vast yet selective memories and algorithmic monitoring, which modern functional subsystems and their distinction between interaction, organisation and protest cannot tame any more. Connectivity transcends the neat, rational divisions of modern society. Even while seemingly running wild, all that connectivity must be bundled into control projects which follow no common logic but are all based on their specific combination of contrarian – and therefore sensitive – elements.

The structure of networks and the culture of complexity seem to be suitable candidates for our structure form and culture form of a society that cannot be differentiated and integrated according to modern expectations and seeks new ways to do so. Idiosyncratic networks within idiosyncratic networks and contrarian complexity meeting contrarian complexity are the fractal eigen-values of a society learning to deal with digitalisation. In order to pursue this line of thought, I would like to add that, of course, we are not speaking of a 'next' society that would be the child of the 21st century. By referring to digital media in relation to electronic media, I am discussing tendencies that date back to the '*Zeitalter der Nervosität*' (Radkau, 1998; and see Asendorf, 1989; and even Musil, 1997 [1930]) or 'Age of Nervousness', which began in the 1880s with the invention of the telegraph. This was followed by broadcasting 40 years later and television 30 years after that. Reflecting on the philosophical

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

implications of the discovery of electricity goes back even further, as evidenced by Immanuel Kant's (1992 [1763]) 'Attempt to Introduce the Notion of Negative Magnitudes into Philosophy', which considers the necessary complementarity of positive and negative magnitudes to explain voltage.

The invention and introduction of computers, the internet and artificial intelligence certainly date from the 1940s onwards, with electronic computers in the 1940s, artificial intelligence (AI) taking off in the 1960s and the internet emerging in the 1980s. However, it may be helpful to consider the broader historical context, because the advent of instantaneous communication, as McLuhan (2001 [1964]) described it, could signify the real catastrophe. It may be revealing to examine fascist and socialist experiments to come up with a conveniently 'totalizing' response that bypasses the 'nation' as both the network and the culture to follow (Sternhell, 1995 [1976]). As computers, the internet and artificial intelligence continue to have an impact, both continuing the electricity shock of instantaneity and taming it for possible human use, we may be well advised to consider digitalisation in broader historical and sociological terms.

THE END OF THE SOCIAL?

Regarding the second question above, namely whether the concepts of modern society are still suitable for describing, understanding and explaining a next society, it must be said that there are indeed concepts in sociological theory – notably in systems theory and network theory – that can be used to describe the phenomena of a digitised society. However, it may well be that what these concepts describe is not the modern printing press society, but rather a next society characterised by the use of electronic and digital media in addition to, and as a complicated superposition and concatenation of, the printing press, writing and orality. Sociological systems theory is useful because, on the one hand, it is the most accurate description of the functionally differentiated modern society we have, which is useful to describe the mode of autopoiesis of the society that we are slowly leaving behind. On the other hand, it has developed concepts of systems and communication that go beyond modern society and help analyse new autopoietic processes of society. Network theory is also suitable because its ideas of identity and control address the question of how new eigen-values of autopoiesis occur and reproduce.

This does not mean that everything in sociological theory is fine. Certain features of societal autopoiesis, which rely on non-transparent electronic technologies to attract, monitor, compute and distribute information, require new notions such as the concepts of platform (Bratton, 2015: 41–72), infrastructure (Kornberger et al., 2019) and communication that go beyond human participants (Baecker, 2007b, 2011b; Esposito, 2022). Big data research on human

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

behaviour produces data of a granularity that computational sociology (Conte et al., 2012; Edelmann et al., 2020) will struggle to cope with for some time, since it does not fit with traditional empirical research or rather coarse-grained sociological terms. Sociological theory will have to look for new meta-data (Baecker, 2013), such as the notions of systems, networks, communication and complexity, to grasp the discernible patterns at this level (Baecker, 2020). For the time being, however, it is the other way round. Digital media are used in such a way that they act as theatres, observing and testing individuals with respect to 'bio-political' criteria that we are only just becoming aware of (John-Mathews and Cardon, 2022).

It does not help that sociological theory begins to view individuals as 'fractal individualities' acting within a 'vague whole' (Day, Lury and Ward, 2023). Similarly, discarding the category of the social is unhelpful, as there are factors beyond human behaviour to consider when examining 'synthetic situations' (Knorr Cetina, 2009; see also Latour, 2001). There is no need to reduce the social to an understanding of human behaviour. Any relationship between sufficiently complex entities that are able to maintain dependency on each other together with their independence from each other may be called social according to specific structures and cultures of communication. The fractality of these entities – a new class of individuals involving not only human beings, but also synthetic intelligences, animals, plants, rivers and perhaps whole eco-complexes – is a condition for accessing networks that draw on and constitute their identity.

ENVELOPES OF RECURSION

The third question, concerning the interdependence of large-scale processes within the society and its subsystems of polity, economy, law, science, education, religion and arts, may be viewed accordingly. If digitalisation consists of new forms of society obtained from new media of communication, then we should indeed expect a whole range of experiments in recursiveness. Attempts to find rock-bottom eigen-values to navigate a complex world and build profiles that are robust or 'resilient' (that is, able to change systems reproduction modes) enough to withstand surprises of all kinds include economisation, politicisation, affectualisation (rage, indignation, hate, but also enthusiasm and excitement), populism, medicalisation and aestheticisation. Each of these proves its value by being able to attract, retain and control resources, addresses, stories and ties that build networks and reproduce systems.

Constellations of valuation (Waibel et al., 2021) are useful for analysing and describing the recursive functions of system reproduction and their network structures as soon as they emerge and begin to value themselves. As in Parsons's (1978) 'telic systems', values are a means of marking not only

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

indications, but also their distinctions, for further connective experience, action and communication. They include certain features and exclude others, emphasising what they include while remaining aware of what they exclude. Valuation studies with respect to digitisation may therefore be a possible entry point for studying the forms of social autopoiesis when some, if not all, familiar forms of modern society undergo some more or less subtle changes. These studies are not bound by preconceived notions of interaction, organisation, protest or functional systems of society, and thus shed new light on the plasticity and variability of society's ability to self-organise and reproduce. Moreover, these values are both self-identical and self-diverse. They reproduce, but in ways that elicit and moderate conflicts among themselves. Sociological theory may consist of unravelling these values and demonstrating how they relate to the various realms of synchronised self-organisation, such as the physical, organic, neuronal, mental, technical and social.

In social affairs, any one value acts like a *figura* (Auerbach, 2023 [1946]), rendering a situation 'real' by linking it to other situations and generalising its features as 'symbols', as Parsons et al. (1951) put it. It also draws on those other situations and their symbols to name and value the features of a situation. Not only are there micro–macro links structuring a situation – the macro framing what happens in the micro, and vice versa – but there are also gradients, asymmetries and orthogonalities time intertwining and separating bodies, minds, communication and machines, ecological sites and technical infrastructure. Values are both the means and the product of a scheme or even intrigue to explore and exploit situations according to some open or hidden interests. Values conceal and reveal what is at play, and must therefore be examined and documented by sociology.

Digitisation as well as digitalisation show no respect whatsoever for traditional methods of constituting and reproducing society. But they must constitute and reproduce society. Sociological theory is necessary in order to provide the categories that can be used to describe both constitutive acts of communication and envelopes or profiles that reproduce them as bundles of such acts. Both digitisation and digitalisation involve a potential struggle for dominance. Technological determinism meets political, economic, aesthetic and even religious attempts at determination. When informed by interdisciplinary systems theory and socio-technical network theory, sociological theory can demonstrate that these attempts are just that: attempts. Sociological theory emphasises the self-organisation and relative autonomy of any one realm of autopoiesis involved, relative to both inner and outer environments.

Lastly, a media approach to digitalisation, which considers the social forms derived from it, will also examine the physical, material or technical form of the medium in question. The distinction between form and medium is analytical, not categorical. One form may simultaneously be a medium within

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

another form. Therefore, a sociological theory of digitalisation must also address sociological questions regarding digitisation. If social forms are made possible and restricted in some way by electronic media, sociology must be interested in how computer programs, applications, algorithms and platforms, as well as screens, keyboards, mice, sensors, actuators, shells and virtual reality glasses, work to connect and calculate bits, bytes, pixels, commands and prompts when attracting glancing users, connecting users to each other and to machines, and monitoring processes in the interest of benevolent or malevolent surveillance agencies.

In any case, there are at least two questions to bear in mind: What kind of digitisation underlies any form of digitalisation? And which social forms are changed, invoked or destroyed by the attraction to the medium at hand?

THE HUMAN CONDITION IN SOCIOLOGICAL PERSPECTIVE

Two final questions: one political and one self-reflective. How can we avoid every keystroke and glance at our screen being recorded by programs operated by strangers? And how can we maintain a form of paperwork or typesetting that not only uses and feeds a chatbot – the last person in town to read our papers – but also keeps up with the unique feature of human beings' imaginative and creative subjectivity?

Even though politics and ethics attempt to address them, there are currently no clear answers to these questions. This chapter, however, emphasises the sociological aspects of digitalisation. While digitisation refers to the technical aspects of introducing computers, the internet and AI into the ways in which human society produces, stores, disseminates and evaluates information and communication, digitalisation refers to the social processes that transform the structure and culture of society through the use of digital media. While the concept of catastrophe may sound exaggerated, it highlights an important point: to understand modern society, we must consider the impact of the printing press und the critical dynamisation of society it produced. This will help us to understand which structures and cultures are changing due to the introduction of computers, and how society must adapt to find new solutions to its functional problems.

Niklas Luhmann's two-volume work on the theory of society (Luhmann, 2012 [1997] and 2013 [1997]; black cover for the German edition, white for the American edition) can be read as an attempt to understand the catastrophe of modern society – a phenomenon that is not well understood, but has been observable for the last three of four centuries – in order to gain an initial understanding of how the next society is already responding to the current catastrophe. Examining current debates about digitisation, an an Aristotelian influence

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

is evident, as people continue to seek the purpose of historical processes and their place and role within them. Our hearts are bound up with the structure and culture of an alphabetical society, even though we have begun to understand it in the modern terms such as fluid rationality and dynamical equilibria. It is our everyday practices, as well as our professional activities, that are being digitalised even though we still lack the vocabulary to understand and describe what is happening.

A sociological theory of catastrophic media epochs that not only replace earlier ones but also overlap with them can provide a picture of a human being who is connected to and surrounded by all four media epochs experienced by human society to date; that is, by both the media and the structures and cultures invented by society to meet their challenges. We still speak and listen, write and read, print and receive, and film and watch. All of our culture techniques for dealing with the wonders and challenges of these means of communication are still with us and necessary. However, it takes sociological theory to consider their more negative aspects. Having to listen, read, receive and watch is not just a gift, but an obligation too; not to mention the need to speak, write, print and film or post. While an economic perspective looks at reducing the transactions costs that these media induce, a sociological perspective looks at the problems that they create. There is nothing trivial about communication. However, examining the problems that it creates also allows us to marvel at the solutions that human beings are up to now able to find in their social intercourse. These two sides of the coin are what drive sociological theory.

As long as we trust words, we also have to know how to mistrust them, so the first catastrophic introduction of oral language is still with us. If a sociological theory of digitalisation can provide an insight into earlier and different forms of media, it can improve our understanding of the human condition. Indeed, computers have given us more than just better data processing. They are not merely an experiment in themselves, exploring a world made possible by computer exploration (Newell and Simon, 1976), but also prompt a reappraisal of earlier media and their social impact.

But beware. This is only the beginning. Understanding the media through which communication is disseminated – such as language, writing, the printing press, and electronic and digital media – is just one chapter of a sociological media theory (Luhmann, 2012 [1997]: chap. 2; Baecker, 2016). Success media such as money, power, love, affect, truth and belief produce their own overflow of meaning and thus their own societal changes (Parsons, 1977). Then there are perception media such as audition, vision, smell, taste and touch, which are indispensable for relating the clear to the unclear – Kant's (2003 [1787]: B33f., *Anschauung* or 'intuition') – and gaining an understanding of the complexity of human action and experience.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

ACKNOWLEDGEMENT

English language editing with the help of DeepL Write.

REFERENCES

Asendorf, Christoph (1989): *Ströme und Strahlen: Das langsame Verschwinden der Materie um 1900*, Berlin: Anabas-Verlag.

Auerbach, Erich (2023 [1946]): *Mimesis: The Representation of Reality in Western Literature*, new and expanded edn, transl. Willard R. Task, introduction Edward W. Said, Reprint. Princeton, NJ: Princeton University Press.

Baecker, Dirk (2006): 'Niklas Luhmann in the Society of the Computer', in: *Cybernetics and Human Knowing* 13, no. 2, pp. 25–40.

Baecker, Dirk (2007a): *Studien zur nächsten Gesellschaft*, Frankfurt am Main: Suhrkamp.

Baecker, Dirk (2007b): 'Communication with Computers, or How Next Society Calls for an Understanding of Form', in: *Soziale Systeme* 13, no. 1+2, pp. 409–420.

Baecker, Dirk (2011a): 'What Is Holding Societies Together?' In: *Criticism: A Quarterly for Literature and the Arts* 53, no. 1, pp. 1–22, jstor.org/stable/23131553, doi: 10.1353/crt.2011.0004

Baecker, Dirk (2011b): 'Who Qualifies for Communication? A Systems Perspective on Human and Other Possibly Intelligent Beings Taking Part in the Next Society', in: *Technikfolgenabschätzung: Theorie und Praxis* 20, no. 1, pp. 17–26, doi.org/10.14512/tatup.20.1.17

Baecker, Dirk (2013): 'Metadaten: Eine Annäherung an Big Data', in: Heinrich Geiselberger and Tobias Moorstedt (eds), *Big Data: Das neue Versprechen der Allwissenheit*, Berlin: Suhrkamp, pp. 156–186.

Baecker, Dirk (2016): 'Sociology of Media', in: Inge Baxmann, Timon Beyes and Claus Pias (eds), *Social Media – New Masses*, Zürich: diaphanes, pp. 151–171.

Baecker, Dirk (2018): *4.0 oder Die Lücke die der Rechner lässt*, Leipzig: Merve.

Baecker, Dirk (2020): 'Soziologie 4.0 und ihre Vorläufer: Eine Skizze', in: Sabine Maasen and Jan-Hendrik Passoth (eds), *Soziologie des Digitalen – Digitale Soziologie? Soziale Welt*, Sonderband 23, Baden-Baden: Nomos, pp. 19–45, doi.org/10.5771/9783845295008

Boltanski, Luc, and Laurent Thévenot (2006 [1991]): *On Justification: Economies of Worth*, transl. Catherine Porter, Princeton, NJ: Princeton University Press.

Bratton, Benjamin J. (2015): *The Stack: On Software and Sovereignty*, Cambridge, MA: MIT Press.

Castells, Manuel (2010 [1996]): *The Rise of the Network Society*, 2nd edn, Oxford: Blackwell.

Conte, Rosaria, et al. (2012): 'Manifesto for Computational Social Science', in: *European Physical Journal Special Topics* 214, pp. 325–346.

Day, Sophie, Celia Lury, and Helen Ward (2023): 'Personalization: A New Political Arithmetic?', in: *Distinktion: Journal of Social Theory*, online 4 January, doi.org/10.1080/1600910X.2022.2098352

Drucker, Peter F. (2001): 'The Next Society: A Survey of the Near Future', in: *The Economist*, 3 November 2001, economist.com/special-report/2001/11/03/the-next-society

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Edelmann, Achim, Tom Wolff, Danielle Montagne and Christopher A. Bail (2020): 'Computational Social Science and Sociology', in: *Annual Review of Sociology* 46, pp. 61–81.
Esposito, Elena (2022): *Artificial Communication: How Algorithms Produce Social Intelligence*, Cambridge, MA: MIT Press.
Flusser, Vilém (2000 [1983]): *Towards a Philosophy of Photography*, transl. Anthony Mathews, London: Reaktion Books.
Godart, Frédéric C., and Harrison C. White (2010): 'Switchings Under Uncertainty: The Coming and Becoming of Meaning', in: *Poetics* 38, no. 6, pp. 567–586.
Goody, Jack, and Ian Watt (1963): 'The Consequences of Literacy', in: *Comparative Studies in Society and History* 5, no. 3, pp. 304–345.
Gradillas, Maria, and Llewellyn D.W. Thomas (2023): 'Distinguishing Digitization and Digitalisation: A Systematic Review and Conceptual Framework', in: *Journal of Product Innovation Management* 42, no. 1, 112–143, doi.org/10.1111/jpim.12690
Heider, Fritz (1959 [1926]): 'Thing and Medium', in: *Psychological Issues* 1, no. 3: idem, *On Perception, Event Structure, and Psychological Environment. Selected Papers*, pp. 1–34.
Hughes, Thomas P. (2004): *Human-Built World: How to Think About Technology and Culture*, Chicago, IL: Chicago University Press.
Innis, Harold A. (1986 [1950]): *Empire and Communication*, Reprint. Victoria, BC: Percépic Press.
John-Mathews, Jean-Marie, and Dominique Cardon (2022): 'The Crisis of Social Categories in the Age of AI', in: *Sociologica* 16, no. 3, pp. 5–15, doi.org/10.6092/issn.1971-8853/15931.
Kant, Immanuel (1992 [1763]): 'Attempt to Introduce the Notion of Negative Magnitudes into Philosophy', in: David Walford (ed.), *Theoretical Philosophy, 1755–1770*, Cambridge: Cambridge University Press, pp. 203–206.
Knorr Cetina, Karin (2009): 'The Synthetic Situation: Interactionism for a Global World', in: *Symbolic Interaction* 32, no. 1, pp. 61–87.
Kornberger, Martin, Geoffrey C. Bowker, Julia Elyachar, Andrea Mennicken, Peter Miller, Joanne Randa Nucho and Neil Pollock (2019): *Thinking Infrastructures. Research in the Sociology of Organizations*, Bingley: Emerald Publishing, p. 62.
Latour, Bruno (2001): 'Gabriel Tarde and the End of the Social', in: Patrick Joyce (ed.), *The Social in Question: New Bearings in History and the Social Sciences*, London: Routledge, pp. 117–132.
Latour, Bruno (2005): *Re-Assembling the Social: An Introduction To Actor-Network Theory*, Oxford: Oxford University Press.
Latour, Bruno (2013): *An Inquiry into Modes of Existence: An Anthropology of the Moderns*, transl. Catherine Porter, Cambridge, MA: Harvard University Press.
Lehmann, Maren (2015): 'Das "Altwerden der funktionalen Differenzierung" und die "nächste Gesellschaft"', in: *Soziale Systeme* 20, no. 2, pp. 308–336.
Lotman, Yuri M. (2001): *Universe of the Mind: A Semiotic Theory of Culture*, transl. Ann Shukman, New York: Tauris.
Luhmann, Niklas (1981): 'The Improbability of Communication', in: *International Social Science Journal* 23, pp. 122–132.
Luhmann, Niklas (1995 [1984]): *Social Systems*, transl. John Bednarz, Stanford, CA: Stanford University Press.
Luhmann, Niklas (2012 [1997]): *Theory of Society*, transl. Rhodes Barrett, vol. 1, Stanford, CA: Stanford University Press.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Luhmann, Niklas (2013 [1997]): *Theory of Society*, transl. Rhodes Barrett, vol. 2, Stanford, CA: Stanford University Press.
Luhmann, Niklas (2017): *Systemtheorie der Gesellschaft*, eds Johannes K. Schmidt and André Kieserling, Berlin: Suhrkamp.
McLuhan, Marshall (2001 [1964]): *Understanding Media: The Extensions of Man*, London: Routledge.
Musil, Robert (1997 [1930]): *The Man without Qualities*, transl. Sophie Wilkins and Burton Pike, vol. 1, New York: Macmillan.
Neumann, John von (1956): 'Probabilistic Logics and the Synthesis of Reliable Organisms from Unreliable Components', in: Claude E. Shannon and John McCarthy (eds), *Automata Studies*, Princeton, NJ: Princeton University Press, pp. 43–98.
Newell, Allen, and Herbert A. Simon (1976): 'Computer Science as Empirical Inquiry: Symbols and Search', in: *Communications of the ACM* 19, pp. 113–126.
Ong, Walter J., SJ (1977): *Interfaces of the Word: Studies in the Evolution of Consciousness and Culture*, Ithaca, NY: Cornell University Press.
Ong, Walter J., SJ (1982): *Orality and Literacy: The Technologizing of the Word*, London: Routledge.
Parsons, Talcott (1977): 'Social Structure and the Symbolic Media of Interchange', in: Talcott Parsons, *Social Systems and the Evolution of Action Theory*, New York: Free Press, pp. 204–228.
Parsons, Talcott (1978): 'A Paradigm of the Human Condition', in: Talcott Parsons, *Action Theory and the Human Condition*, New York: Free Press, pp. 352–433.
Parsons, Talcott, et al. (1951): 'Some Fundamental Categories of the Theory of Action: A General Statement', in: Talcott Parsons and Edward A. Shils (eds), *Toward a General Theory of Action*, Cambridge, MA: Harvard University Press, pp. 3–29.
Pattee, Howard Hunt (2008): 'Physical and Functional Conditions for Symbols, Codes, and Languages', in: *Biosemiotics* 1, pp. 147–168.
Radkau, Joachim (1998): *Das Zeitalter der Nervosität: Deutschland zwischen Bismarck und Hitler*, München: Hanser.
Simondon, Gilbert (2017 [1958]): *On the Mode of Existence of Technical Objects*, transl. Cecile Malaspina and John Rogove, Minneapolis, MN: Univocal Publishing.
Smith, Brian Cantwell (2019): *The Promise of Artificial Intelligence: Reckoning and Judgment*, Cambridge, MA: MIT Press.
Spencer-Brown, George (2008 [1969]): *Laws of Form*, 5th edn, Leipzig: Bohmeier.
Spitzer, Leo (1949): 'Milieu and Ambiance', in: Leo Spitzer, *Essays in Historical Semantics*, New York: S.F. Vanni, pp. 179–316.
Sternhell, Zeev (1995 [1976]): *The Birth of Fascist Ideology*, transl. David Maisel, Princeton, NJ: Princeton University Press.
Thom, René (1983): *Mathematical Models of Morphogenesis*, transl. W.M. Brooks and D. Rand, Chichester: Ellis Horwood.
Waibel, Désirée, Thorsten Peetz and Frank Meier (2021): 'Valuation Constellations', in: *Valuation Studies* 8, no. 1, 33–66.
White, Harrison C. (1992): *Identity and Control: A Structural Theory of Action*, Princeton, NJ: Princeton University Press.
White, Harrison C. (2008): *Identity and Control: How Social Formations Emerge*, 2nd edn, Princeton, NJ: Princeton University Press.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

White, Harrison C., Jan Fuhse, Matthias Thiemann and Larissa Buchholz (2007): 'Networks and Meaning: Styles and Switching', in: *Soziale Systeme* 13, no. 1+2, pp. 543–-555.
Whitehead, Alfred North (1979 [1929]): *Process and Reality: An Essay in Cosmology*, corr. edn by David Ray Griffin and Donald W. Sherburne, New York: Free Press.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

PART I

Digital governance

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

2. Digital transformation readiness: evaluating Dutch municipalities' compliance with the AI Act

Willem Bantema, Trix Mulder and Soner Korucu

INTRODUCTION

On 1 August 2024, the AI Act (Regulation (EU) 2024/1689) came into effect, establishing a standardized framework for artificial intelligence (AI) regulation across the European Union (EU). This legislation aims to ensure AI reliability and safety while safeguarding fundamental rights and fostering innovation to maintain Europe's competitive edge. After a two-year transition period, full implementation is expected by 2026, impacting upon municipalities that integrate AI into their operations and services (Janssen & Van den Berg, 2022; Wirtz, Weyerer & Geyer (2019). Scholars such as Solove (2024), Kleinhout and Naves (2022), Engelfriet (2023), Quintais (2024) and Meuwese and Wolswinkel (2022) discuss the legal and regulatory challenges posed by the AI Act, particularly its implications for public administration.

This chapter examines how municipalities are preparing for the AI Act and outlines key measures for AI governance and compliance. Municipal AI adoption is not just a regulatory issue but also a crucial component of broader digital transformation efforts. Ensuring compliance with the AI Act requires integrating AI into municipal digital strategies, aligning governance structures, and addressing disparities in technological capacity. This chapter examines the readiness of Dutch municipalities to meet the AI Act's requirements and whether AI governance has been meaningfully operationalised within local administrations.

Despite high levels of awareness, findings indicate a significant gap between regulatory knowledge and actual implementation. Many municipalities recognise the importance of AI governance but struggle with practical execution due to limited legal expertise, digital infrastructure disparities, and uncertainties

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

surrounding AI ethics. These challenges necessitate a theoretical framework that explains the persistent barriers to effective AI governance.

This chapter applies three theoretical perspectives: symbolic versus substantive compliance (Taheriruh and Moshtari, 2023), policy–implementation gaps (Edler and Fagerberg, 2017), and regulatory compliance in AI (Ashraf and Haile, 2023). These frameworks illustrate why municipal compliance often remains symbolic, how implementation gaps hinder AI adoption, and why regulatory adaptation is an ongoing challenge. The chapter also integrates insights from Fest et al. (2022), who highlight that AI compliance is frequently fragmented due to low AI literacy and a lack of structured implementation mechanisms.

By examining these issues, this chapter contributes to the discourse on AI governance, regulatory adaptation and institutional compliance behavior. The findings emphasise that compliance alone does not drive meaningful institutional change, and that municipalities must develop adaptive governance models to bridge the gap between policy intent and practical AI integration.

THEORETICAL FRAMEWORK

Although this chapter primarily emphasises empirical findings regarding how Dutch municipalities are responding to the AI Act, it nonetheless aligns closely with theories in the field. This study applies three key theoretical perspectives to understand the gap between policy and practice in municipal AI adoption.

The symbolic versus substantive compliance theory (Taheriruh and Moshtari, 2023) provides a framework for analysing whether municipalities genuinely integrate AI governance or merely engage in superficial compliance. Symbolic compliance occurs when municipalities formally adhere to AI regulations without implementing meaningful structural or operational changes. In contrast, substantive compliance involves embedding AI governance into daily municipal operations, ensuring that regulations lead to practical outcomes rather than remaining an administrative formality. This distinction is essential to evaluating whether the AI Act is driving real change in municipal governance or remains a bureaucratic requirement with limited impact.

The policy–implementation gap (Edler and Fagerberg, 2017) further explains the challenges that municipalities face in translating AI policies into practice. While national and European AI frameworks set clear objectives, municipalities often struggle with limited resources, expertise or institutional support needed to implement these policies effectively. This gap results in delays, inconsistencies and fragmented AI adoption across municipalities. Understanding these challenges is critical to identifying strategies that bridge the divide between policy ambitions and operational feasibility.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

The regulatory compliance in AI framework (Ashraf and Haile, 2023) contextualises the legal complexities surrounding AI governance. Given the rapid evolution of AI technology, municipalities must continuously adapt to shifting regulatory landscapes, which can create uncertainty and hesitancy in decision-making. Compliance requires more than passive adherence to legal requirements: it involves proactive engagement with evolving regulations and ethical considerations. Municipalities that lack the capacity to stay updated with regulatory developments may struggle with enforcement, leading to varying levels of AI governance maturity. Fest et al. (2022) showed that public sector professionals frequently lack clear guidelines on how to operationalise AI governance, contributing to inconsistencies in compliance. This reinforces the need for municipalities to enhance AI literacy at all levels and to integrate compliance mechanisms more explicitly into decision-making structures.

DATA

The core of the research was a survey distributed to all municipalities. This survey was sent out twice: between September and December 2023, and a second invitation between the end of May and the end of July 2024. The first round of responses included 88 municipalities (26 per cent), while the second round had 40 municipalities (12 per cent), likely due to the summer holidays. In both rounds, three questions were asked: (1) Is someone within your organisation aware of the AI Act and its obligations? (2) Is your municipality taking action to raise awareness about the AI Act? (3) Has your municipality made changes to comply with the AI Act? In the second round (about six months later), 19 of the 40 municipalities had also participated in the first round, allowing for a comparison of the scores on these questions to see whether their readiness for the AI Act had changed. At the same time, 21 additional municipalities that did not participate in the first round were included in the total number of unique municipalities, bringing the total to 109 unique (representatives of) municipalities, representing about 32 per cent of all Dutch municipalities (342 in total).

The research included a diverse range of employees from various departments and roles, highlighting the breadth of expertise involved. Participants primarily fell into categories related to information management and security, with roles such as chief information officers, information managers, privacy officers and information advisors contributing valuable insights. Additionally, administrative support staff, including management assistants and communication support roles, participated, providing a well-rounded perspective on operational efficiency. The research also featured employees in programme management and policy advisory positions, such as programme managers and policy advisors, who offered insights into digital transformation and strategic planning. Team leaders and coordinators in information management played a

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

crucial role, emphasising the importance of leadership in guiding information initiatives. However, it is worth noting that there was a limited representation of employees with legal expertise in the survey. This lack of participation from legal professionals may affect the comprehensiveness of insights regarding legal and compliance aspects within the research.

First, we briefly outline the background of the AI Act and discuss what it specifically means for municipalities. Second, we address the awareness and action regarding the AI Act (survey results); and third, we look at insights gained from the three in-depth interviews conducted with representatives from municipalities.

THE AI ACT: IMPLICATIONS AND REQUIREMENTS FOR MUNICIPALITIES

This section examines the legal foundations and requirements of the AI Act, exploring how its provisions specifically impact upon municipal operations. It is important to note that this section does not provide a comprehensive review of the AI Act, but instead focuses on the key elements relevant to the practical research presented later in this chapter.

AI can have a substantial impact on society, offering both opportunities and risks. Therefore, it is essential to build trust that AI and the AI regulatory framework are developed in alignment with the values of the European Union. This became the AI Act (European Parliament and Council of the European Union 2024). The AI Act is enforced through a multi-layered governance framework, outlined in Chapter VII (Governance) of the AI Act, involving cooperation between the AI Office, AI Board, the Advisory Forum and Scientific Panel at the European level and national authorities in each Member State. This structure ensures oversight, compliance and regulatory coordination across the EU (Novelli et al., 2024).

According to recital 6 of the preamble of the AI Act, a fundamental requirement is that AI must be a human-centred technology. This means that AI should serve as a tool for people, with the ultimate objective of enhancing human well-being. For public institutions, such as municipalities, this is an essential requirement. Municipalities inherently aim to serve their citizens and enhance human well-being, irrespective of AI usage. In light of this, and incorporating the regulatory compliance in AI framework theory, compliance for municipalities with the AI Act necessitates not only passive adherence to legal requirements but also proactive engagement with evolving regulations and ethical considerations. Consequently, this current paragraph is written not only to address the legal obligations but also to provide practical guidance on how municipalities can meet the discussed requirements of the GDPR.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

The preamble of the AI Act states that AI should enhance human well-being. This principle should ideally be reflected in the AI system's definition. However, this definition is somewhat vague in wording. According to Article 3 (1) of the AI Act, an AI system is:

> a machine-based system that is designed to operate with varying levels of autonomy and that may exhibit adaptiveness after deployment, and that, for *explicit* or *implicit objectives*, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environment.

This implies that an AI system must always have a defined purpose, although this purpose does not necessarily need to be explicitly stated. Consequently, if municipalities intend to deploy an AI system, they must have a purpose in mind for it, whether explicitly articulated or at least implicitly understood.

That may sound logical, but it is not always the case. A study conducted by the Governance and Security in a Digitalising Society research group indicates that although 82 per cent of the participating municipalities report being aware of the obligations imposed by the AI Act, only 24 per cent of the participating municipalities state that they have already implemented changes. The findings of this research are discussed in detail later this chapter.

Other research among Dutch municipalities in June and July 2024 has shown that 60 per cent of municipalities do not yet know exactly how they want to use AI, but they are certain that they will use it (Dees, 2024). This research sent out a call to participate in the survey to the municipal secretaries of all 342 municipalities. It received 85 completed surveys back. Although the research showed that some municipalities have no idea how they want to use AI, most municipalities indicate that they are currently investigating the possibilities of using AI within their municipality or that they are establishing guidelines for the use of AI (Van Trigt, 2024).

Determining the purpose, or purposes, for which the AI system is deployed is crucial for establishing the risk classification of the respective AI system. Therefore, we use 'purpose' as a guiding principle throughout this legal section. In doing so, we discuss the opportunities that the implementation of AI by municipalities offers, while outlining the preconditions for this implementation. The focus is on the requirements for transparency. This is illustrated with practical examples, starting with the risk classification system employed by the AI regulation.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Purpose and Risk Clarification

The Netherlands Court of Audit categorises AI systems into nine distinct groups. These range from knowledge processing, such as searching through internal documents, to supporting the democratic process by, for instance, transcribing parliamentary debates. The Court of Audit's report clearly and comprehensively discusses these objectives for the use of AI, and they may potentially serve as a guideline for municipalities in determining the purpose of deploying AI systems (Netherlands Court of Audit, 2024: 17).

Municipalities can also take advantage of this diverse range of AI applications. In fact, in Q1 of 2024, research organisation TNO identified a total of 105 potential applications for municipalities (Hoekstra et al., 2024). The use of AI systems by municipalities could open up possibilities such as increased efficiency and improved service quality for residents. However, the various applications of such AI systems also carry different levels of risk. Recital 26 of the AI Act aims to regulate AI systems by categorising them based on the level of risk that they pose. The regulation introduces a risk-based approach, with AI systems classified into three main categories. The rules that apply to an AI system vary depending on the risk level it presents. The greater the risk, the more stringent the regulations.

Unacceptable risk

Article 5 of the AI Act addresses a list of AI systems with an unacceptable risk. This list is exhaustive and contains all categories of AI systems that are deemed unacceptable and therefore prohibited. The provision and use of these AI systems are prohibited because 'they contradict with Union values of respect for human dignity, freedom, equality, democracy, and the rule of law and fundamental rights enshrined in the Charter', as stated in recital 28 of the AI Act. These AI systems are aimed at manipulative, exploitative and social control practices. Examples of such prohibited systems include AI systems that classify individuals based on social behaviour ('social scoring') or databases created or supplemented through indiscriminate scraping of facial images from the internet or CCTV footage for facial recognition purposes.

High risk

AI systems classified as high risk are allowed, but they are subject to more stringent regulations compared to low-risk systems. Under Article 6 and recital 52 of the AI Act, these systems either serve as (safety components of) products regulated by EU product safety legislation, or pose significant risks to individuals' health, safety or fundamental rights by their intended purpose. Additionally, Annexes I and III of the AI Act outline the specific purposes that are considered as high risk.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

An example of a high-risk AI system that is particularly applicable to municipalities is an AI system used to (help) determine whether individuals are eligible for certain public assistance benefits and services, or to decide whether these should be reduced, revoked or reclaimed. Such systems can directly affect individuals since these systems act as the 'decision-maker'. Furthermore, based on recital 58 of the AI Act they may infringe on fundamental rights such as social protection, non-discrimination, human dignity or access to effective remedies.

Limited or no risk

Lastly, AI systems that are not considered high-risk systems fall into the category of systems with limited or no risk. Particular AI systems are subject to little mandatory requirements (based upon transparency) in comparison to the high-risk AI systems. Examples of such systems are generally systems such as spamfilters or chatbots (ex. ChatGPT or Copilot).

From the interviews with three municipalities, it appears that these municipalities primarily consider systems that fall under the lowest risk category. For instance, using an AI system to generate images for social media or to draft recruitment texts poses minimal risk. However, if a municipality uses systems for fraud detection or the provision of benefits, this quickly becomes a high risk. Even the use of systems that initially seem to have limited risk can, in practice, turn out to be high risk, as it depends on the purpose for which the AI system is deployed.

General Purpose AI and Single Purpose AI: The Consequences for the Risk Level

As described above, the distinction between risk levels is crucial, as each risk classification has its own regulatory requirements that are aimed at managing the risks posed by these AI systems. To determine which risk level is applicable for a specific AI system, the intended purpose for which the AI system is used is a leading factor, as outlined in recital 12 of the AI Act.

For so-called single purpose AI (SPAI) systems, the risk classification tends to remain stable. As the name suggests, these AI systems are designed to fulfill a specific, predefined function. Since their function is fixed, the associated risk level is less likely to change significantly over time. However, for general purpose AI (GPAI), this risk classification is not as 'fixed'. Recital 97 of the AI Act defines a GPAI based on its key functional characteristics, particularly its generality and ability to competently perform a wide variety of distinct tasks. These systems can handle a broad range of functions, including image and speech recognition, audio and video generation, pattern detection, question answering and translation (Nikolinakos, 2023). An example of a GPAI,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

as recognised in recital 99 of the AI Act, is a large language model. These models, such as GPT-5, are designed for multiple purposes and can support a wide range of applications. Depending on the specific use and context in which an GPAI system is applied, the risk to individuals and society can vary. In fact, the same GPAI can fall into all risk levels merely based on the purpose of the system.

For instance, a GPAI system that simply rewrites human-made decisions to adjust the language level to the needs of the addressee might be classified as minimal risk. In this case, the system only improves clarity without altering the decision's content or infringing on individuals' rights and freedoms. However, if the same GPAI system is used to autonomously approve or deny applications for social benefits or housing, it would be considered high risk. This is because decisions that affect access to essential public services and benefits – explicitly listed in Annex III of the AI Act – have a significant impact on individuals' well-being. In yet another scenario, the same GPAI system could be deployed for practices involving unaccepted risks, such as creating or managing a face recognition database. These use cases are explicitly banned under Article 5(e) and (h) of the AI Act. This demonstrates how the intended purpose of the system can shift its classification from minimal risk to high risk, or even to a unacceptable category.

Measures and purpose

In principle, AI systems may only be placed on the European market under certain conditions (European Parliament and Council of the European Union, 2024: recital 46) These conditions depend on the risk classification of the respective system. The higher the risk, the stricter the conditions. These requirements appear to be primarily aimed at the developers of the systems. However, there are also conditions for the deployer of the AI systems (Santifort et al., 2023). This means that municipalities which do not develop AI systems themselves cannot blindly rely on the fact that an AI system which has entered the European market can be used without scrutiny.

We established above that municipalities could, in some cases, use AI systems that fall into the 'high risk' category according to the AI Act. According to Article 3 (4) of the AI Act, the deployer is the organisation 'using an AI system under its authority'. Meaning that when a municipality uses a high risk AI system under its authority it must comply with the conditions for high-risk AI systems, as outlined in Article 26 of the AI Act. There are various requirements for deployers of high-risk AI systems. We discuss some of these requirements here and apply them directly to municipalities.

For instance, based on Article 26 (1) of the AI Act municipalities must use the AI system in accordance with the terms of use. To ensure that this is effectively implemented within the municipality, appropriate technical and

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

organisational measures must be taken. This is a rather open requirement, but one that is already familiar from, for example, the General Data Protection Regulation (GDPR) (European Parliament and the Council, 2016). This could, for example, be achieved by making it impossible to use the AI system in any manner other than as prescribed in the terms of use (technical measure), or by providing training to employees who work with the AI system, explaining the importance of using the AI system correctly (organisational measure).

Another important measure is that municipalities shall assign human oversight to natural persons. These persons must possess the necessary competence, training and authority, as well as the necessary support (Van de Ven, 2021). This requirement from Article 26(2) of the AI Act is closely related to the requirement for AI literacy in Article 4 of the AI Act. The current article (pending the Omnibus IV Proposal) states that municipalities:

> shall take measures to ensure, to their best extent, a sufficient level of AI literacy of their staff and other persons dealing with the operation and use of AI systems on their behalf, taking into account their technical knowledge, experience, education and training and the context the AI systems are to be used in, and considering the persons or groups of persons on whom the AI systems are to be used.

As this article indicates, the AI Act does not specify exact measures to achieve AI literacy. However, the Dutch DPA (Autoriteit Persoonsgegevens) provides guidance on how to shape AI literacy. Organisations, including municipalities, are advised to adopt a multi-year (iterative) plan for gradual integration (Autoriteit Persoonsgegevens, 2025). This involves four consecutive steps:

(1) Identifying AI systems and assessing associated risks. In this step, municipalities conduct an inventory of all AI systems currently in use and perform a risk assessment on them. This step can also serve as the initial phase when implementing a new AI system.
(2) Defining concrete and measurable AI literacy objectives. With a clear understanding of the AI systems currently utilised by the municipality and their associated risks, a plan can be formulated in this step to ensure appropriate AI literacy tailored to the risks identified in step 1.
(3) Implementing strategies. With the appropriate AI literacy now clearly defined, practical steps can be taken to effectively implement this AI literacy. This may include training programmes, governance measures and awareness initiatives.
(4) Continuously evaluating and refining these efforts. Given that new AI systems may be implemented, and the risks associated with AI systems that are already in use may change, it is important to regularly repeat the

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

above process, for example once a year, and to adjust the AI literacy plan accordingly.

Another measure stated in Article 26 (4) of the AI Act, which resembles the principles of data accuracy and data minimisation from the GDPR, is the requirement that municipalities must ensure that the input data is relevant and sufficiently representative for the intended purpose.

In addition to the obligations outlined in Article 26 and Article 4 of the AI Act, there are also several relevant obligations for municipalities found in Article 50 of the AI Act. These are transparency obligations (Benedikt et al., 2024). For example, under Article 50 (1) of the AI Act, municipalities that use AI to communicate directly with their residents must ensure that their residents are informed about this. The information must be provided to the involved natural persons at the latest at the time of the first interaction or exposure, in a clear and distinguishable manner.

This section highlights (a couple of) the numerous legal requirements that municipalities must adhere to when implementing AI systems. To evaluate the level of awareness among municipalities regarding the AI Act and its obligations, a survey was conducted. The findings from this survey are detailed in the subsequent sections. It is crucial to note, as mentioned in the introduction, that the survey had a limited number of participants with legal expertise. This shortage of legal professionals may impact upon the depth of insights into legal and compliance issues within the research.

AWARENESS AND PREPAREDNESS OF MUNICIPALITIES FOR THE AI ACT

This section presents survey findings on municipal awareness and initial steps towards compliance with the AI Act. By examining the current state of knowledge among municipalities, the section reveals both achievements and gaps in readiness and highlights where further efforts may be needed. The study focused on the unique municipalities that participated in the first and second survey requests in 2023 and 2024. The results are based on 109 municipalities, representing about 32 per cent of all Dutch municipalities.

Awareness of Obligations in the AI Act

When we look at awareness of the AI Act's obligations, 89 out of 109 municipalities (82 per cent) indicated that they were aware of the requirements. Here are some quotations from municipal officials in response to the survey. The responses vary: 'We are aware that the European draft AI regulation (likely by 2026) will make it mandatory to document high-risk AI algorithms'; 'We will

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

soon start creating a new IT [information technology] vision for the municipality, which will also include AI'; 'We know that the AI Act is coming, but we do not fully understand what it will mean for us'; 'We have to admit that, before receiving this email, we were unaware of this development'. These quotations show that while some municipalities are very aware, others are unsure why this new law is important for them.

Actions Taken to Raise AI Awareness

When asked whether the municipality had taken action to raise AI awareness, 63 out of 109 municipalities (58 per cent) said that they had taken steps. This is lower than the awareness percentage mentioned earlier. Here are a few examples of actions: 'We are including these decisions in our change processes and will, of course, communicate them with all stakeholders'; 'We recently had a speaker from the University of Twente to talk about AI. We've also included AI risks and dangers in our training and shared this on our intranet'; 'We are working on raising awareness about AI, algorithms, and AI chatbots. This includes guidelines for chatbots, organising regional AI knowledge meetings for council members'; 'We have taken steps to raise awareness around the AI Act. For example, we conduct an IAMA test before implementing an AI application. We also informed all staff about the potential risks of using generative AI technology'.

Have Changes been Made to Comply with the AI Act?

The survey also asked whether municipalities had already made changes to comply with the AI Act. Only 26 out of 109 municipalities (24 per cent) said that they had implemented changes, meaning that most still need to take action as the law begins to affect them. Some municipalities shared their progress: 'We have decided to start publishing our algorithms step by step'; 'We are working on embedding AI into our policy in an appropriate and ethical way by 2024'; 'Changes have been made, but they are more related to the upcoming requirement for an algorithm register in 2025'; 'The municipality has already developed policies in preparation for the AI Act'; 'We've set up the basis for a register and have shared this through our intranet and videos'; 'We have added an algorithm to the AI register and plan to expand this next year'. These examples provide a glimpse into the actions that municipalities have taken or are planning to take.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Changes over Time

The second survey had a lower response, but an analysis showed that 19 out of the 40 municipalities that responded had also participated six months earlier. It is interesting to see whether any changes were visible. This small sample size and the varied survey respondents may contribute to differing perspectives.

This analysis showed that most of the 19 municipalities that participated both times were aware of the AI Act obligations (53 per cent), and a few said that they were unaware at both times (16 per cent). For most municipalities (69 per cent), there was no change in awareness between the first and second survey. However, five municipalities (26 per cent) that were initially unaware reported increased awareness six months later.

Regarding actions taken to raise awareness, a different trend was observed. Nine municipalities that did not take any action initially had done so by the second survey (47 per cent). However, some municipalities showed inconsistencies, reporting actions in the first survey but not in the second (11 per cent). It is possible that actions were taken earlier and are no longer ongoing. Some municipalities reported no actions at both times (21 per cent), while others consistently reported actions.

Investigative research shows that AI can help municipalities to improve efficiency and services, but it also brings ethical challenges (Van den Brand, 2024a). Both Rotterdam and Groningen have faced issues in managing AI responsibly. Rotterdam has been criticised twice by its audit office for using biased algorithms, including one that unintentionally discriminated in detecting fraudulent benefits. The 2021 audit report revealed that civil servants do not fully understand the ethical risks associated with AI. In response, the city of Rotterdam established an 'algorithm governance' structure to promote responsible AI use and registered several high-risk algorithms. However, many such algorithms remain unregistered, and transparency towards the public is still insufficient. The audit office therefore emphasised that decisions on ethical AI use should be made by political leaders rather than civil servants, in order to minimise unnecessary risks.

In Groningen, the ethics committee advised against using generative AI, such as Microsoft's Copilot 365, due to poor data management and privacy concerns. The city's growing reliance on tech companies like Microsoft poses risks, and the committee recommended delaying AI use until better protections are in place. Both cities highlight the need for stronger AI governance. Rotterdam is focusing on transparency and political oversight, while Groningen is working on data management and privacy before further AI implementation.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Algorithm Register and Transparency in Practice

One way to increase transparency and shift from a more or less symbolic to a more substantive approach in the use of AI is through algorithm registers (Taheriruh and Moshtari, 2023). In these registers, government bodies, including municipalities, publish their use of algorithms. Each entry includes general information about the algorithm, how it is used responsibly, and technical details. The register also shows the current status of each algorithm, whether it is in use, being developed, or has been discontinued.

It is important to note that the algorithm register is a Dutch initiative based on several opinions and reports. The register was created to provide more transparency about the Dutch government's use of algorithms. There are both similarities and differences between the register and the AI Act. The register also includes rule-based algorithms and low-risk algorithms, not just high-risk ones. Government organisations can submit their algorithms for registration by contacting the relevant authorities.

The general rule for the algorithm register is 'publish unless'. Not all algorithms need to be included in the register. Some may be excluded due to legal reasons. If there is doubt, the guideline says: 'If there are no clear reasons not to publish, then publish information about the algorithm' (BZK, 2023).

The algorithm register helps to show which municipalities are working to make their use of algorithms transparent. Eventually, the register will be required for all government organisations, including water boards, municipalities, provinces and the national government. It is unclear whether other public bodies, such as schools and healthcare, will also need to comply. When the students' survey was conducted, 17 municipalities had registered part of their algorithm use. This was in early 2024.

Shortly afterward, news emerged that municipalities published few algorithms (Van den Brand, 2024b). Several large municipalities have now published their high-risk algorithms in the national algorithm register, but the majority have not yet followed. With new regulations coming and increasing public pressure, changes are expected. The Netherlands has had a National Algorithm Register that it launched in December 2022, when there were 109 algorithms listed. By mid-February 2024, this had risen to 291, with most entries from municipalities. Amsterdam (40), The Hague (29), Utrecht (38) and Rotterdam (11) lead the way, followed by about 40 other municipalities with 1–5 registrations each. However, the published algorithms are just a small portion of the risky codes used by the government. The Court of Audit found dozens of predictive, possibly discriminatory algorithms in use, many of which, such as fraud detection tools, remain unregistered. Even leading municipalities face challenges. Amsterdam, for example, was criticised by its own audit

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

office for lacking control over its algorithms and failing to assess their fairness properly.

Participation in the national register is voluntary, and there is no mandatory involvement yet due to slow legal processes. However, the upcoming European AI regulation will make it mandatory to register high-risk algorithms in a public database, with strict transparency requirements.

A news article in September 2024 reported that municipalities were performing better than ministries (Hartholt, 2024). The Dutch algorithm register now contains more than 500 algorithms, according to a recent review. About 400 government algorithms have been added in the last year and a half, with municipalities ahead of the national government. By the end of 2025, the register should be fully completed, and the government has been speeding up in recent months. When the register was created in December 2022, it started with 109 algorithms. According to the review, most of the registrations come from Dutch municipalities, which have listed 365 algorithms. Amsterdam, Utrecht, and The Hague are leading in this area. Interestingly, the central government has only added 13 algorithms to the register so far. Compared to the central government, Dutch municipalities are doing better.

PRACTICAL INSIGHTS FROM MUNICIPAL INTERVIEWS

Through in-depth interviews, this section offers a closer look at the varied approaches that municipalities take to implement AI, highlighting real-world challenges and readiness for compliance with the AI Act. For example, municipality A focuses on using AI systems as tools rather than decision-makers. Guidelines have been set up to make employees aware of the sensitive information that AI can handle. Employees may use AI systems as tools, but the AI systems must not take over their tasks, nor can they make decisions. The municipality plans to offer training to employees so they understand how to use AI, what they should avoid, how AI works, and how to prevent discrimination or incorrect information. Municipality A is experimenting with AI-generated images on social media for sensitive topics, such as abuse or financial issues, where using real photos may be inappropriate. They clearly indicate when an image is AI-generated and follow data protection guidelines. Municipality A collaborates with other municipalities in some areas but not yet in algorithms. For now, the municipality is waiting to see how the AI Act will be implemented.

Municipality B uses AI for drafting documents and recruitment texts. AI is developing quickly, and the municipality is still exploring its options. It does not have a specific team for the AI Act yet but plans to hire interns to focus on it. It currently does not use many AI systems but intends to add an ethics section to its policies next year. Their biggest challenge is a lack of employee capacity

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

and understanding of AI, which is also an issue for citizens. Many smartphones have AI, but people may not know how to use it, making it difficult for the municipality to ensure that AI systems do not influence decision-making.

Municipality C uses a variety of AI applications, such as AI models for object recognition, text mining for social media sentiment analysis, and drone-based 'urban mining' to identify materials for carbon dioxide (CO_2) reduction. It has used text mining to measure the city's mood after events such as football matches or protests. Ethics and privacy are key concerns. For example, when using drones, the municipality informs residents in advance, asking for permission and explaining the purpose. It also provides ethics training for employees and has strict guidelines to protect sensitive information. Municipality C is well informed about AI regulations and is working on the algorithm register. It also shares experiences with other municipalities, helping to broaden its understanding of AI regulations and ethics. It is aware of how technology will affect the labour market and is preparing employees for job changes due to automation and AI.

These interviews show the different approaches tha municipalities are taking to use and implement AI and comply with the AI Act. From ethics training to strict oversight, all three municipalities are committed to the responsible use of AI.

CONCLUSION AND FUTURE DIRECTIONS

This chapter demonstrates that while Dutch municipalities are aware of the AI Act, significant gaps remain in implementation. Many municipalities are in a phase of symbolic compliance, where awareness and formal policy development occur, but without deep structural and operational integration. Factors such as limited legal expertise, disparities in digital infrastructure, and ethical uncertainties contribute to this fragmented approach to AI governance.

A key insight from this study is that compliance alone does not drive meaningful institutional change. To achieve substantive AI governance, municipalities must integrate AI beyond legal adherence, embedding it within broader digital transformation strategies. This requires capacity-building, AI literacy initiatives, and intermunicipal collaboration to accelerate the transition from symbolic to substantive compliance.

The findings contribute to existing theories on AI governance by refining the symbolic versus substantive compliance framework, highlighting that municipalities move through distinct phases influenced by policy pressure and organisational capacity. The policy–implementation gap is further contextualised by showing that implementation barriers stem not only from resource limitations but also from a lack of cross-departmental cooperation and strategic AI planning. Additionally, this study reinforces the regulatory compliance in

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

AI framework by demonstrating that compliance is an ongoing, adaptive process requiring municipalities to continuously engage with evolving regulations and ethical considerations.

Future research should focus on comparative case studies within the EU, examining how different governance models affect AI implementation. Additionally, investigating the role of intermunicipal collaboration and the effectiveness of AI literacy initiatives could provide actionable insights. Longitudinal studies on AI Act adaptation and research on ethical AI governance in municipalities are also necessary to bridge the gap between policy intent and practical execution.

As AI regulations and technologies evolve, municipalities must move beyond mere compliance and adopt adaptive governance models. A coordinated national strategy and strategic planning are essential to ensure that AI governance is not just a regulatory requirement but a driver of responsible and innovative public service transformation.

BIBLIOGRAPHY

Ashraf, A.N., and Haile, A. (2023). Data protection and AI: Navigating regulatory compliance in AI-driven systems. *Journal of Data Protection and Privacy*. https://doi.org/10.13140/RG.2.2.13639.92328

Autoriteit Persoonsgegevens (2025). *Aan de slag met AI-geletterdheid*. https://www.autoriteitpersoonsgegevens.nl/system/files?file=2025-01/Aan%20de%20slag%20met%20AI-geletterdheid.pdf

Benedikt, K., Sänger, J., Haar, T., Hansen, M., Henning, C., Keber, T.O., Kessen, M., Köhler, M., Kremer, S., and Mühlenbeck, R.L. (2024). *KI-Vo Leitfaden für die Praxis*. Heidelberg: C.F. Müller Verlag.

BZK (2023). *Implementatiekader: Verantwoorde inzet van algoritmen*. Ministerie van Binnenlandse Zaken en Koninkrijksrelaties. https://open.overheid.nl/documenten/9b7b55fd-1762-499b-b089-2b7132c12402/file

Dees, M. (2024). Gemeenten willen Al inzetten, maar weten niet hoe. ICT Magazine. https://www.ictmagazine.nl/nieuws/gemeeten-willen-ai-inzetten-maar-weten-niet-hoe/

Edler, J., and Fagerberg, J. (2017). Innovation policy: What, why, and how. *Oxford Review of Economic Policy, 33*(1), 2–23. https://doi.org/10.1093/oxrep/grx001

Engelfriet, A. (2023). De AI Act door het parlement: welke regels gaan er gelden voor AI en algoritmes? https://www.ictrecht.nl/blog/de-ai-act-door-het-parlementwelke-regels

European Parliament and Council of the European Union (2016). *Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data (General Data Protection Regulation).*

European Parliament and Council of the European Union (2024). *Regulation (EU) 2024/1689 of 13 June 2024 laying down harmonised rules on artificial intelligence and amending regulations and directives (Artificial Intelligence Act). Official Journal of the European Union*.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Fest, I., Wieringa, M., and Wagner, B. (2022). Paper vs. practice: How legal and ethical frameworks influence public sector data professionals in the Netherlands. *Patterns*, *3*(10), 100604. https://doi.org/10.1016/j.patter.2022.100604

Hartholt, S. (2024). Gemeenten lopen voor op ministeries in algoritmeregister. *Binnenlands Bestuur*. https://www.binnenlandsbestuur.nl/digitaal/gemeenten-lopen-voorop-algoritmeregister

Hoekstra, M., Dom, L., and Van Veenstra, A.F. (2024). *Quickscan AI in de publieke dienstverlening III*. TNO Vector. https://publications.tno.nl/publication/34642601/SASNc3ZW/TNO-2024-R11005.pdf

Janssen, M., and Van den Berg, R. (2022). AI governance in public administration: Challenges and strategies. *Public Management Review*, *24*(5), 789–808. https://doi.org/10.1080/14719037.2022.2032010

Kleinhout, B., and Naves, J.L. (2022). Het voorstel voor een Europese AI-verordening en de betekenis daarvan voor Nederlandse overheden. *Nederlands Tijdschrift voor Bestuursrecht*, *38*. https://new.navigator.nl/document/id1fc1865cc6564dbd8414962155cd73f1

Meuwese, A., and Wolswinkel, J. (2022). Een Wet op de Artificiële Intelligentie? De Europese wetgever haalt de nationale in. *Nederlands Juristenblad, 97*(2), 92–100.

Netherlands Court of Audit. (2024). *Focus on AI in the Dutch central government*. Netherlands Court of Audit. https://english.rekenkamer.nl/documents/2024/10/16/focus-on-ai-in-central-government

Nikolinakos, N.T. (2023). *EU policy and legal framework for artificial intelligence, robotics and related technologies: The AI Act*. Springer. https://doi.org/10.1007/978-3-031-27953-9

Novelli, C., Hacker, P., Morley, J., Trondal, J., and Floridi, L. (2024). A robust governance for the AI Act: AI Office, AI Board, Scientific Panel, and national authorities. *European Journal of Risk Regulation*, 1–25. https://doi.org/10.1017/err.2024.57

Quintais, J.P. (2024). Generative AI, copyright and the AI Act. https://ssrn.com/abstract=4912701

Santifort, R., Ezzamouri, I., and Van Dijk, G. (2023). De EU AI Act: de toekomst is (bijna) hier. *Nederlands Juristenblad*, *2631*.

Solove, D.J. (2024). A regulatory roadmap to AI and privacy. *IAPP News*.

Taheriruh, M., and Moshtari, M. (2023). Symbolic compliance with policy-led public procurement: Decoupling practices and compliance barriers. *International Journal of Procurement Management*, *19*(1), 1–20.

Van den Brand, P. (2024a). Meerderheid gemeenten publiceert geen risico-algoritmes. *Binnenlands Bestuur*. https://www.gemeente.nu/bedrijfsvoering/big-data/meerderheid-gemeenten-publiceert-geen-risico-algoritmes

Van den Brand, P. (2024b). Gemeenten worstelen met ethische risico's AI – deel 1. *Binnenlands Bestuur*. https://www.gemeente.nu/bedrijfsvoering/digitalisering/gemeenten-worstelen-met-ethische-risicos-ai-deel-1

Van de Ven, S.W. (2021). Innoveren door te reguleren: Een bespreking van het rapport inzake de regulering van AI. *Maandblad voor Ondernemingsrecht*, *40*, 1–2. https://www.bjutijdschriften.nl/tijdschrift/mvo/2021/1-2/MvO_2452-3135_2021_007_102_005

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Van Trigt, M. (2024). Gemeentelijke datahuishouding leent zich nog niet voor AI-toepassingen. *Binnenlands Bestuur.* https://www.binnenlandsbestuur.nl/digitaal/gemeentelijke-datahuishouding-leent-zich-nog-niet-voor-ai-toepassingen

Wirtz, B.W., Weyerer, J.C., and Geyer, C. (2019). Artificial intelligence and the public sector: Applications and challenges. *International Journal of Public Administration*, *42*(7), 596–615. https://doi.org/10.1080/01900692.2018.1498103

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

3. Navigating waters and algorithms: lessons from ships in developing a liability regime for AI

Rufat Babayev

INTRODUCTION

The increasing integration of artificial intelligence (AI) systems into society raises novel risks that challenge traditional legal frameworks (Hacker, 2023). This stems from the distinctive characteristics of AI systems. First, they possess the capacity for autonomous decision-making and action by operating without direct and continuous human control or input (Mik, 2021). Second, a significant level of opacity is inherent to AI systems as the algorithmic processes and the combination of hardware and software underlying them are complex and inscrutable. Third, AI systems exhibit inherent unpredictability, stemming from their ability to adapt and evolve based on pre-defined data inputs, but also to identify, classify and react to self-identified stimuli (EG-NTF, 2019). These idiosyncratic attributes have been at the forefront of academic and policy debates about designing an appropriate framework of rules that determine who is legally responsible when something goes wrong and causes harm in the AI domain. The dilemma facing lawmakers is creating a liability regime that adequately compensates victims of AI-induced harm without stifling innovation and societal progress (Smuha, 2021).

In this context, parallels can be drawn with maritime law, which has long managed complex liability issues arising from ship operations. Ships and AI systems are indeed vastly different and are not easily comparable. However, they share challenges from a liability perspective, for both involve multi-risk, multi-party and multi-jurisdictional operations. Given this affinity between ships and AI systems, the salient question is whether and to what extent the legal precepts developed in the maritime context can serve as the blueprint for the AI domain. To address this query, this chapter focuses on three precepts: the doctrine of ship personification, the concept of maritime liens, and liability coverage through protection and indemnity clubs.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

DRAWING PARALLELS: SHIPS AND AI SYSTEMS

At first glance, it may seem odd to compare ships and AI systems because of the conspicuous distinctness peculiar to them. Unlike traditional ships, AI systems are not physical entities but exist as algorithms or software. According to the definition provided by the European Commission, 'artificial intelligence refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals' (HLEG, 2019). These systems have the capacity 'to learn to adapt their behaviour by analysing how the environment is affected by their previous actions' (HLEG, 2018). Despite their intangible nature, AI systems can be integrated into physical objects. Some are 'purely software-based, acting in the virtual world' (HLEG, 2019), such as search engines, speech and face recognition technology, voice assistance and image analysis software. In contrast, others are 'embedded in hardware devices', such as advanced robots, autonomous cars or drones (HLEG, 2018).

Ships and AI systems also differ in their autonomous capabilities. Ships, especially the modern ones, rely on automated systems for navigation and operations that involve human oversight. In contrast, AI systems can operate autonomously, making independent decisions without human intervention. They can also evolve with quasi-cognitive learning and adaptation capacity without remaining static (Hacker, 2023). In terms of their sophistication, AI systems are stratified in multiple ways. For some, there is the category of narrow or 'weak AI', encompassing AI systems designed for specific tasks, and the category of general or 'strong AI', which refers to AI systems with human-like cognitive capabilities (HLEG, 2018). AI systems are also classified into specific types based on their capacity, ranging from the most basic form of 'reactive machines' to the more sophisticated 'limited memory programs' to the more advanced technology of 'theory of mind' and 'self-aware models' (Wiring, 2020). While the latter two are only theoretical concepts that do not yet exist, the broad category of 'limited memory programs' covers existing AI systems that utilise past information to inform future decisions. It includes, for instance, self-driving vehicles that collect data from their environment and use it to make real-time driving decisions and generative AI that outputs new content by analysing large datasets and learning patterns. Interestingly, through this category, the realms of ships and AI systems are gradually fusing with the introduction of fully autonomous vessels capable of operating without human intervention or oversight and determining actions by themselves, such as *Mayflower* and *Yara Birkeland* (Carey, 2023).

Another distinguishing aspect is that AI systems are not confined to one environment. Unlike ships that exclusively operate within the maritime

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

environment, navigating oceans, seas and inland waterways, AI systems are integrated into diverse applications across various industries, from information technologies to manufacturing, agriculture, transport, commerce, healthcare and space technologies (Gómez-González, 2020). Such a broad operational reach prompted divergent approaches to regulating AI. The European Union (EU) AI Act, which came into force in 2024, adopts a single, overarching, cross-sectoral regulatory framework based on the risk classification method. The Act prohibits certain 'unacceptable AI practices', lays down requirements for 'high-risk' AI systems, sets transparency obligations for certain 'limited risk' AI systems and contains specific provisions for general-purpose AI. In contrast, the United Kingdom and the United States (US) favour a sector-led approach that involves adopting distinct regulatory frameworks for different industries, the underlying logic of which rests on incremental rather than comprehensive policymaking (Gikay, 2024).

However, parallels can still be drawn between ships and AI systems by focusing solely on the regulatory challenges they pose. First, the operations of both entail a spectrum of risks that require a measured approach. Ships can cause environmental accidents, passenger or crew injuries, and property damage. According to the European Maritime Safety Agency, 542 pollution cases were reported from 2014 to 2022 (EMSA, 2023). In the same timeframe, 727 injuries occurred on passenger ships, nearly 50 per cent of which were caused by collisions and contacts made by ships (EMSA, 2023). Likewise, the risks of harm associated with AI systems are manifold. They are generally categorised into two groups. On one hand are the so-called 'physical' (Wendehorst, 2020a) risks that encompass interests traditionally protected by tort law, such as the right to life, bodily integrity, health and property (Wagner, 2022). In the EU, the revised Product Liability Directive is designed to extend liability for defective products to AI systems that cause death or personal injury, medically recognised psychological harm, harm or destruction to property. Interestingly, the Directive will deem the loss and corruption of data as compensable damage by placing it on equal footing with physical property (Wagner, 2022). On the other hand, there are the so-called 'social' (Wendehorst, 2020a) risks that concern potential harm to the right to personality, including discrimination, impairment of honour or dignity, invasion of privacy, and distortion of the individual image (Wagner, 2022). As part of the European Commission's legislative package, these types of harm will be covered by the newly proposed EU AI Liability Directive, which will extend beyond the scope of the revised Product Liability Directive. However, the distinction between these two categories is not always clear-cut since AI systems pose risks that cannot readily be classified as either. This includes, for instance, cybersecurity risks or harms to essential infrastructure and networks that are 'intangible' in nature (Wendehorst, 2020b).

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Second, ships and AI systems involve numerous stakeholders and complex operational structures, complicating the ascription of liability and the indemnification of victims of harm. In the chain of responsibility in the maritime industry, shipowners are natural or legal persons who own a vessel and oversee its operation and maintenance. Although some have in-house teams handling technical or commercial operations, others delegate these to specialised companies, such as ship operators responsible for a vessel's commercial aspects, or ship management companies that handle crewing and technical maintenance. As part of their primary responsibilities, ship operators enter into contracts with charterers, who are natural or legal persons who rent or lease a vessel for a specific period or voyage and may be held liable for damages arising from their control. Among other stakeholders exposed to liability are maritime pilots who navigate ships through challenging or congested waters and salvors who recover ships and cargo after maritime casualties.

Likewise, a broad spectrum of stakeholders is involved within the framework of AI systems. They can be split into the 'development and supply' and 'operational and end-user' chains. The first group includes all actors who contribute to the development, design and production of autonomous systems, such as software developers and programmers who create and implement AI systems and algorithms (Soyer and Tettenborn, 2023). It also encompasses manufacturers of AI-integrated products, extending even to their authorised representatives, distributors and importers, which are explicitly mentioned, for instance, in Article 4(5) of the revised EU Product Liability Directive. The second group, in turn, relates to those who interact as operators, keepers, or users with AI systems that are put into circulation (Wagner, 2019, 'Robots'). As part of this, two further sub-categories of front-end and back-end operators are distinguished (Wendehorst, 2020a). The latter refers to a natural or legal person who continuously defines the features of the technology and provides data and essential backend support services (Zech, 2019). They are responsible for maintaining servers and cloud platforms supporting AI systems. The former, in turn, concerns a natural or legal person who deploys AI systems in a real-world environment (Zech, 2019). This sub-category includes businesses incorporating AI systems into their day-to-day operations (Soyer and Tettenborn, 2023). It also comprises end-users that interact with AI systems by operating, for instance, autonomous vehicles, drones or robots.

Third, the operation of ships and AI systems transcends multiple jurisdictions, complicating the ascription of liability for harm. Both can lead to situations that trigger two or more liability regimes, each with varying regulatory standards, scope of protection, and enforcement mechanisms. A ship, for instance, registered in one country, owned by a natural or legal person from another, and operated by a crew from a third, raises the question of the applicable law governing liability in the event of an accident. Enforcing liability for

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

AI systems can pose a similar yet far more complex challenge. This primarily stems from the digital dimension intrinsic to artificial intelligence. A harm inflicted by an AI system may be linked to multiple potentially liable defendants, increasing the number of applicable laws and creating interfaces across different jurisdictions. In these circumstances, securing indemnity for the victim of tortious conduct may face three hurdles. First, it may not be possible to localise an AI system operating in a virtual setting to a particular *situs*, which would raise uncertainty over the forum's jurisdiction regarding the victim's claim (HCCH, 2024). Second, suppose the harm is caused in a virtual setting, for example, where an AI system harms one's right to personality. In that case, the traditional legal instrument to determine the applicable law based on where the damage occurs may not be suitable (Henckel, 2023). Third, even if the two hurdles are overcome, a judgment awarding compensation may be difficult to enforce due to discrepancies in regulatory approaches to liability for AI systems.

PRINCIPLES OF THE MARITIME LIABILITY REGIME

Given the parallels between ships and AI systems, certain legal principles developed in maritime/admiralty law could be instrumental in shaping a liability framework for AI systems. Without attempting to provide an exhaustive account of the maritime/admiralty liability regime, this section briefly highlights the central legal principles underpinning it that are most relevant to AI systems. The subsequent section explores how these principles can be adapted to these systems.

Maritime Lien (Direct Liability Mechanism)

A maritime lien is a legal concept in maritime law that allows a victim of harm to secure a debt or claim directly against a ship, regardless of who owns it at the time. It constitutes a special right that 'sticks' to the ship, ensuring that the victim or claimant can recover what they are owed, even if the ship changes hands or when the responsible party is difficult to locate (*The Ripon City*, 1898). A maritime lien attaches to a ship for a wide array of wrongs or obligations, ranging from collisions and allisions, to discharge of pollutants, to the failure to make payment for supplies and necessaries, salvage, repairs and crew wages (Lind, 2009). It is satisfied through the payment of the debt, the submission of bail or, ultimately, out of the proceeds from the judicial sale of the ship (Hutton, 2003). This occurs through a specific legal procedure called *in rem* proceedings, in which some jurisdictions treat ships as separate legal entities that can be sued directly for compliance with contractual or non-contractual obligations. It differs from the so-called action *in personam*, which

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

is a method of enforcement of a claim against an individual, either an owner or master of a ship, for causing an injury, damage or loss (Jackson, 2015). In action *in rem* against an offending ship, the appearance or nomination of an individual, such as the owner, as a defendant is not necessarily needed because the enforcement of a maritime lien through this legal procedure involves an arrest, forfeiture, and sale of the ship to compensate the claimant for the harm or loss sustained (Hutton, 2003).

An immediate question that arises here is whether the concept of a lien can be adapted to artificial technologies. Consider, for instance, an autonomous vehicle causing an accident due to a malfunction, an industrial robot failing to deliver a service or causing financial loss, or an automated health-monitoring system providing incorrect recommendations that lead to patient harm. Can such AI-driven systems be subject to a lien in the same way as physical ships, or does their intangible nature require a different legal approach? If a lien-like mechanism were to be applied, what form should it take, and how could it be enforced against AI entities? Can they be considered separate legal entities analogous to ships under the concept of a maritime lien?

The Doctrine of Personification (Ships as Legal Entities)

An *in rem* proceeding based on a maritime lien, as outlined above, is fundamental to US admiralty practice, which adheres to the doctrine of personification. It is based on legal fiction that a ship is treated as a separate legal entity akin to a natural person (Gauci, 2021). A legal system can attribute the status of a legal entity to a person, organisation, or thing by recognising it as having rights, responsibilities, or both. According to the doctrine of ship personification, a ship gets assigned legal personality (*Tucker v. Alexandroff,* 1902), whereby it may be liable even though its owner is not personally liable, or indeed, no one is personally liable (Tettenborn, 2023). In *Canadian Aviator*, the US Supreme Court defines the personification of a ship as 'treating it as a juristic person whose acts and omissions, although brought about by her personnel, are personal acts of the ship for which, as a juristic person, she is legally responsible' (*Canadian Aviator*, 1945).

This concept of treating a non-human entity as a legal person raises two overarching questions regarding artificial intelligence. Can AI systems, particularly autonomous technologies, be granted legal personality in a manner similar to ships, and what would be the implications for liability, accountability and victim compensation in cases of AI-induced harm? Before addressing these queries in the subsequent section, it is worth first briefly looking at the scope of the doctrine of ship personification.

There are three aspects to the personification doctrine. First, since a ship acts as a separate 'judicial entity', a maritime lien attaches to it irrespective

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

of the owner's liability (*The Barnstable*,1901). As held in *The Malek Adhel*, 'the vessel which commits the aggression is treated as the offender, as the guilty instrument or thing to which the forfeiture attaches, without any reference whatsoever to the character or conduct of the owner' (*US v. The Brig Malek Adhel*, 1844). Second, the maritime lien remains indelible, meaning that it does not perish with the change of ownership of a ship (Allsop, 2016). The principle adhered to since *The Bold Buccleugh* is that 'the lien may be enforced, into whosesoever possession the thing may come', including when 'the offending ship had passed into the hands of a good-faith purchaser' (*The Bold Buccleugh*, 1852). Third, the extent of liability to be satisfied through an *in rem* action is limited to the amount equal to the value of the offending ship.

These aspects distinguish the personification doctrine from the procedural theory favoured under English law, which, as shown in *The Indian Grace No. 2* (*Republic of India and The Government of The Republic of India v. India Steamship Co. Ltd.,1998),* emphasises a ship's owner or operator's liability (Hebert, 1929–1930), viewing the action *in rem* merely as a procedural mechanism to compel the owner or operator to appear in court (Derrington, 2007). In the context of AI, this raises the question of whether the doctrine of personification or the procedural theory is better suited to address liability for AI systems and which approach – treating AI as a separate legal entity, or using it as a procedural tool to hold relevant human stakeholders accountable – better balances accountability, victim compensation and innovation in the development of autonomous technologies. Adopting either approach would have to be grounded in a clear rationale and pursue a precise purpose analogous to those adopted in the maritime context.

The doctrine of personification, based on ancient maxims, finds its underlying logic in the intricacies of maritime commerce. A ship's metaphysical identity separating it from its owners favours the party claiming loss or harm for the procedural convenience it offers (Corcione, 2013). An action *in rem* against the offending ship obviates the need for a claimant to determine the identity of the current owner or the previous owners, which is required if the claim is made *in personam* (Howard, 1990). When the ship is held responsible, it leaves the parties interested in the ship, such as owners, charterers and mortgagees, to allocate the loss among themselves based on their agreements (Davies, 2000). Even if the defendant's identity is known, an action *in personam* may be complicated by the defendant's location. In England, for instance, a claim *in personam* is contingent on the action being served therein or the direct participation of the party in court proceedings (*Baroda (Maharanee of) v Wildenstein*, 1972). Furthermore, under an action *in personam*, the claimant may also require obtaining evidence from the defendant, who might contumaciously refuse to cooperate, and the effectiveness of the claim would rest on the defendant's willingness or ability to pay (Corcione, 2013). In contrast,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

evidence might be more readily accessible through actions *in rem* focusing on the offending ship itself. This type of proceeding also ensures that those who suffered loss or harm are not 'remitted to the insufficient or evasive responsibility of persons but shall have the security of the tangible and available value of the thing' (*The Western Maid*, 1922).

The legal fiction of anthropomorphising a ship can be construed to serve the needs of maritime commerce by encouraging investment and business engagement. As ships are expensive to buy and operate, they are often controlled by a coalition of different commercial interests, such as co-owners, charterers and mortgagees, that coalesce to provide the funds needed to conduct maritime operations (Davies, 2000). By enabling a ship to bear independent guilt, its personification furnishes greater security for all engaged in maritime commerce (Lind, 2009). An action *in rem*, which allows legal claims to be made directly against the ship rather than the shipowner, has provided tangible security for lenders and suppliers to recover debts. At the same time, this has mitigated the risks associated with owning and operating ships. The personified ship acts as the bearer of obligations of such a joint venture, which allows the separation of the assets of those involved by limiting the liability of the venture to the ship's value (Davies, 2000).

Drawing parallels with AI, a two-layered question emerges. First, can treating AI systems as independent legal entities, akin to ships, simplify liability attribution in cases where harm is caused by autonomous decision-making, and what mechanisms would be needed to enforce such liability? Second, can the legal personification of AI systems provide a comparable level of security for investors and stakeholders in the development and deployment of autonomous technologies? Before exploring how maritime practices can inform AI liability, it is also important to examine another cornerstone of maritime risk management: mutual insurance, which has long provided a cooperative mechanism for pooling risks and resources in the shipping industry.

Marine Insurance and Third-Party Liabilities (Risk Distribution Models)

In the maritime context, there are two kinds of insurance: market and mutual. Broadly construed, market insurance refers to traditional insurance policies offered by commercial insurance companies that cover the hull or cargo of a shipping vessel (De Roover, 1945). It is purchased from a profit-making entity for a fixed premium (Noussia, 2006). In contrast, mutual insurance is a form of protection from financial losses typically organised by shipowners who come together to share their respective risks (Lambeth, 1986). The nature of mutual insurance is paradigmatically illustrated by protection and indemnity (P&I) insurance provided through the so-called P&I clubs formed by shipowners

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

(Tilley, 1986). P&I clubs operate on a non-profit, cooperative basis and are designed to pool losses over a given period at the cost of contributions made by their members (Noussia, 2006). The inception of the first P&I club in the middle of the 19th century was prompted by two interrelated factors. This was a response to the substantial growth of the range and size of liabilities imposed upon shipowners that increased the number of claims against them (Clark, 1980). With this development, however, shipowners could not secure adequate coverage through the traditional insurance market, which could not meet their needs (Anderson and Colin, 2011). For this reason, shipowners opted to form associations in which they each entered their ships for a certain sum, and each undertook to contribute to any loss that a fellow member might incur by maintaining, for instance, a reserve fund (Tilley, 1986). Since then, P&I insurance has been the primary means of protection for shipowners from third-party liability claims (Zhu, 2007). The risks covered by it include, among other things, personal injury, illness or loss of life of passengers, crew or others; pollution and other environmental damage; collision with other vessels; and loss or damage to third-party property.

A number of principles underpin P&I insurance. First, it operates on a mutual basis, premised on the principle of indemnity. This means that the insured member receives compensation equal to the losses, claims or expenses that the member has become liable to pay and has paid without providing a profit or gain to the insured (Noussia, 2006). Third, P&I insurance is closely linked to the concept of limitation of liability, which is deeply entrenched in the maritime industry (Jackson, 2015). It allows shipowners, charterers and operators to limit liability for claims related to loss of life, personal injury, property damage and environmental harm, based on a vessel's tonnage (Roberts, 1968). The limitation of maritime liability is justified on several grounds (Gauci, 2014). Some see the limitation of liability as pursuing the aim of bringing competitiveness to maritime commerce by attracting investments and ensuring that potential entrepreneurs are not dissuaded from entering the shipping industry (Gaskell et al., 1987). Others find that shipping is fraught with high risks which lead to the near inevitability of a relatively high number of routine accidents and the likelihood of occasional serious incidents (Seward, 1986). Support is also found in the difficulties and even impossibility of securing insurance coverage for claims not protected by the limitation of liability (Gauci, 1995).

The central question that arises in this context relates to the suitability of a mutual insurance model in the AI domain. Is such a model a viable solution for covering complex risks posed by rapidly evolving artificial technologies, which traditional market insurers may not accurately assess or underwrite? Unlike the maritime industry, the possible risks posed by artificial technologies are highly dynamic, not easily foreseeable, and even if foreseeable may not be readily measured. While the maritime sector has long benefited from

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

the principle of limitation of liability, it remains uncertain whether introducing a similar framework in the AI domain would effectively balance the interests of industry stakeholders and the rights of victims of AI-related harms.

TRANSFERABLE PRINCIPLES FROM MARITIME LAW TO AI: PERSPECTIVES AND CHALLENGES

In light of the parallels drawn between ships and AI systems regarding the liability-related challenges that they pose, the core issue is whether and to what extent the legal precepts developed in the maritime context, such as the doctrine of personification, the concept of liens and mutual insurance, can serve as the blueprint for the liability framework in the AI domain.

Personification of AI

With recent rapid technological advancements, the possible recognition of AI systems as discrete legal entities has become the focus of policy and academic debates. At the policy level, the often-cited development is the European Parliament's Resolution of 2017, which raised liability-related challenges posed by AI by highlighting that:

> the more autonomous robots are, the less they can be considered to be simple tools in the hands of other actors (such as the manufacturer, the operator, the owner, the user, etc.) … this, in turn, questions whether the ordinary rules on liability are sufficient or whether it calls for new principles and rules

On this premise, the European Parliament called on the European Commission to explore the attribution of legal personality to robots as a potential solution. It envisaged:

> creating a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently.

Although the proposed legal framework was not adopted by the European Commission or insisted on by the European Parliament in the recently adopted EU AI Act, it amplified debates over the plausibility of AI systems acquiring a separate personality. Two distinct levels of reasoning often frame the discourse: ontological and instrumental (Chesterman, 2020). Each has generated conflicting opinions.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

The ontological perspective reflects the philosophical conception of personhood constituting a prerogative associated with being human (Novelli, 2023). On this basis, the recognition of AI as a separate person is considered to rest on the extent to which AI can lend itself to anthropomorphic projections. Central to this approach is whether AI can replicate or acquire human attributes of personhood (Solaiman, 2017), which represent cognitive and moral traits of the human condition (Novelli, 2023). For some, the essential pre-requisite for taxonomising AI as a separate person is the extent of autonomous decision-making and free will to produce its own outputs displayed by AI (Solum, 1992). Others emphasise AI's level of consciousness expressed in self-reflection, argumentation and desires (Van den Hoven van Genderen, 2018). There are those for whom the personhood of AI depends on whether it acquires the sentiment of rationality, explained in '[the capacity to justify] one's actions in reference to determined and determinable purposes, which, in turn, requires the deliberative and argumentative skills that only human beings possess' (Bertolini and Episcopo, 2022).

In legal terms, the conception of personhood does not have human-centric underpinnings. It is a fictional creation in law attributed to non-human entities without possessing anthropomorphic characteristics. The legal personality of an entity denotes its recognition as an addressee of law within a legal system that either bestows it with rights or subjects it to obligations or a combination of both (Mik, 2021). As a bundle of rights and obligations, legal personality is divisible (Banteka, 2021). A legal system may treat entities differently in relation to some rights and some obligations (Negri, 2021), whereby their exact number and nature would vary depending on their subject. A legal person is not a bearer of rights and obligations, but a corollary to those rights and obligations (Kelsen, 2015). Unlike the philosophical conception of personhood, the legal one is imbued with functionalism or pragmaticism. This manifests itself in two ways (Raskulla, 2023). First, since the inherent characteristics are not necessarily determinative of whether a legal system treats an entity as a legal person, anything can enjoy such status, irrespective of its consciousness, intelligence or autonomy (Mik, 2021). Second, legal personhood is an artificial construct conferred at the legislature's will, and such a decision is prompted by the pursuit of either certain policy ends or the protection of legally relevant interests (Zevenbergen et al., 2018). From a legal standpoint, therefore, the issue is not what entity or thing ought to be attributed with personality, but what reasons warrant it and what purpose it would achieve.

Set against the instrumental understanding of personhood, it is possible to rationalise the recognition of ships as separate legal entities and to consider the prospect of AI systems acquiring a similar status. As highlighted in the previous section, the personification of a ship has served a practical purpose in powering the development of maritime commerce by separating the assets of

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

shipowners and simplifying the allocation and enforcement of liability. Such functional considerations are even weightier in the AI domain for the capacity of artificial technologies to operate as autonomous agents. The question of granting AI legal personality, therefore, can be approached from two angles.

Assigning legal personhood to artificial technologies may resolve the challenge of apportioning liability based on the application of traditional fault-based and strict liability standards to AI-facilitated harm. Fault-based liability is a legal doctrine that holds an individual or entity accountable for harm if they breach a duty of care by acting negligently, recklessly or with intentional misconduct. This liability standard may not be suitable for the AI domain, where harm can occur due to an AI system's operational autonomy and cannot be directly linked to the negligent actions of responsible parties such as the manufacturer, programmer, data developer or operator (Novelli, 2023). It may be impossible, for instance, for a programmer to predict AI's conduct if it functions as a neural network capable of learning patterns of behaviour independently (Kurki, 2019). Strict liability, in turn, is a legal doctrine that holds an individual or entity accountable for harm regardless of fault, negligence or intent in inherently dangerous circumstances if the harmful act directly causes damage. The appropriateness of this liability standard for the AI domain divides opinion. For some, its application is warranted, as autonomous AI systems can cause harm without human fault or negligence, and establishing such fault or negligence may be impossible due to the complexity of AI decision-making (Soyer, 2019). Others raise concerns that the ascription of liability on the stakeholders under a strict liability standard, irrespective of fault, could be overly burdensome and risk stifling innovation (Novelli, 2023). For this reason, the attribution of a separate legal personality is seen to encourage innovation and investment in AI technology. Although comparisons with corporations are often made to assert this, a similar proposition follows from drawing an analogy between AI and ships. Akin to the maritime domain, AI's separate legal personality may allow asset segregation that can incentivise investments in AI technology by shielding developers, operators and creditors from the liability for unplanned operations of autonomous systems (Bertolini, 2020).

However, the arguments in favour of recognising AI's legal personality are not without contention. At one level, the functional utility of ascribing legal personality requires that AI be categorised based on decision-making capacity. This is because not all AI-based systems demonstrate the level of autonomy to warrant legal personhood. As previously discussed, in its current form, AI can be split into two levels of intelligence: narrow AI and general AI (Banteka, 2021). General AI 'includes systems that exhibit human intelligence or even superior in all fields' (Durães et al., 2024), while narrow AI represents systems that '[perform] autonomous operations and adapts only in a narrow, well-defined area of tasks' (Raskulla, 2023). Granting legal personality to

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

narrow AI is not warranted, for it lacks significant independence and does not hold the capacity to act in ways that would necessitate legal accountability. At another level, the separate legal personhood of AI can only effectively serve as a shield, granted that it has certain recognised assets to be targeted for compensation claims or liabilities. Otherwise, this would lead to a complete externalisation of risk, whereby victims of the harm caused by AI would bear the losses (Wagner, 2022). If AI systems were to be considered as separate legal entities, there would need to be other means to ensure victim compensation, as discussed below.

From Maritime Liens to AI Liens

Although much has been written about ascribing legal personhood to AI to bridge potential liability gaps in the growing landscape of autonomous technologies, little attention has been given to the practical mechanisms for achieving this. One possible approach to operationalising AI's legal personhood is adapting the concept of maritime lien to the AI domain. As highlighted in the previous section, a maritime lien is a legal instrument that attaches to a ship for a wide array of wrongs or obligations, allowing the claimant to pursue it directly against the ship itself, irrespective of ownership (Lind, 2009). These liens are enforced through actions *in rem*, where the ship may be arrested and sold to satisfy claims. Applying this principle to AI would mean that a lien would be attached to an AI system for the harm it causes, allowing claimants to seek redress directly from it.

At first sight, enforcing a lien based on an action *in rem* in the AI domain may offer more efficacious protection for victims of the harm caused by autonomous technologies. According to this, claimants would initiate proceedings without needing to go through the lengthy, often expensive and arduous process of identifying the individuals responsible (Zevenbergen et al., 2018), particularly when the responsibility cannot be readily traced back to any specific individuals (Novelli, 2023). Like maritime liens, the entitlement to an AI lien would accrue from a range of wrongs, encompassing both 'physical' and 'social' types of harm, described in the previous section. For example, if an autonomous robot injures a pedestrian, a lien would be attached to the AI system powering it. Likewise, a lien would arise if AI algorithms used in recruitment discriminate against applicants of a specific age (Stypinska, 2022). In these instances, affected individuals would have a right to initiate an action *in rem* against the AI system seeking damages for injuries sustained or loss caused by discrimination. A lien in this context would serve as a legal tool to secure the claimant's rights directly against the AI system, irrespective of other parties' involvement.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

While theoretically plausible, modelling the concept of a lien to the AI domain poses several challenges. The effective enforcement of a lien rests on the means available to satisfy it. In the maritime context, as discussed in the previous section, a claim secured by a maritime lien can lead to the seizure of a ship and its forced judicial sale, with the proceeds being used to fulfil contractual or non-contractual obligations. In contrast, the possible enforcement of a lien in the AI domain would be far more complex than it may appear. There are three broad intertwined aspects to it. First, unlike physical ships, AI systems are intangible, comprising immaterial elements, such as algorithms, datasets and software, at their core. Consequently, the question of liability in the AI domain often leads to calls for remediation through reprogramming, changes to data inputs or even destruction rather than traditional asset seizure (Chesterman, 2020).

Second, although the concept of a lien could theoretically attach to assets associated with an AI system, such as algorithmic code, datasets, machine learning models and application programming interfaces, identifying and defining these assets to redress wrongs is not an easy task (Brown, 2020). Considering the complex technological structure in which they are embedded, separating them to seize and liquidate to satisfy a lien may be impossible without disrupting the AI system's core functionality. Even if that were achievable, given their interdependency, it would be difficult to determine their fair value to enforce a lien. This vastly differs from the traditional ships, the judicial sale of which does not affect their functionality and purpose under new ownership. In contrast, the seizure and sale of an AI-based fully autonomous ship cannot easily occur, as the auctioning of the ship may not transfer the software system powering it.

Third, even if a lien were to attach theoretically, the assets constituting an AI system may be dispersed across multiple jurisdictions. Unlike physical ships registered in a specific jurisdiction, these assets are not easily identifiable or localised without a clear territorial attachment through some form of registration (Novelli, 2023). AI systems lack a defined legal domicile, which can create uncertainty over the legal regime governing the lien.

Mutual Insurance in the AI Domain

Given the challenges associated with enforcing liens on intangible AI assets, a mutual insurance model may present a more feasible pathway to close the potential liability gap in the AI domain. As discussed in the previous section, P&I clubs are mutual insurance associations where members, typically shipowners, pool their risks to provide collective protection. Their emergence was prompted by the introduction of the new set of liabilities imposed upon shipowners by the legislature and the lack of traditional insurance policies to cover

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

them (Anderson and Colin, 2011). The same can be observed in the AI domain. With AI technologies growing in complexity and their scope of application expanding, lawmakers race to introduce new tailored liability regimes to cover the unique risks associated with autonomous systems (Smuha, 2021), including data privacy breaches and discriminatory outcomes, for which traditional insurance providers may not offer adequate coverage or demand excessively high premiums (Faure and Li, 2022). As such, a mutual fund may serve as a mechanism to guarantee the necessary resources to remedy harm caused by autonomous systems.

A mutual club in the AI domain may lead to the internalisation of risks. This would involve developers, operators and manufacturers contributing to a mutual fund specifically reserved for liabilities arising from AI-related incidents, such as unintended outcomes, errors or harm caused by autonomous systems. The fund would operate on a cooperative model, with members sharing financial responsibility for liabilities linked to autonomous actions and potential harms associated with their AI systems. Contributions to the fund could be calculated based on two interrelated variables: the degree of control each stakeholder has over the risks that they can reasonably identify and manage within the AI system (Bertolini, 2020), excluding liabilities due to wilful misconduct or gross negligence (Bashayreh et al., 2021); and the specific risks inherent to each AI system, assessed based on factors such as application, operational environment and potential for harm. For instance, an autonomous vehicle operating in public spaces would likely present a higher liability risk than a limited-use industrial AI system within a controlled environment (Bertolini, 2020).

Mutual funds would also allow cover for a broad range of liabilities. As mentioned above, a P&I club provides collective protection against various risks arising from environmental damage, personal injury, or property damage. Similarly, stakeholders in the AI domain would contribute to the pool aimed at addressing a diverse spectrum of liabilities that traditional insurance may not fully cover. These could include not only claims related to death, physical injuries or property damage, but also those stemming from algorithmic bias, data breaches and privacy violations caused by autonomous decision-making of AI systems. Furthermore, given the global reach of AI technologies, which often operate across multiple jurisdictions and impact upon individuals worldwide, an AI-specific mutual fund could allow its members to address claims from incidents regardless of where the AI was developed or deployed.

However, modelling a mutual fund in the AI domain on P&I clubs would not be without challenges. Unlike the maritime industry, where P&I clubs are primarily aimed at shipowners with well-defined roles and responsibilities, setting out membership in a mutual fund would be complex due to the diverse stakeholders involved in the AI ecosystem. The contribution levels would need

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

to reflect the risk profile of developers, operators and data providers based on factors such as application type, operational environment and potential impact. Additionally, compared to the maritime industry, where risks are relatively well known, the broad spectrum of risks posed by AI systems is not readily amenable to quantification and compensation. First, many AI-related harms lack a clear physical component, which complicates the assessment of adequate compensation; for example, harms such as privacy violations or algorithmic discrimination are abstract and harder to value. Second, with no established limits on liability in the AI context, potential claims could be significantly higher than those seen in traditional P&I contexts (Faure and Li, 2022), particularly in large-scale harm, such as data breaches affecting numerous individuals. Third, while the maritime industry benefits from international standards that create some uniformity, the AI domain currently lacks cohesive international frameworks for liability, risk assessment or compensation across jurisdictions, which could complicate cross-border claims.

CONCLUSION

This chapter aimed to examine the parallels between ships and AI systems in order to establish whether principles from maritime law could help to address the liability challenges posed by autonomous technologies. Since ships and AI systems share core characteristics in their multi-risk, multi-party and multi-jurisdictional operations, the doctrines of personification, maritime liens and mutual insurance arrangements in maritime law may present a blueprint for structuring the liability frameworks in the AI domain. Ascribing legal personality to AI systems could simplify the attribution of responsibility when harm occurs, much like the legal fiction of a ship as a separate entity, which has facilitated accountability in maritime law. Similarly, the concept of liens may offer a way to directly address harms caused by autonomous actions. However, adapting these principles raises challenges. AI's intangible and integrated nature complicates the identification and valuation of its assets, thereby making enforcement in the AI domain more complex than in the maritime context. Given these challenges, it is submitted that mutual funds modelled on P&I clubs could provide a cooperative mechanism to pool resources to ensure victim compensation while fostering innovation. That said, the broad spectrum of potential harms involved in the AI domain may complicate the arrangement of equitable contributions and adequate coverage.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

REFERENCES

Allsop, J.L.B. (2016). Security Interests in Ships. In D. Attard, M. Fitzmaurice, N. Martinez, I. Arroyo and E. Belja (eds), *The IMLI Manual on International Maritime Law Volume II Shipping Law* (pp. 152–179). Oxford Academic.

Anderson, C.B., and De la Rue, Colin (2011). The Role of the PandI Clubs in Marine Pollution Incidents. *Tulane Law Review*, 85(5/6), 1257–1304.

Banteka, N. (2021). Artificially Intelligent Persons. *Houston Law Review*, 58, 537–596.

Bashayreh, M., Sibai, F.N., and Tabbara, A. (2021). Artificial Intelligence and Legal Liability: Towards an International Approach of Proportional Liability Based on Risk Sharing. *Information and Communications Technology Law*, 30(2), 169–192.

Bertolini, A., and Episcopo, F. (2022). Robots and AI as Legal Subjects Disentangling the Ontological and Functional Perspective. *Front Robot AI*. https://doi.org/10.3389/frobt.2022.842213

Bertolini, A. (2020). Artificial Intelligence and Civil Liability. European Parliament – Committee on Legal Affairs. https://www.europarl.europa.eu/RegData/etudes/STUD/2020/621926/IPOL_STU(2020)621926_EN.pdf

Brown, R.D. (2020). Property Ownership and The Legal Personhood of Artificial Intelligence. *Information and Communications Technology Law*, 30(2), 208–234.

Carey, L. (2023). Contractual and Tortious Maritime Liability Regimes and the Introduction of Autonomous Vessels. NUS Law Working Paper No. 2023/012, NUS Centre for Maritime Law Working Paper 23/03. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4403620

Chesterman, S. (2020). Artificial Intelligence and The Limits of Legal Personality. *International and Comparative Law Quarterly*, 69, 819–844.

Clark, A.F.B. (1980). The Role of the Protection and Indemnity Club in Oil Pollution. *International Business Lawyer*, 8(8), 205–212.

Corcione, C. (2013). Bring the Vessel to Court: The Unique Feature of the Action In Rem in the Admiralty Law Proceedings. *International Review of Law*, 7, 1–12.

Davies, M. (2000). In Defense of Unpopular Virtues: Personification and Ratification. *Tulane Law Review*, 75(2), 337–410.

De Roover, F.E. (1945). Early Examples of Marine Insurance. *The Journal of Economic History*, 5(2), 172–200.

Derrington, S. (2007). The Continuing Utility of the Action In Rem. *Law Quarterly Review*, 123, 358–361.

Durães, D., Freitas, M.P., and Novais, P. (2024). The Relevance of Deepfakes in the Administration of Criminal Justice. In H.S. Antunes, P.M. Freitas, A.L. Oliveira, C.M. Pereira, E.V. De Sequeira, L.B. Xavier (eds), *Multidisciplinary Perspectives on Artificial Intelligence and the Law* (pp. 351–369). Springer.

European Maritime Safety Agency (2023). Annual Overview of Marine Casualties and Incidents 2023. https://emsa.europa.eu/component/flexicontent/download/7639/5052/23.html

Expert Group on Liability and New Technologies – New Technologies Formation (2019). Liability for Artificial Intelligence and Other Emerging Digital Technologies. https://data.europa.eu/doi/10.2838/573689

Faure, M., and Li, S. (2022). Artificial Intelligence and (Compulsory) Insurance. *Journal of European Tort Law*, 13(1), 1–24.

Gaskell, N.J.J., Debattista, C., and Swatton, R.J. (1987). *Chorley and Giles Shipping Law*. Pearson.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Gauci, G. (1995). Limitation of Liability in Maritime Law: An Anachronism? *Marine Policy,* 19(1), 65–74.
Gauci, G. (2014). Compulsory Insurance Under EC Directive 2009/20/EC: An Adequate Solution For Victims, or Is It Also Time For The Abolition of Maritime Limitation of Liability and the Establishment of An International Fund as an Insurer of Last Resort. *Journal of Maritime Law and Commerce*, 45(1), 77–96.
Gauci, G. (2021). The Ship as an Extension of Flag State Territory and an Entity With Human Attributes – Is It Time To Jettison These Legal Fictions? *International and Comparative Law Review,* 21(1), 7–28.
Gikay, A.A. (2024). Risks, Innovation, and Adaptability in The UK's Incrementalism Versus the European Union's Comprehensive Artificial Intelligence Regulation. *International Journal of Law and Information Technology*, 32, 1–25.
Gómez-González, E. (2020). Artificial Intelligence in Medicine and Healthcare: Applications, Availability and Societal Impact. JRC Science for Policy Report. https://publications.jrc.ec.europa.eu/repository/bitstream/JRC120214/jrc120214_ai_in_medicine_and_healthcare_report-aiwatch_v50.pdf
Hacker, P. (2023). The European AI Liability Directives – Critique of a Half-hearted Approach and Lessons for the Future. *Computer Law and Security Review*, 51, 1–42.
HCCH - Hague Conference on Private International Law (2024). Private International Law Aspects of the Digital Economy: Report. https://assets.hcch.net/docs/b74f3bfe-51dd-4d0e-8d4b-59e5e32367da.pdf
Hebert, Paul Macarius (1929–1930). Origin and Nature of Maritime Liens. *Tulane Law Review*, 4(3), 381–408.
Henckel, K. (2023) Issues of Conflicting Laws – A Closer Look at the EU's Approach to Artificial Intelligence. *Nederlands Internationaal Privaatrecht*, 12, 199–226.
High-Level Expert Group on Artificial Intelligence (2018). A Definition Of AI: Main Capabilities and Scientific Disciplines. https://digital-strategy.ec.europa.eu/en/library/definition-artificial-intelligence-main-capabilities-and-scientific-disciplines
High-Level Expert Group on Artificial Intelligence (2019). Ethics Guidelines for Trustworthy AI. https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=60419
Howard, A.T. Jr (1990). Personification of the Vessel: Fact or Fiction. *Journal of Maritime Law and Commerce*, 21(3), 319–330.
Hutton, N. (2003). The Origin, Development, and Future of Maritime Liens and the Action In Rem. *Tulane Maritime Law Journal*, 28(1), 81–112.
Jackson, D. (2015). *Enforcement of Maritime Claims* (4th edn). Routledge.
Kelsen H. (2015). On the Theory of Juridic Fictions. With Special Consideration of Vaihinger's Philosophy of the As-If. In M. Del Mar and W. Twining (eds), C. Kletzer (transl.), *Legal Fictions in Theory and Practice*(pp. 1–23). Springer.
Kurki, V. A.J. (2019). *A Theory of Legal Personhood*. Oxford.
Lambeth, R. (1986). *Templeman on Marine Insurance: Its Principles and Practice* (6th edn). Pitman.
Lind, D. (2009). Pragmatism and anthropomorphism: reconceiving the doctrine of the personality of the ship. *University of San Francisco Maritime Law Journal*, 22(1), 39–122.
Mik, E. (2021). AI as a Legal Person? In J-A. Lee, R. Hilty and K-C. Liu (eds), *Artificial Intelligence and Intellectual Property* (pp. 419–439). Oxford.
Negri, S.M.C.A. (2021). Robot as Legal Person: Electronic Personhood in Robotics and Artificial Intelligence. *Frontiers in Robotics and AI* (8), (1–10).
Noussia, K. (2006). *The Principle of Indemnity in Marine Insurance Contracts: A Comparative Approach*. Springer.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Novelli, C. (2023). Legal Personhood for the Integration of AI Systems in The Social Context: A Study Hypothesis. *AI and Society*, 38, 1347–1359.
Raskulla, S. (2023). Hybrid Theory of Corporate Legal Personhood and Its Application to Artificial Intelligence. *SN Social Sciences*, 3(78), 1–14.
Roberts, K.E. (1968). For Retention of Limitation of Liability for Shipowners. *American Bar Association Section of Insurance, Negligence and Compensation Law* 1967, 415–423.
Seward, R.C. (1986). The insurance viewpoint. In N. Gaskell (ed.), *The Limitation of Shipowners' Liability: The New Law, Institute of Maritime Law* (pp. 161–187). Sweet & Maxwell.
Smuha, N.A. (2021). From a 'Race to AI' to a 'Race to AI Regulation': Regulatory Competition for Artificial Intelligence. *Law, Innovation and Technology*, 13, 57–84.
Solaiman, S.M. (2017). Legal Personality of Robots, Corporations, Idols and Chimpanzees: A Quest for Legitimacy. *Artificial Intelligence and Law*, 25, 155–179.
Solum, L.B. (1992). Legal Personhood for Artificial Intelligences. *North Carolina Law Review*, 70(4), 1231–1287.
Soyer, B. (2019). Autonomous Vessels and Third-Party Liabilities: The Elephant in The Room. In B. Soyer and A. Tettenborn (eds), *New Technologies, Artificial Intelligence and Shipping Law in the 21st Century* (pp 105–115). Routledge.
Soyer B., and Tettenborn A. (2023). Artificial Intelligence and Civil Liability: Do We Need a New Regime? *International Journal of Law and Information Technology*, 30, 385–397.
Stypinska, J. (2022). AI Ageism: A Critical Roadmap for Studying Age Discrimination and Exclusion in Digitalized Societies. *AI and Society*, 38, 665–677.
Tettenborn, A. (2023). The Maritime Lien: An Outdated Curiosity. *Lloyd's Maritime and Commercial Law Quarterly,* 3, 405–419.
Tilley, M. (1986). The Origin and Development of the Mutual Shipowners' Protection and Indemnity Associations. *Journal of Maritime Law and Commerce*, 17(2), 261270.–
Van den Hoven van Genderen, R. (2018). Do We Need New Legal Personhood in the Age of Robots and AI? In M. Corrales, M. Fenwick and N. Forgó (eds), *Robotics, AI and the Future of Law* (pp. 14–55). Springer.
Wagner, G. (2022). Liability Rules for the Digital Age. *Journal of European Tort Law*, 13(3), 191–243.
Wagner, R. (2019). Robot Liability. In S. Lohsse, R. Schulze and D. Staudenmayer (eds), *Liability for Artificial Intelligence and the Internet of Things* (pp. 27–63). Nomos.
Wendehorst, C. (2020a). Strict Liability for AI and other Emerging Technologies. *Journal of European Tort Law*, 11(2), 150–180.
Wendehorst, C. (2020b). Liability for Artificial Intelligence: The Need to Address Both Safety Risks and Fundamental Rights Risks. In S. Voeneky, P. Kellmeyer, O. Mueller and W.Burgard (eds), *The Cambridge Handbook of Responsible Artificial Intelligence: Interdisciplinary Perspectives* (pp. 187–209). Cambridge University Press.
Wiring, R. (2020). Artificial Intelligence in Healthcare. In J. Madir (ed.), *HealthTech: Law and Regulation* (pp. 340–354). Edward Elgar Publishing.
Zech, H. (2019). Liability for Autonomous Systems: Tackling Specific Risks of Modern IT. In S. Lohsse, R. Schulze and D. Staudenmayer (eds), *Liability for Artificial Intelligence and the Internet of Things* (pp. 187–201). Nomos.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Zevenbergen, B., Finlayson, M.A., Kortz, M., Pagallo, U., Borg, J. and Zapušek, T. (2018). Appropriateness and Feasibility of Legal Personhood for AI Systems. International Conference on Robot Ethics and Standards. http://users.cs.fiu.edu/~markaf/doc/w16.zevenbergen.2018.procicres.3.59_archival.pdf

Zhu, L. (2007). *Compulsory Insurance and Compensation for Bunker Oil Pollution Damage*. Springer.

CASE-LAW

*Baroda (Maharanee of) v Wildenste*in (1972) 2 All E.R 689.

Canadian Aviator, Ltd. v. United States (1945) 324 U.S. 215.

Republic of India and The Government of The Republic of India (Ministry of Defence) v. India Steamship Co. Ltd. (The Indian Grace (No2)) (1998) A.C. 878.

The Barnstable (1901) 181 U.S. 464.

The Bold Buccleugh (1852) 7 Moo PC 267.

The John G. Stevens (1898) 170 U.S. 113.

The Ripon City (1898) 2 WLUK 36.

The Western Maid (1922) 257 U.S. 419.

Tucker v. Alexandroff (1902) 183 U.S. 424.

United States v. The Brig Malek Adhel (1844) 43 U.S. 210.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

4. Artificial intelligence and the governance of smart cities in Africa: possibilities and constraints

Alhassan Yakubu Alhassan and Abdul-Rahim Abdulai

INTRODUCTION

This chapter explores the potential and constraints of artificial intelligence (AI) in the governance of smart cities across Africa, a continent currently experiencing rapid urbanization. By 2050, more than half of Africa's population is projected to reside in urban areas, highlighting a critical need for innovative governance solutions that can enhance urban infrastructure, service delivery and residents' quality of life (Balkaran, 2019; Güneralp et al., 2017). The integration of AI into urban management systems offers unprecedented opportunities to improve decision-making processes, optimize resources and tailor services to meet dynamic urban demands (Jha et al., 2021; Luusua et al., 2023; Sanchez et al., 2023). At the same time, using AI in cities faces several constraints, including a lack of infrastructure, ethical concerns, a lack of political will and a lack of skills (Harnal et al., 2022; Zhou and Kankanhalli, 2021).

The concept of smart cities has increasingly become a focal point for discussing how urban areas can evolve to become more efficient, sustainable and liveable through technology. In the context of Africa, smart cities are not just futuristic aspirations but necessary innovations for addressing the complex challenges posed by rapid urbanization. This includes managing overstretched services and infrastructure, which are often inadequate due to historical underinvestment and rapid population growth (Kamana et al., 2023).

AI's role in this transformation is multifaceted. It extends beyond mere automation, encompassing advanced data analytics that can predict urban growth patterns, optimize traffic and public transport systems, manage energy consumption, and improve public safety through intelligent surveillance systems (Oke et al., 2020). However, the deployment of AI technologies in African

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

cities must be approached with a nuanced understanding of the local socio-economic, cultural and political contexts, which significantly differ from those in Western cities where smart city concepts have been more extensively developed and implemented (Zuboff, 2019).

The governance of AI itself becomes a crucial issue as it involves setting the right policies and frameworks to ensure that AI technologies are used ethically and effectively (Echendu and Okafor, 2021). Governance challenges include addressing issues related to privacy, security and the potential for increased surveillance, which raises significant ethical concerns (Buiten, 2019; Echendu and Okafor, 2021; Reed, 2018). Additionally, there is a risk that AI could exacerbate existing inequalities in urban areas, making it imperative that governance frameworks are designed to ensure inclusivity and equity (Benjamin, 2019; Kim et al., 2021). Moreover, literature increasingly points to the need for a critical examination of how AI technologies are integrated into public policies and urban management. Scholars such as Flyverbom et al. (2019) argue that the governance of digital technologies, including AI, necessitates new roles and responsibilities for policymakers to ensure that these technologies do not merely reinforce existing power dynamics, but instead foster genuine public engagement and accountability.

Thus, this chapter sets the stage for the exploration of both the potential benefits and the challenges associated with AI in the governance of smart cities in Africa. It aims to provide a balanced perspective, highlighting how AI can be leveraged to enhance urban life while also critically examining the social and ethical implications of its adoption in diverse African contexts. By doing so, it contributes to an understanding of how AI can be harnessed to promote more sustainable, inclusive and resilient urban environments in Africa.

STATEMENT OF THE PROBLEM AND RESEARCH QUESTIONS

As African cities continue to experience rapid urbanization, there is increasing pressure on urban governance systems to provide efficient, equitable and sustainable services. In response, smart city initiatives have gained traction across the continent, often framed as technological solutions to enduring challenges such as traffic congestion, waste management, energy distribution and public safety (Güneralp et al., 2017; Kamana et al., 2023). At the centre of many of these initiatives is artificial intelligence, which is expected to enhance data-driven decision-making, resource optimization and service delivery in urban environments (Cath, 2018; Kim et al., 2021; Oke et al., 2020). However, the integration of AI technologies into African smart cities is not a neutral or purely technical process. It raises important questions about governance, infrastructure readiness, ethical accountability and socio-political inclusivity.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Existing literature on AI and smart cities is largely dominated by perspectives from the Global North, often assuming the presence of robust digital infrastructure, regulatory systems and governance capacities. In contrast, many African urban contexts are marked by infrastructural deficiencies, uneven digital access, limited regulatory oversight and deep-rooted socio-economic inequalities (Echendu and Okafor, 2021; Hassan, 2023).

Despite the growing deployment of AI tools in African cities, empirical studies critically examining how these technologies are governed in practice remain limited. Questions persist regarding who defines the goals of AI deployment, how inclusive governance processes are, and whether AI technologies enhance or undermine equity and social justice in urban life (Benjamin, 2019; Flyverbom et al., 2019; Soja, 2000). There is thus a pressing need to interrogate the intersection between AI, urban governance and the socio-political context in which these technologies are implemented.

In light of these issues, this chapter explores the governance of AI technologies within smart city initiatives in four African cities (Accra, Nairobi, Praia and Johannesburg). It aims to explore how AI is being integrated into urban governance structures, what constraints shape its implementation, and how theoretical frameworks from science and technology studies (STS), postcolonial theory and critical urban studies can help explain the political, ethical and infrastructural dynamics at play. The analysis is guided by the following research questions: How is AI being integrated into smart city governance in selected African cities? What socio-technical, infrastructural and ethical constraints affect the deployment and effectiveness of AI in these contexts? How do theoretical perspectives from STS, postcolonial theory and critical urban studies help explain the governance implications of AI in African urban settings? By engaging with these questions, the chapter seeks to contribute to a more grounded and critical understanding of AI-driven urban transformation in Africa. It focuses on the importance of inclusive, context-sensitive and reflexive approaches to technology governance that acknowledge the continent's diverse urban realities and historical legacies.

REVIEW: URBANIZATION, SMART CITIES AND AI IN AFRICA

Africa's rapid urbanization is poised to be one of the most significant global transformations of the 21st century. Projections indicate that by 2050, urban centres on the continent will house over 55 per cent of its population (Güneralp et al., 2017). This demographic shift presents both an urgent challenge and a unique opportunity to reimagine urban governance and infrastructure development. However, current challenges faced by African cities are multifaceted: critical infrastructure deficits, such as inadequate water supply,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

unreliable electricity and insufficient waste management systems, are prevalent (O'Farrell et al., 2019; United Nations Economic Commission for Africa, 2008). In addition, the transportation systems in many African cities are often underdeveloped and overburdened, contributing to congestion and pollution (Sánchez-Corcuera et al., 2019). Resource constraints, such as limited financial and human capital, exacerbate these challenges by impeding sustainable urban development and management (Balkaran, 2019).

Smart city initiatives promise to address some of these prevalent challenges by enabling more efficient resource management, improving service delivery and enhancing the quality of urban life (Chirisa and Matamanda, 2019; Slavova and Okwechime, 2016). AI is increasingly discussed in the context of these smart city initiatives as a way to increase efficiency in various aspects of cities' operations (Ben Dhaou et al., 2024; Voda and Radu, 2018). For example, AI can optimize traffic flow through real-time data analysis, predict and manage energy usage in public buildings, and even streamline waste management through sensor-based technologies (Kim et al., 2021; Oke et al., 2020). Furthermore, AI applications in public safety and health services can significantly improve emergency response times and disease surveillance, which are crucial in densely populated urban environments, as found in many parts of Africa (Kamana et al., 2023). Likewise, smart grids can help to manage electricity supply more efficiently, reducing waste and improving access, especially in areas with unstable power supply (Bwalya, 2019). Smart water management systems can help in the conservation of water resources, a critical issue for many growing African cities facing water scarcity (Hassan, 2023). The potential for AI in city management is enormous in the context of the multitude of challenges that African cities still face.

The deployment of smart city technologies in Africa, however, must consider the unique socio-economic and cultural contexts of the continent. Unlike in Western countries, where smart city projects often build upon existing advanced technological infrastructure (Golubchikov and Thornbush, 2020), many African cities first need to address basic infrastructural needs (Echendu and Okafor, 2021). As Africa has many different cultural contexts, the implementation of AI in such settings requires adaptive solutions that are not only technologically effective but also socio-culturally and politically acceptable (Yatta, 2018).

Essentially, the context of Africa's urban transformation provides an important canvas for the deployment of smart city initiatives. AI technologies offer innovative solutions to some of the continent's most pressing urban challenges. However, their success will largely depend on thoughtful integration that respects and responds to local realities. The discussion around AI in urban contexts should include a critical examination of data governance, privacy and security. As noted by scholars such as Zuboff (2019), the rise of surveillance

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

capitalism highlights the need for stringent regulations to protect citizens' privacy and ensure that AI technologies are used for the public good rather than for extensive surveillance and control. The potential of AI to transform African cities into more sustainable, efficient and liveable environments is significant, but realizing this potential requires a careful and inclusive approach to technology governance and implementation.

THEORETICAL FRAMEWORK

The application of AI in African cities is not just a technological evolution; it is deeply embedded within social, political and economic frameworks. This chapter leverages theories from science and technology studies, postcolonial theory, and critical urban studies to understand and analyse the implications of AI in smart city governance. These frameworks provide essential insights into the socio-political, cultural and technological dynamics at play.

Drawing from science and technology studies (STS), which views technology as socially constructed and society as technically constructed (Latour, 2005), AI's role in African cities can be seen as a product and producer of urban societal norms and practices. Science and technology studies offers a comprehensive approach to understanding how technological innovations, such as AI, influence society and are themselves shaped by societal forces. STS emphasizes the mutual shaping of society and technology, arguing that technological developments are not merely technical solutions but are embedded within social contexts that influence their design and use (Bijker et al., 1987; Latour, 2005). When it comes to smart cities in the context of Africa, STS prompts an examination of how AI technologies are adopted within specific socio-economic and political contexts and how these technologies, in turn, reshape urban life. This approach helps in identifying how AI can be designed and implemented to meet the unique needs of African urban populations, taking into account local practices and the potential for technology to reinforce or challenge existing power structures (Jasanoff, 2004).

Similarly, postcolonial theory provides a lens to critically analyse the power dynamics and neo-colonial influences inherent in the adoption of predominantly Western-developed AI technologies in African contexts (Birhane, 2020; Shohat and Stam, 1994). Postcolonial theory provides a framework for analysing how colonial legacies affect how technology is used today in countries that were once colonies, such as many African countries (Adams, 2021; Bhabha, 1994; Said, 1978). This theory encourages scrutiny of how AI technologies introduced in African cities might perpetuate neo-colonial relationships, privileging Western paradigms of knowledge and technology over local expertise and needs (Adams, 2021; Mbembe, 2001). Applying postcolonial theory can help us to understand how AI governance models in African cities might either

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

reinforce or dismantle historical inequalities, and how these technologies can be harnessed to foster genuine local empowerment and development (Kponyo et al., 2024; Shohat and Stam, 1994).

Critical urban studies focus on the spatial justice implications of AI, examining how these technologies impact urban equity and access (Soja, 2000). Critical urban studies contribute by examining the complexities of urban environments and how these environments are affected by various forms of inequality and governance strategies (Harvey, 2008; Soja, 2000). When applied to AI in smart cities, this perspective highlights how urban space is organized, governed and experienced, paying special attention to issues of spatial justice and the right to the city (Marcuse, 2009). This framework is invaluable for assessing how AI initiatives impact upon different urban populations, particularly marginalized groups. It also provides insights into how AI-driven urban development can either exacerbate or alleviate urban disparities.

These theoretical traditions provide entry points to exploring the governance implications of AI in smart cities. Each of these theories focuses on specific ways of seeing the phenomenon of AI and its interaction with society, and allows a different perspective of seeing the interactions of actors in the enactment, implementation and regulation of AI in urban Africa. Thus, we apply these theories to the experiences of AI in African smart city initiatives.

METHODOLOGICAL NOTE: CASE SELECTION AND DATA SOURCES

This chapter adopts a qualitative, comparative approach to explore the governance of artificial intelligence within smart city initiatives in selected African urban contexts. The cases of Accra (Ghana), Nairobi (Kenya), Praia (Cape Verde) and Johannesburg (South Africa) were purposefully selected to reflect a diverse range of urban governance systems, technological investments and regional characteristics. These cities vary not only in their geographic location, spanning West, East, Southern and island Africa, but also in their economic profiles, institutional capacities and stages of smart city implementation. The selection was guided by the analytical objective of capturing variation in AI adoption and governance practices, consistent with case-oriented urban research that privileges contextual depth over representativeness (Harvey, 2008; Soja, 2000).

The analysis presented in this chapter is based on an interpretive review of publicly available documentary sources. These include government policy documents and urban development plans, reports by international organizations and technology providers (for example, Huawei, IBM), peer-reviewed academic literature, non-governmental organization (NGO) publications and reputable media articles (Arakpogun et al., 2021; Ben Dhaou et al., 2024;

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Flyverbom et al., 2019). These materials were thematically analysed with a focus on identifying governance logics, infrastructural constraints, ethical dilemmas and implementation narratives across the selected cases. This approach is aligned with methods in critical urban and digital governance research that treat documents and public discourse as important artefacts for revealing underlying assumptions, priorities and power dynamics in policy environments (Jasanoff, 2004; Zuboff, 2019).

While this chapter does not rely on primary fieldwork, the use of documentary analysis is methodologically consistent with scholarship in Science and Technology Studies (STS), critical urban studies, and postcolonial theory that interrogate how sociotechnical imaginaries are constructed, legitimized, and contested through discourse and institutional framing (Bijker et al., 1987; Latour, 2005; Shohat and Stam, 1994). The conclusions are therefore situated within a theoretically informed analytical lens that foregrounds the socio-political implications of AI deployment in African urban governance contexts.

CASE STUDIES: AI-DRIVEN SMART CITIES INITIATIVES AND PROPOSALS IN AFRICA

This section presents case studies from four African cities – Accra (Ghana), Praia (Cape Verde), Nairobi (Kenya) and Johannesburg (South Africa) – that have embarked on smart city projects utilizing AI technologies. These case studies illustrate the practical applications of AI in urban management, highlighting successes and addressing the challenges encountered.

Accra, Ghana

In Accra, the integration of AI into city management focuses primarily on transportation, energy, waste management, health and education management systems. The Digital Accra project exemplifies this smart city initiative. The project is a collaboration between the city council, the National Information Technology Agency, the Ministry of Communication and Digitalization, international development agencies and several technology firms. Under the Accra Intelligence Traffic Management Project (AITMP) (2012) and the Digital Accra Project,[1] the city uses AI to analyse traffic flow data collected from sensors and cameras across the city. The system is designed to alleviate the city's significant traffic congestion, with the plan to deploy streetlights with solar-power backups and intelligent traffic signals. As of June 2023, the Department estimated the project as 79 per cent complete, with the completion of dualization carriageways with asphaltic concrete surfacing, construction of three bridges, smart signalized intersections, and road markings and signs.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Although the smart city traffic system is an ongoing work, the progress has been reported to facilitate traffic light sequences instantly, based on current traffic conditions (Oke et al., 2020). It also involves continuous monitoring of road conditions and the establishment of digital payment systems in public transport. The system also helps to reduce congestion, and in improving travel times. This system also supports greater transparency and accountability, as traffic data and management policies can be monitored and audited in real time. The use of AI to manage traffic flows has significantly enhanced the efficiency of road use and reduced congestion in some areas (Oke et al., 2020).

Praia, Cape Verde

Praia is in the process of becoming a role smart city in Africa.[2] The city has implemented an ambitious smart city initiative that uses AI to enhance public service delivery and environmental management. The initiative draws on public and private technology systems, including eGovernment cloud, Cape Verde Smart City Foundation, Praia Tech Park and Huawei IT systems. There are also investments in telecommunication networks and data centres, including three at the Praia Tech Park, to enhance the speeds of AI-driven urban management systems (Mendes et al., 2018).

One notable project is the Nos Zona Smart Project.[3] It seeks to promote a smart, sustainable, safe and 'smiling' city through a range of AI-driven smart initiatives. Likewise, recent years have seen growing efforts to make Praia's electricity grid smart. The Smart Grid focuses on improving energy reliability through AI monitoring and managing electricity distribution. Also, the government in 2017 permitted the Chinese technology firm Huawei to install surveillance cameras in Praia as part of the Safe City project. This project was expanded in later years to include other cities (Mendes et al., 2018). The use of digital surveillance and facial recognition in Praia has therefore become a part of the policing structure of the city.

Johannesburg, South Africa

Johannesburg, as South Africa's economic hub, has incorporated AI into several aspects of urban management, notably in energy management and crime prevention (Maphangwa and van der Waldt, 2023). The city's Smart Electricity project uses AI to manage electricity loads and integrate renewable energy sources into the grid, enhancing energy efficiency and stability (Sánchez-Corcuera et al., 2019). Johannesburg's integration of AI in managing smart grids aids is optimizing energy distribution and has spurred economic growth by fostering a market for green technology and sustainable urban solutions (Sánchez-Corcuera et al., 2019).

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

In crime prevention, Johannesburg launched the Integrated Intelligence Operations Centre (IIOC) Reaction Unit as part of its Smart City Programme in 2019.[4] The programme introduced CCTV cameras to monitor criminal activities in the city. It relies heavily on facial recognition and licence plate recognition for investigations and the deployment of resources, such as police patrols (Maphangwa and van der Waldt, 2023). Additionally, AI algorithms analyse patterns from crime data to predict hotspots and optimize police patrol routes and schedules (Flyverbom et al., 2019).

Another area of AI in Johannesburg is through the launch of the Intelligent Transport System (ITS) Strategy 2027.[5] A key part of the strategy is the Smart Traffic Signal System and a hi-tech Traffic Operations Centre[6] to curb traffic congestion. Through the collaboration between engineers and local governments, the city has already implemented smart signals, remote monitoring systems (RMS), CCTV and motion detectors to assist with traffic flow. The system is based on AI and Internet of Things (IoT) technology to adjust signals based on real-time traffic conditions.[7] These programs are already showing signs of improvements in traffic flow and travel times in the city.

Johannesburg's smart electricity grid is another area of AI usage. The project forms a part of the South African Smart Grid 2030 vision[8] and broader smart cities efforts. The system uses AI to predict power demand and adjust supply accordingly, reducing wastage and improving energy efficiency (Sánchez-Corcuera et al., 2019). Smart meters, microgrids and transmission grid upgrades are core elements to the smart grid system of the city (Maphangwa and van der Waldt, 2023). These systems have allowed for intelligent use of the limited available energy through energy savings mechanisms of these novelties.

Nairobi, Kenya

Nairobi, dubbed the 'Silicon Valley of Africa', is also at the heart of AI-driven smart city plans and actions. Nairobi's smart city project, Konza Technopolis,[9] aims to transform the city into a technology hub. AI applications in this planned city are extensive, covering sectors such as healthcare, public safety and transportation. In healthcare, AI-driven diagnostic tools will be used to enhance disease surveillance and response, particularly in managing outbreaks such as cholera and COVID-19 (Benjamin, 2019).

In practice thus far, Nairobi has integrated AI into its surveillance systems, using facial recognition technology to enhance security. Nairobi's Central Business District (CBD) is said to currently host at least 42 CCTV cameras used by security agencies to combat and track crimes in the area. Additionally, a draft CCTV policy has obligated businesses, organizations and facilities to ensure that the areas where they operate are covered by CCTV systems.[10] CCTV cameras are also used by police to monitor traffic flow, identify congestion

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

and dispatch officers to areas around the city (Kirui, 2024). However, this has raised ethical concerns regarding privacy and surveillance, highlighting the need for strict regulatory frameworks (Zuboff, 2019).

THEORETICAL AND PRACTICAL REFLECTIONS OF CASES

In all four cities, AI is being leveraged to varying degrees in a quest to improve the efficiency of urban services such as traffic management, waste collection and public safety. Drawing from the theoretical frameworks outlined earlier (science and technology studies, postcolonial theory and critical urban studies) this section reflects on how these perspectives help interpret and deepen our understanding of the empirical cases explored.

From an STS perspective, the deployment of AI in cities such as Accra and Praia illustrates the co-production of technology and society. AI systems, including traffic management platforms and smart grids, are not merely technical infrastructures; they are shaped by and in turn shape existing socio-political institutions and material conditions (Bijker et al., 1987; Latour, 2005). For example, Accra's traffic optimization initiative cannot be fully understood without acknowledging the infrastructural fragilities and energy supply inconsistencies that constrain its functionality. Similarly, Praia's Smart Grid project illustrates how AI technologies interact with institutional capacity and energy infrastructure to produce differentiated outcomes. These cases reflect the STS insight that technological systems are embedded in specific social and institutional contexts, where they are constantly negotiated, adapted and sometimes resisted (Jasanoff, 2004).

Critical urban studies and STS work together to show how technological solutions need to be changed to fit local situations and current infrastructures in order to be truly useful and long-lasting (Soja, 2000). The cases presented in this chapter show critical deficiencies, especially in infrastructure, that may undermine any prospect for positive gains in AI for city governance. AI applications may remain blind to the high levels of inequalities and divides in urban Africa, potentially exacerbating them. That explains why there is a growing concern that AI technologies may deepen existing inequalities, particularly in areas with low digital literacy levels, such as urban Africa (Benjamin, 2019).

Postcolonial theory further illuminates the asymmetrical power dynamics that underlie AI adoption in African cities. The dominance of foreign firms and external technological models, such as Huawei's surveillance infrastructure in Praia and Nairobi, exemplifies how smart city initiatives may reproduce forms of digital dependency and techno-colonialism (Adams, 2021; Birhane, 2020; Kponyo et al., 2024). The framing of African cities as experimental laboratories for AI-enabled governance reinforces hierarchical global relations

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

in which African actors are positioned as recipients rather than producers of technological knowledge. This critique is especially evident in Nairobi's deployment of facial recognition surveillance, which raises ethical concerns about privacy and consent, and mirrors broader critiques of data extraction and surveillance capitalism (Benjamin, 2019; Zuboff, 2019). The ethical dilemmas presented by surveillance initiatives highlight the tension between security and privacy. While enhancing security, there are significant concerns about privacy and the potential for government overreach (Zuboff, 2019). Thus, postcolonial and critical urban studies argue for a governance approach that prioritizes the rights and dignity of urban residents (Shohat and Stam, 1994).

Insights from critical urban studies emphasize how AI reconfigures access to urban space and public services. As Johannesburg's integration of AI into electricity and transport management demonstrates, smart technologies are often introduced in ways that prioritize efficiency and security over equity and inclusion. Without deliberate efforts to embed principles of spatial justice and democratic accountability, such systems risk exacerbating existing urban inequalities (Harvey, 2008; Soja, 2000). The absence of community consultation and transparency mechanisms in many of the initiatives reviewed suggests a disjuncture between smart city ideals and the lived experiences of urban residents. This highlights the need for governance frameworks that not only manage AI technologies but also democratize their design and implementation.

Furthermore, critical urban studies, in particular, bring up important questions about who might benefit from these AI systems and who might be hurt by them. This highlights the need for inclusive governance that actively involves community input to lower the risks of exclusion or surveillance. Without careful consideration, technological solutions may exacerbate urban inequalities, suggesting a need for policies that ensure equitable benefits from AI technologies (Brokensha et al., 2023; Marcuse, 2009). Meanwhile, from a postcolonial theory perspective, these technologies can replicate colonial patterns of power unless consciously deployed to empower local populations and address historical inequalities (Mbembe, 2001). Issues of inequalities and suppression that may emanate from AI, therefore, must be central in any attempt to integrate them in urban management.

These cases show that the introduction of AI also complicates governance structures, including trust in public institutions, if not managed with transparency and accountability. Thus, there is a need for robust legal frameworks to govern AI use in smart city initiatives (Zuboff, 2019). So, while these cities may have seen notable improvements in crime solving and prevention (Kirui, 2024; Minnaar, 2002; Moyo, 2019), the implementation of AI also brings challenges that need to be addressed through comprehensive policies and frameworks to ensure that AI technologies are used ethically and benefit all citizens equitably.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Taken together, these theoretical frameworks help reveal the layered and contested nature of AI integration in African cities. They direct attention to the political, cultural and infrastructural dimensions of smart city governance, offering critical tools to assess who benefits, who is excluded and how power circulates through digital infrastructures. In this way, the chapter contributes to a growing body of scholarship calling for more inclusive, pluralistic and justice-oriented approaches to urban digital transformation in the Global South.

CONSTRAINTS TO USING AI IN SMART CITY GOVERNANCE

Despite the potential of AI in urban environments, its successful integration may be fraught with significant challenges and constraints. From infrastructural deficits to ethical concerns, careful consideration and strategic management are required to ensure that the benefits of AI are realized without exacerbating existing issues or creating new problems. The deployment of AI technologies often presupposes the existence of robust digital and physical infrastructures, which many areas in Africa lack. Limited broadband access, inadequate networking hardware and unreliable electricity supplies are common issues that can hinder the effectiveness of AI systems (Abdulai et al., 2023; Cath, 2018; Arakpogun et al., 2020). Without the basic digital infrastructure, such as stable electricity, even the most sophisticated AI solutions cannot operate reliably, which poses a significant barrier to implementing AI in areas with erratic power supply (Güneralp et al., 2017; Tan and Taeihagh, 2020). Meanwhile, power outages are particularly acute in sub-Saharan Africa, where power infrastructure is underdeveloped and problems are common (Andersen and Dalgaard, 2013; Farquharson et al., 2018; Sánchez-Corcuera et al., 2019). These occurrences continue to disrupt not only daily life but also digital networks essential for AI operations. It is more likely that data will be lost and AI will not work consistently without reliable power (Kong et al., 2025). This makes smart city projects less useful.

Also, the digital divide represents a significant social challenge in the context of AI deployment, especially in sub-Saharan Africa. This term refers to the gap between demographics and regions that have access to modern information and communication technologies and those that do not (Van Dijk, 2020; Warschauer, 2010). Diverse iterations of the digital divide simultaneously exist in Africa, including spatial (rural–urban) and socio-economic (educated and non-educated) (Abdulai, 2022; Mutula, 2005; Pick and Sarkar, 2015). This digital divide affects not only access to AI technologies but also the ability to leverage them effectively (Bentley et al., 2024). Addressing the digital divide is thus crucial for ensuring that AI benefits are equitably distributed and do not further marginalize underprivileged communities (Hassan, 2023).

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

The risk of social discrimination through AI is also a critical ethical issue. There is a chance that AI systems which are driven by data will inadvertently perpetuate existing social biases if they are trained on biased datasets, or if their algorithms fail to account for the complexity of human diversity (Fountain, 2022; Hong and Williams, 2019). This can lead to discriminatory outcomes in services such as policing, loan approvals and job recruitment (Sadowski, 2019). These issues, therefore, place ethical concerns at the forefront of the challenges associated with AI deployment. Moreover, algorithms can perpetuate and even amplify biases and reinforce racial and socio-economic inequalities if they are not carefully designed and regularly audited, especially in diverse urban environments (Benjamin, 2019)

Privacy risks are exacerbated in smart cities where surveillance and data collection become ubiquitous. Zuboff (2019) articulates concerns about surveillance capitalism, a phenomenon where data are commodified in ways that threaten individual privacy and autonomy. The use of AI in public spaces raises significant concerns about individuals' right to privacy and the potential for governmental overreach. Flyverbom et al. (2019) discuss the transparency paradox, where increased data collection for enhancing service delivery simultaneously leads to potential oversurveillance, necessitating stringent safeguards and transparent policies to protect citizens' privacy rights.

These various challenges and constraints described in this section raise many questions about the practicality of AI in smart cities. Importantly, they raise concerns about the governance of AI, as various constraints and challenges may lead to abuse of the system in areas with limited oversight, such as those in Africa, where corruption has undermined many public institutions. Therefore, as AI continues to permeate the region, it is crucial to explore the governance implications through various theoretical lenses.

THE FUTURE OF AI IN THE GOVERNANCE OF AFRICAN SMART CITIES

Despite the concerns about AI in the governance of African smart cities, the digital momentum around such initiatives is most likely to continue. A unique set of needs and the potential for leapfrogging traditional developmental stages in urban management, healthcare, education and infrastructure in African cities make AI look particularly promising. AI is imagined as playing a crucial role in the futures of African cities. AI can enhance governance by improving transparency and accountability in urban management (Adeniran et al., 2023; Arakpogun et al., 2021). AI tools can help city governments to analyse public feedback, optimize budget allocations and ensure that civic services are meeting the needs of their populations effectively.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Also, AI has significant potential to transform healthcare systems in African cities (Arefin, 2024; Mbunge and Batani, 2023; Owoyemi et al., 2020). With the challenge of limited healthcare resources, AI can help in diagnosing diseases, predicting outbreaks and managing healthcare supplies more efficiently. Telemedicine, powered by AI, can extend the reach of healthcare services to underserved urban and peri-urban populations, improving access and outcomes.

Furthermore, AI is anticipated to revolutionize education in African cities (Kolog et al., 2022; Oyelere et al., 2022). By providing personalized learning experiences and supporting educators with tools that can assess students' progress in real time, AI is set to change the way that people learn in urban Africa. AI-driven platforms can offer students in urban areas access to high-quality educational content and virtual tutoring, helping to bridge the education gap.

Another area of imagined AI changes is improvement in traffic management in bustling African cities (Mahugu and Mambo, 2024; Olayode et al., 2020a; Olayode et al., 2020b). By analysing data from satellite imagery, sensors and citizen feedback, AI can help city planners to optimize transportation networks. Through the use of AI in analysing traffic patterns and controlling traffic lights and signage, cities can reduce congestion and enhance public transportation systems. This will not only save time for commuters but also reduce the environmental impact of heavy traffic.

AI applications in energy management can help African cities to manage their growing energy needs more sustainably (Mienye et al., 2024; Zulu et al., 2024). By predicting energy demand and optimizing the distribution and consumption of renewable energy sources, AI can help cities to reduce dependence on non-renewable energy sources and cut carbon emissions.

Furthermore, AI can optimize water and sanitation efforts in urban Africa. AI can manage waste collection routes, manage recycling processes and predict landfill capacities (Adeleke et al., 2021; Nwokediegwu et al., 2024). Smart waste management systems could dramatically improve sanitation in rapidly expanding urban areas, contributing to healthier urban environments. AI could be instrumental in managing water resources in African cities (Gaffoor et al., 2020; Niyongabo et al., 2024), where water scarcity is often a pressing issue. AI can help in detecting leaks, predicting water demand and managing water distribution systems to ensure that limited water resources are used efficiently.

Finally, AI-driven surveillance systems can enhance public safety in urban areas by monitoring criminal activities and coordinating rapid responses (Chitimira and Ncube, 2021; Cloete and Spies, 2009). The use of CCTV cameras to track movements in urban centres allows police to easily solve crimes and makes citizens mindful of actions. However, it is essential to balance these benefits with concerns over privacy and civil liberties, ensuring that surveillance systems are used ethically and responsibly.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

TOWARDS EFFECTIVE AI USE IN SMART CITY GOVERNANCE

Effective governance mechanisms are essential for ensuring that the integration of AI technologies enhances urban life while respecting the socio-economic and cultural variances that characterize different regions across Africa. How can AI be harnessed to help in the governance of the smart city in Africa? Effective development of AI in smart city governance requires a framework that not only addresses the technical aspects of AI deployment but also considers the ethical, legal and social implications (Tan and Taeihagh, 2020). As Flyverbom et al. (2019) suggest, the governance of digital technologies needs to balance innovation with accountability, ensuring that technological advancements benefit all segments of society. This involves creating transparent policies that regulate data use, protect privacy and ensure the inclusivity of technological benefits (Flyverbom et al., 2019). Integrating AI into existing urban governance structures is not merely a technical challenge but also a complex socio-political endeavour. This is due to the risk that the adoption of AI can reshape power dynamics, altering roles and responsibilities within government and between the state and its citizens (Fast and Schroeder, 2020; Laterza, 2021; Ulbricht, 2024). For instance, AI can enhance decision-making processes through predictive analytics and automated service delivery, but it can also lead to job displacement if not managed carefully (Zuboff, 2019).

It is important to have governance structures that include different ethical points of view, especially when technology affects different social groups. Forming multidisciplinary ethics boards can help to oversee AI projects, ensuring that they align with ethical standards and public values. These boards should include stakeholders from diverse backgrounds to represent the broader community (Floridi and Cowls, 2019). Active community engagement should be a central component of AI projects. Public consultations and participatory design practices, which involve community members in the planning and implementation phases, can achieve this (Dantec and DiSalvo, 2013). Irani et al. (2010) advocate for participatory approaches in technology design, which improve project outcomes by ensuring that they meet the real needs of the community. AI deployment strategies should explicitly address and aim to reduce social and economic disparities (Adams, 2021; Brokensha et al., 2023). This involves designing AI systems that are accessible to all, including marginalized and underserved communities (Eubanks, 2018). The implementation of these strategies requires committed collaboration among policymakers, technology experts and community stakeholders to ensure that AI serves as a tool for enhancing urban life and governance across Africa.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

The success of AI integration may largely depend on the adaptability of existing governance frameworks. Many African cities face challenges related to governance capacity, which can impede the effective implementation of AI technologies (Echendu and Okafor, 2021; Tan and Taeihagh, 2020). The governance of AI in smart cities must, however, be sensitive to socio-economic and cultural differences across the continent. According to Benjamin (2019), technologies that are designed without consideration of cultural contexts can exacerbate social inequalities and marginalize vulnerable populations. For example, AI applications in law enforcement need to be carefully monitored to prevent biases that could reinforce racial and ethnic stereotypes (Benjamin, 2019; Laterza, 2022). Thus, involving local stakeholders in the planning and implementation of AI projects can enhance the cultural relevance and acceptance of these technologies, ensuring that they meet the specific needs of African urban dwellers (Hassan, 2023; Tan and Taeihagh, 2020). Specifically, stakeholders from various sectors, including local communities, are integral to ensuring that the deployment of smart city technologies aligns with the public's needs and values. This will require capacity building within local governments to enable the effective use of AI, ensuring that these technologies are governed in a way that is transparent and accountable.

Finally, a good understanding of AI among policymakers and citizens is significant for the democratic governance of technology (Crawford and Calo, 2016). This literacy empowers individuals, enabling them to participate more actively in discussions and decisions regarding AI implementations. Enhancing the AI literacy of government officials and the public is essential. Educational programmes should be implemented to raise awareness about AI's capabilities and risks (Bostrom and Yudkowsky, 2014; Brokensha et al., 2023). Supporting local universities and tech hubs in developing AI solutions tailored to local needs can foster innovation grounded in the African context (Aker and Mbiti, 2010).

CONCLUSION

The integration of AI in African urban settings presents a double-edged sword, offering substantial benefits for the governance of smart cities while also posing significant challenges that could undermine these very benefits. This chapter sets out to analyse the use of AI in the governance of smart cities in Africa, exploring the potential and challenges. As African cities continue to grow and evolve, the integration of AI presents a unique opportunity to redefine urban governance and improve the quality of life for urban residents. However, realizing this potential requires careful consideration of the technological, social and ethical dimensions of AI. By employing adaptive governance models and

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

committing to continuous research, stakeholders can ensure that AI serves as a catalyst for inclusive and sustainable urban development across Africa.

This chapter serves as a basis for policymakers, urban planners and scholars in shaping the future trajectory of AI in African cities, ensuring that technology is harnessed for the greater good of all urban inhabitants. The successful integration of AI into urban environments is not just a technical challenge but also a socio-ethical endeavour. While the potential benefits of AI for enhancing urban life are significant, they come with a set of complex challenges that require multidisciplinary approaches to overcome. Addressing these challenges involves not only improving physical and digital infrastructures but also embracing ethical guidelines and policies that safeguard privacy, prevent discrimination and ensure that the benefits of AI are distributed fairly across all segments of society.

NOTES

1. https://dur.gov.gh/greater-accra-region/
2. https://www.huawei.com/en/huaweitech/publication/winwin/31/bringing-the-digital-world-to-cape-verde-archipelago
3. https://noszonasmart.cv/
4. https://policyaction.org.za/sites/default/files/PAN_TopicalGuide_AIData2_CrimePolicing_Elec.pdf
5. https://joburg.org.za/media_/Newsroom/Pages/2023%20News%20Articles/July/JRA-partnerships-keep-traffic-lights-on-during-loadshedding.aspx
6. https://joburg.org.za/media_/Pages/Media/Blog/We%E2%80%99re-getting-closer-to-a-traffic-free-City-of-Joburg.aspx
7. https://reprosupplies.co.za/the-history-of-traffic-lights-in-south-africa/
8. https://sanedi.org.za/smart-grid/
9. https://konza.go.ke/
10. https://www.edgelands.institute/blog/nairobis-watchful-eyes-how-reliables-are-the-cctv-cameras

REFERENCES

Abdulai, A.R. (2022). Toward digitalization futures in smallholder farming systems in Sub-Sahara Africa: a social practice proposal. *Frontiers in Sustainable Food Systems*, *6*, 866331. https://doi.org/10.3389/fsufs.2022.866331

Abdulai, A.R., Tetteh Quarshie, P., Duncan, E., and Fraser, E. (2023). Is agricultural digitization a reality among smallholder farmers in Africa? Unpacking farmers' lived realities of engagement with digital tools and services in rural Northern Ghana. *Agriculture and Food Security*, *12*(1), 1–14. https://doi.org/10.1186/s40066-023-00416-6

Adams, R. (2021). Can artificial intelligence be decolonized? *Interdisciplinary Science Reviews*, *46*(1–2), 176–197. https://doi.org/10.1080/03080188.2020.1840225

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Adeleke, O., Akinlabi, S., Jen, T.C., and Dunmade, I. (2021). Towards sustainability in municipal solid waste management in South Africa: a survey of challenges and prospects. *Transactions of the Royal Society of South Africa*, *76*(1), 53–66. https://doi.org/10.1080/0035919X.2020.1858366

Adeniran, A., Balogun, K., and Ihezie, E. (2023). Towards digital governance in Africa. In *Handbook of Public Management in Africa* (pp. 355–373). Edward Elgar Publishing. https://doi.org/10.4337/9781803929392.00035

Aker, J.C., and Mbiti, I.M. (2010). Mobile phones and economic development in Africa. *Journal of Economic Perspectives*, *24*(3), 207–232. https://doi.org/10.1257/jep.24.3.207

Andersen, T.B., and Dalgaard, C.J. (2013). Power outages and economic growth in Africa. *Energy Economics*, *38*, 19–23. https://doi.org/10.1016/j.eneco.2013.02.016

Arakpogun, E.O., Elsahn, Z., Nyuur, R.B., and Olan, F. (2020). Threading the needle of the digital divide in Africa: the barriers and mitigations of infrastructure sharing. *Technological Forecasting and Social Change*, *161*, 120263. https://doi.org/10.1016/j.techfore.2020.120263

Arakpogun, E.O., Elsahn, Z., Olan, F., and Elsahn, F. (2021). Artificial intelligence in Africa: challenges and opportunities. In *The fourth industrial revolution: implementation of artificial intelligence for growing business success* (pp. 375–388). https://doi.org/10.1007/978-3-030-62796-6_22

Arefin, S. (2024). Leveraging AI for healthcare advancement in Africa. *Academic Journal of Science and Technology*, *7*(1), 1–11.

Balkaran, S. (2019). Smart cities as misplaced priorities in South Africa: a complex balance of conflicting societal needs. *Journal of Management and Administration*, *2019*(2), 1–30. https://doi.org/doi:10.10520/EJC-19c1cb06f9

Ben Dhaou, S., Isagah, T., Distor, C., and Ruas, I. (2024). Global assessment of responsible artificial intelligence in cities: research and recommendations to leverage AI for people-centred smart cities.

Benjamin, R. (2019). *Race after technology: abolitionist tools for the new Jim code*. John Wiley and Sons.

Bentley, S.V., Naughtin, C.K., McGrath, M.J., Irons, J.L., and Cooper, P.S. (2024). The digital divide in action: how experiences of digital technology shape future relationships with artificial intelligence. *AI and Ethics*, *4*(4), 901–915. https://doi.org/10.1007/s43681-024-00452-3

Bhabha, H.K. (1994). *The location of culture*. Routledge.

Bijker, W.E., Hughes, T.P., and Pinch, T.J. (eds) (1987). *The social construction of technological systems: new directions in the sociology and history of technology.* MIT Press.

Birhane, A. (2020). Algorithmic colonization of Africa. *Scripted: A Journal of Law, Technology and Society*, *17*(2), 389–409. https://doi.org/10.2966/scrip.170220.389

Bostrom, N., and Yudkowsky, E. (2014). The ethics of artificial intelligence. In *The Cambridge Handbook of Artificial Intelligence* (pp. 316–334). Cambridge University Press. https://doi.org/10.1017/CBO9781139046855.020

Brokensha, S., Kotzé, E., and Senekal, B.A. (2023). *AI in and for Africa: a humanistic perspective*. Chapman & Hall/CRC.

Buiten, M.C. (2019). Towards intelligent regulation of artificial intelligence. *European Journal of Risk Regulation*, *10*(1), 41–59. https://doi.org/10.1017/err.2019.8

Bwalya, K.J. (2019). The smart city of Johannesburg, South Africa. In L. Anthopoulos (ed.), *Smart City Emergence* (pp. 407–419). Elsevier. https://doi.org/10.1016/B978-0-12-816169-2.00020-1

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Cath, C. (2018). Governing artificial intelligence: ethical, legal and technical opportunities and challenges. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *376*(2133), 20180080. https://doi.org/10.1098/rsta.2018.0080

Chirisa, I., and Matamanda, A.R. (2019). Smart cities in sub-Saharan Africa: opportunities and challenges. In *Industrial and urban growth policies at the sub-national, national, and global levels* (pp. 83–99).

Chitimira, H., and Ncube, P. (2021). The regulation and use of artificial intelligence and 5G technology to combat cybercrime and financial crime in South African banks. *Potchefstroom Electronic Law Journal/Potchefstroomse Elektroniese Regsblad*, *24*(1). https://doi.org/10.17159/1727-3781/2021/v24i0a10742

Cloete, C.E., and Spies, J.S. (2009). Combating crime in Gauteng, South Africa: a paradigm shift. *WIT Transactions on The Built Environment*, *108*, 137–147. https://doi.org/10.2495/safe090141

Crawford, K., and Calo, R. (2016). There is a blind spot in AI research. *Nature*, *538*(7625), 311–313. https://doi.org/10.1038/538311a

Dantec, C.A.L., and DiSalvo, C. (2013). Infrastructuring and the formation of publics in participatory design. *Social Studies of Science*, *43*(2), 241–264. https://doi.org/10.1177/0306312712471581

Echendu, A.J., and Okafor, P.C.C. (2021). Smart city technology: a potential solution to Africa's growing population and rapid urbanization? *Development Studies Research*, *8*(1), 82–93. https://doi.org/10.1080/21665095.2021.1894963

Eubanks, V. (2018). *Automating inequality: how high-tech tools profile, police, and punish the poor.* St Martin's Press.

Farquharson, D., Jaramillo, P., and Samaras, C. (2018). Sustainability implications of electricity outages in sub-Saharan Africa. *Nature Sustainability*, *1*(10), 589–597. https://doi.org/10.1038/s41893-018-0151-8

Fast, N.J., and Schroeder, J. (2020). Power and decision making: new directions for research in the age of artificial intelligence. *Current Opinion in Psychology*, *33*, 172–176. https://doi.org/10.1016/j.copsyc.2019.07.039

Floridi, L., and Cowls, J. (2019). A unified framework of five principles for AI in society. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3831321

Flyverbom, M., Deibert, R., and Matten, D. (2019). The governance of digital technology, big data, and the internet: new roles and responsibilities for business. *Business and Society*, *58*(1), 3–19. https://doi.org/10.1177/0007650317727540

Fountain, J.E. (2022). The moon, the ghetto and artificial intelligence: reducing systemic racism in computational algorithms. *Government Information Quarterly*, *39*(2), 101645. https://doi.org/10.1016/j.giq.2021.101645

Gaffoor, Z., Pietersen, K., Jovanovic, N., Bagula, A., and Kanyerere, T. (2020). Big data analytics and its role to support groundwater management in the southern African development community. *Water*, *12*(10), 2796. https://doi.org/10.3390/w12102796

Golubchikov, O., and Thornbush, M. (2020). Artificial intelligence and robotics in smart city strategies and planned smart development. *Smart Cities*, *3*(4). https://doi.org/10.3390/smartcities3040056

Güneralp, B., Lwasa, S., Masundire, H., Parnell, S., and Seto, K.C. (2017). Urbanization in Africa: challenges and opportunities for conservation. *Environmental Research Letters*, *13*(1), 015002. https://doi.org/10.1088/1748-9326/aa94fe

Harnal, S., Sharma, G., Malik, S., Kaur, G., Khurana, S., Kaur, P., Simaiya, S., and Bagga, D. (2022). Bibliometric mapping of trends, applications and challenges of

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

artificial intelligence in smart cities. *ICST Transactions on Scalable Information Systems*, e76. https://doi.org/10.4108/eetsis.vi.489

Harvey, D. (2008). The right to the city. *New Left Review*, *53*, 23–40.

Hassan, Y. (2023). Governing algorithms from the South: a case study of AI development in Africa. *AI and Society*, *38*(4), 1429–1442. https://doi.org/10.1007/s00146-022-01527-7

Hong, J.W., and Williams, D. (2019). Racism, responsibility and autonomy in HCI: testing perceptions of an AI agent. *Computers in Human Behavior*, *100*, 79–84. https://doi.org/10.1016/j.chb.2019.06.012

Irani, L., Vertesi, J., Dourish, P., Philip, K., and Grinter, R.E. (2010). Postcolonial computing: a lens on design and development. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Atlanta, Georgia, USA*. https://doi.org/10.1145/1753326.1753522

Jasanoff, S. (ed.) (2004). *States of knowledge: the co-production of science and social order.* Routledge.

Jha, A.K., Ghimire, A., Thapa, S., Jha, A.M., and Raj, R. (2021). A review of AI for urban planning: towards building sustainable smart cities. In *2021 6th International Conference on Inventive Computation Technologies (ICICT)* (pp. 937–944). IEEE. https://doi.org/10.1109/icict50816.2021.9358548

Kamana, A.A., Radoine, H., and Nyasulu, C. (2023). Urban challenges and strategies in African Cities – a systematic literature review. *City and Environment Interactions*, 100132. https://doi.org/10.1016/j.cacint.2023.100132

Kim, D., Sung, W., Chung, C.-S., Eom, S.-J., Hagen, L., Hwang, S., and Chun, S.A. (2021). DG.O 2022: opportunities and risks in intelligent governance and smart city. *Proceedings of the 22nd Annual International Conference on Digital Government Research, Omaha, NE, USA*. https://doi.org/10.1145/3463677.3463724

Kirui, G. (2024). Enhancing police operations: the impact of CCTV in monitoring, incident response, and crime investigation in Nairobi City County, Kenya. *International Journal of Scientific Research and Management (IJSRM)*, *12*(5), 1823–1834. https://doi.org/https://doi.org/10.18535/ijsrm/v12i05.sh01

Kolog, E.A., Odoi Devine, S.N., Egala, S.B., Amponsah, R., Budu, J., and Farinloye, T. (2022). Rethinking the implementation of artificial intelligence for a sustainable education in Africa: challenges and solutions. In *Management and information technology in the digital era: challenges and perspectives* (pp. 27–46). Emerald Publishing. https://doi.org/10.1108/S1877-636120220000029003

Kong, S., Zhu, K., Wen, C., Li, Y., Wu, F., Yu, J., and Chang, X. (2025). What can AI reciprocally contribute to energy: concept, method, and technology. *Science China Chemistry*, 1–8. https://doi.org/10.1007/s11426-024-2466-5

Kponyo, J.J., Fosu, D.M., Owusu, F.E.B., Ali, M.I., and Ahiamadzor, M. (2024). Techno-neocolonialism: an emerging risk in the artificial intelligence revolution. *Trayectorias Humanas Trascontinentales*, *18*. https://doi.org/10.25965/trahs.6382

Laterza, V. (2021). (Re)creating 'society in silico': surveillance capitalism, simulations and subjectivity in the Cambridge Analytica data scandal. *Partecipazione e Conflitto*, *14*(2), 954–974. http://dx.doi.org/10.1285/i20356609v14i2p954

Laterza, V. (2022). Human-technology relations in an age of surveillance capitalism: towards an anthropological theory of the dialectic between analogue and digital humanity. *EtnoAntropologia*, *9*(2), 59–74. https://doi.org/10.1473/ea.v9i2.381

Latour, B. (2005). *Reassembling the social: an introduction to actor-network-theory.* Oxford University Press.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Luusua, A., Ylipulli, J., Foth, M., and Aurigi, A. (2023). Urban AI: understanding the emerging role of artificial intelligence in smart cities. *Ai and Society*, *38*(3), 1039–1044. https://doi.org/10.1007/s00146-022-01537-5

Mahugu, J., and Mambo, S. (2024). Real time smart road traffic flow management system in a developing country. In *First African Transport Research Conference, Cape Town, South Africa* (pp. 5–7).

Maphangwa, M., and van der Waldt, G. (2023). Towards a smart city model for local government. *Administratio Publica*, *31*(3), 61–84. https://journals.co.za/doi/epdf/10.10520/ejc-adminpub_v31_n3_a6

Marcuse, P. (2009). From critical urban theory to the right to the city. *City*, *13*(2–3), 185–197. https://doi.org/10.1080/13604810902982177

Mbembe, A. (2001). *On the postcolony.* University of California Press.

Mbunge, E., and Batani, J. (2023). Application of deep learning and machine learning models to improve healthcare in sub-Saharan Africa: emerging opportunities, trends and implications. *Telematics and Informatics Reports*, *11*, 100097. https://doi.org/10.1016/j.teler.2023.100097

Mendes, C.F.P., Bernal-Agustín, J.L., Elgueta-Ruiz, Á., and Dufo-López, R. (2018). Smart grids for the city of Praia: benefits and challenges. *Environmental Science and Sustainable Development*, *3*(2), 36–52. https://doi.org/10.21625/essd.v3iss2.376

Mienye, E., Obaido, G., Ainah, P.K., Emmanuel, I.D., and Mienye, I.D. (2024). Enhancing energy access in Africa through artificial intelligence: opportunities and challenges. *2024 IEEE PES/IAS PowerAfrica*, 01-06. https://doi.org/10.1109/powerafrica61624.2024.10759401

Minnaar, A. (2002). The implementation and impact of crime prevention / crime control open street closed-circuit television surveillance in South African Central Business Districts. *Surveillance and Society*, *4*(3). https://doi.org/10.24908/ss.v4i3.3447

Moyo, S. (2019). *Evaluating the use of CCTV surveillance systems for crime control and prevention: selected case studies from Johannesburg and Tshwane, Gauteng, South Africa*. University of South Africa.

Mutula, S.M. (2005). Peculiarities of the digital divide in sub-Saharan Africa. *Program*, *39*(2), 122–138. https://doi.org/10.1108/00330330510595706

Niyongabo, A., Zhang, D., Guan, Y., Wang, Z., Imran, M., Nicayenzi, B., … and Hatungimana, P. (2024). Predicting urban water consumption and health using artificial intelligence techniques in Tanganyika Lake, East Africa. *Water*, *16*(13), 1793. https://doi.org/10.3390/w16131793

Nwokediegwu, Z.Q.S., Ugwuanyi, E.D., Dada, M.A., Majemite, M.T., and Obaigbena, A. (2024). AI-driven waste management systems: a comparative review of innovations in the USA and Africa. *Engineering Science and Technology Journal*, *5*(2), 507–516. https://doi.org/10.51594/estj.v5i2.828

O'Farrell, P., Anderson, P., Culwick, C., Currie, P., Kavonic, J., Mcclure, A., ... and Wong, G.. (2019). Towards resilient African cities: shared challenges and opportunities towards the retention and maintenance of ecological infrastructure. *Global Sustainability*, *2*. https://doi.org/10.1017/sus.2019.16

Oke, A.E., Aghimien, D.O., Aigbavboa, C.O., and Akinradewo, O.I. (2020). Appraisal of the drivers of smart city development in South Africa. *Construction Economics and Building*, *20*(2), 109–126. https://doi.org/10.5130/ajceb.v20i2.6632

Olayode, I.O., Tartibu, L.K., Okwu, M.O., and Uchechi, U.F. (2020a). Intelligent transportation systems, un-signalized road intersections and traffic congestion in

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Johannesburg: a systematic review. *Procedia CIRP*, *91*, 844–850. https://doi.org/https://doi.org/10.1016/j.procir.2020.04.137

Olayode, O.I., Tartibu, L.K., and Okwu, M.O. (2020b). Application of artificial intelligence in traffic control system of non-autonomous vehicles at signalized road intersection. *Procedia CIRP*, *91*, 194–200. https://doi.org/https://doi.org/10.1016/j.procir.2020.02.167

Owoyemi, A., Owoyemi, J., Osiyemi, A., and Boyd, A. (2020). Artificial intelligence for healthcare in Africa. *Frontiers in Digital Health*, *2*(6), 1–5. https://doi.org/10.3389/fdgth.2020.00006

Oyelere, S.S., Sanusi, I.T., Agbo, F.J., Oyelere, A.S., Omidiora, J.O., Adewumi, A.E., and Ogbebor, C. (2022). Artificial Intelligence in African schools: towards a contextualized approach. In *2022 IEEE Global Engineering Education Conference (EDUCON)* (pp. 1577–1582). IEEE. https://doi.org/10.1109/educon52537.2022.9766550

Pick, J.B. and Sarkar, A. (2015). Digital divide in Africa. In *The global digital divides: progress in IS* (pp 275–310). Springer. https://doi.org/10.1007/978-3-662-46602-5_9

Reed, C. (2018). How should we regulate artificial intelligence? *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *376*(2128), 20170360. https://doi.org/10.1098/rsta.2017.0360

Sadowski, J. (2019). When data is capital: datafication, accumulation, and extraction. *Big Data and Society*, *6*(1), 1–12. https://doi.org/10.1177/2053951718820549

Said, E.W. (1978). *Orientalism*. Pantheon Books.

Sanchez, T.W., Shumway, H., Gordner, T., and Lim, T. (2023). The prospects of artificial intelligence in urban planning. *International Journal of Urban Sciences*, *27*(2), 179–194. https://doi.org/10.1080/12265934.2022.2102538

Sánchez-Corcuera, R., Nuñez-Marcos, A., Sesma-Solance, J., Bilbao-Jayo, A., Mulero, R., Zulaika, U., Azkune, G., and Almeida, A. (2019). Smart cities survey: technologies, application domains and challenges for the cities of the future. *International Journal of Distributed Sensor Networks*, *15*(6), 1550147719853984. https://doi.org/10.1177/1550147719853984

Shohat, E., and Stam, R. (1994). *Unthinking Eurocentrism: multiculturalism and the media*. Routledge. https://doi.org/10.4324/9781315771441

Slavova, M., and Okwechime, E. (2016). African Smart Cities Strategies for Agenda 2063. *Africa Journal of Management*, *2*(2), 210–229. https://doi.org/10.1080/23322373.2016.1175266

Soja, E.W. (2000). *Postmetropolis: critical studies of cities and regions*. Wiley-Blackwell.

Tan, S.Y., and Taeihagh, A. (2020). Smart city governance in developing countries: a systematic literature review. *Sustainability*, *12*(3), 899. https://doi.org/10.3390/su12030899

Ulbricht, L. (2024). Power in AI and public policy. In *Handbook on Public Policy and Artificial Intelligence* (pp. 40–52). Edward Elgar Publishing. https://doi.org/10.4337/9781803922171.00009

United Nations Economic Commission for Africa (2008). *The state of African cities 2008: a framework for addressing urban challenges in Africa*. UN-HABITAT.

Van Dijk, J. (2020). *The digital divide*. John Wiley and Sons.

Voda, A.I., and Radu, L.D. (2018). Artificial intelligence and the future of smart cities. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, *9*(2), 110–127. https://brain.edusoft.ro/index.php/brain/article/download/812/941

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Warschauer, M. (2010). Digital divide. *Encyclopedia of Library and Information Sciences*, *1*(1), 1551–1556.

Yatta, F.P. (2018). Urbanization in Africa: trends, regional specificities, and challenges. In *Placemaking and cultural landscapes* (pp. 317–339). Placemaking and Cultural Landscapes. https://doi.org/10.1007/978-981-10-7799-9_14

Zhou, Y., and Kankanhalli, A. (2021). AI regulation for smart cities: challenges and principles. In *Smart cities and smart governance: towards the 22nd century sustainable city* (pp. 101–118). Springer International Publishing. https://doi.org/10.1007/978-3-030-61033-3_5

Zuboff, S. (2019). *The age of surveillance capitalism: the fight for a human future at the new frontier of power*. Profile Books.

Zulu, M.L., Carpanen, R.P., and Tiako, R. (2024). Optimization of Internet of Things (IoT) for smart grid energy management using artificial intelligence (AI) techniques to reach SDG7. In *2024 32nd Southern African Universities Power Engineering Conference (SAUPEC)* (pp. 1–6). IEEE. https://doi.org/10.1109/saupec60914.2024.10445033

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

PART II

Digital citizenship

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

5. When public servants need to help non-digital and partially digital citizens

Carl Erik Moe and Margunn Aanestad

INTRODUCTION

Our societies are being reshaped in many ways due to the digital transformation. Digital public services promise new opportunities for us as end-users, through saving time and effort, fewer errors and increased data safety, and less discrimination (Murataj and Schulte, 2022). Digital citizen participation can enhance democracy and citizen deliberation (Holzer et al., 2004). People can connect 24/7 to their social networks, irrespective of location, and businesses get access to global markets.

Most governments are pushing digitalization. The European data strategy (EU, 2019) aims to make the EU a leader in a data-driven society. The national strategies in the Nordic countries related to digitalization have similar goals, with a focus on offering digital public services, supporting growth and innovation in business, and ensuring digital security (Nordregio report 2019:4), and the Nordic countries are widely accepted as digital front-runners in the European and global context.

There is, however, a growing concern related to digital exclusion in both Norway and Denmark, and in other European countries (Midtgård et al., 2022; SSB, 2022; Niegård, 2023; House of Lords, 2023; Audit Scotland, 2024). This chapter is based on findings from the SOS project[1] which ran from 2021 to 2024. In the project we addressed the issue of digital exclusion caused by the increasing digitalization of public services in the Nordic countries. Our focus here is therefore not the benefits for the majority of citizens and for government, but rather the consequences for non-digital and the partially digital citizens, and what this implies for the public sector. More specifically, we address that public sector employees encounter this problem when their clients are not able to deal with the digital interfaces to public services. As part of the SOS

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

project, we conducted a survey among nurses working in primary healthcare in Norway, concerning how they helped their patients with digital issues.

We first give some background, where we present in more detail some of the policies in the Nordic countries. We then focus on the non-digital and the partially digital citizens, the challenges they meet and what they require help with. Subsequently, we describe our findings relating to the nurses' work as 'digital helpers' (or 'warm experts') in addition to caring for their patients.

Based on this we argue that both policy makers and technology designers need to take a broader perspective of the citizen when designing digital services. They need a stronger awareness of the situational, institutional and material embeddedness of the situation of use, and of how this situation changes throughout a life course. In practice, this means that they should recognize that at some points in life we may all need help. These changing needs for help are recognized in the 'analogue' world, where for instance the 'guardian' role is institutionalized. Parents act as guardians for their children, and others can have a guardian appointed if needed. This is not institutionalized in the same way in the digital world, where there is very little accommodation for involving a 'digital helper'. Therefore, we argue that policy and design should acknowledge the centrality of the 'helper' based on a broader perspective of the citizen. If we do not consider such implications, we risk losing the expected benefits of digitalization of our public services. More so, the future of our welfare state (access to welfare services) and possibly even our democracy may face risks.

BACKGROUND

The Nordic countries are generally considered frontrunners in digitalizing society, including public services. The Nordic countries have well-established infrastructure with national registers for vital domains, such as population, tax and health data. They all have electronic IDs and many of the welfare services have a digital interface. Tax is fully automated in all countries, banking is digital, and they were early in implementing electronic health records. They are among the countries with the highest Internet penetration in the world, and Denmark had the highest number of individuals (98.5 per cent) that used a website or an app for a public authority in the last 12 months in 2024 in the European Union (EU) (Eurostat, 2025), well above the average of 70 per cent. Norway had the same high proportion, although not being an EU member, Norway is not part of the same statistics.

A comparison of the policies and regulations in Norway, Sweden and Denmark (SOS, 2022) shows that Nordic countries have fairly similar policies regarding digitalization. 'Digital first' has been a basic principle in Norway since 2013 (Regjeringen, 2013), and this was reinforced in 2015/16 with the

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

introduction of the digital mailbox (Regjeringen, 2015, Meld. St. 27, 2015–2016). Digital first implies that citizens are nudged towards digital channels, but they can opt to apply manual channels for some services such as tax or health. Sweden and Finland have the same basic principle of digital first, and Denmark have gone even further, with a 'digital only' policy (Ozols and Meyerhoff Nielsen, 2018).

An effect of these policies is that non-digital and partially digital citizens risk becoming a 'digital underclass', and suffer from less access to information and fewer opportunities for commercial offers, from challenges in accessing welfare and health services, and from less social interaction. Many elderly in Norway struggle as an effect of the digital transformation as it is normally no longer possible to pay for a bus or train ticket with cash. Also, all general practitioners (GPs) have electronic payment services, and to use today's TV offerings you need to be fairly technical, as the choice of streaming is better than what is offered in real time.

Accessing the health services and applying for welfare services in Norway (Health Norway, Norwegian Labour and Welfare Administration (NAV)), and in Denmark (where citizen service centres act as front-end) is largely digitized, motivated by the need to provide efficient and accessible services. In parallel with establishing digital services, the manual channels (such as face-to-face meetings, physical help desks and receptions, and paper-based processes) are reduced. The advantage of digitizing these services is obvious, as the numbers of users are large, and many have the same needs (for example, access to health data 24/7, or application for retirement compensation or parental allowance). Services that do not require anything beyond standardized information are also easy to digitalize.

The public health and welfare services handle large volumes of sensitive data and require two-factor authentication based on a combination of an electronic identification (E-ID), and a password. Other public services in Norway (tax, access to education, signing legal contracts, and filing applications for building permits and so on) also require an electronic id. The most common E-ID in Norway is the BankID, but MinId, Buypass and Commfides are also applied. MinID is available to all citizens but does not offer the highest security level required by, for example, digital health services. The BankID technology is privately owned, by BankAxept. Bank customers can get a free BankID from their bank, while Buypass and Commfides are commercial services.

The BankID was already widely applied in Norway when the government wanted to introduce a public electronic id, and the government decided to open up for application this also for accessing public services in 2012.

The banks have different age limits for authorizing BankID, but most of them have 13 years as the age limit. The other E-IDs (MinID, Buypass and Commfides) have the same age limit. Further, the banks require a citizen to

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

have an 11-digit social service number before granting the BankID. Hence, immigrants to Norway need to access a social security number before the banks can assign a BankID. As there is normally a delay when moving to Norway before the social security number is granted, immigrants cannot open a bank account and receive payment from working, or before up to four weeks (Oslo commune, 2025) after being granted a residence permit. Access to Health Norway and NAV's services requires BankId, and migrants to Norway may expect a delay beyond the initial four weeks, as the bank they deal with need to approve a request for issuing a BankID.

THE NON-DIGITAL AND PARTIALLY DIGITAL CITIZEN

Parallel to these policies of pushing digitalization, there has been an increase in the population's access to digital technology and networks. The barrier of lack of digital access, often called a first-level digital divide, has been overcome to a large degree in the Nordic countries. However, still, not all households have internet connectivity, and not all citizens have both a computer and a smartphone. People living on the street or without a permanent address may not acquire phones or may lose them, and are often denied subscription programs that allow data transfer or internet connectivity. Also, in times with rising costs, more people struggle to purchase updated and modern digital equipment.

However, there are also other causes for digital divide than lack of access to equipment and networks. According to Midtgård et al. (2022; see also Digdir, 2023), there are five barriers to digital inclusion: (1) access; (2) information and data literacy; (3) language skills; (4) domain competence (understanding what the public entity is asking from them and which implications their actions will have); and (5) health-related challenges, such as old age, cognitive decline, anxiety, and so on.

Even if most people do have access, parts of the population are less able to utilize the digital services and need help from others. The helpers they approach are often a spouse or a family member, but not everybody has someone in their social network who can help them. Studies show that factors such as age and social inequality due to unemployment, disability or migrant status (Vassilakopoulou and Hustad, 2023) or lack of education (SSB, 2022) may contribute to digital exclusion. On the other hand, we believe that an understanding of the issue as being mainly related to belonging to specific groups is insufficient to grasp the size of the problem. We need to acknowledge that we all risk becoming digitally excluded, on a temporary or permanent basis.

New skills are harder to learn as people grow older. Digital skills may become lost when people lose contact with the job market due to retirement or unemployment, and there are less opportunities to learn new skills and new

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

tools once a person is outside the job market. Health-related barriers may also play a role. Digital equipment is harder to operate as the eyesight declines, and the elderly may find it harder to use the keypad (especially on a cellphone). Most touchscreens do not respond as well to the drier skin of elderly people's fingers.

Citizens with cognitive disabilities are another group who face difficulties. Some skills may be learnt through basic education, vocational education and university education; but not all get an education. Other skills may be learnt through work, but some fall out of the job market. As many as approximately 2.6 per cent of young people (18–29 years old) in Norway are on disability benefit.

Many find it hard to understand some of the public services due to lack of domain competence, or do not understand the bureaucratic language used for communicating. Immigrants who get a BankID have to learn and understand how to navigate the domain of public services in a new country, which may be very different from their country of origin.

Another challenge is that not all citizens are allowed a BankID. The banks do check whether a citizen is able to use and remember passwords before authorizing it. Some have been reluctant to grant BankID to citizens who are not able to read Norwegian or English, due to concerns about whether they then can understand the rules for usage and the associated risks. If a person is found to share their BankID, they risk that the access is closed. There have been stories in the press about people losing their BankID, and one of the authors of this chapter was called over the phone by a husband who described the case of his wife. We have recalled the story below. Let us call them Sven and Gerd:

> Gerd had been active and managed on her own until very recently, had managed her own [affairs] also on the Internet without help of her husband. Recently, she suffered from a stroke (an apoplexy) and became uncapable of using the keyboard of the tablet. Hence her husband had to log in and do her banking services, although she was perfectly capable of instructing him what to do. Sven was 'stupid enough' to tell a bank clerk about this and due to this, the bank closed Gerd's BankID. This was an awful blow to his wife, Gerd, as she felt she lost a lot of her empowerment.

If we add up all these groups of people, there are many who have challenges in using digital tools and services. A survey from Kompetanse Norge (HKdir, 2021) indicates that 130 000 adult Norwegians do not use the internet, and an additional 470 000 have 'weak' basic digital skills.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

THE HELP REQUIRED BY THE CITIZENS

Our survey of how nurses in the municipal sector also help their clients with digital technology is introduced in the next section. Findings from our survey also reveal what the citizens find challenging. The survey results show that many nurses frequently (often daily) help citizens with both basic hardware and software challenges, as well as with specific services. This includes both public and commercial/private services and technologies that are not related to the nurses' core tasks. Without this help, many of the citizens would be incapable of connecting to the internet, accessing information and using public self-services. As our survey targeted nurses, their responses relate mainly to patients, most of whom are elderly. They may also need to assist younger people who for some reason may need care, immigrants, and schoolchildren visiting the school health service.

Our survey finds that citizens ask for help with digital health services such as Health Norway (Helse Norge), and for other services such as ordering a taxi or ordering goods from different stores. Some even ask for help with Bank-Id and online payment. The nurses also report that their patients need help with health and welfare technologies, and that patients also ask for help because they lack skills, sometimes even basic skills, such as unlocking their phone, connecting to the wi-fi, operating the TV, answering text messages, and connecting to a charger. Tables 5.1 and 5.2 show results for prevalence of the pre-determined response alternatives.

The nurses help (Table 5.3) because they are asked to by citizens who often have no one else to ask or who do not want to bother their next of kin. We do not know who these citizens are, but we can expect that many of them are old,

Table 5.1 Tasks patients normally need help with

What concrete tasks do your patients/users normally need help with?	No.	Proportion
Logging on public services, including Health Norway	1440	47%
Filling in forms for the public sector	1302	43%
Using BankID or something similar	868	29%
Completing payments online or other tasks related to banking and economy	746	25%
Replying to letters from the public sector	726	24%
Using social media	667	22%
Ordering goods and services from private entities	623	21%

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Table 5.2 Typical problems that patients face

What are the typical problems patients/users have that lead to their need for help?	No.	Proportion
Patients/users have problems in using digital technology	1879	62%
Patients/users are not safe enough to do the task on their own	1482	49%
Patients/users have problems in understanding the content of the services they are supposed to use	1407	46%
Patients/users have problems in finding the information and services they need	1361	45%
Patients/users do not have the necessary technical equipment or access to Internet	1165	38%

Table 5.3 Why do the patients ask for help?

What are the typical situation where the patients/users need help with digital technologies and services?	No.	Proportion
Have no one else to ask	1582	52%
Technical problems	1482	49%
Doing something they have not done before	1132	37%
Are in a new and challenging situation	1060	35%
Doing an important task	535	18%

as most of the nurses in our survey work either in nursing homes or in home care services. Many of the citizens may have a spouse the same age, others may have lost their spouse, in some cases this may have been the one they could ask for help. Other citizens may live some distance away from their next of kin and hence find it hard to ask them.

The help is important to the patients. Many face a new and challenging life situation or have to do something they have never tried before. Even if some of the help concerns very basic issues, it may still be important to them: the importance of being able to answer a text message, or connecting to the wi-fi, should not be underestimated. Other tasks may be vital in themselves, such as paying for goods and services, applying for social care or accessing health services.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

NURSES AS HELPERS; AND 'ESCAPE VALVES'

An important aim of the SOS project was to learn more about challenges that helpers of non-digital and partially digital citizens face. In 2023, we conducted an online survey distributed to various groups of public sector employees: to nurses in Norwegian municipalities, to citizen service centre employees in Denmark and to teachers in Sweden. This gave us the opportunity to collect responses from a wide variety of helpers covering a large variety of citizens' needs. We here describe the findings from the survey conducted in Norway.

We wanted to address a large cohort of nurses of different ages and from different parts of the country, and from large and small municipalities. The Norwegian Nurses Association sent an e-mail with a link to the survey form on our behalf to approximately 39 000 of its member nurses working in the municipalities, and we received 3044 completed anonymous responses, including a few (less than 2 per cent) who did not work in a municipality. This includes both nurses in administration and practicing nurses, for example, in nursing homes, home care and at schools. The survey form was chosen to capture the expected variation in experiences that follow from the wide variation in how different municipalities in Norway organize their services, in the capacity of they have as frontline staff, and the challenges and dilemmas they face. The survey contained both closed and free-text open-ended questions. The open-ended questions were included to provide further insight into the issues, and the participants made extensive use of these opportunities.

The nurses find that they have the skills necessary to help the citizens to a high degree or at least to some degree. The nurses who we surveyed were of all ages, from 21 to 69 years old, which tells us that most of them got their training many years ago; and even today nurses do not learn much about digital technologies as part of their education. Some of the tasks that they help citizens with are so basic that the nurses probably do not need any training, but other tasks are more complex. Some nurses may have learnt how to help with these through experience, others may not be able to help with the more complex tasks. Still, most often, the nurses who we have data from do not decline to help, and if they do it is more often related to not having time than not having the right skills.

Helping patients takes time away from the nurse's core tasks. Also, this work is done by public employees who have not been trained to do this. They are not necessarily familiar with the technologies or services in question, and the effect may be that they spend more time than might be needed, and the patients may not get proper help. So why do they do this, which definitely is not a core task? They do it to help, out of a strong ethos of caring. As one nurse put it: 'everything affects their mental health'. Another nurse told us: 'The help I

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

give does not relate to nursing issues, but the effect is that the patients are able to communicate'. The findings from the survey indicate that the nurses act as 'escape valves' for some patients; they help with issues that would otherwise be unsolved.

However, many nurses worry. They worry that they may:

- do something beyond what they really are allowed to, and get in trouble with relatives or a guardian;
- do something wrong, which may have negative effects for the citizens they are helping; or
- get too much insight into the citizens' personal information.

Many nurses responded that they declined to help when requests necessitated applying the BankID, but others were uncertain, and some did help with tasks that required BankID for logging into a service. Some patients might need a guardian, but there is a delay of up to six months from applying before the guardian is appointed, and in the meantime nurses may face dilemmas over whether to conform to the regulations or help when this is needed. The fear of doing something that may harm the patient may be linked to nurses helping patients even if they feel that they do not have enough skills. They may harm the patient by supplying wrong information when filling in information for a service, or by missing opportunities for support. Patients may place a lot of trust with the nurses, and hence the nurses may get access to sensitive information regarding passwords, economy, consumption and health issues.

The nurses find that this often takes away time from core tasks, and that they often worry about having enough time for the help they should provide. This problem of 'unpaid work' in nursing is not new; it has been studied before and it was found that unpaid work may lead to health problems including stress (Walters et al., 1996), and a higher rate of leaving their job (Zeytinoglu et al., 2006). The extra work related to digital problems may add to the unpaid work that they are already doing. Winthereik et al. (2024) describe how work done by public sector employees can be invisible in several ways: it can be unnoticed (not acknowledged as work), it may be neglected and not formally recognized, or it may be hidden and conducted secretively (ibid.: 68). A consequence of not acknowledging and recognizing the helpers' work may be that savings in public administration due to digitalization may incur extra costs in nursing.

A surprising finding from our survey is that most nurses lack guidelines covering digital help to patients. Our survey shows that 57 per cent of the respondents do not have formal guidelines, and 30 per cent of the respondents do not know whether they have guidelines or not. Some refer to informal procedures, traditions or 'ways of doing things' at their workplace. However,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

several comment on the need for written guidelines, and several also remark that different nurses in their workplace have different borderlines regarding whether to help or not.

Further, the nurses rarely talk with colleagues about the digital help they offer to citizens. That may make it harder for the young nurses to develop the necessary level of confidence. This may have the result that some nurses decline to help patients who have needs, whereas others may actually do something they are not allowed to do, or do something wrong, opening up problems related to privacy, and possibly even fraud or suspicion of fraud.

The result of this is that nurses find themselves in a grey zone, exacerbated by a lack of guidelines and support from peers and colleagues. Many nurses (and possibly other frontline workers) have to navigate a grey zone where they are not sure what they are allowed to help with, or whether, when helping, they may inadvertently do something that has negative consequences for the citizens. Younger nurses may find this grey zone more difficult to navigate. Our findings show that the proportion of nurses who worry is nearly three times as high among the youngest group (18–29 years old) as in the oldest group (above 60 years old). A strong professional identity is critical for nurses, and they develop this partly through their education, but continue developing it through their working life (Johnson et al. 2012).

IMPLICATIONS OF OUR FINDINGS: THE NEED FOR RESPONSIBLE GOVERNANCE OF THE DIGITAL TRANSFORMATION

Not all citizens (and not all elderly citizens) are patients and have a nurse to ask for help. And not all who ask, get the help that they need due to nurses not having the time or skills needed. So, we suggest equipping the nurses with the skills needed, and with guidelines that can help them to navigate the grey zone. This includes informing nurses on whether there are others who can help the patients in the municipality where they work; more than half of our respondents did not know whether such a service existed. Many municipalities offer help, either through the library, through a contact point in the administration or through a non-governmental service (for example, Seniornett).

However, just as important as equipping the nurses with this information is to make it easier for next of kin to help. Some challenges can be handled if a family member or friend can be assigned power of attorney and a formal role in the digital service. Currently, this is possible to do for bank services and for the service in the citizen portal Health Norway. The current digitalization strategy proposes to make this a more generic functionality across multiple public services. Being able to formally appoint a helper in the digital world will be useful for many.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Guidelines and training for the helpers could assist them in navigating the grey zones and dealing with dilemmas. There is also the possibility to apply to the state administrator to appoint a guardian when a citizen is incapable of taking care of themself. Information concerning these options needs to be accessible, and both public employees and family need to know about them.

Perhaps even more important than helping the helpers is making it possible for citizens to manage as much as possible on their own, especially since not all have someone who they can ask for help. It will always be important to seek better (more inclusive) technology design, to attend to the clarity and understandability of the language used in the digital services, and also to continue to provide physical or analogue alternatives. The various service providers need to take this issue seriously. For instance, in 2023, the Norwegian bank sector led by Finans Norge agreed on a Code of Conduct that included a voluntary commitment to provide support for users of the digital services, and to also provide non-digital alternatives to those who could not use the digital channels.

We have pointed to the need for a broader perspective on the citizen, as someone who progresses through phases of life where abilities change, but who is part of a social network where there are possible helpers. It is worthwhile to ask which aspects of this social support structure, which we know from ordinary life, should be replicated in the digital life world. Responsible digitalization should be aware of the risk that increased digitalization can also produce digital exclusion, and should seek to counteract it.

NOTE

1. 'Infrastructures for partially digial citizens: Supporting informal welfare work in the digitized state' financed by NodForsk, project no. 100742.

REFERENCES

Audit Scotland (2024). Tackling digital exclusion. https://audit.scot/uploads/2024-08/nr_240822_tackling_digital_exclusion.pdf

Digdir (2023). «Kor mange opplever digitalt utanforskap?», https://www.digdir.no/rikets-digitale-tilstand/kor-mange-opplever-digitalt-utanforskap/4456

EU (2019). A Europe fit for the digital age https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-data-strategy_en, accessed 20.11.2024.

Eurostat (2025). 70% of EU citizens used online public services in 2024. https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20250226-1

HKdir (2021). Befolkningens digitale kompetanse og deltakelse – Med et ekstra blikk på seniorer og ikke-sysselsatte. https://hkdir.no/rapporter-undersokelser-og-statistikk/befolkningens-digitale-kompetanse-og-deltakelse-2021

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Holzer, M., Melitskin, J., Rho, S.Y., and Schwester, R. (2004). Restoring trust in government: the potential of digital citizen participation. *Frontiers of Public Administration*, *6*(6), 6–23.

House of Lords (2023). Digital exclusion. Communications and Digital Committee, 3rd Report of Session 2022–23. https://publications.parliament.uk/pa/ld5803/ldselect/ldcomm/219/219.pdf

Johnson, M., Cowin, L.S., Wilson, I., and Young, H. (2012). Professional identity and nursing: contemporary theoretical developments and future research challenges. *International Nursing Review*, *59*(4), 562–569.

Meld. St. 27 (2015–2016). Digital agenda for Norge. https://www.regjeringen.no/no/dokumenter/meld.-st.-27-20152016/id2483795/?ch=1

Midtgård, T.M., Sand, K., Thun, S., Hilland, G.H., and Ose, S.O. (2022). Digital ekskludering i NAV—Hvem, når, hvorfor? *SINTEF Rapport*.

Murataj, I., and Schulte, M. (2022). No-stop government: expected benefits and concerns of German young adults. In *International Conference on Electronic Government* (pp. 47–59). Cham: Springer International Publishing

Niegård, H. (2023). Hver 5. dansker i digitalt limbo, Danmarks biblioteker, 6, 2022, p. 8.

Nordregio report (2019:4). *Governing the Digital Transition in Nordic Regions: The Human Element*. By Linda Radall and Anna Berlina. https://norden.diva-portal.org/smash/get/diva2:1295022/FULLTEXT01.pdf

Oslo commune (2025). Opening your first Norwegian bank account. https://www.oslo.kommune.no/english/welcome-to-oslo/plan-and-prepare/open-your-first-bank-account/#gref, accessed 31.03.25.

Ozols, G., and Meyerhoff Nielsen, M. (2018). Connected government approach for customer-centric public service delivery: comparing strategic, governance and technological aspects in Latvia, Denmark and the United Kingdom. https://collections.unu.edu/eserv/UNU:7347/Digital_Transformation_LV_DK_UK.pdf

Regjeringen (2013). På nett med innbyggerne. Regjeringens digitaliseringsprogram. https://www.regjeringen.no/globalassets/upload/fad/kampanje/dan/regjeringensdigitaliseringsprogram/digit_prg.pdf

Regjeringen (2015). Digitaliseringsrundskrivet 2015. https://www.regjeringen.no/no/dokumentarkiv/regjeringen-solberg/andre-dokumenter/kmd/2015/digitaliseringsrundskrivet/id2462793/

SOS (2022). Digitalization policies in the Nordic countries – implications for citizens. Project report.

Vassilakopoulou, P., and Hustad, E. (2023). Bridging digital divides: a literature review and research agenda for information systems research. *Information Systems Frontiers*, *25*(3), 955–969.

Walters, V., Lenton, R., French, S., Eyles, J., Mayr, J., and Newbold, B. (1996). Paid work, unpaid work and social support: a study of the health of male and female nurses. *Social Science and Medicine*, *43*(11), 1627–1636.

Winthereik, B.R, Aanestad, M., and Mäkitalo, Å. (2024). *Digital Inclusion*. DJØF Forlag.

Zeytinoglu, I.U., Denton, M., Davies, S., Baumann, A., Blythe, J., and Boos, L. (2006). Retaining nurses in their employing hospitals and in the profession: effects of job preference, unpaid overtime, importance of earnings and stress. *Health Policy*, *79*(1), 57–72.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

6. The interplay of blockchain technologies and citizenship

Martin Rolf Herbers

INTRODUCTION

Democracy is a matter of communication. Although there are various ideas on how political power should be distributed among citizens, exerted by them and legitimized through them, they all rely on processes of communication. Those who seek office vocalize their ideas, citizens need journalistic information to decide on publicly relevant issues, and the political administration needs reliable information to exert citizens' rights. The quantity, quality, access, distribution and processing of such information forms the basis of government as well as everyday citizenship (Casey and Vigna, 2019: xiii).

Digital technology has made information ubiquitous. Especially, internet technologies helped to set up forms of e-government, which place the emphasis on the administrative side of the political system. Citizens, on the other hand, can also gain access to journalistic and other mediated forms of information, which can help to foster their political opinions, or engage in online activism (Bennett and Segerberg, 2012). Yet this so-called 'Internet of Information' (Tapscott and Tapscott, 2018) comes at a price.

The 'Internet of Information' relies on the TCP/IP protocol, which allows networked communication that routes itself freely through a series of nodes, access points, devices and software. This becomes prevalent in Web 2.0 technologies, for example social media platforms that provide easy access, sharing and manipulation of information, which are mostly in the economic interest of powerful institutions or organizations which centralize the information provided by the users (Zuboff, 2019).

Along these lines, governmental institutions also collect information on citizens and process, record and archive them to allow for functioning democratic processes. These institutions are often opaque, leaving citizens in the dark about the information that is collected and processed.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Yet, citizens need trustworthy information to fulfil their role, and need to trust the institutional forms of politics to handle their information correctly and legitimately. To foster this trust, the technology of the so-called 'Internet of Information' should be reevaluated against new forms of digital information processing. Communication technologies play a vital role here, as they emphasize the verified, authenticated and yet transparent handling of information. At the heart of these 'trust machine[s]' (*Economist*, 2015) lies blockchain, a decentralized, cryptographical, secured and transparent record of informational transactions between government and citizens.

From this vantage point, the chapter provides an analysis of the interplay between blockchain technologies and citizenship. This addresses further gaps in research: blockchain technologies are predominantly researched by information sciences (Fill and Meier, 2020) and economic sciences (Ragnedda and Destefanis, 2019), although some research implies the social and political consequences of these new technologies (Casey and Vigna, 2019; Tapscott and Tapscott, 2018). Yet these are not reflected thoroughly in research on democracy and citizenship.

To systematically explore the complex interplay between blockchain technologies and citizenship, it is essential to frame clear research questions that guide both theoretical analysis and empirical inquiry. While blockchain promises transformative potentials for cultural citizenship, political participation and privacy management, the practical implications for individuals and institutions remain underexplored and contested. Thus, this chapter addresses two central research questions: first, how does blockchain technology alter the concept and practice of cultural citizenship within network societies? Second, what are the implications of balancing transparency and privacy through blockchain for institutional politics and citizen engagement? These questions provide the analytical foundation for examining blockchain's transformative impact on modern citizenship.

Hence, the chapter provides an analytical review on the interplay of blockchain technologies and citizenship. It presents a more general introduction to blockchain technologies and emphasizes their social and political impact. Further, it argues that the concept of citizenship should be reevaluated against this transformation, and reviews traditional and newer ideas of citizenship, especially regarding information. It proposes the idea of ledger-based citizenship. This new concept is discussed against the backdrop of actual and existing implementations of blockchain technologies in Europe. In conclusion, the chapter discusses further social and political consequences for citizenship beyond its original scope, and gives implications for further research, abstaining from solutionist and deterministic visions.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

BLOCKCHAIN TECHNOLOGIES AND CITIZENSHIP: A THEORETICAL OUTLINE

This chapter discusses the theoretical premises and concepts of the interplay of blockchain technologies and citizenship. It presents an overview of blockchain technology, based on a socio-cultural overview of its development, which carries over into the technologies' social and political consequences for citizenship. These are discussed against the backdrop of Thomas Marshall's influential ideas on the concept of citizenship. He regards citizenship as a political – or more precisely, a merely political – passive form of participation in the context of more institution-driven forms of political systems. These connect more to centralized forms of power and authority. Critiquing this narrow focus on citizenship, Klaus and Lünenborg (2004) argue that this notion of citizenship fails to take into account forms of social, cultural and symbolic dimensions of citizenship. These stem from what Castells (2019) calls networked forms of society. As social life becomes more and more 'datafied' (Breiter and Hepp, 2018) new forms of sociality arise that are more pluralistic and multi-faceted, calling for a more nuanced and new form of citizenship beyond the mere political dimension. The chapter amalgamizes these two lines of thought into a 'ledger-based' form of citizenship, which includes political, social, cultural and symbolic dimensions. It discusses these findings against the backdrop of networked forms of politics, which call for more active and complex forms of political participation.

Blockchain Technologies: An Overview

At the heart of all political power lies the access to, distribution, recording and processing of information. Currently, these processes are facilitated by more centralized forms of political institutions: for example, social or fiscal records are developed, maintained and kept by the respective departments of the political administration. This lies in part in the privileged access to recording technologies used by these institutions, that in turn privileges the storage and analysis of data. Fully fledged transparency of these processes is not granted to the citizens, who serve as a mere 'data source' and is thus often restricted, as Casey and Vigna (2019: xiii) argue.

Yet, technological transformations which foster transparency can allow citizens to access their data more freely. This connects to the problem of keeping these more accessible data free from falsification or fraud. They cannot be tampered with, as these reliable records are at the centre of a functioning political administration and the processes it serves. Against this backdrop,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

blockchain technologies can allow for safe and secure access to trustworthy information, and support the storage of viable records.

Although blockchain technologies were not created with the intention to foster political record-keeping, they can be applied to any process where trustworthy and tamper-free information is necessary. Blockchain technology was first mentioned publicly in 2008 in a technical whitechapter (Nakamoto, 2008) by a pseudonymous author (or a collective of authors) under the name of 'Satoshi Nakamoto'. Despite the fact that the author's identity remains speculative as of today, the technology laid out in the paper, distributed through a mailing list on cryptography, gained traction fast.

Nakamoto's paper must be seen in the context of two converging cultural and political processes: the crash of the global financial system following the bankruptcy of the American Lehman Brothers bank, and the online community of the 'Cypherpunks' (Hughes, 1993). The crash of the global financial system exposed a problem of centralized organizations and institutions, economically and politically: when they function, they provide efficient forms of social and political organization and processes; when they fail, they reveal themselves to be a part of a longer chain of transactions between individuals and other organizations, which in turn can no longer function properly. Thus, the online community of the Cypherpunks argue that these systemic failures of centralized institutions are bound to happen. Hence, they call for an empowerment of individuals, to not naively trust these organizations with the protection of their data. They strive to empower individuals to protect their data and the processes in which their data are involved, through cryptography and other precautions. Organizations, especially the more centralized organizations of the Web 2.0, serve as sole authorities over data, and should not be trusted blindly.

Hence, Tapscott and Tapscott (2018) refer to the Web 2.0 as the 'Internet of Information'. In this infrastructure, information can be shared, altered and archived freely, yet the facilitators of these processes are just a few (economic) organizations that hold economic and political power, based on the information that they acquire. As information is the key to political and economic participation of citizens, they argue that the sovereignty over the data should rest with the citizens and not, in this case, problematic institutions. They emphasize the necessity of a new internet infrastructure, which they call the 'Internet of Value'. This adds a new layer of technology to the internet which provides safe, trustworthy and tamper-proof processing of information not by the institutions alone, but in the interplay with citizens who provide the information.

This technology is put forward in Nakamoto's (2008) paper, and is called blockchain. At its core, it serves as distributed ledger that records transactions between pseudonymous users. These are organized in a decentralized way, and secure the entries on the ledger through cryptography. They also perform

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

validity checks every time the ledger is updated, as new entries are recorded. It is worth mentioning that blockchain does not serve as a database in which data are stored. It is a ledger that keeps records of interactions with data; for example, push and pull requests by users. New entries are not merely added, but incorporate the history of previous transactions, which prevents malicious data entry, as any new record of transactions is checked against the previous ones and is further verified by a consortium of users. Hence, there is an ongoing consensus between the users that any new entries are authentic, verified and validated. Nakamoto states that this fosters trust among the users of blockchain through the combination of social and technological security measures.

The technology behind blockchain might prove arcane to the uninitiated eye, yet the social and political implications of this technology are striking. Initially conceived as an alternative to record financial transactions between users without the intermediary actions of banking institutions, there is no limit on the kinds of transactions that can be stored, distributed and accessed via blockchain. Hence, blockchain can be seen as a 'universal medium' (DuPont, 2019), which is content-agnostic as it focuses on the infrastructure. Regarding the social organization of information, blockchain can be regarded as a democratizing medium. It allows individuals access to data and the entry of new data, if they adhere to the consensus protocol. Thus, no central authority – or intermediaries, as Casey and Vigna (2019: 6–7) call them – is needed.

Blockchain technologies promise that political information processing can be organized in a decentralized, non-authoritative manner that is still functional. Yet, it calls for a reevaluation of the concept of citizenship which presently restricts informational processes. An active form of citizenship is needed to fully engage in these informational processes.

New Forms of Citizenship: From Political to Ledger-Based Citizenship

The concept of citizenship is central to democratic theory, as it emphasizes the general interactions between citizens, as well as between citizens and the nation state. The later is often bound to centralized forms of institutions. Yet, the role of technology for modern forms of citizenship is often dismissed.

One of the influential concepts of citizenship was put forward by Thomas S. Marshall (1965). He subdivides the concept of citizenship into three aspects: civil, political and social citizenship. Civil citizenship encompasses any rights that secure individual liberties, such as freedom of speech, freedom of the press, or other liberties. Opposed to that, the aspect of political citizenship involves the right to participate in political power through institutionalized settings. This becomes visible in the rights to vote and to hold office. Finally, social citizenship is defined as a right to at least a minimum amount of economic welfare and overall security provided through state actors such as the

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

police or the military. Marshall emphasizes the historical evolution of these aspects of citizenship, which eventually leads to a more just and solidaric society.

Klaus and Lünenborg (2004) address several points of criticism of this concept. The idea of a linear and additive growth of civil rights does not hold true for a heterogeneous society. This is composed of diverse social groups and communities with different socio-political demographic backgrounds and resulting needs. As the civil rights of white affluent men grew, women, people of colour and others lost their rights. Hence, models of citizenship should acknowledge social differences and propose ways to bridge them. Further, Marshall's (1965) ideas circle around the concept of a nation state with a more homogeneous application of the three dimensions of citizenship. Yet citizenship encompasses not only economic and political aspects, but is also a form of cultural participation. Hence, Klaus and Lünenborg propose to add cultural citizenship to this overarching concept that allows for individuals and their idiosyncrasies to shine; which Marshall largely omits.

Based on their critique of Marshall's concept of citizenship, Klaus and Lünenborg (2004) propose to add cultural citizenship to the underlying concept. This is due to a missing reflection of the symbolic dimension and softer forms of social interactions and political participation in a non-formalized or even institutionalized setting that Marshall builds his theory on. The authors ground their additional work in cultural studies. This line of thought emphasizes the interplay of macro social structures and institutions, as well as the individual response to these structures by unique individuals in their everyday lives. This provides a more varied, rounded concept of citizenship, which further emphasizes the role of information and media in this context.

The cultural dimension of citizenship is based on the idea that individual citizens learn about and engage in a political system through communication. Communication can be subdivided into personal interactions and mass-mediated forms of communication which are based on symbols. Through language, texts, images, videos and other forms of communication, it can be regarded as a constructive process that pervades meaning and relevance. Thus, institutions can be regarded as a form of communicative meaning. Through socialization, individual citizens learn about the meaningful structures and their political surroundings.

Yet, as Hall (1979) argues, meaning is not only transported through communication, it is also negotiated against the backdrop of the idiosyncrasies of individual actors and their everyday lives. Individuals thus derive individual meaning from communication through a process of internal negotiation. They can take communication and its meaning 'as is', or they can resist or deny its meaning. Or they can negotiate meaning, asserting some aspects of

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

the proposed meaning while resisting others. In any case, citizens are highly active in meaning-making.

Meaning is also conveyed through the mass-mediated forms of communication. As Klaus and Lünenborg (2004) point out, meaningful communication about citizenship is not only restricted to generally assumed politically relevant content, for example news media. Ideas of citizenship can also be conveyed in television dramas, movies, blog posts, Instagram reels and other forms of media. This makes ideas of citizenship much more accessible and grounded in the life world of individuals than Marshall's narrow idea of citizenship as a mode of political actualization.

Two problems stem from this constellation, as citizenship has an undeniably cultural and symbolic dimension. Individual citizens are bound to construct their own identities through media. In this 'DIY-citizenship' (Fiske, 1987), any two citizens may not share the same symbolic background. This illustrates the cultural studies emphasis on, or overemphasis of, individual idiosyncrasies. This becomes even more problematic against the background of global communication networks that make their content accessible beyond the national context. Man's cultural and symbolic citizenship, such as Castells's (2019) network society, is inherently diverse and must address individual differences and capabilities. Yet other forms of citizenship, political, social, and more, are still valid and need to be addressed as well. This results in the overarching question of how the informational aspects of citizenship can be fully addressed regarding the non-homogeneous groups of citizens that are contrary to traditional concepts of democracy and citizenship.

Ledger-Based Citizenship: A New Approach for the Blockchain Era

To unify these multiple perspectives and ensure a functioning political system, the institutional approach alone is not enough, as it fails to address the decentralized and multi-faceted aspects of citizenship. Hence, a new method for reuniting these perspectives is needed.

Blockchain technologies address this exact problem not only from a technological but also from a social standpoint. In the highly diversified world of individual actors, there is still the possibility to form a collectively binding decision.

Blockchain technologies enable this through a decentralized form of consensus-making. Individual actors as well as institutional actors refer to the same record of transactions in their copies of a ledger, and record any new transactions through a consensus-based system. This adds a layer of protection to the data, as citizens are part of the record-keeping process and actively engaged in processing information. They make meaning that is not merely bound to institutional actors, which distributes informational power and helps

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

to activate citizens' potential. This form of ledger-based citizenship already has its applications in the real world, and can cater to any kind of economic, social and political citizenship, as the following examples show.

BLOCKCHAIN TECHNOLOGIES AND CITIZENSHIP: CASE STUDIES FROM LIECHTENSTEIN, SWITZERLAND AND ESTONIA

In recent years, blockchain technologies have transcended their origins in cryptocurrency, demonstrating potential across diverse sectors, including public administration, legal frameworks and civic identity. The integration of blockchain within governmental structures presents new avenues for citizenship and governance, aligning with Thomas S. Marshall's (1965) as well as Klaus and Lünenborg's (2004) concepts of citizenship, which emphasize the importance of civil, political and social rights. This chapter examines how three countries, namely Liechtenstein, Switzerland and Estonia, have integrated blockchain technologies into their civic frameworks, and the implications for citizens within these nations. Through these cases, we can see the diverse ways in which blockchain impacts upon the citizen–state relationship, advancing transparency, security and inclusion in the digital age.

Liechtenstein: Building a Blockchain Economy through Legal Innovation

Liechtenstein has emerged as a leader in blockchain regulation, setting itself apart with the pioneering Token and Trusted Technology Service Providers Act, also known as the Blockchain Act, which was enacted in January 2020. This comprehensive legal framework provides a regulatory structure for tokenized services and assets, granting legal certainty to various blockchain-based applications beyond cryptocurrency. The Blockchain Act offers a clearly defined structure for digital assets and facilitates the tokenization of economic activities, such as real estate and share ownership, within a protected legal framework. It not only provides a safe environment for innovation but also bridges the gap between traditional legal structures and the digital assets economy, allowing individuals and businesses to engage confidently in blockchain-based transactions.

The Blockchain Act's alignment with citizen interests exemplifies the concept of civil and social rights by enabling citizens to participate in new economic models with legal protection and clarity. Liechtenstein's approach to blockchain encourages financial inclusion, empowering citizens to manage digital assets safely and to participate in a digital economy built on trust and transparency. The promotion of blockchain-driven entrepreneurship has also

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

fostered job creation and innovation, indirectly enhancing the social rights of citizens by promoting economic stability and encouraging local talent development in technology-driven industries (Singh, 2023).

Switzerland: Advancing Civic Participation Through Blockchain-Based Identity and Transactions

Switzerland, particularly the city of Zug, has positioned itself as a hub for blockchain innovation. Known as 'Crypto Valley', Zug has been at the forefront of implementing blockchain-based services that facilitate civic engagement and streamline administrative processes. The Swiss government has also created a favourable regulatory environment, fostering blockchain applications within finance and public services, while balancing innovation with necessary protections. Since 2016, Zug has issued blockchain-based digital IDs, allowing citizens to verify their identity for accessing various public services. The local government also allows residents to pay certain public fees in bitcoin, integrating blockchain into civic life. Additionally, Switzerland has clarified its regulatory stance on blockchain, creating a structured environment for companies to innovate while ensuring compliance and security.

For Swiss citizens, Zug's digital ID initiative underscores the civil rights associated with Marshall's citizenship framework by providing a secure, efficient way to verify identities without the traditional reliance on paperwork. This approach enhances civic trust, giving citizens more control over their data and promoting streamlined access to governmental services. By enabling cryptocurrency payments for public services, the Swiss government recognizes the role of digital assets in modern financial systems, positioning the country as adaptable to future financial and civic innovations. This blockchain-based framework not only improves administrative efficiency but also fosters a sense of modernized civic participation, especially among tech-savvy citizens.

Estonia: Digital Citizenship and Blockchain as a Pillar of E-Governance

Estonia, known for its e-governance model, has incorporated blockchain into its public administration since 2012. It has pioneered the use of blockchain to secure government data across multiple sectors, including healthcare, judicial records and legislative processes. Estonia's approach, rooted in transparency and security, allows it to serve as a model for blockchain-enhanced citizenship within a digital governance framework.

Blockchain technology forms a cornerstone of Estonia's digital infrastructure. The country's e-Residency program allows global citizens to register and operate European Union (EU)-based businesses online, leveraging blockchain's security and transparency benefits. In Estonia, citizens' health records,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

legal documents and government files are secured on a blockchain, minimizing the risk of data tampering and enhancing trust in digital services.

Estonia's blockchain infrastructure bolsters the concept of social rights by ensuring government accountability and transparency, providing citizens with secure, efficient digital services. For Estonian citizens, blockchain secures the integrity of personal and civic data, which not only protects individual rights but also reinforces a trust-based relationship between the state and its citizens. The e-Residency programme exemplifies Estonia's commitment to an inclusive digital society, extending the benefits of its digital infrastructure to global citizens who contribute to its economy. Blockchain thus enhances both national and transnational engagement, allowing Estonia to redefine the parameters of citizenship in the digital age (E-Estonia, 2021; Martinson, 2019).

Comparative Analysis of Blockchain and Citizenship across Case Studies

Across Liechtenstein, Switzerland and Estonia, blockchain technologies provide varied but complementary benefits to citizenship, illustrating different aspects of it. Liechtenstein's regulatory focus primarily supports citizens' economic engagement in the blockchain economy, enhancing civil rights by ensuring legal clarity and protection for digital transactions. Switzerland's blockchain-based digital ID and crypto-payment systems reflect an embrace of civil and political rights by promoting digital access and integration with civic life, while Estonia's broad use of blockchain in e-governance reinforces social rights by providing citizens with a secure, transparent governance structure.

These cases highlight the nuanced ways that blockchain can influence the citizen–state relationship, addressing challenges of data security, administrative efficiency and economic inclusion. As blockchain continues to evolve, these examples may serve as models for other nations exploring similar technological integrations.

Blockchain technologies are reshaping the concept of citizenship in profound ways, aligning with Marshall's framework by promoting civil, political and social rights within a digital context. As evidenced by the experiences of Liechtenstein, Switzerland and Estonia, blockchain has the potential to enhance trust, security and transparency, thereby fostering a modernized, inclusive approach to governance. In an era where technology drives societal change, these cases illustrate how blockchain can support the development of a digitally enhanced citizenship framework, reinforcing both national and global civic identities.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

CONCLUSION

Addressing the first research question, this chapter demonstrates that blockchain technology fundamentally reshapes cultural citizenship within network societies by decentralizing political participation and enhancing individual agency, identity expression and self-sovereignty. Yet, the requirement for technical literacy inherent in blockchain presents significant accessibility challenges, potentially exacerbating existing societal divides and digital inequalities. Regarding the second research question, the analysis highlights that the implementation of blockchain in institutional politics carries profound implications for balancing transparency and privacy. While blockchain can significantly enhance government accountability and empower citizens, achieving an ethically sound and practically viable equilibrium requires careful regulatory oversight and nuanced technological design. Thus, policymakers must actively address privacy risks to ensure that transparency does not inadvertently compromise citizen autonomy or data security.

The chapter has shown that transformations in society and politics, and their informational environment, call for new ideas of government and democracy as well as citizenship that takes technology into account. At the heart of this nexus lies trust. If citizens cannot trust their governmental institutions to act in their interest or cannot trust public communication, they will not exert their civil rights and liberties. If institutions cannot trust the quality and quantity of information and process it transparently, they cannot uphold their functions either. Blockchain technologies provide decentralized, authenticated, verified and cryptographically secured records, with transactions between institutional and individual actors forming a network of informational processes. These are reflected in the concept of ledger-based citizenship which is presented here. As real-world examples show, these technologies are already applied, but are still in their infancy. The social and political implications remain open, and thus offer a variety of questions that further research should address.

On the social and political level, three issues stand out: security, ethics and literacy. Despite elaborate security measures, any form of cryptography can be deciphered, and the transaction records stored on the blockchain can be revealed to third parties. This becomes even more prevalent with the advent of quantum computing and the attacks on blockchain technologies by state-based hackers in Russia or China. Proactive and effective countermeasures against tampering with the ledger beyond its own inbuilt safety precautions need to be undertaken.

Apart from security issues, which are connected to legal issues, there are also normative issues and ethical issues. Although data collection, processing and archiving is legally possible, for example, the data collection of the United

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

States after the events of 9/11, which was legal under the terrorism prevention laws, it is not necessary to do so. Data might be collected without consensus, which might foster trust issues rather than mitigate them. Utilitarian perspectives would argue that the means of collecting data should follow a certain end. Yet privacy issues must also be observed. Here the underlying conflict between citizens and government and the role of authority comes into full view. Does the state view citizens as data sources who are only passive consumers of their rights, or are they regarded as active individuals who actively participate in informational processes?

The issues of security and ethics point towards a third underlying issue: literacy. Blockchain technologies as well as other forms of new technologies are often arcane to uninitiated eyes. It takes a steep learning curve to understand their basic functions as well as their limitations. Hence, to become fully incorporated into citizens' everyday lives, they must be understood at least to the level of a working knowledge, and accepted as well. Here 'pioneer communities' (Hepp, 2016) might come into play, as these groups of actors are technologically savvy and can try out the possibilities and limits of new technologies in test settings. In this way, blockchain-based access to public services can be tested, evaluated and ordered before being rolled out to the public.

These issues can serve as a starting point for future research, which should be explorative in nature as the social and political impact of blockchain technologies is still in development. It could thus be analytical and descriptive, but also might be transformative, addressing the impact of new technologies on society in a more creative and potentially impactful way. Despite this general stance towards research, it could address the macro, meso and micro levels of transformation on politics through blockchain.

On the micro level, the actual practices of citizenship become observable. As the concept of citizenship can further be regarded as a series of performances and is thus enacted (Lünenborg and Raetzsch, 2018), the concept of affordances comes to mind. How does a blockchain-based interface need to be designed in order to fulfil its democratic function? When and under which circumstances do citizens act upon it? Are there social differences that lead to different forms of actions, or are they omitted altogether?

On the meso level, the role of intermediary organizations and their role in the network society come to mind as well (Herbers, 2024). These organizations serve a different function than the centralizing institutions. We can assume that governmental actors will not develop and maintain their own blockchain, but will employ a service provider, consulting agencies or others that will provide access to blockchain solutions and will thus play a vital role in designing them. The actual interfaces and infrastructures that individual actors use to interact with the software will promote acceptance or dissatisfaction. The role of these

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

organizational technology intermediaries in political processes is a field that still lacks scholarly attention, not only regarding blockchain technologies.

The macro level opens the view to broader social, political, cultural and economic aspects. Regarding the implementation of blockchain technologies, how open is a certain society to new technologies? How complex are the political processes that could or should be recorded if there is a climate of innovation, or a more conservative stance towards technology? To answer these questions, scholars can draw from the literature on innovation research, and science and technology studies. This cross-referencing offers ideas that could also benefit from system engineering views, which combine social, entrepreneurial and technological aspects in the development and distribution of new technology.

Discussions about new technologies and their social implications usually place themselves somewhere on a spectrum between a highly optimistic form of functional techno-solutionism, and a pessimistic outlook on a dysfunctional world. This leads to overzealous adaption and the implied hope that technology can solve social problems, or a conservative reflex of overregulation that dismisses technology before it reaches maturity. Both are unhelpful for the underlying problems of democracy and citizenship. To mitigate these issues, van Dijk (2020) argues for taking a different stance: to employ technology means that it can sometimes solve some problems for some people, but not for all of them. The future of democracy and citizenship is thus beyond technological solutions.

REFERENCES

Bennett, W.L., and Segerberg, A. (2012). The logic of connective action: Digital media and the personalization of contentious politics. *Information, Communication and Society*, *15*(5), 739–768. https://doi.org/10.1080/1369118X.2012.670661

Breiter, A., and Hepp, A. (2018). Die Komplexität der Datafizierung: Zur Herausforderung, digitale Spuren in ihrem Kontext zu analysieren. In C. Katzenbach, C. Pentzold, S. Kannengießer, M. Adolf and M. Taddicken (eds), *Neue Komplexitäten für Kommunikationsforschung und Medienanalyse: Analytische Zugänge und empirische Studien* (pp. 27–48). Online only. https://doi.org/10.17174/dcr.v4.2

Casey, M.J., and Vigna, P. (2019). *The truth machine: The blockchain and the future of everything.* St Martin's Press / Picador.

Castells, M. (2019). Communication power. Mass communication, mass self-communication and power relations in the network society. In J. Curran and D. Hesmondhalgh (eds), *Media and society* (pp. 83–100). Bloomsbury Academic.

Dijk, J. van. (2020). *The network society* (4th edn). SAGE.

DuPont, Q. (2019). *Cryptocurrencies and blockchains*. Polity.

Economist (2015, October 31). The trust machine. *The Economist*. https://www.economist.com/leaders/2015/10/31/the-trust-machine

E-Estonia (2021). *KSI Blockchain.* https://e-estonia.com/solutions/cyber-security/ksi-blockchain/

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Fill, H.-G., and Meier, A. (2020). *Blockchain kompakt: Grundlagen, Anwendungsoptionen und kritische Bewertung*. Springer Fachmedien. https://doi.org/10.1007/978-3-658-27461-0

Fiske, J. (1987). *Television culture*. Routledge.

Hall, S. (1979). Encoding/decoding. In S. Hall, D. Hobson, A. Lowe and P. Willis (eds), *Culture, media, language. Working chapters in Cultural Studies (1972–1979)* (pp. 128–138; 294). Routledge.

Hepp, A. (2016). Pioneer communities: Collective actors in deep mediatization. *Media, Culture and Society*, *38*(6), 918–933. https://doi.org/10.1177/0163443716664484

Herbers, M.R. (2024). *Post-Publics: Rekonstruktion einer Theorie der Öffentlichkeit*. von Halem.

Hughes, E. (1993, 3 March). *A cypherpunk's manifesto.* activism.net. https://www.activism.net/cypherpunk/manifesto.html

Klaus, E., and Lünenborg, M. (2004). Cultural Citizenship. Ein kommunikationswissenschaftliches Konzept zur Bestimmung kultureller Teilhabe in der Mediengesellschaft. *Medien and Kommunikationswissenschaft*, *52*(2), 193–213. https://doi.org/10.5771/1615-634x-2004-2-193

Lünenborg, M., and Raetzsch, C. (2018). From public spheres to performative publics. Developing media practice as an analytical model. In S. Foellmer, M. Lünenborg, and C. Raetzsch (eds), *Media practices, social movements, and performativity. Transdisciplinary approaches* (pp. 13–35). Routledge.

Marshall, T.H. (1965). *Citizenship and social class and other essays*. Anchor Books.

Martinson, P. (2019). *Estonia: The digital republic secured by blockchain*. PriceWaterhouseCoopers. https://www.pwc.com/gx/en/services/legal/tech/assets/estonia-the-digital-republic-secured-by-blockchain.pdf

Nakamoto, S. (2008). *Bitcoin: A peer-to-peer electronic cash system*. bitcoin.org. https://bitcoin.org/bitcoin.pdf

Ragnedda, M., and Destefanis, G. (2019). *Blockchain and web 3.0: Social, economic, and technological challenges*. Routledge.

Singh, J. (2023, 29 September). *An overview of the Liechtenstein Blockchain Act*. Cointelegraph. https://cointelegraph.com/learn/an-overview-of-the-liechtenstein-blockchain-act

Tapscott, D., and Tapscott, A. (2018). *Blockchain revolution: How the technology behind bitcoin is changing money, business, and the world*. Portfolio / Penguin.

Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. Profile Books.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

7. Challenges of citizen e-participation in shaping urban mobility policy: state of research

Bernardo Valente

INTRODUCTION

The push by international institutions towards more effective and sustainable urban mobility requires a dialogue between stakeholders and policy actors (Moradi and Vagnoni, 2018). The growing literature on bottom-up approaches in urban mobility programmes underscores the role of citizens' opinions in achieving consensus for public policy implementation (Kiaei and Daneshfard, 2016; Foroughi et al., 2023). As by the rules of PRISMA systematic literature review methodology, this chapter tracks the evolution of citizen e-participation in urban mobility based on articles published in Q1 and Q2 journals in the last 25 years.

This chapter uses the concept of citizen e-participation theorized by Sæbø et al. (2008), which understood this process as the 'use of information and communication technology (ICT) to engage in public affairs and democratic processes'. E-participation can be achieved through formal mechanisms such as in-person geo-mapping exercises (Meng et al., 2023) or apps/web pages created by government services or third-party enterprises (Prokop and Tepe, 2022). It can also be done through informal channels by collecting data from citizens' social media activities to provide information to governments or other interested entities (Linders, 2012). The outcome of e-participation processes could be influenced by how population contributions are evaluated and incorporated into policy measures. This is particularly important in urban areas, as city mobility systems often perpetuate and exacerbate social and economic inequalities among citizens (Sulis and Proietti, 2024).

Extensive studies have been conducted on citizen e-participation in policy drafting and urban mobility (Simonofski et al., 2021; Coelho et al., 2022; Robertson, 2023). Nonetheless, there is a relative lack of an approach that allows for assessing both dimensions under the same theoretical framework.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

This chapter aims to fill this gap by bringing citizen e-participation in urban mobility to the field of democracy studies, by establishing a set of factors that might harm the democratic goals of citizen e-participation in both a top-down and a bottom-up perspective, which has not been done before. While urban studies (Candipan et al., 2021), planning (Aydin et al., 2022) and technology studies (Dia et al., 2021) have been discussing the topic of ICT introduction in urban mobility, there is a need to delve deep into the challenges and consequences of e-participation in urban areas from a deliberative democracy perspective.

The systematic literature review throughout this chapter helps to track and systematize the different trends in the literature of the field over the first years of the 21st century (Van Raan, 2014). This saves time and resources for future studies that aim to connect citizen digital deliberative mechanisms with urban mobility theories. This systematic literature review is a way to manage the information on the topic and provide a conceptual analysis of the trends in the field (Donthu et al., 2021). Through this chapter, one might find the patterns of challenges to e-participation initiatives based on practical cases and help to compare the strategies applied in e-participation and conventional participation circumstances, as well as to draw policy recommendations to future cases in similar urban landscapes transitioning to innovative models of city management.

The chapter starts with a contextualization that traces the origins and development of citizen e-participation in order to understand how technological advancements are shifting towards e-governance models and how it has impacted upon public policy in urban mobility. Following this section, the methodology explains how the Web of Science (WoS) search was conducted via the PRISMA (Page et al., 2021) approach, and how categories for a structured analysis of the various e-participation bottlenecks present in the scientific literature organized the collected data.

Following that, the chapter outlines strategies for citizen e-participation to address the key challenges in urban mobility policy, such as conflicts between citizens and governments, technological issues during the process and the inclusion of misrepresented population samples. Some of these challenges are shared with non-ICT participatory practices and processes in urban mobility. Therefore, this chapter highlights the specificities that these bottlenecks take in the context of e-participation.

Lastly, the chapter includes policy recommendations and indicates potential areas for future research in the field of citizen e-participation for urban mobility from a deliberative democracy perspective. This research systematizes the challenges to citizen e-participation in urban mobility by organizing them by clusters based on their similarities, understanding how the level of technology and the level of citizen engagement has been evolving, and finding the

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

most effective strategies to overcome the challenges to citizen e-participation in this field. The insights gained from the findings will also help to inform citizens, stakeholders and politicians about the contextual factors hindering or supporting the latest citizen e-participation initiatives in urban mobility policy drafting.

LITERATURE REVIEW

From Public Participation to E-Participation

Citizen participation is widely researched in various academic disciplines, including urban planning, public policy and environmental studies (Innes and Booher, 1999; Rowe and Frewer, 2000; Bovaird, 2007). As a conceptual background, it is critical to acknowledge Arnstein's (1969) crucial research, which characterized public participation as a dynamic process that empowers individuals to engage in decision-making and actively exercise meaningful impact on policy outcomes.

This approach underscores the critical importance of power relations between the government and citizens, establishing public involvement to empower citizens by considering the population's personal and group interests (Rijal, 2023). Several researchers have suggested typologies or frameworks to understand different levels and forms of public engagement (Susskind and Elliott, 1981; Pretty, 1995; Rocha, 1997; Cardullo and Kitchin, 2019).

Pretty (1995) proposed a citizen participation scale, with tiers ranging from 'manipulative participation' to 'interactive participation and self-mobilisation', each indicating increasing degrees of community involvement and impact. Rowe and Frewer (2000) proposed three degrees of public participation – passive, consultative and collaborative – each representing a particular citizen's role in decision-making processes, which influenced the categorization of the e-participation initiatives in this chapter. Ringholm et al. (2018) offered a methodology in a modern environment that incorporates legislative requirements as the starting point for analysing participation levels and customizing the approach to the unique participatory process context. These contextual proceedings were further developed as determinant factors for the success of citizen empowerment, or as detrimental reasons to hinder citizen e-participation in smart contexts (Cardullo and Kitchin, 2019).

This governance strategy must be adaptable, including knowledge-sharing initiatives and building organizational learning skills to meet the unique demands of citizen e-participation in places aiming for a transition towards a smart city model (Israilidis et al., 2021). The definition of 'smart city' is a contested concept, and it remains unclear (Kitchin, 2022); the interdisciplinarity of the topic translates into diverse approaches to the same concept (Camero

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

and Alba, 2019). Nonetheless, the broader definition of 'smart city' was offered by Fontana (2014), who stated that 'smart' within an urban environment promotes interconnectedness between citizens and services through the growth of ICT applications in a city.

As envisioned in this chapter, a critique that can be posed to this smart city concept is that a more connected city through ICT does not necessarily mean development in social capital or city functionalism (Calzada and Cobo, 2015). In this context, the term 'e-participation' is frequently used to refer to the potential of technology to increase public engagement in decision-making processes, considering the careful analysis that these models require to be able to push forward the development of fragile cities or social groups (Berntzen and Johannessen, 2016; Kopackova et al., 2022; Yue and Beta, 2022).

Tracking the Evolution of Citizen E-Participation in Urban Mobility

Since the smart city concept emerged, governments have supported cities' decisions to move towards a more digitalized urban space (Collins, 2023; Mangnus et al., 2022). Smart cities hinge on deploying and utilizing information and communication technologies as instrumental tools to foster sustainable urban development and enhance residents' quality of life (Caragliu et al., 2011).

Consequently, urban technology plays a role in leveraging policies built with the help of e-participation methods (Muñoz and Bolivar, 2021) in large areas where human, non-human, cultural and economic features coexist and contribute to building complete urban ecosystems (De Jong et al., 2015; Kontokosta, 2016). One of those areas is urban mobility, where data collection and extraction methods are growing and can provide a better service based on the population's travel patterns and mobility behaviour (Stojanovic et al., 2016; Sun and Axhausen, 2016).

The latest widespread methods for e-participation use artificial intelligence and big data, as these technologies spread all over the public administration sector in Europe (Wirtz et al., 2019). Some of the most common updates on e-participation in urban mobility through ICT include sensor placement in areas with high traffic levels (Leone et al., 2017), tracking of citizens' smartphone data mobility patterns (Chowdhury et al., 2023) and scrapping social media publications focused on mapping people's opinions on city travelling experiences (Yang et al., 2019; Cagney et al., 2020). These methods might help to understand citizens' behaviour based on the urban mobility routes in an *ex post* dimension; however, all these models turn citizens into passive data generators (Papyshev and Yarime, 2021). While those methods grow in importance and provide local governments with large databases, none of these include the direct opinion of citizens or the role of citizens as co-creators of policy in urban planning (Sadowski, 2019; Cao and Kang, 2024).

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

On the side of the local governments, the methods to select the population to be engaged in these processes determine which demographics can or cannot engage (Mariani et al., 2023). The reluctance of citizens to actively participate in such processes poses challenges in recruiting representative samples (Temeljotov Salaj et al., 2020; Jowkar et al., 2022; Lim and Yigitcanlar, 2022). Significantly, the successful implementation of citizen e-participation results can only be improved if crucial knowledge about the pertinent issue is effectively conveyed to participants (Chen, 2023).

Before delving into the role of citizen e-participation or other stakeholders' involvement in policy, the governance of urban ecosystems must provide a knowledge base for its citizens (Shaikh et al., 2021). This knowledge equips them with the skills to effectively collaborate with urban planners in policymaking strategies (Macaulay et al., 2022; WHO, 2022). A lack of knowledge sharing throughout this citizen empowerment process could turn citizen involvement into an artificial mechanism without practical implications resulting from their feedback or opinions.

Consequently, evaluating the effectiveness of participatory processes becomes crucial in understanding how to enhance citizen e-participation in city initiatives (Castelnovo et al., 2016). Given that the objectives of city e-participation extend beyond the mere accumulation of participants and the collection of individual opinions (Royo and Yetano, 2015), it is crucial to identify the benefits that citizens and cities derive from these processes, rather than solely focusing on quantifying their participation (Bouzguenda et al., 2019). This approach ends with assessing citizens' present and future needs, ensuring the adoption of technologies, and inspiring a shift towards incentivizing sustainable and safe behaviours in the urban mobility sector (Przybylowski et al., 2024).

Governing Citizen–Technology Interaction for Successful Civic Participation

E-governance dynamics have conflictual dynamics regarding the implementation of citizen-centric services (Zuboff, 2019). On the one hand, there is literature which supports the application of ICT in urban environments to bring citizens closer to the centres of decision (Ruhlandt, 2018), while other scholars see the empowerment of the population through technology as a mechanism for the neoliberal influence keeping control over the citizens through heavy-data systems (Shelton and Lodato, 2019; Zuboff, 2019).

This tension between citizens as policymakers and citizens as consumers of the service is a challenge for any form of e-governance when transitioning to the modern mode of smart city. Granier and Kudo (2016) found that there was a tendency for the local government to engage citizens in the decision-making

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

at both ends of the process in the case of energy consumption. By establishing the demand and defining the service the citizen takes the role of producer and as the end-user is the consumer of that same service (Granier and Kudo, 2016). The citizens become 'prosumers', perpetuating market dynamics that can harm the population and keep the wheel of inequality rolling (Şanta, 2022).

The approach of scholars who see the ladder of citizen participation as a perversion of the local governance system to benefit private interests assumes that climbing the ladder does not translate in the direction of a more empowered civil society as the traditional models implied (Falanga, 2018; Liang et al., 2022). Local contexts should be weighed before positioning a mechanism of public participation in a specific urban environment, due to the possible hazard of missing contextual information decisive for strengthening the administration–citizens' ties (Irazábal, 2017).

By incorporating individuals in decision-making, governments and stakeholders may better match policies and initiatives with citizens' demands, improving governance effectiveness and legitimacy (Munthe-Kaas et al., 2024). However, the effectiveness of public engagement can be limited by power imbalances, citizen resources and skill constraints, and insufficient communication between stakeholders (Laurian and Shaw, 2009). Understanding the many aspects and degrees of assessing public involvement, and identifying variables that permit or impede its efficacy, becomes a critical scientific contribution (Bishop and Davis, 2002). The interdisciplinarity of the topic feeds various scientific domains that can be complementary to pushing the field of citizen e-participation within urban mobility and informing public policymaking.

METHODOLOGY

The 27 stages of the PRISMA approach (Page et al., 2021) were applied and can be identified throughout the chapter. Stages were circumstantially merged and excluded to improve the efficiency of the analysis and adjust it to the topic, finishing with a total of 11 steps. The starting point was the 960 articles available after the keyword search (Table 7.1), and the elimination stages are explained in this section.

The PRISMA 2020 Approach

What is the research question? After identifying this study as a systematic literature review and explaining the rationale behind the analysis in the previous sections, the first PRISMA step is to clarify the question which is addressed by this review: are the main bottlenecks to implementing citizen e-participation in urban mobility policymaking, and can these bottlenecks be overcome?

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

What are the studies included in the analysis? This systematic review investigates diverse types of studies of e-participation and conventional participation, to be aware of the similarities and differences between both typologies of citizen engagement. The articles that constitute the core of the analysis belong to a wide range of studies and methodologies, from transport efficiency practical papers to theoretical analyses of public management concepts such as co-creation. The goal is to include all studies (Q1 and Q2) that mention forms of citizen e-participation, even if the main subject of those studies is not related to understanding the complexity of citizen e-participation.

What was the method used to collect the data? The data to reproduce the systematic literature analyses was collected through the Web of Science (WoS) database by applying keyword filters. The methodological choices encompass fine-tuning the keyword selection. This process was made collaboratively within the Institute of Governance and Public Policy (IGOP) of the Universitat Autònoma de Barcelona (UAB), further developed during the presentation of this chapter as a paper at the international conference 'Towards a New European Social Contract'; later fine-tuned by members of a transnational consultancy firm working on the mobility sector and based in Lisbon. Those keywords were paired as topic filters in the WoS database.

Filters applied utilized a timeline between 1 January 2000 and 1 April 2024, a period chosen to capture the most recent developments in the field, when the technology implementation in European cities achieved an unprecedented implementation level. The keywords were split into two categories: 'Mobility' and 'Citizen E-Participation.'

Keywords in the Mobility category were: Smart Cit* Mobilit* / Urban* Mobilit* / Urban* Transport* / Smart Cit* Transport* / Technolo* Mobilit* / Technolo* Transport* / Innovati* Mobilit* / Innovati* Transport*.

Keywords in the Citizen E-Participation category were: Public Participati* / E-Participati* / Citizen* / Public Govern* / Consult* / Social Movement* / Democrac* / Engageme* (Table 7.1).

The starting point was the 960 articles available after the keyword search (Table 7.1), and this section explains the further exclusion stages until the final sample of 29 articles was clear.

How was the data screened? Using the 960 articles obtained from the keyword search, one reviewer (the author of this chapter) assessed each record. This included eight screening steps, as depicted in Figure 7.1.

Screening steps after the keyword search (the first screening step) gradually excluded: (1) all the articles that were not journal articles (n = 575); (2) all articles that were not written in English (n = 500); (3) all duplicated articles (n = 433); (4) all articles with an out-of-scope title (n = 268); (5) all articles for which the abstracts did not mention citizen e-participation in urban mobility (n = 99); (6) all articles that were not published in Q1 and Q2 journals (n = 54);

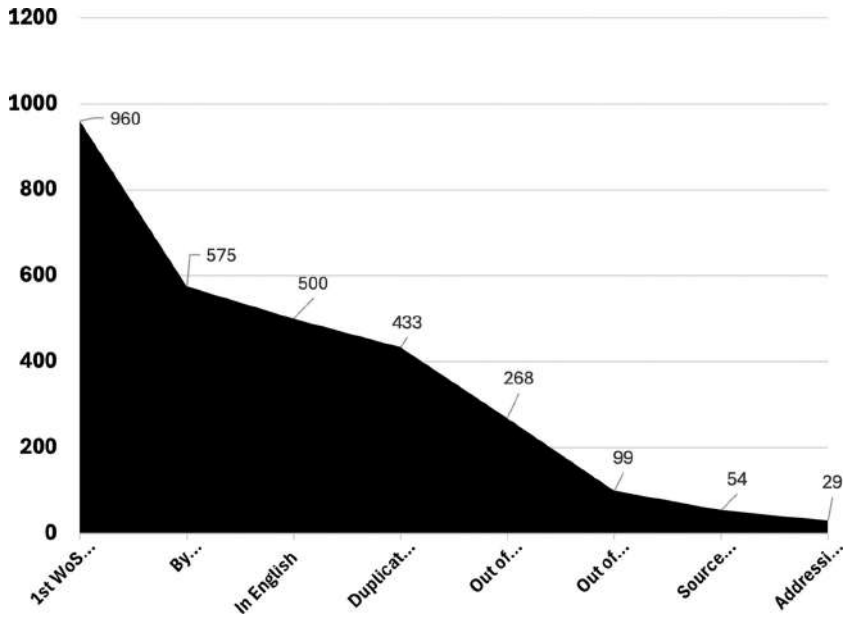
Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Table 7.1 Web of Science filtered keywords results

-	Smart* Cit* Mobilit*	Urban* Mobilit*	Urban* Transport*	Smart*Cit* Transport*	Technolo* Mobilit*	Technolo* Transport*	Innovati* Mobilit*	Innovati* Transport*	Total
Public Participati*	0	16	29	0	0	0	0	1	46
E-Participati*	2	7	7	0	9	8	6	2	41
Citizen*	4	367	262	10	4	6	8	10	671
Public Govern*	0	0	0	0	0	0	0	0	0
Consult*	0	20	16	0	1	0	0	1	38
Social Movement*	0	6	2	0	0	0	0	0	8
Democrac*	0	10	13	0	0	1	0	0	24
Engageme*	0	66	50	0	3	5	2	6	132
Total	6	492	379	10	17	20	16	20	960

Source: Own elaboration based on WoS data.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative
Commons Attribution-NonCommercial-NoDerivatives 4.0 International
(https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/



Source: Own elaboration based on WoS data.

Figure 7.1 Articles' selection milestones

and (7) after reading the 54 full articles, those that did not have any explicit reference to bottlenecks in citizen e-participation were also excluded (n = 29). Table 7A.1 in the Appendix summarizes articles and citations by journal (Q1 and Q2).

How was the accuracy of the selection secured? The author of this chapter independently screened titles, abstracts and full papers. In case of doubt about integrating an article in the final sample, a reviewer working in a consulting firm in the field of EU transport policy worked as a second reviewer to confirm or dismiss the integration of the papers.

Which outcome categories emerged from the analysis? The data extraction was made through the rules of PRISMA for single screening (Page et al., 2021), with the author responsible for finding patterns of citizen e-participation bottlenecks in the selected full papers. The bottlenecks were split into three main categories: as per Table 7.2, Table 7.3 and Table 7.4. The categories are transparency, citizens–government tension, and ICT (information and communication) barriers (summarized in Figure 7.2).

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Table 7.2 Transparency related articles and bottlenecks

Author and title	Case study	Case study/bottlenecks
May et al., 2018	Amiens, Dresden, Ghent, West	konSULT Project
Option generation for policy measures and packages …	Yorkshire, Brno, Budapest, Krakow, Timisoara and Zagreb	Lack of awareness of the wider range of policy measures available
Mariano et al., 2023	Ljubljana and Maribor	Living Labs
Designing mobility policies for vulnerable users employing the living lab approach …		There is a risk that living lab participants belong to specific categories and do not represent the entirety of classes of potential users
Kluge et al., 2024	Darmstadt	N/A
Digital co-creation in urban mobility planning …		Citizens may not perceive an immediate impact of participation and opt out from the process
Kuokkanen et al., 2020	Lahti	CitiCAP App
A proposal for a novel urban mobility policy …		Citizens who may perceive the outcomes of the project as harmful for their own interests tend to not to want to collaborate
Ferreira and Liu, 2023	Matosinhos	*App Bike4Me*
Social determinants, motivation, and communication …		It is fundamental to provide previous knowledge and adapt the e-participation method to the education levels
Savastano et al., 2023	Milan	Multiple Apps
How smart is mobility in smart cities? …		The most frequent users of digital services are mainly literate residents in the city under 35 years old

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Author and title	Case study	Case study/bottlenecks
Caputo et al., 2023 Rethinking the role of technology for citizens' engagement and sustainable development in smart cities	N/A	Traffic02 (Mobile App – Videogame) The participants must focus on the policy outcome, keeping awareness about the possibility of their participation being instrumentalized to gather public support
Ghorbanzadeh et al., 2018 Sustainable urban transport planning considering different stakeholder groups …	Mersin	Interval-AHP Model Ranking scenarios is unpredictable, it is always dependent on the level of knowledge of the citizens
von Wright et al., 2022 Needs must? Fair allocation of personal carbon allowances in mobility	Lahti	CitiCAP App Almost impossible to achieve a distributive consensus
Nogués et al., 2023 Planning policies for the driverless city …	Santander	Participatory Q-Methodology A generational gap, based on different priorities, can impact upon the process to achieve consensus
Loukopoulos and Scholz, 2004 Sustainable future urban mobility: using 'area development negotiations' …	Gothenburg	EP Decision Model Greater public participation does not make the sample adequate (representativeness, inclusiveness and relevance)
Jaspers and Steen, 2021 Does co-production lead to the creation of public value? …	N/A	Mobility Alternative and City Streets Distrust of the government results in avoidance strategies by the population

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Author and title	Case study	Case study/bottlenecks
von Schneidemesser et al., 2020 Re-claiming the responsivity gap: the co-creation of cycling policies in Berlin's mobility law	Berlin	Website Votes Lack of heterogeneity; overrepresentativeness from males with a higher level of education
Vanoutrive and Huyse, 2023 Revisiting modal split as an urban sustainability indicator using citizen science	Flanders	Straatvinken / Straat-O-Sfeer Almost impossible to achieve a distributive consensus
Nikitas et al., 2018 Understanding the public acceptability of road pricing and the roles of older age, social norms, pro-social values and trust …	Bristol	Focus Groups The use of technology might ostracize already fragile social groups
Kotzebue, 2022 Integrated urban transport infrastructure development: The role of digital social geo-communication …	Hamburg	Online Survey Web-based activities such as crowdsourcing depend on the digital capacity of the community, so the quality of the gathered data can be low
Franceschini and Marletto, 2015 Assessing the benefits and the shortcomings of participation – findings from a test in Bari (Italy)	Bari	Local Council Assembly Participants abandoned the project when the results were not acknowledged by the municipality
Istrate et al., 2023 Collaborative research for transitioning to climate-neutral cities …	N/A	N/A E-participation through novel tools can make accesss difficult for the population

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Author and title	Case study	Case study/bottlenecks
Kyriakidis et al., 2023 Evaluating the public acceptance of sustainable mobility interventions responding to Covid-19 …	Athens	Surveys Fundamental to build public acceptance before implementing a policy
Belli et al., 2020 IoT-enabled smart sustainable cities: challenges and approaches	Parma	3D RTE Parma Information Management Fundamental to build trust in the technology applied
Gatta et al., 2017 Smart urban freight planning process …	N/A	Living Labs The entities promoting e-participation methods should previously go through a knowledge acquisition process regarding the characteristics of the city and its inhabitants

Source: Own elaboration based on the PRISMA SLR findings.

What data was extracted? From the final 39 articles, data was collected on: author, year of publication, title, case study, cities analysed, name of the citizen e-participation project, and main findings for the field of citizen e-participation.

What were the limitations and bias risks of the analysis? An extensive reading of the full version of the articles and a small-N approach averted the risk of sample bias. Nonetheless, the keywords selected and the use of the Web of Science as the only source of the literature review were methodological choices that might impact upon the final findings of this research. To avoid these factors from significantly impacting upon the outcome of this chapter, the sample was limited to Q1 and Q2 journals, which means that it is highly likely that the selected articles are equally present in all databases (Scopus, WoS, Google Scholar, and so on). Therefore, using more than one database would be redundant, as the increased complexity of the duplicated cases would not make a meaningful contribution to the final findings. The keyword choice was discussed with scholars and technicians in urban mobility policy and urban governance to find overarching concepts that could keep the analysis broad without stepping into other scientific areas distant from the presented research question.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Table 7.3 Citizens–government tensions related articles and bottlenecks

Author and title	Case study	Case study/bottlenecks
Rogers and Hunt, 2019 Realising visions for future cities: an aspirational futures methodology	Bristol and Birmingham	Workshops Different opinions and different levels of information lead to bias and lack of transparency
Kotzebue, 2022 Integrated urban transport infrastructure development: the role of digital social geo-communication …	Hamburg	Online Survey One-way communication does not allow for an adequate response and transparent discussion
Fernandez-Heredia and Fernandez-Sanchez, 2020 Processes of civic participation in the implementation of sustainable urban mobility systems	Madrid and Seville	ConBici Less communication equals more social movements
Ghorbanzadeh et al., 2018 Sustainable urban transport planning considering different stakeholder groups …	Mersin	Interval-AHP model Ranking scenarios is unpredictable, it is always dependent on the level of knowledge of the citizens
Jaspers and Steen, 2021 Does co-production lead to the creation of public value? …	N/A	Mobility Alternative and City Streets The limits of citizens' expertise require support from civil servants
Kluge et al., 2024 Digital co-creation in urban mobility planning …	Darmstadt	N/A Misinformation leads citizens to not perceiving the benefit of participation
Mariano et al., 2023 Designing mobility policies for vulnerable users employing the Living Lab approach …	Ljubljana and Maribor	Living Labs Difficulties in overcoming disagreements with limited information

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Author and title	Case study	Case study/bottlenecks
Kijewska et al., 2021	Oslo, Stavanger, Szczecin and	Stakeholders Forum
Proposing a tool for assessing the level of maturity for the engagement of urban freight transport stakeholders …	Bydgoszcz	A historical process of participatory tradition helps in engaging multiple stakeholders
Franceschini and Marletto, 2015	Bari	Local Council
Assessing the benefits and the shortcomings of participation …		The process of participation can be seen as too complex by the citizens
Nikitas et al., 2018	Bristol	Focus Groups
Understanding the public acceptability of road pricing and the roles of older age, social norms, pro-social values and trust for urban policy-making …		The use of technology might ostracize already fragile social groups
Kyriakidis et al., 2023	Athens	Surveys
Evaluating the public acceptance of sustainable mobility interventions responding to Covid-19 …		Crowdsourcing as a solution to cope with information mismanagement
Morton et al., 2021	National Level (Scotland)	Surveys
Public acceptability towards low emission zones: the role of attitudes, norms, emotions, and trust		Perceptions of cost and procedural fairness benefit positive attitudes

Source: Own elaboration based on the PRISMA SLR findings.

How was the data systematized? The original list of articles is depicted in this step, already split by main bottleneck categories (Table 7.2, Table 7.3 and Table 7.4). The same article can be found in more than one category if it addresses two types of bottlenecks simultaneously.

What was the nature of the studies analysed? From the final selection of 29 articles, 14 were exclusively focused on methods of e-citizen participation in urban mobility (48 per cent). The rest of the papers focused on cases where citizen and e-citizen participation were applied, usually focusing more on citizen participation strategies. From the total sample, seven articles (24 per cent) explored how using an app could help citizen participation in urban mobility

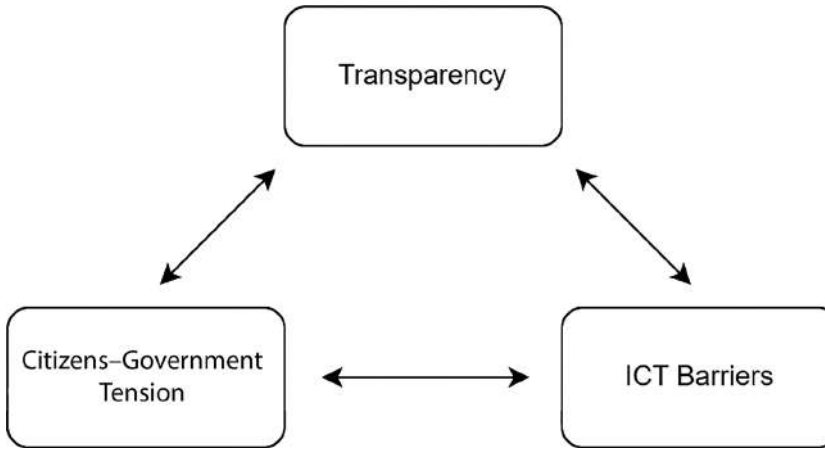
Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Table 7.4 ICT Barriers related articles and bottlenecks

Author and title	Case study	Case study/bottlenecks
Gabrielli et al., 2014 Design challenges in motivating change for sustainable urban mobility	Trento, Helsinki, Barcelona and Milan	MatkaHupi High battery consumption, citizens often forgot to interact with the app
Morishita-Steffen et al., 2021 Smarter together: progressing smart data platforms in Lyon, Munich, and Vienna	Lyon, Munich and Vienna	3 Open Source Apps 3 dimensions when engaging with Open Source Apps for e-participation: privacy policy, legal context and quality of the information
Belli et al., 2020 IoT-enabled smart sustainable cities: challenges and approaches	Parma	3D RTE Parma Information Management Privacy leakage and data interference by external attackers (e.g., malicious data injection, spoofing attacks, Denial of Service (DoS) attacks, and Distributed DoS (DDoS) attacks)
Loukopoulos and Scholz, 2004 Sustainable future urban mobility: using 'area development negotiations' …	Gothenburg	EP Decision Model Make sure the e-participation tools suit the demands and level of education of the population
Hansson, 2020 Visual representation in urban transport planning: where have all the cars gone?	Multiple cities in Norway	Visual Illustration Cars are scaled down in the plans; hence, the visual representation is different from the estimated outcomes
Fonseca et al., 2021 Towards smart city governance. Case study: improving the interpretation of quantitative traffic measurement …	Barcelona	Game4City The use of a larger number of sensors does not necessarily translate into an improvement in the quality of life of smart city citizens

Source: Own elaboration based on the PRISMA SLR findings.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/



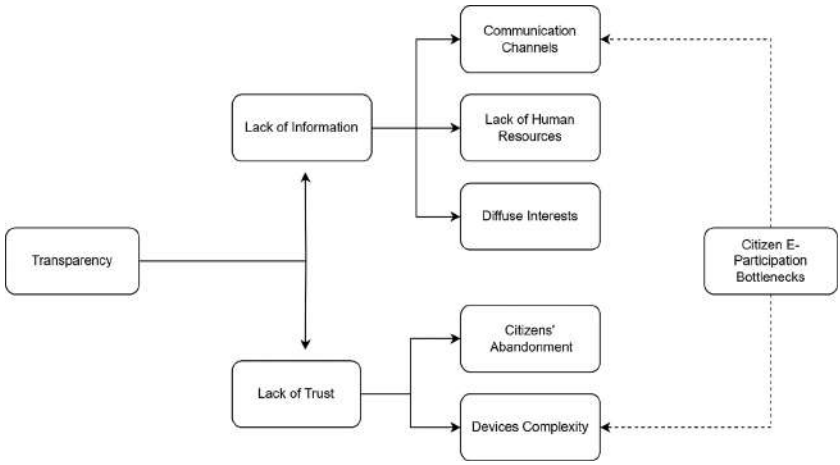
Source: Own elaboration based on the findings (WoS data).

Figure 7.2 Citizen e-participation bottlenecks categories

management. Five articles (17 per cent) elaborated on the potential of applying technology ecosystems, such as living labs or innovation projects, for citizen participation regarding mobility. Two articles tried to comprehend the benefits or harm produced by online surveys (7 per cent). The other papers outside of the aforementioned articles were usually focused on providing a theoretical basis; the subjects were not specific citizen e-participation projects, or had only more minor mentions of challenges in this field.

What were the challenges of this PRISMA SLR and what are the future research paths? Merging the topics of citizen e-participation and urban mobility is challenging as there is not a strong scientific background to provide a solid theoretical foundation in the field. The collection of articles compiles very diverse literature and academic areas, which poses some obstacles to guaranteeing that this study is not missing any pivotal work. A recent article points to the risk of a single screening analysis within the systematic literature review, leading to missing up to 13 per cent of relevant studies (Gartlehner et al., 2020). In the future, looking for the consolidation of this topic and following the recent European Union (EU) directives on deliberative democracy, the research paths should investigate the variation of citizen e-participation in the different stages of policymaking, from drafting to implementation and execution.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/



Source: Own elaboration based on the PRISMA SLR (WoS data).

Figure 7.3 Summary of bottlenecks to citizen e-participation in the category transparency

RESULTS AND DISCUSSION

All three main categories present both bottom-up and top-down dynamics and unravel problems related to the samples' options, the behaviour of the citizens, and malfunctions with the ICT devices. The thicker arrows correspond to the particular challenges posed by the use of technology for citizen e-participation in urban mobility drafting; this represents one of the main findings of this chapter as it goes beyond traditional participation to identify the new risks exclusively related to technology introduction in the process (connected by dotted lines in the illustrative figures), as mentioned by the literature.

TRANSPARENCY

Lack of Information

The first significant finding from our analysis of the literature on citizen e-participation within urban mobility was the glaring need for more suitable information channels between citizens and politicians when establishing models and strategies for citizen e-participation. Figure 7.3 illustrates a summary of bottlenecks to citizen e-participation in the transparency category.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

This chapter follows the systematic literature content, underscoring the critical challenges related to the communication channels between decision-makers and citizens in urban mobility (Rogers and Hunt, 2019; Kotzebue, 2022). The literature highlights the absence of formal communication channels as a catalyst for polarizing opinions among different social groups involved in mobility policy (Fernandez-Heredia and Fernandez-Sanchez, 2020). The stakeholders often disagree on crucial smart city decision-making, each pursuing their own agendas and interests, with unequal access to information (Ghorbanzadeh et al., 2018).

The lack of structural tools to engage citizens in digital participatory strategies and provide civil society with information on the most pressing mobility issues undermines the effectiveness of citizen e-participation. To address this, cities should empower their participation tools by hiring or allocating a public servant or expert (Jaspers and Steen, 2021) to find the middle ground. This individual plays a crucial role in clarifying the main urban mobility issues, drawing scenarios to help citizens understand feasible future policy paths, and assisting the population in interacting with the specific software used (ibid.).

The public servant works as a trust bridge between citizens and politicians, helping citizens to overcome their distrust of politicians' intentions and making politicians aware of the increased public value resulting from co-creation strategies (ibid.). These expert actions balance citizens' innovative ideas and demands with practical solutions for the urban environment, often turning dissensus into fruitful social value.

As previously mentioned, the different groups participating in these dynamics usually have different agendas, and it can be hard to define where the lack of information ends and the pursuit of its incentives starts (Kluge et al., 2024). Avoiding collaborative failures in this environment of opposite interests turns the citizens' short-term, sometimes egoistic, preferences into long-term goals (Mariano et al., 2023). That is why having a Sustainable Urban Mobility Plan (SUMP) constructed through participation can effectively integrate the citizens' preferences into long-term strategic goals (Fernandez-Heredia and Fernandez-Sanchez, 2020; Kijewska et al., 2021). Bridging this gap requires a concerted effort to enhance communication and trust for a sustainable commitment towards more inclusive urban mobility. Citizens' prior knowledge of a policy framework (Franceschini and Marletto, 2015) and the support for a digital options generation model are essential conditions for successful inhabitants' engagement in participatory models (May et al., 2018).

Lack of Trust

Building trust is not just a feature but a cornerstone of a well-developed model for citizen e-participation. The question is not when trust plays a role

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

in policymaking, but how can we ensure that trust is always present in the process?

This analysis of the main body of literature argues that an early-stage influence on the policy drafting process can effectively implement a policy that addresses the citizens' concerns (Baiocchi and Ganuza, 2020). However, the citizens tend to become impatient if the results of their demands are not answered promptly. This results in some of those citizens abandoning their participation during the process or reducing their level of engagement (Kluge et al., 2024). The lack of trust in digital systems, leading to a belief that their contribution will not have any meaningful impact or practical application, is a concerning trend that hampers effective policy drafting (Jaspers and Steen, 2021).

Citizens' reluctance to invest time and effort in projects that do not immediately impact upon their livelihoods leads them to engage in avoidance strategies (Kluge et al., 2024) and eventually drop out of the initiatives. In Bari, there was a similar situation regarding forming the local council with citizens and environment protection non-governmental organizations (NGOs). In 2015, there was a Deliberative Participatory Process aimed at listening to the city's demands and turning them into valuable insight for establishing an urban mobility policy that was more environmentally friendly (Franceschini and Marletto, 2015). The e-participation mechanism was expected to be as simple as possible and to reach the co-creation stage, allowing for more participants from different social groups to participate; nonetheless, the project that aimed at following the co-creation principles ended up not progressing further than consultation status as the system increased complexity as it scaled the tech level of e-participation (ibid.).

Despite the efforts of Bari's local government, the policy document did not reflect the citizens' interventions. This lack of consideration for their input triggers a Polanyian countermovement, eroding trust in direct representation structures. The resulting trust deficit undermines the credibility of the projects and hampers transparent and inclusive e-governance (Nikitas et al., 2018).

While tracking functions provide ample big data for policy drafting, studies have consistently shown that citizen engagement in policy formulation enhances public acceptance (Kyriakidis et al., 2023) and fosters a positive trust bond between governments and citizens. However, it is important to note that technology is not a panacea, and its use should be balanced with other forms of engagement to ensure a comprehensive approach to contextual factors of citizen e-participation, paving the way for future programmes (Morton et al., 2021).

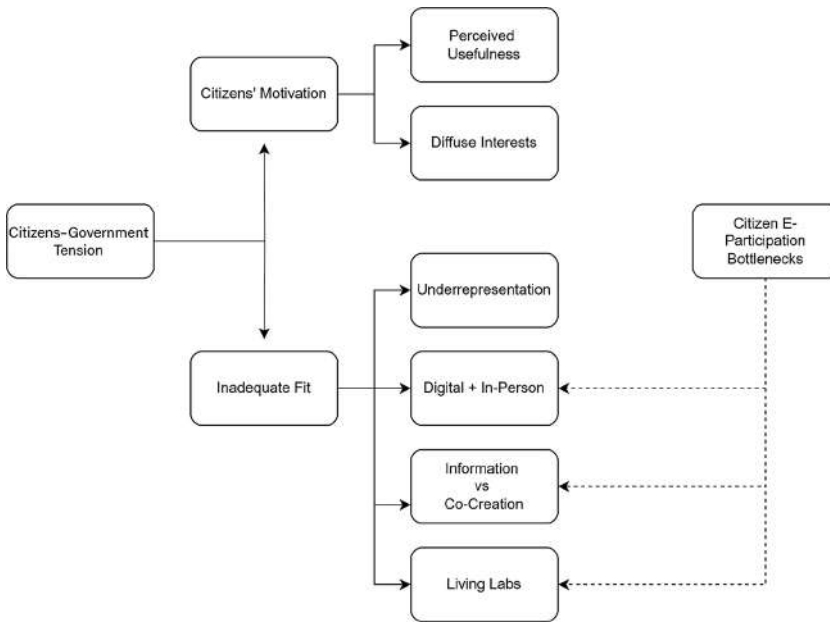
Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

CITIZENS–GOVERNMENT TENSIONS

Citizens' Motivation

Trust in political agents and the perception of effective city management can serve as powerful catalysts, empowering citizens to actively participate in initiatives that require participatory forms of urban policy formulation. Conversely, a government perceived as distant and a history of ineffective participation initiatives can lead to disengagement from smart city actions (May et al., 2018). It is important to acknowledge that citizens may have reservations about specific citizen e-participation programmes, often due to a perceived lack of usefulness in events, workshops or apps (Mariano et al., 2023). A summary of bottlenecks in the citizens–government tensions category is given in Figure 7.4.

Furthermore, certain groups' resistance to participating in these initiatives can be attributed to the impact of recent policies on their daily lives (Kluge



Source: Own elaboration based on the PRISMA SLR (WoS data).

Figure 7.4 *Summary of bottlenecks to citizen e-participation in the category citizens–government tensions*

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

et al., 2024). For instance, individuals who feel that recent policies have disrupted their mobility patterns may be less inclined to participate (Schwanen et al. 2012). The expectation of being affected by a particular outcome of the participation action can also undermine people's willingness to engage. For example, the shift towards more sustainable urban landscapes, aimed at reducing emissions and promoting clean transport, may deter individuals heavily reliant on private vehicles from participating in the initiative (Kuokkanen et al., 2020).

Moreover, it is widely acknowledged that individuals with higher university degrees (Ferreira and Liu, 2023) and those under the age of 35 are more likely to engage in these dynamics involving ICT devices (Savastano et al., 2023). However, using technology in citizen participation, transforming it into e-participation, can potentially decrease the motivation of certain groups, such as the older population sectors (Caputo et al., 2023). In this context, citizen e-participation may yield unexpected outcomes.

The aim is to leverage innovation and technology to facilitate participation across all civil society sectors, under the paradigm of inclusive cities. However, some individuals may feel overwhelmed by the complexity of the technological systems, which can impact upon their motivation to participate in consultation or co-creation initiatives (Ferreira and Liu, 2023).

The diverse perspectives of social groups on the future of mobility are also obstacles to implementing these actions in the urban mobility sector. Different citizens or groups of citizens prioritize different policies, creating a barrier to motivation emphasized in the literature as the lack of absolute distributive consensus (Ghorbanzadeh et al., 2018; von Wright et al., 2022). As mentioned, the agendas are always challenging to coordinate and can generate tensions when the opinions are far apart. In the Santander case, there was a rising issue between the younger and older population. In this case, there was a dispute between drafting a policy focused on implementing high-quality public spaces and active mobility, the stance of the older population, or following the younger generations' concerns with social inclusiveness and more automated mobilities (Nogués et al., 2023).

This tension might make participants feel frustrated and reluctant to continue advocating for their interests. The presence of an expert and the creation of scenarios can be instrumental (Loukopoulos and Scholz, 2004; Jaspers and Steen, 2021). Despite their conflicting views, in some urban settings, consensus was reached through dialogues that complemented the use of technological tools that effectively addressed the challenges that arose (Nogués et al., 2023). This underscores the potential for shared ideals based on the city's long-term social and environmental sustainability, even in the face of initial discord.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Inadequate Fit

Government entities are responsible for selecting a sample of participants adequate to the drafted scenario, ensuring representation for all potentially affected inhabitants. To uphold the principles of participatory democracy, the selection of citizens must mirror the overall population, including underrepresented groups (von Schneidemesser et al., 2020). A flawed sample can undermine citizen participation, leading to outcomes that deviate from the decision-making goals (Mariano et al., 2023).

The government's role is to understand the communities that should be involved, providing a clear framework for citizen e-participation design (Vanoutrive and Huyse, 2023). This is followed by efforts to disseminate and mobilize the population (Nikitas et al., 2018; Kotzebue, 2022).

Moreover, this can be particularly hard to manage, as Franceschini and Marletto (2015) found in their study that even if there is sufficient representation of all the groups affected by such policies, there must be forms of control of those initiatives to avoid people with more resources, stronger opinions or more time available dominating the discussion and often relegating the voices of marginalized communities to a secondary role. The technological input should mitigate the opportunities for this hierarchization; nonetheless, these innovative or digital features must be complemented by in-person participation actions (Istrate et al., 2023; Kluge et al., 2024); if not, there is a strong possibility that the technology barriers can penalize the older, people experiencing poverty, and those most in need (Nikitas et al., 2018).

New, entirely technological ways of public engagement through web-based participatory activities, such as crowdsourcing, have grown in importance (Kyriakidis et al., 2023). However, these activities are usually associated with lower participation models on the scales of citizen participation (Kotzebue, 2022). This happens because such methods require homogeneous digital literacy and internet access (Savastano, 2023). Therefore, local governments use these systems as a one-way communication feature that does not include consultation of people's opinions (Kotzebue, 2022). It is usually done through metadata of citizens' daily mobility, avoiding more direct engagement between inhabitants and decision-makers (Belli et al., 2020). This partially explains why there is a high level of technological development in the information steps of the participation and, on average, a low level of innovation in policy co-creation and consultation.

The last critique regarding the choice of the population to be engaged in citizen e-participation initiatives concerns the emergence of the living labs concept (Mariano et al., 2023). Living labs are real-life environments where new technologies, services, and systems are tested and evaluated collaboratively and openly. Some authors look at the existence of cities or areas denominated

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

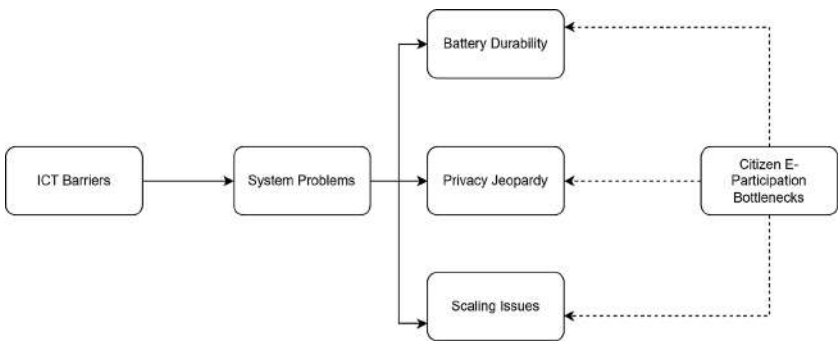
as living labs as examples that may need more efficiency when being translated to other regions under different circumstances and institutional arrangements (Mariano et al., 2023). The generalization of successful models in such environments must be taken with a grain of salt because it is often a product of a particular policy package or population's contextual circumstances in a specific city (Gatta et al., 2017). This undermines the potential of policymakers in other towns or regions to implement similar policies. The scientific findings on living labs must be restricted to some case studies and not seen as a one-size-fits-all strategy (Gatta et al., 2017; Mariano et al., 2023).

ICT BARRIERS

System Problems

The challenges in implementing citizen e-participation in urban mobility extend beyond the dynamics of government–citizen relationships. This includes problems that might emerge from using systems, software, platforms, apps, online surveys or similar methods to facilitate citizen participation. These technological components can introduce errors, mismanagement and system-related issues that disrupt data collection operations. A summary of bottlenecks to citizen e-participation in the ICT barriers category is given in Figure 7.5.

We start with the problems related to the durability of the devices' batteries applied in these initiatives. The programs dedicated to collecting participant data were reported to have high battery consumption, leading to device



Source: Own elaboration based on the PRISMA SLR (WoS data).

Figure 7.5 Summary of bottlenecks to citizen e-participation in the category ICT barriers

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

problems (Gabrielli et al., 2014). For example, in the citizen participation project MatkaHupi (ibid.), if the battery ran out in the middle of the citizens' actions, it was always difficult to collect data on the mobility patterns, which could impact upon the future engagement and participation of the people undergoing those situations. Furthermore, it was also diagnosed that people using smartphone apps for policy consultation or co-creation will likely need to remember to access the platform regularly (ibid.).

Online data collection can also be related to another damaging factor of citizens' private information, which is the vulnerability of these systems to external attacks. The European Union is tightening data privacy regulations under the General Data Protection Regulation, a legal framework that reinforces strategies to prevent the leakages of personal information (Morishita-Steffen et al., 2021). This stringent focus on data privacy ensures that citizens' information is protected, fostering a sense of security and trust in these initiatives (Belli et al., 2020).

Firstly, the model of citizen e-participation must be adequate for the technology available. The local governments or entities running these experiences should be aware of the risks of citizens' private information being exposed. They should choose the model or device that best suits mitigating that risk and guarantees high levels of software protection (Loukopoulos and Scholz, 2004). Moreover, in cases where that is feasible, a member of the local government must be responsible for the project's data management. This individual needs to have a decent knowledge of the local, national and European legal frameworks to reassure the population about the data policy. This member will also inform the decision-makers about the appropriate procedures to respect the boundaries of participants' personal information (Morishita-Steffen et al., 2021).

In urban mobility, the initiatives that include citizen e-participation are eager to present the digital models of the cities to have a more direct interaction between the citizens and the situation exposed through geo-mapping. This means that the data is given to the civil society participants as visual representations of a street or agglomerate of streets or traffic flows. For the participation to be meaningful, this representation must be accurate and reflect the complexity and nuances of the urban environment, underscoring the importance of this aspect in urban planning (Hansson, 2020).

Suppose the data lacks an appropriate scale reflecting the significant issues in a determined area. In that case, the citizens' participation misses the real needs of the situation. To illustrate, using sensors is fundamental to collecting data on urban mobility and making it easier to convert it into a visual representation; however, it does not concretely increase the citizens' quality of life (ibid.). Doing so suggests an efficient application of the sensors' data into a visual representation that captures the complexity of urban mobility so that

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

citizens can complement this effort by providing feedback on the geo-mapping model.

CONCLUSION

This chapter emphasizes the importance of bringing the topic of citizen e-participation in urban policy settings to the field of democracy studies. The knowledge base in this field is sparse between scientific areas such as planning theories, sustainability studies, computational sciences and transport geography. However, this triplex interaction between citizens, government and technology faces technical issues regarding the implementation of e-government platforms and bottlenecks related to the technicalities of participating in such projects, based on behavioralist variables and underrepresentation issues.

This literature review sheds light on the relevance of attending regional and population characteristics when designing an e-governance strategy for citizen engagement in urban mobility policy. The complexity of the technology to be applied and the level of participation in the production when drawing up public policy, depend on the possible outcome of such initiatives. Therefore, a more advanced system for citizen e-participation will not always result in a better survey of people's opinions on urban mobility, and advanced levels of co-creation are not always the best option for citizen e-participation. The goal is to adopt a participation system that allows for broad consensus among the social groups impacted upon by such policies.

The model of direct democracy has its roots in philosophical principles of social justice (Wampler, 2012); the crucial concern of government entities should be promoting citizen e-participation as a structure which allows the more fragile groups of the population to be comfortable in engaging and expressing their feelings towards the policymaking being discussed.

The application of ICT is one of the most adequate solutions to overcome this barrier. It offers a way for people to engage in these citizen participation models without physically moving or gathering with other citizens. This helps provide a more comfortable arena for people to freely express their demands regarding public policy that affects their daily lives.

Nonetheless, policymakers must be acquainted with the cost of adaptation, as civil society requires a learning process to participate effectively with ICT devices. These gaps can be tackled through the engagement of civil servants responsible for clarifying the purpose of citizen participation in those circumstances and informing the population about the benefits and limits of using ICT in this context (Bottin and Mazeaud, 2023).

It requires promoting training to build know-how in human resources to stimulate regular deliberative processes when discussing public policy drafting in urban areas. Citizen e-participation depends on the willingness of the

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

population to engage in the process; however, it is still a top-down model highly dependent on the capacity of governments to create the technological and social conditions for a suitable design that leads to wide participatory models representative of the population and social groups' heterogeneous demands.

ACKNOWLEDGEMENTS

I am grateful to my PhD supervisor, Iolanda Bianchi, whose guidance and support have been invaluable throughout this chapter's research process. Equally significant were the contributions of my fellow PhD students and researchers at IGOP, who played a fundamental role in helping me to overcome the obstacles to producing this chapter along the way.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

APPENDIX

Table 7A.1 Articles and citations by journal (Q1 and Q2)

Journal	Sum of articles	Sum of citations
Administration and Society	1	21
Buildings	1	8
Business Horizons	1	24
Case Studies on Transport Policy	2	21
Cities	6	60
Computers in Human Behavior	1	53
Design Journal	1	3
Ecological Economics	1	10
Energies	2	25
Environment and Planning A – Economy and Space	1	42
European Societies	1	19
European Transport Research Preview	1	56
Heliyon	1	8
IEEE Access	1	14
IEEE Intelligent Transportation Systems Magazine	1	20
Journal of Transport and Health	1	8
Journal of Transport Geography	3	44
Journal of Urban Technology	2	15
Local Government Studies	1	0
Mathematics	1	14
Natural Resources Forum	1	11
Planning Theory	1	0
Proceedings of the Institution of Civil Engineers – Urban Design and Planning	1	17
Research in Transportation Economics	1	24
Sensors	2	47
Simulation and Gaming	1	6
Smart Cities	1	75
Soft Computing	1	0
Sustainability	7	343

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Journal	Sum of articles	Sum of citations
Sustainable Cities and Society	2	45
Transport Policy	1	4
Transportation Research Interdisciplinary Perspectives	1	6
Transportation Research Part A – Policy and Practice	2	32
Urban Science	1	28
Utilities Policy	1	20
Total	54	1123

Source: Own elaboration based on WoS data.

REFERENCES

Arnstein, S.R. (1969). A ladder of citizen participation. *Journal of the American Institute of Planners*, *35*(4), 216–224.

Aydin, N., Seker, S., and Özkan, B. (2022). Planning location of mobility hub for sustainable urban mobility. *Sustainable Cities and Society*, *81*, 103843.

Baiocchi, G., and Ganuza, E. (2020). *Popular democracy: The paradox of participation*. Stanford University Press.

Belli, L., Cilfone, A., Davoli, L., Ferrari, G., Adorni, P., Di Nocera, F., ... and Bertolotti, E. (2020). IoT-enabled smart sustainable cities: Challenges and approaches. *Smart Cities*, *3*(3), 1039–1071.

Berntzen, L., & Johannessen, M. R. (2015). The role of citizen participation in municipal smart city projects: Lessons learned from Norway. In, *Smarter as the new urban agenda: A comprehensive view of the 21st century city* (pp. 299-314). Cham: Springer International Publishing.

Bishop, P., and Davis, G. (2002). Mapping public participation in policy choices. *Australian Journal of Public Administration*, *61*(1), 14–29.

Bottin, J., and Mazeaud, A. (2023). The deliberative public servants: The roles of public servants in citizens' assemblies. In, *De Gruyter Handbook of Citizens' Assemblies*, *1*, 337–348.

Bouzguenda, I., Alalouch, C., and Fava, N. (2019). Towards smart sustainable cities: A review of the role digital citizen participation could play in advancing social sustainability. *Sustainable Cities and Society*, *50*, 101627.

Bovaird, T. (2007). Beyond engagement and participation: User and community coproduction of public services. *Public Administration Review*, *67*(5), 846–860.

Cagney, K.A., York Cornwell, E., Goldman, A.W., and Cai, L. (2020). Urban mobility and activity space. *Annual Review of Sociology*, *46*(1), 623–648.

Calzada, I., and Cobo, C. (2015). Unplugging: Deconstructing the smart city. *Journal of Urban Technology*, *22*(1), 23–43.

Camero, A., and Alba, E. (2019). Smart city and information technology: A review. *Cities*, *93*, 84-94.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Candipan, J., Phillips, N.E., Sampson, R.J., and Small, M. (2021). From residence to movement: The nature of racial segregation in everyday urban mobility. *Urban Studies*, *58*(15), 3095–3117.

Cao, H., and Kang, C.I. (2024). A citizen participation model for co-creation of public value in a smart city. *Journal of Urban Affairs, 46*(5), 905–924.

Caputo, F., Magliocca, P., Canestrino, R., and Rescigno, E. (2023). Rethinking the role of technology for citizens' engagement and sustainable development in smart cities. *Sustainability*, *15*(13), 10400.

Caragliu, A., Del Bo, C., and Nijkamp, P. (2011). Smart cities in Europe. *Journal of Urban Technology*, *18*(2), 65–82.

Cardullo, P., and Kitchin, R. (2019). Being a 'citizen' in the smart city: Up and down the scaffold of smart citizen participation in Dublin, Ireland. *GeoJournal*, *84*(1), 1–13.

Castelnovo, W., Misuraca, G., and Savoldelli, A. (2016). Smart cities governance: The need for a holistic approach to assessing urban participatory policy making. *Social Science Computer Review*, *34*(6), 724–739.

Chen, Z., and Chan, I.C.C. (2023). Smart cities and quality of life: A quantitative analysis of citizens' support for smart city development. *Information Technology and People*, *36*(1), 263–285.

Chowdhury, P.K., Ghosh, N., and Kuriakose, P.N. (2023). Towards seamless urban mobility through smartphone-based mobility apps: Insights from India. In U. Chatterjee, N. Bandyopadhyay, M. Zelenakova, & K. C. Gouda (Eds.) *Urban commons, future smart cities and sustainability* (pp. 935–955). Springer International Publishing

Coelho, T.R., Pozzebon, M., and Cunha, M.A. (2022). Citizens influencing public policy-making: Resourcing as source of relational power in e-participation platforms. *Information Systems Journal*, *32*(2), 344–376.

Collins, F.L. (2023). Geographies of migration III: The digital migrant. *Progress in Human Geography*, *47*(5), 738–749.

De Jong, M., Joss, S., Schraven, D., Zhan, C., and Weijnen, M. (2015). Sustainable–smart–resilient–low carbon–eco–knowledge cities; Making sense of a multitude of concepts promoting sustainable urbanization. *Journal of Cleaner Production*, *109*, 25–38.

Dia, H., Bagloee, S., and Ghaderi, H. (2021). Technology-led disruptions and innovations: The trends transforming urban mobility. In J. C. Augusto (Ed.), *Handbook of smart cities* (pp. 1163–1198). Springer International Publishing.

Donthu, N., Kumar, S., Pandey, N., and Gupta, P. (2021). Forty years of the International Journal of Information Management: A bibliometric analysis. *International Journal of Information Management*, *57*, 102307.

Falanga, R. (2018). Critical trends of citizen participation in policymaking. Insights from Portugal. In M. C. Lobo, F. C. da Silva, & J. P. Zúquete (Eds.). *Changing societies: legacies and challenges. Vol. 2. Citizenship in crisis* (pp. 295–318).

Fernandez-Heredia, A., and Fernandez-Sanchez, G. (2020). Processes of civic participation in the implementation of sustainable urban mobility systems. *Case Studies on Transport Policy*, *8*(2), 471–483.

Ferreira, L.J., and Liu, J. (2023). Social determinants, motivation, and communication: How people perceive and choose sustainable mobility at a local level in Portugal. *Sustainability*, *15*(18), 13294.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Fonseca, D., Sanchez-Sepulveda, M., Necchi, S., and Peña, E. (2021). Towards smart city governance. Case study: Improving the interpretation of quantitative traffic measurement data through citizen participation. *Sensors*, *21*(16), 5321.

Fontana, F. (2014). The smart city and the creation of local public value. In *Smart city: how to create public and economic value with high technology in urban space* (pp. 117-137). Cham: Springer International Publishing.

Foroughi, M., de Andrade, B., Roders, A.P., and Wang, T. (2023). Public participation and consensus-building in urban planning from the lens of heritage planning: A systematic literature review. *Cities*, *135*, 104235.

Franceschini, S., and Marletto, G. (2015). Assessing the benefits and the shortcomings of participation–findings from a test in Bari (Italy). *Journal of Transport Geography*, *44*, 33–42.

Gabrielli, S., Forbes, P., Jylhä, A., Wells, S., Sirén, M., Hemminki, S., ... and Jacucci, G. (2014). Design challenges in motivating change for sustainable urban mobility. *Computers in Human Behavior*, *41*, 416–423.

Gartlehner, G., Affengruber, L., Titscher, V., Noel-Storr, A., Dooley, G., Ballarini, N., and König, F. (2020). Single-reviewer abstract screening missed 13 percent of relevant studies: A crowd-based, randomized controlled trial. *Journal of Clinical Epidemiology*, *121*, 20–28.

Gatta, V., Marcucci, E., and Le Pira, M. (2017). Smart urban freight planning process: Integrating desk, living lab and modelling approaches in decision-making. *European Transport Research Review*, *9*, 1–11.

Ghorbanzadeh, O., Moslem, S., Blaschke, T., and Duleba, S. (2018). Sustainable urban transport planning considering different stakeholder groups by an interval-AHP decision support model. *Sustainability*, *11*(1), 9.

Granier B., & Kudo, H. (2016). How are citizens involved in smart cities? Analysing citizen participation in Japanese "Smart Communities". *Information Polity*, *21*(1), 61-76.

Hansson, L. (2020). Visual representation in urban transport planning: Where have all the cars gone? *Transportation Research Part A: Policy and Practice*, *133*, 1–11.

Innes, J.E., and Booher, D.E. (1999). Consensus building and complex adaptive systems: A framework for evaluating collaborative planning. *Journal of the American Planning Association*, *65*(4), 412–423.

Irazábal, C. (2017). *City making and urban governance in the Americas: Curitiba and Portland*. Routledge.

Israilidis, J., Odusanya, K., and Mazhar, M.U. (2021). Exploring knowledge management perspectives in smart city research: A review and future research agenda. *International Journal of Information Management*, *56*, 101989.

Istrate, A.L., Popartan, L.A., Auerbach, J., Gaspari, J., and Tavangar, M.R. (2023). Collaborative research for transitioning to Climate-Neutral Cities: contouring a prospective framework for integrated planning. *Planning Theory*, 14730952231183303.

Jaspers, S., and Steen, T. (2021). Does co-production lead to the creation of public value? Balancing the dimensions of public value creation in urban mobility planning. *Administration and Society*, *53*(4), 619–646.

Jowkar, M., Temeljotov-Salaj, A., Lindkvist, C.M., and Støre-Valen, M. (2022). Sustainable building renovation in residential buildings: Barriers and potential motivations in Norwegian culture. *Construction Management and Economics*, *40*(3), 161–172.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Kiaei, M., and Daneshfard, K. (2016). Mechanisms to facilitate citizen participation in public policy making. *International Journal of Human Rights and Constitutional Studies*, *4*(4), 295–312.

Kijewska, K., de Oliveira, L.K., dos Santos, O.R., Bertoncini, B.V., Iwan, S., and Eidhammer, O. (2021). Proposing a tool for assessing the level of maturity for the engagement of urban freight transport stakeholders: A comparison between Brazil, Norway, and Poland. *Sustainable Cities and Society*, *72*, 103047.

Kitchin, R. (2022). Conceptualising smart cities. *Urban Research and Practice*, *15*(1), 155–159.

Kluge, M., Kachel, J., & Knodt, M. (2024). Digital co-creation in urban mobility planning: What motivates people to participate? *Local Government Studies*, 51(1), 1-26. https://doi.org/10.1080/03003930.2024.2310213.

Kontokosta, C.E. (2016). The quantified community and neighborhood labs: A framework for computational urban science and civic technology innovation. *Journal of Urban Technology*, *23*(4), 67–84.

Kopackova, H., Komarkova, J., and Horak, O. (2022). Enhancing the diffusion of e-participation tools in smart cities. *Cities*, *125*, 103640.

Kotzebue, J.R. (2022). Integrated urban transport infrastructure development: The role of digital social geo-communication in Hamburg's TEN-T improvement. *Journal of Transport Geography*, *99*, 103280.

Kuokkanen, A., Sihvonen, M., Uusitalo, V., Huttunen, A., Ronkainen, T., and Kahiluoto, H. (2020). A proposal for a novel urban mobility policy: Personal carbon trade experiment in Lahti city. *Utilities Policy*, *62*, 100997.

Kyriakidis, C., Chatziioannou, I., Iliadis, F., Nikitas, A., and Bakogiannis, E. (2023). Evaluating the public acceptance of sustainable mobility interventions responding to Covid-19: The case of the Great Walk of Athens and the importance of citizen engagement. *Cities*, *132*, 103966.

Laurian, L., and Shaw, M.M. (2009). Evaluation of public participation: The practices of certified planners. *Journal of Planning Education and Research*, *28*(3), 293–309.

Leone, G.R., Moroni, D., Pieri, G., Petracca, M., Salvetti, O., Azzarà, A., and Marino, F. (2017). An intelligent cooperative visual sensor network for urban mobility. *Sensors*, *17*(11), 2588.

Liang, Y., Aroles, J., and Brandl, B. (2022). Charting platform capitalism: Definitions, concepts and ideologies. *New Technology, Work and Employment*, *37*(2), 308–327

Lim, S.B., and Yigitcanlar, T. (2022). Participatory governance of smart cities: Insights from e-participation of Putrajaya and Petaling Jaya, Malaysia. *Smart Cities*, *5*(1), 71–89.

Linders, D. (2012). From e-government to we-government: Defining a typology for citizen coproduction in the age of social media. *Government Information Quarterly*, *29*(4), 446–454.

Loukopoulos, P., and Scholz, R.W. (2004). Sustainable future urban mobility: using 'area development negotiations' for scenario assessment and participatory strategic planning. *Environment and Planning A*, *36*(12), 2203–2226.

Macaulay, R., Lee, K., Johnson, K., and Williams, K. (2022). Mindful engagement, psychological restoration, and connection with nature in constrained nature experiences. *Landscape and Urban Planning*, *217*, 104263.

Mangnus, A.C., Rebel, K.T., Vervoort, J.M., Dotinga, R.A., Hoogendoorn, E., Driessen, P.P., and Hajer, M.A. (2022). Picture the future, play the present: Re-imagining sustainable cities through a large-scale location-based game. *Futures*, *135*, 102858.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Mariani, I., Mortati, M., and Rizzo, F. (2023, July). Strengthening e-Participation through Design Thinking. Relevance for Better Digital Public Services. In *Proceedings of the 24th Annual International Conference on Digital Government Research* (pp. 224–232).

Mariano, P., Trolese, M., Kastelec, D., Bitenc, M., and Jurgec, D. (2023). Designing mobility policies for vulnerable users employing the living lab approach: Cases of a demand-responsive transit service in Ljubljana and Maribor. *Sustainability*, *15*(20), 14698.

May, A.D., Khreis, H., and Mullen, C. (2018). Option generation for policy measures and packages: An assessment of the KonSULT knowledgebase. *Case Studies on Transport Policy*, *6*(3), 311–318.

Meng, J., Lin, Y.P., and Tsai, H.J. (2023). Environmental activism in the platform society: Spatial agency in digital maps. *New Media and Society*, 14614448231162581.

Moradi, A., and Vagnoni, E. (2018). A multi-level perspective analysis of urban mobility system dynamics: what are the future transition pathways? *Technological Forecasting and Social Change*, *126*, 231–243.

Morishita-Steffen, N., Alberola, R., Mougeot, B., Vignali, É., Wikström, C., Montag, U., ... and Andreucci, M.B. (2021). Smarter together: Progressing smart data platforms in Lyon, Munich, and Vienna. *Energies*, *14*(4), 1075.

Morton, C., Mattioli, G., and Anable, J. (2021). Public acceptability towards Low Emission Zones: The role of attitudes, norms, emotions, and trust. *Transportation Research Part A: Policy and Practice*, *150*, 256–270.

Munthe-Kaas, H.M., Oxman, A.D., von Lieres, B., Gloppen, S., and Ohren, A. (2024). Public participation in decisions about measures to manage the COVID-19 pandemic: A systematic review. *BMJ Global Health*, *9*(6), e014404.

Muñoz, L. and Bolívar, M. (2021). Different levels of smart and sustainable cities construction using e-participation tools in European and Central Asian countries. *Sustainability*, *13*(6), 3561.

Nikitas, A., Avineri, E., and Parkhurst, G. (2018). Understanding the public acceptability of road pricing and the roles of older age, social norms, pro-social values and trust for urban policy-making: The case of Bristol. *Cities*, *79*, 78–91.

Nogués, S., González-González, E., Stead, D., and Cordera, R. (2023). Planning policies for the driverless city using backcasting and the participatory Q-Methodology. *Cities*, *142*, 104535.

Page, M.J., Moher, D., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., ... and McKenzie, J.E. (2021). PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. *BMJ*, *372*.

Papyshev, G., and Yarime, M. (2021). Exploring city digital twins as policy tools: A task-based approach to generating synthetic data on urban mobility. *Data and Policy*, *3*, e16.

Pretty, J. (1995). Participatory learning for sustainable agriculture. *World Development*, *23*(8), 1247– 1263

Prokop, C., and Tepe, M. (2022). Talk or type? The effect of digital interfaces on citizens' satisfaction with standardized public services. *Public Administration*, *100*(2), 427–443.

Przybyłowski, A., Kaszuba, A., and Suchanek, M. (2024). Smart and sustainable urban mobility-public and shared transport users' behavior in Gdynia city: A case study. *Transport Problems*, *19*(2), 33-46

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Rijal, S. (2023). The importance of community involvement in public management planning and decision-making processes. *Journal of Contemporary Administration and Management (ADMAN)*, *1*(2), 84–92.

Ringholm, T., Nyseth, T., & Gro, S. H. (2018). Participation according to the law?: The research-based knowledge on citizen participation in Norwegian municipal planning. *European Journal of Spatial Development*, *67*, 1-20.

Robertson, D. (2023). Implementing limited e-participation on mobility policy in Bogotá. *Latin American Perspectives*, *50*(6), 156–174.

Rocha, E.M. (1997). A ladder of empowerment. *Journal of Planning Education and Research*, *17*(1), 31–44.

Rogers, C.D., and Hunt, D.V. (2019). Realising visions for future cities: An aspirational futures methodology. *Proceedings of the Institution of Civil Engineers – Urban Design and Planning*, *172*(4), 125–140.

Rowe, G., and Frewer, L.J. (2000). Public participation methods: A framework for evaluation. *Science, Technology, and Human Values*, *25*(1), 3–29.

Royo, S., and Yetano, A. (2015). 'Crowdsourcing' as a tool for e-participation: Two experiences regarding CO2 emissions at municipal level. *Electronic Commerce Research*, *15*, 323–348.

Ruhlandt, R.W.S. (2018). The governance of smart cities: A systematic literature review. *Cities*, *81*, 1–23.

Sadowski, J. (2019). When data is capital: Datafication, accumulation, and extraction. *Big Data and Society*, *6*(1), 2053951718820549.

Sæbø, Ø., Rose, J., and Flak, L.S. (2008). The shape of eParticipation: Characterizing an emerging research area. *Government Information Quarterly*, *25*(3), 400–428.

Şanta, A.M.I. (2022). Prosumers – A new mindset for citizens in smart cities. *Smart Cities*, *5*(4), 1409–1420.

Savastano, M., Suciu, M.C., Gorelova, I., and Stativă, G.A. (2023). How smart is mobility in smart cities? An analysis of citizens' value perceptions through ICT applications. *Cities*, *132*, 104071.

Schwanen, T., Banister, D., and Anable, J. (2012). Rethinking habits and their role in behaviour change: The case of low-carbon mobility. *Journal of Transport Geography*, *24*, 522–532.

Shaikh, A.K., Ahmad, N., Khan, I., and Ali, S. (2021). E-participation within e-government: A bibliometric-based systematic literature review. *International Journal of Electronic Government Research (IJEGR)*, *17*(4), 15–39.

Shelton, T., and Lodato, T. (2019). Actually existing smart citizens: Expertise and (non) participation in the making of the smart city. *City*, *23*(1), 35–52.

Simonofski, A., Fink, J., and Burnay, C. (2021). Supporting policy-making with social media and e-participation platforms data: A policy analytics framework. *Government Information Quarterly*, *38*(3), 101590.

Stojanovic, D., Predic, B., and Stojanovic, N. (2016). Mobile crowd sensing for smart urban mobility. In, *European Handbook of Crowdsourced Geographic Information*, 371–382.

Sulis, P., and Proietti, P. (2024). Who can access what? Uncovering urban inequality in access to service for senior citizens. *Environment and Planning B: Urban Analytics and City Science*, 23998083241260757.

Sun, L., and Axhausen, K.W. (2016). Understanding urban mobility patterns with a probabilistic tensor factorization framework. *Transportation Research Part B: Methodological*, *91*, 511–524.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Susskind, L., and Elliott, M. (1981). Learning from citizen participation and citizen action in Western Europe. *The Journal of Applied Behavioral Science*, *17*(4), 497–517.

Temeljotov Salaj, A., Gohari, S., Senior, C., Xue, Y., and Lindkvist, C. (2020). An interactive tool for citizens' involvement in the sustainable regeneration. *Facilities*, *38*(11/12), 859–870.

Wampler, B. (2012). Participation, representation, and social justice: Using participatory governance to transform representative democracy. *Polity*, *44*(4), 666–682.

World Health Organization. (2022). *Implementing citizen engagement within evidence-informed policy-making: an overview of purpose and methods*. https://www.who.int/publications/b/59570.

Vanoutrive, T., and Huyse, H. (2023). Revisiting modal split as an urban sustainability indicator using citizen science. *Cities*, *143*, 104592.

Van Raan, A.F. (2014). Advances in bibliometric analysis: Research performance assessment and science mapping. *Bibliometrics Use and Abuse in the Review of Research Performance*, *87*(4), 17–28.

von Schneidemesser, D., Herberg, J., and Stasiak, D. (2020). Re-claiming the responsivity gap: The co-creation of cycling policies in Berlin's mobility law. *Transportation Research Interdisciplinary Perspectives*, *8*, 100270.

von Wright, T., Kaseva, J., and Kahiluoto, H. (2022). Needs must? Fair allocation of personal carbon allowances in mobility. *Ecological Economics*, *200*, 107491.

Wirtz, B.W., Weyerer, J.C., and Geyer, C. (2019). Artificial intelligence and the public sector: Applications and challenges. *International Journal of Public Administration*, *42*(7), 596–615.

Yang, Y., Heppenstall, A., Turner, A., and Comber, A. (2019). Who, where, why and when? Using smart card and social media data to understand urban mobility. *ISPRS International Journal of Geo-Information*, *8*(6), 271.

Yue, A., and Beta, A.R. (2022). Digital citizenship in Asia: A critical introduction. *International Communication Gazette*, *84*(4), 279–286.

Zuboff, S. (2019). *The age of surveillance capitalism*. Profile Books.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

8. Creation and captivation: analysing professional agency among teachers utilizing immersive technology in SEN education

Martin Smith-Gahrsen

INTRODUCTION

The importance of developing inclusive and equitable teaching–learning cycles at all educational stages has received increasing attention in recent years. This is reflected in the Sustainable Development Goals (SDGs) of the European Agenda 2030, which state in Goal 4 that quality education must '[e]nsure inclusive and equitable quality education and promote lifelong learning opportunities for all' (European Commission, n.d.). Aligning with this goal, immersive technologies, especially educational approaches based on virtual reality (VR) and augmented reality (AR), have proven to aid and enhance teaching–learning processes for children with special education needs (SEN), highlighting the benefits of flexibility, accessibility, and adaptability (Tekedere and Göker, 2016; Bradley and Newbutt, 2018; Bradley et al., 2019; Santa-María et al., 2021). For children diagnosed with autism spectrum disorder (ASD), a neurodevelopmental disorder characherized by deficits in social interaction and communication (American Psychiatric Association (APA), 2013), VR-based educational approaches have shown promising results (SikLányi and Tilinger, 2004; Parsons et al., 2006). Early VR studies have pointed to the usefulness of this technology in the training of behavioural skills, such as rehearsing traffic behaviour (Strickland et al., 1996) or communication skills in diversified social and public settings (Cobb et al., 2002; Parsons et al., 2004, 2005, 2006; Mitchell et al., 2007; Tartaro, 2011). Virtual environments have even proven adequate to train children with ASD in social interaction skills using virtual peers, i.e., animated characters with whom they can interact and repeatedly rehearse both verbal and non-verbal interaction skills (Cassell and Bickmore, 2003; Ryokai et al., 2003; Cassell, 2004).

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

However, the potential benefits of using immersive technologies to enhance quality in SEN education remain unrealised on a broad scale for financial, technical, and personal reasons. Developing 360 or 3D content compatible with VR and AR-based educational platforms costs more than most public schools can afford (Jensen and Konradsen, 2018: 1525). This is what has been referred to as an external or 'first-order' barrier to successfully implementing digital resources. This initial barrier concerns access to digital resources and necessary training and support (Bower et al., 2020; Abedi and Ackah-Jnr, 2023). In recent years, the lack of available VR and AR-based software for educational use has been somewhat resolved, as shown in Valero-Franco and Berns's study outlining ten available end-user development (EUD) tools suitable for creating VR content for education (Valero-Franco and Berns, 2024). However, cost and training issues prevail as perceived barriers when implementing immersive technologies in educational settings (Gal et al., 2019; Magomadov, 2020). Another threat to a fruitful adoption of digital resources in education has been referred to as a 'second-order' barrier, involving internal barriers such as 'teacher confidence, perceived value of technology and perceptions about how students learn' (Bower et al., 2020; Ertmer et al., 2012). Perceptions like these have proven especially effective at impeding transformative changes in educational approaches, as inherent frames of reference and habits of mind may distort the didactic potentials of innovative technologies (Blundell et al., 2020). In addition to the first two barriers, a 'third-order' hindrance to efficacious employment of digital resources relates to the degree to which teachers become designers with technology in education, thereby transcending the mere application of accessible technology. Becoming a designer with technology involves orchestrating the relationship between content knowledge, learning objectives, and learners' needs (Bower et al., 2020; Tsai and Chai, 2012; Laurillard et al., 2018; Mishra and Henriksen, 2018).

Recent studies highlight a need to bridge the gap between the potential affordances of innovative technologies and their actual use, not least when it comes to immersive technologies applied to SEN education (Bower et al., 2020; Gal et al., 2019). Checa-Domene et al. explicitly call for teacher-training programmes that explore the 'attitude and training of teachers in training and in practice in the face of these new resources' (Checa-Domene et al., 2024: 724) to determine whether further educational policies regarding teacher education are needed.

This chapter analyses to what extent the threefold barriers to viable implementation of VR and AR technologies in education came into play during a postgraduate teacher-training unit at the University of Agder in Kristiansand, Norway in 2023. The unit is part of an advanced training course in special education for in-service teachers focusing on universal design elements and technological innovations, with the last part of the course offering training in the

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

creation of VR- and AR-based teaching resources. As part of the 2023 delivery of the unit, teachers developed a digital product using the VR- and AR-based program CoSpaces Edu (now known as Delightex Edu) and set up a product trial involving selected SEN students at their home schools. Subsequently, the teachers wrote reflection papers assessing the responses of their SEN students, their learning cycle during creation and trial periods, and their projections of the perceived educational value of immersive teaching practices using this program. The following research questions are asked:

- *How do the SEN students respond to didactical approaches that include virtual scenes made with CoSpaces Edu (RQ1)?*
- *How do the teachers describe their learning processes as they develop virtual and immersive learning resources with CoSpaces Edu (RQ2)?*
- *What are the perceived educational outcomes of immersive learning with CoSpaces Edu, according to the teachers (RQ3)?*

The reflection papers (N = 41) are analysed thematically, and the findings are then aligned with the theories of human and professional agency (Emirbayer and Mische, 1998; Toom et al., 2021; Hinostroza-Paredes, 2020). The following sections explore this theoretical framework further.

PROFESSIONAL TEACHER AGENCY

If a viable interplay between human actors and digital technology is to be attained, the first, second, and third-order barriers to digital implementation must be overcome. This places human agency – and in an educational context, professional teacher agency – at the centre of attention. Human agency can be defined as 'the capacity of human beings to shape circumstances in which they live' (Aagaard and Lund, 2020: 7), placing it in contradiction to existential concepts such as determinism, fatalism, or apathy, where the human actor is disempowered. Human agency is neither executed nor developed in a vacuum. Instead, it is a 'contextually enacted way of being in the world, mediated by psychological and technical tools, such as language or computers' (Hinostroza-Paredes, 2020: 3). The way in which humans – and more specifically, professional teachers – can deploy their agency amidst this plethora of cultural tools is at the centre of interest. Hinostroza-Paredes therefore calls for research identifying how digital technology influences teacher agency, thus contributing to 'a better understanding of the possibilities for enhancing … creativity and innovation within professional spaces in rapid digital transformation' (Hinostroza-Paredes, 2020: 19).

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

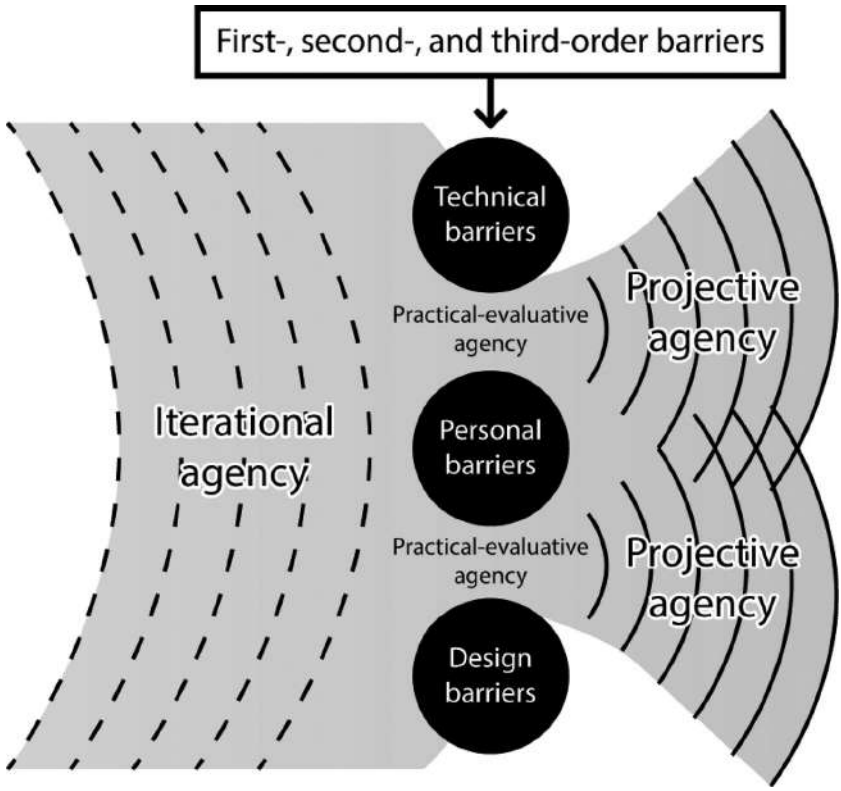
According to the influential agency theorists Emirbayer and Mische, human agency can be understood as 'a temporally embedded process of social engagement, informed by the past (in its habitual aspect), but also oriented toward the future (as a capacity to imagine alternative possibilities) and toward the present (as a capacity to contextualize past habits and future projects within the contingencies of the moment)' (Emirbayer and Mische, 1998: 963). More specifically, Emirbayer and Mische (1998: 971) understand human agency as an overlapping and threefold process ('a chordal triad') encompassing: (1) the iterational dimension, involving past experiences and 'the selective reactivation of past patterns of thought and action as routinely incorporated in practical activity'; (2) the practical-evaluative dimension, implying the capacity to 'make practical and normative judgments … in response to emerging demands, dilemmas, and ambiguities of presently evolving situations' emphasizing personal judgement and situational awareness; and (3) the projective dimension, focusing on projectivity as an imaginative generation of 'future trajectories of action'.

These three temporal dimensions of agency will always exist concurrently with the agent. However, depending on the context, one will dominate, determining whether the mental references within which the individual operates are transformed or reproduced (Hinostroza-Paredes, 2020: 3; Emirbayer and Mische, 1998).

When it comes to professional teacher agency, Toom et al. define this as a 'core capability in the sense that it offers a key for active and skillful learning' (Toom et al., 2021: 2), thereby linking agency to a teacher's ability both to learn and to 'promote students' and colleagues' learning, as well as innovate and promote change in schools' (ibid.; Saariaho et al., 2016). Professional teacher agency is thereby understood as both internal capacities involving 'cognitive, motivational, and attitudinal resources' as well as capabilities 'needed for intentional and accountable orchestration of learning in a variety of contexts' (Toom et al. 2021: 3). To enhance their professional agency, teachers must be actively involved in the planning, execution, and evaluation of teaching and experience varied opportunities for participation, contribution, and constructive collaboration with students and peers (Madigan and Kim, 2021: 5–6). Moreover, studies show that challenging teachers and providing them with opportunities to experience transformative practices in learning and teaching is imperative to foster their professional agency (Ketelaar et al., 2012; Heikkilä et al., 2012). Enhancing a teacher's professional agency may result in decreased stress, and openness to innovative ideas relevant to the current debates on teacher attrition (Madigan, 2021) and creating resilience (Davis and Borden, 2025).

Merging the above-mentioned definitions of agency, teachers' professional agency emerges as an 'interplay of individual capacities and social, material, and temporal environments' (Priestley et al., 2015). Figure 8.1 illustrates this

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/



Source: Model derived from Østern et al. (2024: 37) and designed by Thomas Andersen, University of Agder.

Figure 8.1 Professional teacher agency

process, depicting agency as temporal waves referring to iterational, practical-evaluative and projected dimensions of agency, aligned with the threefold barriers to implementation of digital technology.

The three dimensions of agency were put at stake in this study, as the in-service teachers were challenged to design didactical approaches using immersive technology for their SEN students. However, the teachers' iterational dimension lacked experiences connected to the technical development of virtual scenes. Some teachers had previously designed social stories, but most were unfamiliar with this practice. This lack of previous experience is illustrated using striped waves in Figure 8.1. All teachers had established teacher–student

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

relations with their SEN students, which gave them valuable insights into their special education needs, challenges, and diagnoses. The teachers then had to use their personal judgement to create suitable virtual scenarios for their SEN students and execute situational awareness while testing their products in practice. They subsequently wrote about future possibilities for using immersive technologies in SEN education. Entangled with the complexity of technological barriers (first-order), previous habits of mind (second-order), and the challenges of educational design (third-order), they executed their professional agency as they explored new didactical approaches with immersive technology.

RESEARCH CONTEXT

To create their immersive products, the teachers utilised the CoSpaces Edu application. This application allows for the creation of virtual scenes, using either a panoramic (360-degree) photo as a background or one of the 3D background environments available in the app. The scenes can be made dynamic by adding animated 3D figures, visual 3D objects, recorded voices, and interactive quizzes. The application has been positively assessed for its user-friendliness, offering accessibility for students of different age groups and skill levels (Valero-Franco and Berns, 2024). CoSpaces Edu has also been recognised for its versatility, allowing for the creation of virtual environments that can be aligned with individualised learning needs, and potentially facilitating creative learning processes (Valero-Franco and Berns, 2024). The pro-version of the application, allowing access to all the animating and virtual features, is considered affordable for a public school budget. Figure 8.2 and Figure 8.3 show screenshots from a 2D versions of CoSpaces Edu scenes.

The teachers were assigned to create social stories modelling how to behave or react in diversified settings, intending to develop a sense of psychological predictability and provide extended social scripts for SEN students (Nyheim et al., 2023). They could also create virtual spaces that could be utilised for preparation or introduction to group activities, for concept training, or as preparation for field trips or other social activities outside the classroom. All teachers used 3D figures as virtual peers interacting in their stories and employed code-blocking features in the application to move and animate the figures. Table 8.1 illustrates the various themes employed in the virtual products.

Previous studies have shown that using the CoSpaces application in educational settings may lead to a higher sense of perceived challenge and achievement and enhance students' sense of accomplishment (Khattib and Alt, 2024). However, in Khattib and Alt's study, the participating students did not develop the virtual product but instead employed a virtual game that professional educators had made in advance. The same strategy was applied in Valero-Franco and Berns's study, where CoSpaces was successfully integrated

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Figure 8.2 *A screenshot from a 2D version of a CoSpacesEdu scene showing a social situation with a girl approaching two fellow pupils, asking, 'Hi, is it okay that I sit down with you?'*

into a pre-service teacher education program to train and rehearse language concepts in foreign language learning (FLL) (Valero-Franco and Berns, 2024). According to Valero-Franco and Berns, the intent was to 'encourage other teachers to integrate EUD tools [end-user development tools, such as CoSpaces] into their teaching practices and to create their own VR content/environments' (Valero-Franco and Berns, 2024: 168). However, this study, like Khattib and Alt's, did not actively engage the pre-service teachers in creating virtual scenes. They remained on the consumer's side of the application; therefore, and the third-order barrier, involving the teachers in the creative process of designing virtual scenes, was unchallenged. The question remains whether the same results prevail if previously untrained in-service teachers are challenged to develop subject and student-specific virtual scenes. This question is explored further below.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Figure 8.3 *A screenshot from a 2D version of a CoSpacesEdu scene showing a social situation where the teacher says, 'This is probably just a misunderstanding. Thomas misunderstood the message.'*

EMPLOYING ACTION RESEARCH METHODOLOGY AND THEMATIC ANALYSIS

The study is grounded in the principles of action research, challenging established approaches and routines and exploring innovative ways to improve human lives. Action research even invites people across society to collaborate and create viable trajectories of action to positively impact their way of life (Ness and von Heimburg, 2021: 19). In this study, professionals from various educational levels have collaborated to develop and assess innovative didactic practices, thereby blurring the conventional boundaries between researchers and participants (Marshall and Rossman, 2011: 23).

The teachers first received two lectures on research findings on the didactical use of immersive technologies. Next, they were then given time on campus (90 minutes) to start developing their social and virtual stories using the CoSpaces Edu application. Each teacher was given access to the pro-version of

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Table 8.1 Employed themes in the virtual products

Content	Themes
Social stories	Modelling social situations in the school yard
Social stories	Practicing social alternatives for how to behave when accepted or rejected
Social stories	Modelling social behaviour in the school yard
Social stories	Modelling social situations involving substitute teachers in the classroom
Social stories	Practicing general social skills
Social stories	Rehearsing social skills for playing a board game
Social stories	Practicing behaviour to achieve social contact in the schoolyard
Social stories	Rehearsing a social situation in the school yard
Social stories	Virtually experiencing meeting with a new class
Social stories	Modelling social behaviour for inviting others to play
Social stories	Rehearsing social behaviour in class and in the school yard
Social stories	Practicing how to behave when meeting a dog (of which the student is afraid)
Social stories	Rehearsing social situations at school
Social stories	Interactive scene about using a helmet when riding a bicycle
Social stories	Preparing for participation and discussion in whole class
Social stories	Scenes to create predictability before a field trip
Social stories	Scenes simulating transitions during whole-class activities
Social stories	Scenes preparing for a day of physical exercises
Social stories	Preparation before a field trip to create predictability
Social stories	Simulating and rehearsing oral presentations
Social stories	Scenes used to prepare for a field trip
Social stories	Preparation for reasonable behaviour in traffic situations
Social stories	Rehearsing an ethical choice situation
Social stories	Preparing for transitions at school
Social stories	Rehearsing situations that demand social initiative
Social stories	Preparing for a cycle excursion

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Content	Themes
Social stories	Modelling ethical choice situations connected with inclusion and outsiderness
Social stories	Rehearsing traffic behaviour
Social stories	Rehearsing social behaviour in the schoolyard
Social stories	Practicing different ways of connecting with other children during play
Social stories	Preparing for a visit to the local zoo
Social stories	Rehearsing social behaviour in the schoolyard
Content-specific themes	Introduction to a conversation in religious education
Content-specific themes	Introduction to a new theme and practice in reading
Content-specific themes	Introducing concepts in natural science
Content-specific themes	Rehearsing basic concepts in natural science
Content-specific themes	Practicing elementary math tasks
Content-specific themes	Introducing naturalism as a literary epoch in Norwegian
Content-specific themes	Introducing German glossary
Content-specific themes	Rehearsing concepts related to the seasons of the year

the application, thereby unlocking all the code-blocking features. They were even provided with compatible CardBoard goggles, often considered the simplest version of a head-mounted display (HMD). These VR goggles enabled trials utilising the 360 features of the virtual scenes. The teachers completed the scenes at home before testing their virtual products with their SEN students. The trial group of students had various special education needs, but due to privacy concerns, their diagnostic specifics are not displayed in this chapter. The trials were completed within one month after the campus sessions. Finally, the teachers reviewed their teaching and learning processes and assessed their trials by writing reflection papers, which they turned in via the University's Learning Management System as written course assignments. The questions that the teachers answered for the assignment correspond with the research questions posed in this study. Forty-one out of 67 teachers consented to participate in the study, allowing their reflection papers to be analysed qualitatively. The data collection was approved by the Norwegian Directorate for Higher Education and Skills.

Following the guidelines of thematic analysis (Braun and Clarke, 2006), an inductive approach to the data was employed, identifying recurring codes and themes in the reflection papers. NViVo, a qualitative data analysis software, was used to ease and enhance the coding process. The reflection papers

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

were first coded semantically, to employ the teachers' explicit perceptions of the challenges and benefits of utilising this technology as a basis for analysis. A realist or essentialist approach was taken at this stage, as the teachers' experiences and motivations were interpreted 'straightforwardly', assuming a 'unidirectional relationship … between meaning and experience and language' (Braun and Clarke, 2006: 85). The results of this inductive analysis are presented below, including the number of data references associated with each theme is reported. A reference denotes a specific statement or line of thought in the data that was coded as part of a given theme. Finally, the findings are discussed in light of the conceptual lenses of teacher agency and first-, second-, and third-order barriers to digital technology implementation.

RESULTS

The thematic analysis of the 41 reflection papers unfolded a threefold divide, corresponding to the three research questions. First, an overview of themes deriving from the SEN students' responses, as perceived by their teachers, is presented (RQ1). Second, central themes pertaining to the in-service teachers' perceived learning processes are outlined (RQ2). Third, the analysis of the teachers' projections of potential educational outcomes of didactical approaches using CoSpaces Edu is described (RQ3).

An Account of SEN Students' Perceived Responses

Four themes emerged from the thematic analysis of the in-service teachers' perceptions of student responses. These are conceptualised as 'excitement', 'dialogue starter', 'subject goal fulfilled', and 'technical or physical strain'.

Excitement

> I noticed that the student found it very exciting to test the virtual product, and it became an amusing approach to a theme the student usually does not like. [my translation] (in-service teacher)

The most prominent theme emerging from the teachers' accounts of student responses is 'excitement'. 34 references in the data correspond to this theme. Being immersed in a visual approach to a social story appealed to most SEN students. As they navigated visually through the virtual scenes, they attained knowledge exploratively, which had a motivational effect, easing the approach to content knowledge that the students usually disliked. Interacting with 3D figures, quizzes, sounds, and voiceovers made learning more accessible. It seemed to be a more playful and captivating approach to learning. Several students who usually struggled to concentrate could now focus more actively on

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

the content knowledge displayed. Some teachers noted that the SEN students did not want to stop interacting with the virtual tours when it was time to move on to other activities.

Dialogue starter

> We had a nice dialogue afterwards, where we could talk about situations that may occur in 'real life' connecting to the virtual experience that he had had. [my translation] (in-service teacher)

Many in-service teachers reported that their virtual products served as dialogue starters, easing the transition from acquiring the subject content to a subsequent discussion. In the data, 13 references correspond to this theme. As the virtual social stories simulated scenarios that may occur in real life, some teachers reported that conversations about similar everyday situations became easier, enabling peaceful and valuable dialogues about social situations that would typically be difficult to discuss. One teacher reported that a conversation initiated by virtual scenes paved the way for greater student ownership of the subject, empowering the student to participate in subsequent class discussions.

Subject goal fulfilled

> Having used the VR goggles … the student was prepared for the lesson in class and participated actively. The student had a sense of self-efficacy and made several appropriate contributions to the class discussion. [my translation] (in-service teacher)

As the virtual scenes aimed to model situations and behaviour that would help the SEN students achieve a broader repertoire of social skills, a crucial point would be to which degree this didactical approach succeeded. 14 references from the in-service teachers' reflection notes are subsumed under 'subject goal fulfilled'. The teachers who used the virtual product to prepare their students for field trips or 'alternating school days', involving physical and didactical deviations from predictable daily routines, reported that the virtual scenes relieved the students, ensuring greater predictability and producing feelings of safety and calmness. The visual dominance of the 360 scenes even helped the students recall and discuss subject content, in situations in which they might typically struggle with reading written instructions.

Technical or physical strain

> The student had trouble using his finger [to interact with the scenes]. He probably would have benefitted from using other VR goggles than these. [my translation] (in-service teacher)

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

The data includes 12 references to various technical challenges that arose when the virtual worlds were explored. These concern either deficiencies in how the virtual scenes were constructed or difficulties in handling the technical equipment. The immersion into virtual worlds, encapsulated in a head-mounted display (HMD), can be an overwhelming experience, even though the HMD in this case was just a smartphone embedded in CardBoard goggles. This visual dominance can distract students from verbal instructions, as previously shown (Smith-Gahrsen and Beckmann, 2024). To avoid such distractions, the CoSpaces Edu application allows for the integration of various forms of texual content. However, the in-service teachers realised that these text messages had to remain visible for a long enough time to be readable and preferably appear simultaneously with audible voiceovers. Other teachers found that the voiceovers were sufficient to convey understanding, as too many text messages led to mental overload for some SEN students, especially those with reading difficulties. Some of the teachers found it time-consuming and difficult to understand and use the application's animating or coding features and settled for less technically complex versions of their social stories. Further, the relatively low-cost VR equipment provided only low levels of immersion for some students, as the scenes appeared pixelated. As some students had had experiences with more advanced VR systems before, offering higher levels of immersion and interaction, they were not impressed with the 3D graphics embedded in the CoSpaces Edu application. Using a CardBoard goggle to interect with the the scenes even proved difficult for some students as this meant placing a finger on the smartphone screen while wearing the HMD. Some SEN students even reported physical discomfort during the virtual tours, feeling nauseated and dizzy. This was typically resolved by taking breaks or sitting down while wearing the HMD. Some chose to replace the HMD with a smartphone or tablet as they continued to watch the scenes.

In-Service Teachers' Learning Processes

The analysis pertaining to the second research question (RQ2) explores how the teachers describe their learning processes as they developed the immersive learning resources. The analysis reveals three main themes: 'inexperience', 'self-efficacy', and 'the value of socio-constructive approaches'.

Inexperience

None of the 41 participating teachers had any experience in developing virtual scenes or facilitating didactic approaches with VR or AR-based digital resources before the course. A few had experience using digital coding or making analogue social stories. This general inexperience made the teachers feel insecure, and many of them wavered emotionally at the prospect of

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

creating virtual products on their own. 34 references correspond to the theme 'inexperience' in the data. Describing this unfamiliarity both with the technology and the didactical method, most teachers felt overwhelmed and frustrated. They were challenged, not only by having to develop digital products utilizing VR technology, but also by the scarcity of time and perceived lack of relevance: 'It is possible to do this at my school? Will I gain sufficient competence to feel secure enough to do this as part of my teaching? What about the time aspect?' Several teachers mentioned these questions, along with a perceived resistance against changing one's habits of mind regarding teaching methods. Many teachers were therefore negatively disposed to completing the compulsory task of making virtual products before they started their work.

Self-efficacy

Despite their initial resistance and perceptions of inadequacy, most teachers reported that the process of exploration, creation, and cooperation in developing the virtual products resulted in feelings of self-efficacy, motivation, and pride. Creating products that led to didactic innovation and excitement among their SEN students increased their confidence. The reflection papers contain 33 references to this theme. Most of these references point to the value of being in a process of trial and error, thereby being able to identify with students who experience such learning processes every day: 'I got insight into the life worlds of many students, and how they may experience their everyday life at school. I had the courage to start experimenting, even though I did not have a specific plan or knowledge about the digital program. By doing this I developed new knowledge.' Several teachers reported reaching a 'zone-of-flow' (Csikszentmihalyi, 1990, in Skaug et al., 2020) once the first barriers of personal resistance and technical strain were overcome.

The value of socio-constructive approaches

Several of the teachers who reported anxiety and pessimism about making virtual products changed their minds after participating in the lessons on campus. During these lessons, they received an overview of the didactic potential of using VR resources, along with time to rehearse practical and technical skills as they experimented with the program. In twelve references, the in-service teachers explicitly state that peer cooperation and guidance helped them accomplish the task. Additionally, various statements point to the necessity of individual experimentation, and in 15 references the motivational joys connected with creating and designing virtual products are mentioned. One teacher maintained, 'It was exciting and a little complicated to make virtual worlds that include interactive experiences. When I first came to understand the program, it gave me inspiration and opportunities of creative development that I haven't experienced as a teacher before.'

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Perceived Educational Outcomes

Analysing the data with regard to the last research question (RQ3), which concerns the teachers' perceptions of the potential educational outcomes of the implementation of the immersive learning resource, a cluster of themes emerge. These include 'visual and auditive support' (34 references), 'accessing the inaccessible' (30 references), 'cooperation and creation' (22 references), 'motivation and engagement' (20 references), and 'adaptive education' (18 references). Regarding perceived challenges, a central theme is labelled 'time and cost' (30 references).

Visual and auditive support

Most teachers pointed to the advantage of using immersive virtual scenes like those available in CoSpaces Edu to visualise key concepts, situations or places. Many SEN students, especially those who have difficulties with reading or writing, benefit from compensating learning situations that let them use several bodily senses, including visual and auditive ways of attaining knowledge. The teachers noted that using immersive products in teaching may increase cognitive capacity and thereby ease potential knowledge-building processes. Visualising social situations or objects helped the SEN students to acquire a more concrete understanding of abstract concepts, leading to higher levels of motivation and concentration. Many teachers reported that their SEN students, ordinarily prone to mental and physical distractions, could retain their attention for more extended periods using HMD goggles, which blocked out other interferences and let them interact undisturbed with immersive content.

Accessing the inaccessible

Many teachers observed that immersive scenes allowed the SEN students to access the inaccessible – that is, they facilitated a feeling of being present in situations or at places that would otherwise be too costly or unethical to visit. They mentioned the opportunity to prepare emotionally insecure SEN students for field trips by capturing 360 photos of the physical sites and making these available as immersive scenes in the CoSpacesEdu application, creating predictability. Several also pointed to the opportunity to rehearse social situations such as navigating traffic or approaching other students in the schoolyard or in the classroom. They noted that practicing social skills in a safe environment, using simulated VR scenes, may increase students' perceived security in social situations in real life. Reviewing places or situations in VR allows for an adaptive, and potentially slower, approach to social learning, as scenes may be watched multiple times, offering shared spaces of reflection and alternating perspectives. The scenes even allow for embodied experiences of bullying or social exclusion.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Cooperation and creation

While testing their virtual products with the SEN students, many of the in-service teachers observed that the program would be well suited even for whole class use. Students could design virtual products themselves, which would enrich the didactical toolbox with a creative and immersive way of presenting knowledge. The teachers emphasised that the intuitive and potentially generic features of the application are suitable for inclusive classroom teaching, offering multiple ways of differentiating the content created, and thereby strengthening student cooperation and engagement as they experiment with using an algorithmic approach to learning.

Motivation and engagement

Several teachers reported that experiencing immersive scenes may increase perceptions of self-efficacy among SEN students. This is associated with the visual and auditive support described previously, which makes the subject content more accessible, as well as with the affordance of interactiveness of the scenes, which enables the SEN students to respond to animated 3D objects or answer quiz questions, and receive immediate, encouraging feedback in the form of cheering, clapping, or other visual affirmations. The potential proximity to the simulated social situations is also highlighted, as these offered the SEN students opportunities for experiential rather than theoretical or deductive approaches to learning. The teachers also emphasised bridging the divide between leisure and school-based activities as a benefit of immersive and virtual ways of learning.

Adaptive education

Utilizing immersive VR and AR-based educational resources can also facilitate adaptive learning processes. The CoSpaces Edu application allows teachers to create content that suits the individual needs of SEN students, as the code-blocking features open limitless ways of designing virtual scenes, stories and situations. The teachers regarded this as a benefit, stressing that confining each student in HMD goggles enables invisible differentiation of content knowledge, leaving other students out of the individually adapted virtual worlds. The opportunity to isolate scenes or situations that address specific special education needs, such as the need for predictability and the rehearsal of social skills, was even stressed as a vital advantage.

Time and cost

Many in-service teachers described the process of developing the virtual worlds as very time-consuming, thus representing a challenge to the feasibility of a VR and AR-based approach to teaching. Given the load of administrative, pedagogical, and social tasks that the average teacher must accomplish daily,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

they found the process of utilising immersive technologies as demanding in terms of time and effort. Yet some of them realised that once the initial and most time-consuming tasks involved in making the virtual scenes had been completed, the block-coding and creation of the virtual scenes released creative energies not commonly utilised in their everyday teaching practice. The value of reuse, having developed a virtual product, is almost infinite, some of them argued. Many of the teachers even maintained that they could easily imagine facilitating didactical approaches with immersive resources if the students themselves were the designers. However, this would require schools to allow for necessary disbursements for hardware equipment and software, and most of the teachers were sceptical as to whether this would ever be prioritised by their school administrations. Consequently, the potential of didactical approaches with immersive technologies remains uncertain for the foreseeable future.

DISCUSSION

The findings show that most of the SEN students responded with excitement to the virtual scenes their teachers created, and the playful and explorative immersion in social stories was an appealing and effective way of enhancing perceptions of security and predictability for many of them. This confirms that many of the participating teachers succeeded in overcoming the first-, second- and third-order barriers to implementing of immersive technology. Although their iterational dimension of agency lacked experiences connected to use of immersive technologies, they managed to use their practical and evaluative agency to create transformative didactical approaches, widening their projective agency as they anticipated a range of future trajectories of learning. This finding suggest that bridging the gap between the reported benefits of educational use of immersive technologies and actual practice is feasible. Creating innovative teaching–learning cycles with immersive technologies that lead to flexible, accessible, and adaptable learning trajectories for SEN students (Tekedere and Göker, 2016; Bradley and Newbutt, 2018; Bradley et al., 2019; Santa-María et al., 2021) is not beyond reach, even for inexperienced teachers. Whereas previous studies have found that didactic approaches with CoSpaces Edu may meet individualised learning needs, facilitate creative learning processes (Valero-Franco and Berns, 2024), and lead to perceived challenge and personal achievement (Khattib and Alt, 2024), this study shows that these educational outcomes are achievable even when teachers with no pre-training are the designers.

Toom et al. (2021) identified a conceptual link between professional teacher agency and the capability to promote innovative learning paths, and this study has shown that developing teacher agency is essential to the feasibility of

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

immersive teaching pracices. Participating in assignments like those orchestrated in this study may enhance a teacher's professional agency to promote active and skillful learning, as well as to innovate and instigate educational transformation in schools. Almost every teacher who initially experienced uncertainty or perceived the project as inadequate changed their views once their virtual stories proved effective in meeting their students' educational needs. This suggests that developing teacher agency is inherently linked to the intentional orchestration of learning activities, through which cognitive, motivational, and attitudinal capacities are cultivated via participation, contribution and constructive collaboration, in line with the propositions of Toom et al. (2021).

The process of designing personalised learning resources triggered the teachers' practical-evaluative agency both as they designed social stories adaptable to the special education needs of their students and as they facilitated the dialogues that followed the exploration of the virtual scenes. The teachers successfully overcame the third-order design barrier as their imaginative agency allowed them to create stories that promoted engagement and opened spaces for dialogues. However, the data material even indicates that some teachers only partially succeeded in designing social stories that engaged their SEN students. Some referred to struggles utilising the code-blocking or animating features in the application, resulting in social stories that were either too simplistic or unrealistic to trigger feelings of immersion or identification. Nonetheless, it is worth noting that the special education needs of the students conceivably could have been adressed through a range of educational approaches other than creating virtual social stories. The mere act of designing a personalised learning resource for a SEN student may, in and of itself, yield positive effects, regardless of the actual quality of the intervention. Yet the findings in this study suggest that when previously inexperienced teachers create immersive content, student engagement, participation, and personal fulfilment may emerge in ways unforeseen by the teachers and not previously accounted for research literature.

Finally, the analysis shows that the process of developing and testing immersive learning resources triggered the teachers' projective dimension of human agency as multiple ways to acquire new knowledge along transformational learning paths were opened, providing visual and auditive support and opening spaces to visit the inaccessible through immersion in simulated, but realistic, social stories. This led to changes affecting the second-order barrier, enabling transformations in the teachers' habits of mind concerning potential trajectories of learning for their SEN students and the transformation of their own learning. However, to many teachers, the challenge of mastering the 360-degree technology remained a prospective barrier to the successful implementation of immersive didactics in education, thus emphasising the continued

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

presence of a significant first-order barrier. The data material thereby reveals contrasting percpetions of immersive technology implementation, with aspirations of meaningful, exhilarating, and deep learning processes on the one hand and concerns of time-inefficiency, technological challenges, and the improbabiity of substantial investment in equipment on the other.

LIMITATIONS

The findings in this chapter are based on the perceptions of the teachers who participated in the study. There is an obvious risk of bias, as some of the teachers might have idealised or embellished the results of their trials, given that they were performing compulsory coursework. However, the questions asked in the course assignment encouraged a critical stance towards their trials, and the submissions were evaluated as 'pass' or 'fail' and not graded. Further, the study did not include control groups deploying alternative didactical approaches to verify the findings by comparison. The trials initiated during relatively brief and introductory courses on campus, followed by short timespans of designing, developing, and testing the virtual products before exposure to the SEN students. More longitudinal studies are therefore needed to verify the results. Additionally, the products were tested across 41 local schools in Southern Norway, and diverse didactical contexts and structural conditions influenced the outcomes of each intervention. This contextual variability should be considered when evaluating the transferability of the findings. Lastly, although the virtual products were tested on SEN students with a range of educational needs, future research should focus on the perceived experiences or effects on students with specific diagnoses or syndromes.

IMPLICATIONS

This chapter suggests that even short-spanned teacher-training courses using immersive technologies may open learning spaces for SEN students that allow for knowledge creation along different trajectories from those favouring more traditional linear-textual ways of learning. Enhancing professional teacher agency during a transient course such as the one employed in this study may result in a perceived plethora of innovative ways of approaching immersive educational resources. Nonetheless, follow-up studies are required to weigh the promising benefits against the first-order barriers, which still require time, effort, and money if a large-scale educational implementation of immersive technology such as CoSpaces Edu is to be considered attainable.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

REFERENCES

Aagaard, T. and Lund, A. (2020). *Digital agency in higher education*. Routledge Focus.

Abedi, E.A. and Ackah-Jnr, F.R. (2023). First-order barriers still matter in teachers' use of technology: an exploratory study of multi-stakeholder perspectives of technology integration barriers. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, *19*(2), 148–165.

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th edn). American Psychiatric Publishing.

Blundell, C., Lee, K.-T. and Nykvist, S. (2020). Moving beyond enhancing pedagogies with digital technologies. Frames of reference, habits of mind, and transformative learning. *Journal of Research on Technology in Education*, *52*(2), 178–196. https://doi.org/10.1080/15391523.2020.1726235

Bower, M., DeWitt, D. and Lai, J.W.M. (2020). Reasons associated with preservice teachers' intention to use immersive virtual reality in education. *British Journal of Educational Technology*, *51*(6), 2214–2232. https://doi.org/10.1111/bjet.13009

Bradley, R., Conley, I. and Newbutt, N. (2019), Using virtual reality head-mounted displays in schools with autistic children: views, experiences, and future directions. *Cyberpsychology, Behavior, and Social Networking*, *23*(1). https://doi.org/10.1089/cyber.2019.0206

Bradley, R. and Newbutt, N. (2018), Autism and virtual reality head-mounted displays: a state of the art systematic review, *Journal of Enabling Technologies*, *12*(3), 101–113. https://doi.org/10.1108/JET-01-2018-0004

Braun, V. and Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Cassell, J. (2004). Towards a model of technology and literacy development: story listening systems. *Journal of Applied Developmental Psychology*, *25*(1), 75–105.

Cassell, J. and Bickmore, T. (2003). Negotiated collusion: modeling social language and its relationship effects in intelligent agents. *User Modeling and User-Adapted Interaction*, *13*(1–2), 89–132.

Checa-Domene, L., García-Martínez, I., Gavín-Chocano, O. and García-Valdecasas Prieto, M. (2024). Augmented and virtual reality as a teaching resource to attend to the diversity of students with special educational needs: a systematic review, *European Journal of Special Needs Education*, *39*(5), 709–728. https://doi.org/10.1080/08856257.2023.2282247

Cobb, S., Neale, H., Crosier, J., & Wilson, J. R. (2002). *Applied Virtual Environments to support learning of social interaction skills in users with Asperger's Syndrome. Digital Creativity, 13*(1), 11–22. DOI: 10.1076/digc.13.1.11.8016.

Davis, W.S. and Borden, R. (2025). Examining the resilience of two early career world language teachers: a two-year case study. *Language, Culture and Curriculum*, *38*(1), 1–18. https://doi.org/10.1080/07908318.2024.2369581

Emirbayer, M. and Mische, A. (1998). What is agency? *American Journal of Sociology*, *103*(4), 962–1023.

Ertmer, P.A., Ottenbreit-Leftwich, A.T., Sadik, O., Sendurur, E. and Sendurur, P. (2012). Teacher beliefs and technology integration practices: a critical relationship. *Computers and Education*, *59*(2), 423–435.

European Commission (n.d.). *Models for SDGs. Goal 4: Quality education*. An official website of the European Union. https://knowsdgs.jrc.ec.europa.eu/contribution-goal-by-goal

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Gal, E., Weiss, P.L.T., and Massimo Zancanaro (2019). Using innovative technologies as therapeutic and educational tools for children with autism spectrum disorder. In A. 'Skip' Rizzo and S. Bouchard (eds), *Virtual reality for psychological and neurocognitive intervention* (pp. 227–246). Virtual Reality Technologies for Health and Clinical Applications, Springer. https://doi.org/10.1007/978-1-4939-9482-3_10

Heikkilä, A., Lonka, K., Nieminen, J. and Niemivirta, M. (2012). Relations between teacher students' approaches to learning, cognitive and attributional strategies, well-being and study success. *High. Educ.*, *64,* 455–471.

Hinostroza-Paredes, Y. (2020). University teacher educators' professional agency: a literature review. *Professions and Professionalism*, *10*(2). https://doi.org/10.7577/pp.3544

Jensen, L. and Konradsen, F. (2018). A review of the use of virtual reality head-mounted displays in education and training. *Education and Information Technologies*, *23*, 1515–1529. https://doi.org/10.1007/s10639-017-9676-0

Ketelaar, E., Beijaard, D., Boshuizen, H.P.A. and Den Brok, P.J. (2012). Teachers' positioning towards an educational innovation in the light of ownership, sensemaking and agency. *Teach. Teach. Educ., 28*, 273–282.

Khattib, H. and Alt, D. (2024). A quasi-experimental study on the advantages of digital gamification using CoSpaces Edu application in science education. *Education and Information Technologies*. https://doi.org/10.1007/s10639-024-12635-w

Laurillard, D., Kennedy, E., Charlton, P., Wild, J. and Dimakopoulos, D. (2018). Using technology to develop teachers as designers of TEL: evaluating the learning designer. *British Journal of Educational Technology*, *49*(6), 1044–1058.

Madigan, D.J. and Kim, L.E. (2021). Towards an understanding of teacher attrition: a meta-analysis of burnout, job satisfaction, and teachers' intentions to quit. *Teaching and Teacher Education*, *105*, 103425. https://doi.org/10.1016/j.tate.2021.103425

Magomadov, V. S. (2020). Examining the potential of VR and AR technologies for education. *Journal of Physics: Conference Series 1691* (2020), 012160. https://doi.org/10.1088/1742-6596/1691/1/012160

Marshall, C. and Rossman, G.B. (2011). *Designing qualitative research,* 5th edition. SAGE.

Mishra, P. and Henriksen, D. (2018). *Creativity, technology and education: exploring their convergence*. Springer.

Mitchell, P., Parsons, S. and Leonard, A. (2007). Using virtual environments for teaching social understanding to adolescents with autistic spectrum disorders. *Journal of Autism and Developmental Disorders*, *37, 589–600.*

Ness, O. and von Heimburg, D. (2021). Aksjonsforskning: Samskapt kunnskap som endrer liv og samfunn [Action research: co-created knowledge changing lives and society]. In D. von Heimburg and O. Ness (eds), *Aksjonsforskning: Samskapt kunnskap som endrer liv og samfunn* (pp. 19–33). Fagbokforlaget.

Nyheim, M., Tangvold, K., Beghdadi, M. and Kaland, N. (2023). *Sosiale historier som metode [Social stories as method].* Kommuneforlaget.

Østern, T.P., Dahl, T., Bjørkøy, I., Skjøstad Hovde, S., Golovatina-Mora, P. and Martin, R. (eds) (2024). Performativ læring for performativ utdanning [Performative learning for performative education]. In T.P. Østern, T. Dahl, I. Bjørkøy, S. Skjøstad Hovde, P. Golovatina-Mora and R. Martin (eds), *Performativ læring. Skapende og samskapende utdanning.* Universitetsforlaget.

Parsons, S., Mitchell, P. and Leonard, A. (2004). The use and understanding of virtual environments by adolescents with autistic spectrum disorders. *Journal of Autism and Developmental Disorders*, *34*, 449–466.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Parsons, S., Mitchell, P. and Leonard, A. (2005). Do adolescents with autistic spectrum disorders adhere to social conventions in virtual environments? *Autism*, *9*, 95–117.

Parsons, S., Leonard, A. and Mitchell, P. (2006). Virtual environments for social skills training: comments from two adolescents with autistic spectrum disorder. *Computers and Education*, *47*, 186–206.

Priestley, M., Biesta, G.J.J. and Robinson, S. (2015). Teacher agency: what it is and why it matters. In J. Evers and R. Kneyber (eds), *Flip the system: changing education from the ground up*. Routledge. https://doi.org/10.4324/9781315678573-15.

Ryokai, K., Vaucelle, C. and Cassell, J. (2003). Virtual peers as partners in storytelling and literacy learning. *Journal of Computer Assisted Learning*, *19*, 195–208.

Saariaho, E., Pyhältö, K., Toom, A., Pietarinen, J. and Soini, T. (2016). Student teachers' self- and co-regulation of learning during teacher education. *Learning: Research and Practice, 2(*1), 44–63. https://doi.org/10.1080/23735082.2015.1081395.

Santa-María, R.M., Núñez, B.F. and Sánchez-Ortega, P.L. (2021). La realidad aumentada como recurso didáctico para el alumnado con necesidades educativas especiales [Augmented reality as didactic resource for students with special education needs]. In M.C. Pérez-Fuentes (Ed.), *Innovación docente e investigación en educación*. Dykinson.

SikLányi, C. and Tilinger, A. (2004). Multimedia and virtual reality in the rehabilitation of autistic children. In K. Miesenberger (ed.), *IHCCP 2004, LNCS 3118* (pp. 22–28). Springer.

Skaug, J.H., Husøy, A., Staaby, T. and Nøsen, O. (2020). *Spillpedagogikk* [The pedagogy of gaming]. Fagbokforlaget.

Smith-Gahrsen, M. and Beckmann, M. (2024). Opplevelse og læring med virtuelle ekskursjoner i KRLE [Experience and learning with virtual excursions in religion and worldview education]. In C.E. Tømte, A. Lien, I. Trysnes and M. Smith-Gahrsen (eds), *Lærerrollen i endring. Studentaktive læringsformer og profesjonsfaglig digital kompetanse* (pp. 47–72). Universitetsforlaget.

Strickland, D., Marcus, L. M., Mesibov, G. B., & Hogan, K. (1996). Brief Report: Two Case Studies Using Virtual Reality as a Learning Tool for Autistic Children. *Journal of Autism and Developmental Disorders, 26(6), 651–659.* DOI: 10.1007/BF02172354.

Tartaro, A. (2011). Authorable virtual peers: technology as an intervention for difficulties with peer social interaction in autism spectrum and related disorders. Doctoral dissertation, Northwestern University, Evanston, IL.

Tekedere, H. and Göker, H. (2016). Examining the effectiveness of augmented reality applications in education: A meta-analysis. *International Journal of Environmental and Science Education*, *11*(16). https://files.eric.ed.gov/fulltext/EJ1118774.pdf

Toom, A., Pyhältö, K., Pietarinen, J. and Soini, T. (2021). Professional agency for learning as a key for developing teachers' competencies? *Educ. Sci.*, *11*, 324. https://doi.org/10.3390/educsci11070324

Tsai, C.C. and Chai, C.S. (2012). The 'third'-order barrier for technology-integration instruction: implications for teacher education. *Australasian Journal of Educational Technology*, *28*(6), 1057–60.

Valero-Franco, C. and Berns, A. (2024). A virtual reality app created with CoSpaces: Student perceptions and attitudes. In M. Bowdon, K. Yee and W. Dorner (eds), *Ethical considerations of virtual reality in the college classroom* (pp. 164–179). Routledge. https://doi.org/10.4324/9781003329718

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

PART III

Responsible and ethical digital transformation

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

9. The ethical dilemmas of building a safe society

Jaanika Puusalu

INTRODUCTION

This chapter analyses the ethical dilemmas that emerge from the possibility of using data analysis (including automated decision-making and artificial intelligence systems)[1] to ensure internal state security in the modern digitally enhanced state. To do so, it draws on the critical theory tradition, and more specifically, critical theory's communicative turn as represented by Juergen Habermas's account of the discourse-enabling public sphere (Habermas, 1989) and the rules governing open discourse in that sphere (Habermas, 1984, 1990, 1992).

Critical theory refers to a loosely defined tradition of Marx-influenced social and political thought, connected by a concern for identifying and explaining the forces of domination operating within a given society, especially the capitalist economic system, with the aim of bringing to light the possibility of change (Celikates and Flynn, 2023). It is most often associated with the Frankfurt School thinkers Adorno, Horkheimer and Marcuse, but also, less canonically, with figures such as Fromm, Habermas, Honneth and Jaeggi. A recurring feature of work within the tradition – taken directly from Marx's analysis of the capitalist system of his time – is the central role attributed to technology. Herbert Marcuse offers a clear expression of this in his 1941 essay 'Some Implications of Modern Technology':

> We do not ask for the influence or the effect on the human individuals. For they are for themselves an integral part and factor of technology, not only as the men who invent or attend to machinery but also as the social groups which direct its applications and utilizations (Marcuse, 1978, p. 138).

In other words, technological developments not only influence but are also always integral to the nature of the prevailing socio-political reality; and the life of the individual within it. Insofar as technological development is (often)

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

driven by the aims of empowering the economy, creating certain kinds of value for the owner and/or users, and optimising the state and state functioning, therefore, these values are also a part how society, the state and the individual are constituted. Correspondingly, transformative technologies also lead to socio-political transformations of society, state and the individual.

This chapter adopts this critical theory perspective on technology to suggest that contemporary society, the contemporary state, and thus the contemporary individual are all undergoing such a transformation via the phenomenon of digitalisation.

Digitalisation can be understood as a process occurring at different societal and organisational levels where the adoption of digital technologies leads to the enhancement of products and services; new means for carrying out state, public sector and individual activities; and the creation of new kinds of digital artefacts. At the core of digitalisation is digitisation, which refers to the technical processes of converting analogue data to digital data as well as generating new digital data, digital data storage and digital data processing (Frenzel et al., 2021). Crucially, digitisation has made it possible to easily access data and build datasets on a massive scale, which in turn has facilitated the development of a huge variety of novel ways of analysing and processing that data. It is these two consequences of digitisation, then, that underwrite the functionality of the various digital products, services and means that digitalisation consists of.

Echoing the critical theory view of technology, digitalisation is often presented as a disrupting and transformational force that will lead to the emergence of new socio-economic realities (Gradillas and Thomas, 2025), whereby the attitudes towards those transformations are optimistic, at times even utopian (Nyhlén and Gidlund, 2022). In this regard, digitalisation is seen to have the potential to enhance all fields of life: from (re)organising the public sector, governance, healthcare and policing (Kraus et al., 2021), to creating opportunities for businesses and enterprises in the private sector, to changing how individuals conduct their everyday life, whether in terms of remote work (Šímová, 2022), education (see Oomen-Early and Early, 2015; Kumar Basak et al., 2018), or new leisure activities (Rojas de Francisco et al., 2016).

Whatever benefits digitalisation might bring, however, the combination of its scope and momentum raises the concern that any resulting transformations of socio-political reality will be, in some sense, inevitable and outside of the influence of society and the individual. This idea resonates with a further theme running through the critical theory tradition: how technology – for instance, the emergence of mass media – can foster a certain kind of passivity towards its own role in determining the content of the societal norms and values that individuals live under (Eley and Palmowski, 2007; Habermas, 1989). While this potential for technology to be a vector of domination may be central to critical theory, however, this is not to say that the tradition holds that

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

the individual must passively accept it as such. Rather, as especially comes through in the work of Juergen Habermas, active engagement by society members (citizens) in determining what the prevailing norms and values are – and thus what the socio-political reality is and how they live – is a fundamental feature of any well-functioning (democratic) society or state.

Applying this perspective to the current context, then, it follows that neither the nature of the digital transformation of society, nor the norms and values on which it operates, should be taken as given and absolute. Yet, social discourse is nonetheless required concerning whether the social norms and values established prior to large-scale digitalisation and automated digital data need to be renegotiated in contemporary society, what dilemmas and compromises might that involve, and how that can be done.

With this thought in mind, the rest of this chapter adopts a more specifically Habermasian perspective to examine one of the areas where digitalisation has the potential to have the greatest impact, both within that domain and on the socio-political reality more broadly: internal security.

Internal security can be understood as the arm of the state entailing all those services and institutions provided by the state to ensure the safety of its population and a peaceful society within the legal territory of the state. This includes, most obviously, the police, but also, for instance, the border guard, intelligence agencies and the rescue services. Internal security is relevant to the current discussion because it has already been deeply impacted upon by digitalisation and there is great optimism about further developments of this kind. The European Union's digital vision for the decade up to 2030, for example, explicitly highlights the potential of a union-wide digital transformation to enhance the modern justice system, including by increasing the capacities of internal security institutions to engage in collaborative law enforcement and investigation (European Commission, 2021: 12). Likewise, many states and law enforcement agencies are interested in the possibilities for developing digital data-based crime and recidivism prediction tools (Dakalbab et al., 2022). To give one example, in 2025, a freedom of information request by the civil liberties campaign group Statewatch uncovered evidence that the United Kingdom's (UK) Ministry of Justice, commissioned by the office of former Prime Minister Rishi Sunak, is developing a 'murder prediction' tool for UK police that would identify possible killers, based on collecting and processing personal data from both internal and publicly accessible sources (Dodd, 2025).

The previous example well highlights the potential utility of digitalisation in internal security; it also raises alarm bells about the potential harms, whether they stem from data leaks, abuse of the powers afforded by the technologies, or simply when the analyses they produce are unreliable or acted upon in ways that do not match the nature of their outputs. Any implementation of digital technologies in internal security, therefore, raises immediate concerns about

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

how safely the data is collected, stored and analysed; how transparent those processes are; and whether they are carried out in an ethical manner that respects people's individual interests, freedoms and privacy.

The dilemma for the state and internal security institutions, then, is that the potential safety and security benefits of digitalisation, and the ethical issues regarding individual interests, are both grounded in the scale and scope of digitisation. With that in mind, the research question motivating the following discussion is whether it remains possible for the state to simultaneously ensure security, safety and societal well-being while also protecting the interests of the individual members of its population; in particular, with respect to the usage of digital data.

The chapter first briefly introduces Habermas's communication theory of society and democracy. Next, it expands upon the phenomenon of digitalisation in relation to the contemporary society and state, before providing an overview of some of the key concerns about data usage practices in the context of digitalisation. The chapter then draws on Habermas's theory to outline three ethical dilemmas that emerge from the preceding discussion, and highlights why they should be at the centre of discourse about digitalisation, particularly in internal security.

HABERMAS'S COMMUNICATION THEORY: DEMOCRACIES AS SOCIETIES WHERE THE RULES AND NORMS EMERGE FROM DISCOURSE

While Habermas's work owes much to earlier thinkers within the critical theory tradition, as well as his engagement with developmental psychology and the linguistic turn in philosophy, the roots of his theory of democracy can be found in the social contract theories of Thomas Hobbes and Jean Jacques Rousseau.

For both Hobbes (2008) and Rousseau (1993), living as a citizen of a democratic state and being a member of such a society means being subject to a social contract that is determined by the existing structure of the society as well as the agreed-upon social, moral and political norms. This contract between the individual and the state establishes a certain social cohesion and, through ensuring that cohesion, the state protects the livelihood and well-being of the individual. For that to happen, however, the individual needs to give away some of the freedom that is an intrinsic aspect of every human life. Rousseau (1993) even goes as far as to argue that, in becoming a member of society and thus subject to norms and values, the individual is alienated from their true being.

While the cost to the individual is clear, when looked at from the perspective of how that individual can benefit from life in society, it remains a tall

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

order for the state to hold up its side of the bargain. This is because, for the state to secure order and so protect the individual, the individual must follow the rules set by the state as well as recognise the legitimacy of those in power. This is so even for individuals whose personal preferences run counter to the politics of those in power. Correspondingly, to secure the individual's favour, that is, that they prefer to live under the authority of the state and within its structure, the state must recognise the interests of the individual members of society and aim to guarantee, as well as increase, their well-being.

Crucially, reflecting the earlier discussion, the content of this contractual promise does not have a set value and is not absolute. Instead, societal well-being or safety can be conceived and measured in terms of different features and measured according to different metrics: economic well-being, happiness score, crime rates, and so on. For any preferred conception of well-being, however, there must also be a state(s) of unwellness that is in contraposition to it. Hence, if the state sets itself the aim of providing and enhancing well-being as an aim, it necessarily also sets itself the aim of preventing unwellness. Ensuring well-being for the society as a whole may come into conflict with the interests of the individual, therefore, upholding the social contract requires the state to negotiate between the opposing states of well-being and unwellness. This view of social phenomena as a negotiation between different states of being is also consistent with a similar conception of state security whereby the desired state of security is, in principle, coupled with the undesirable state of insecurity (Bigo and McCluskey, 2018). Yet, since the values of individual freedom and privacy are in tension with state-protected security, the social contract requires that the state must negotiate between the desired and the undesired states at the societal level.

Similarly to Rousseau and Hobbes, Habermas also places continuous negotiation and inherent subjectivity at the centre of his conceptualisation of social norms and how they are determined. Crucially, whilst the state aims or agenda may be a product of the negotiation between what is considered to be well-being and what is unwellness, for Habermas the state and/or civic society leaders should not determine the prevalent social values and norms that underwrite that negotiation, including the concept of well-being, in isolation from the perceptions and understandings of the individual members of its population. Vice versa, in a properly functioning (democratic) society, the norms and values that guide society are the outcome of a public discourse in which everyone can participate freely, and the outcome of which is publicly acceptable. Reflecting this central role that he affords to discourse, the focal point of Habermas's political and social/democratic theory is his theory of communication (Habermas, 1984, 1990, 1992), which aims to explain how individuals can coordinate action through communication. It does this by focusing not on the intentions

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

of the speaker but on the function and functions of language in intersubjective relations (Habermas, 1984: 275).

Habermas's theorisation of the 'ideal' rules of free communication and discourse is sophisticated and complex, and there is not the space here to give a detailed account of it. What makes it relevant here, though, is how Habermas explicates the ideal democratic communicative situation, understood as one in which everyone is equal as an interlocutor and recognised in the communicative instance as such, via comparison with its opposing state. In this light, he introduces a distinction between the 'lifeworld' and the 'systems world'. The lifeworld refers to a society in which norms and rules are determined by democratic deliberation, which happens against a shared background of meanings that make free communication possible. The systems world, in stark contrast, refers to a society in which discursive structures are repressed, and the norms and rules are instead determined by the instrumental rationality of technological-economic supremacy (Habermas, 1992: 174).

To relate this idea to the issues regarding digitalisation, digitisation and internal security, then, the point is that simply being led by the potential of this technological shift to enhance well-being or security is a path to a society that resembles the systems world: in which values and meanings are determined by the instrumental rationality of the technology, not communication and discourse, and there is no possibility to negotiate these. To avoid that result, therefore, digitalisation should be seen not only in terms of the objective or quantitative differences that can be made, but also as a process happening in the context of the existing prevailing norms and values of the relevant society, and thus it should be a matter of negotiation in relation to those norms (Richterich, 2018: 24).

With this Habermasian perspective in mind, the following sections introduce some of the key issues and dilemmas posed by digitalisation, specifically as related to the collection and use of digital data.

CONTEMPORARY SOCIETY: THE DOMINANCE OF DATA (USE) (AND THE CONTENT OF TRANSFORMATION)

As noted before, at the core of digitalisation is the process and expanding scope of digitisation. The initial trigger for this can be ascribed to the introduction of the commercial internet at the beginning of the 1990s, which enabled the rapid exchange and collection of data at a global scale, and effectively transformed the individuals and entities sharing that data into machine-readable data nodes. The possibilities presented by these developments were first taken up by private companies, which quickly found uses for digital data in providing customers with novel services, such as social media and instant messaging, and transforming existing services, such as banking, from analogue to digital.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Each new use service and use case – as well as the new technologies that accompanied them, such as smartphones, wearables and smart-home devices – in turn generate additional data points and datasets regarding their users.

While it may have led the way, however, the potential of digitisation and digitalisation is not limited to the private sector. As Giddens (1990) and Mahon (2009) argue, in general, the collection and ownership of data, especially data about individuals, has always had value to the state just as much as it can be a means to have power over its subjects – but also for how statistical knowledge can help a well-functioning state perform its functions – including with regard to internal security. As elsewhere, however, digitisation has vastly increased the scale, value and utility of such data, and consequently has been embraced by many states and other bodies across the full spectrum of state functions. In Estonia, for example, 99 per cent of public services are already available online and with high rates of adoption; for example, the online tax declaration system has near 100 per cent penetration (Solvak and Lauringson, 2024). Meanwhile, as part of its digital agenda, the European Union (EU) has set the goal of similarly making all key public services available online by 2030 (European Commission, n.d.).

Accompanying the development of digital services in both private and public sectors has been the emergence of new ways in which societal developments can be analysed and theorised. The immediate availability of digital data, for instance, has enabled real-time analysis of trends as well as predictions of further developments in human behaviour. At the same time, the scale at which data is collected and the scope of that data, theoretically, makes it possible to analyse such behaviours at a macro/population level directly, for both private and public service users. This can be seen in, for instance, the wide adoption of data-driven population segmentation analysis in medicine (see Yan et al., 2018) and the use of big data analytics in (real-time) urban resources planning and city governance (Soomro et al., 2019). Finally, there is, at least, a widespread assumption that inferences about individual behaviours, traits and characteristics can also be made from the previous two forms of analysis/information. This can be seen, for instance, in the expectation that analysis of activity tracker health data will, in the future, enable highly personalised lifestyle and health monitoring (and so, too, might serve as a means of prevention) (Mair et al., 2022); while, in the context of internal security, it is represented by the idea that data from social media use could help police and first responders to identify risky behaviour (as with the UK's 'murder prediction' plans) or possible victims of crime (Antonius and Rich, 2013).

In regard to these developments, it is perhaps apt to describe the current era as the era of the large dataset-driven society: one in which, to follow Kitchin's suggestion, the primary method for knowledge acquisition is no longer theoretical inference, but direct observation of patterns and connections at a

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

large scale (Kitchin, 2014). To return to the main theme of this chapter, we might say that it is this change in the prevailing epistemological paradigm that underwrites the transformative potential of digitalisation, and it is the implicit assumption that it will lead to qualitative improvement in our socio-political reality that gives it its societal momentum. On that premise, then, understanding the dilemmas and conflicts raised by digitalisation requires understanding the possible failures and harms associated with these large dataset-driven methods of inference, prediction and decision-making. The next section of the chapter introduces some of the core concerns in this regard.

DATA-DRIVEN SOLUTIONS: GROUNDS FOR CAUTION

Inbuilt Biases

Among the benefits of large digital dataset analysis listed by its proponents is that, insofar as the systems performing such analyses are automated, it can remove human subjectivity from decision-making processes. For instance, Rizer and Watney's assessment of risk assessment algorithms used in pre-trial decisions in New York between 2013 and 2018 significantly outperformed judge-made assessments (Rizer and Watney, 2018: 200). Meanwhile, in terms of public attitudes, Kaun et al.'s (2023) study of comparative attitudes toward automated decision-making in European and Scandinavian countries showed an association between lower trust in societal institutions and greater trust in automated decision-making systems; suggesting that implementing such systems might enhance societal trust in such contexts. Nonetheless, it would be a mistake to assume that complete objectivity is a given, and there are grounds for thinking that susceptibility to bias and subjectivity is inherent to such systems. Indeed, to quote Aradau and Blanke from their discussion of facial recognition systems, 'by incorporating automated means of error optimization ... error has become a part of the way a machine learns by itself' (Aradau and Blanke, 2021, p. 7) Moreover, these biases and propensities of error may manifest in ways that are not as immediately apparent as with more analogue approaches; partly because they differ in nature from human propensities for error (see, e.g., Nishant al., 2023).

As described below, there are three principal areas of concern: theory choice, datasets and the replication of existing societal biases. The first concern is a general one: namely, analysis always depends on the question posed and the questioner posing it. Even when working on the same problem and with the same datasets, insofar as researchers have a free hand in determining the parameters according to which an analysis is carried out or how the system performing that analysis operates, it is likely that different groups will not get identical results.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

This applies just as much to automated/digital systems as it does to analogue/human analysis; after all, just as, for instance, human choices determine experimental design, so too do they determine the design of any automated system for processing digital data. To offer a real-world example of this happening in the sphere of internal security, Benbouzid (2019) describes a case in which two parties – a professor in earth sciences who developed an algorithm for earthquake detection, and the developers of the PredPol predictive policing product based on the same algorithm – came to different interpretations of the predictive capabilities of the algorithm even though they used the same methods of evaluation and datasets.

The second concern relates to the content of the datasets on which automated analyses are carried out. Firstly, while the data used to train the system, as well as the data it analyses, will be collected according to certain criteria and grouped into datasets, the sheer size of these datasets in question means that any inclusion and exclusion conditions must be extremely broad. Given this, however, it cannot be assumed that any such dataset will be appropriately representative relative to the purposes for which it is processed. Secondly, and a possible compounding factor for the first issue, is that the behaviour of the users of a service may greatly differ, thus producing quite different kinds of and amounts of data. Importantly, these differences will not necessarily track standard demographic indicators well, such as age group, education or socio-economic status. For instance, many social media platforms allow users relatively fine-grained control of their privacy preferences. However, such preferences may be very individual, thus creating a vector for significant confounding heterogeneity in the data collected. As another example, 'friendship' or 'follow' connections are important data points on many social media platforms; but again, whether a person has many 'friends' or 'follows' or few is likely to be a highly individual matter that may bear little relation to other more generalisable data points.

As is well documented, issues similar to the two concerns described so far not only introduce subjectivity to a system, but they can also do so in a way that leads to unfair or discriminatory treatment, including outputting decisions that repeat and perpetuate existing structural inequalities and inequities (Browning, 2024; Browning and Shahrestani, 2019).

In the United States, for instance, racial discrimination and bias have been identified in a range of automated decision-making systems, including critical systems that support law enforcement, medicine and personnel recruitment. One of the most reported cases is the court decision in *Loomis vs State*, where the COMPAS system – an algorithmic prediction system designed to calculate the likelihood of criminal recidivism – attributed a high criminality score to Mr Loomis, a black man, which the judge presiding took into account when delivering a sentence of six years jail time for eluding an officer when found

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

driving a car that had been used for a shooting. An analysis of data acquired through a public data request conducted for ProPublica found, however, that COMPAS criminality scores are significantly higher for people with darker skin tones and significantly lower for people with lighter skin tones (Larson et al. 2016; for further discussion, see Israni, 2017). Based upon this apparent bias (which the defence suggested was partly explained by the system's taking gender and race into account), as well as the lack of transparency as to how the closed-source system functions, the defence appealed the decision to the United States Supreme Court; however, it was not heard.

Gerards and Zuiderveen (2021: 4) point out that the challenge of removing unfairness from data analytics-based decision-making systems (especially those based on artificial intelligence) may be more complex than it initially seems. In particular, from browser usage information to house numbers, data points are not limited to those straightforwardly connected to so-called protected characteristics, and thus protected under, at least, EU law. Plausibly, though, any data point creating 'differentiation could still be unfair, for instance, if it reinforces social inequality' (Gerards and Zuiderveen, 2021: 2). Moreover, systems that are led by large datasets may give weight in their analyses to much irrelevant information, or produce irrelevant criteria on the basis of that. For instance, a traffic accident analysis system may give weight to a correlation between accidents and house number, even though there is no causal relationship between the two (Gerards and Zuiderveen, 2021: 17). Thus, the additional question arises as to how to eliminate – and regulate – not only discriminatory treatment but also incoherent treatment; that is to say, discrimination in its neutral sense (Gerards and Zuiderveen, 2021: 6). Adding to the problem is that while discrimination is prohibited by law and so relatively clearly defined, it is difficult to establish what counts as unequal or unfair treatment in this more neutral sense, despite the fact that it too can impair people's well-being or undermine their dignity; and, indeed, in previously unseen ways (Gerards and Zuiderveen, 2021: 15; Howard and Borenstein, 2018).

Enhanced Analysis Needed for Safety and Well-Being

The vectors of subjectivity discussed in the previous section represent a general problem for any digital decision-making system or mode of analysis. More specific concerns arise when we turn to the use of data at a societal level, including state use for internal security.

Public awareness of the methods and technologies used in the security sector, as well as the breadth of data collected and analysed, were raised by the publication of information leaked by Edward Snowden in *The Guardian*, *The Washington Post* and various other international newspapers in early June 2013 about the PRISM programme clandestinely run by the NSA in the United

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

States. PRISM employed – alongside more conventional surveillance tools – digital data collection and data mining with the aim of uncovering patterns that might be indicative of terrorist activity or intentions. The clandestine nature, secrecy and implementation of the PRISM programme raised a significant number of legal and moral issues. Yet, putting these aside, a fundamental issue with the kinds of digital analysis employed in PRISM is that they can be deceptive insofar as 'correlations among data indicate only that a particular pattern displayed by a person (probably only identified at the metadata level at this point) looks like what a terrorist would display, but it does not mean that the individual is in fact a terrorist' (Lahneman, 2016: 710–711).

Overall, the so-called international fight against terrorism has played a key role in stimulating discussion surrounding the collection and use of data, including publicly accessible data, for security purposes; as well as helping to shed light on the complex relationship between ensuring security and ensuring human rights. Central to this discussion is the tension between public security and individual privacy, especially regarding how digitisation has enabled the collection and analysis of data related not only to large-scale security threats, but also to the individual as a potential threat. It is worth noting that data analysis systems such as HUMINT (intelligence gathering by humans and through human relationships) and OSINT (intelligence gathering from open sources) have long been employed for security purposes (Schaurer and Störger, 2013). However, digitisation has massively increased their capacity (Braynea, 2017: 994). From the security side, access to information referring to an individual's identity, behaviour and movements, for instance, is necessary to provide public safety. Thus, people who advocate for safeguarding this data could also be considered to be rejecting a potentially key means to enhancing security and so, too, resisting a key means to enhance societal well-being (Richterish, 2018: 45). The flip side, reflecting the previous points, is that such systems might lead to the unfair treatment of the individuals they make predictions about.

Discussions in healthcare – another field where there is huge potential to use previously untapped forms of data; for instance, analysing Google searches to track the spread of a virus (Sorell, 2020) – well illustrate this conflict. As Asgarinia points out, the use of large dataset-driven methods to make predictions or suggestions on individual care may put fairness 'at stake because an individual may be judged or treated based on merits or characteristics that he or she did not acquire voluntarily, such as a poor health condition' (Asgarinia, 2023: 65). From that perspective, it would seem that even minimally invasive interventions with significant societal benefits, such as precautionary health screenings, should be voluntary; and the status quo, in which the individual is responsible for the decision as to whether they want to be subject to care or not, should be maintained. Some states' handling of the COVID-19 pandemic, on the other hand, made a convincing case for the benefits of adopting new digital

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

services and expanding the use of citizen data to enhance the well-being of the whole society (understood in terms of physical health) and protect the most vulnerable groups. For instance, the fact that installation of a movement-tracking app on people's phones in South Korea was mandatory is considered to have been a significant factor in the country's early success in managing the virus (Sorell, 2023).

Putting aside the potential conflicts with privacy, Miller and Smith point out that a further concern with the implementation of digital technologies in extreme situations is how they can lead to function creep (Miller and Smith, 2023: 50): that is, when technology and data analysis used under exceptional circumstances becomes normalised by society despite how it might conflict with existing norms, and that leads to continuing use of similar technology and analysis when the situation is over. This phenomenon can already be seen in the security field. For instance, Safdar et al. (2016) discuss how, despite its limited effectiveness with regard to public safety on its own, the data provided by closed-circuit television (CCTV) networks has enabled the development of powerful facial recognition tools that can be seamlessly integrated into those networks. With the increasingly comprehensive CCTV networks already in place (see Bauman and Lyon, 2013), there is already evidence of some internal security organisations implementing these functions without public debate (for discussion of these examples and issues, see Hill et al., 2022).

That finishes the discussion of the development of digital and data-driven technologies. In the following section, I bring this together with the Habermasian framework introduced earlier to identify the central dilemmas faced by society, the state and the individual that should form the basis of discourse concerning the issues discussed so far.

ETHICAL DILEMMAS

One of the central themes of the discussion in the preceding sections was how the momentum of the promises of digitalisation has, on its own, accelerated that process; even when the outputs of the relevant technologies or their implementations can be considered controversial, intrusive or even harmful. As per the Habermasian framework introduced earlier, this suggests that digitalisation could transform social reality, not for the better, but into the systems world. In this light, this section builds upon that discussion to sketch out the foundational dilemmas between norms, values and promises on which the discourse about the social implementation of data-driven services and solutions necessary to avoid this should be built. These dilemmas can each be seen from the perspectives of the society, the state and the individual.

From the perspective of society, the overarching dilemma is how to balance the interests of the collective with the interests of the individual. Accordingly,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

if increased use of data is deemed to benefit the whole society, should an increase in the data shared become a new social norm, or should individuals have the right to reject this demand?

The key point here, as the discussion has indicated, is that the capacity of a system for automated data analysis to identify significant patterns or connections is dependent on it having a large enough dataset for its intended purpose. Correspondingly, when we talk about advancing collective interests via data analysis – in principle – the capacity of the system doing that analysis would be at its greatest if the system had access to the data of all the individuals in that society. In other words, the greatest collective benefits would come at the expense of individuals divulging a massive amount of data on themselves – including data that they would not otherwise voluntarily share and have good reason not to – and whereby doing so may not be in their interests. For instance, the data that could be utilised to enhance public health services includes data that might indicate if a woman is pregnant. In certain legal contexts, however, revealing that information may simultaneously lead to a situation where that woman loses control over decisions concerning her body. Moreover, as discussed previously, even if a system is reliable overall, it is likely to be inherently subject to bias and error in ways that can lead to unfair and unjust treatment of the people involved in individual cases.

Moving on to the state, the central dilemma from this perspective is derived from the societal dilemma as it manifests in the context of the state's responsibilities to protect and enhance the security of the society and the well-being of its members (Drewer and Miladinova, 2017). Most acutely, the state faces the question of whether it should push for the wider implementation and uptake of digital solutions – especially in the public sector – to guarantee the security of society or maintain the current social agreement, accept that there is a limit to how far security can be enhanced through data use before the state oversteps its limits, and continue to follow existing norms and regulations regarding individual rights to privacy.

Finally, the ethical dilemma for the individual that emerges with the possibility of further data use is one related to trust: that is, considering the issues concerning possible further data use, does the individual trust the state – as a data collector and processor – to use data purposefully and without harming them, or do they advocate for maintaining their right to anonymity and resisting further data sharing?

Relating to this question, Waldman (2018) argues that information and privacy in the context of the use of digital tools is a social construct based on the trust of social sharers: people and intermediaries of internet services. When we are told that privacy and data exchanges are protected, in an ideal situation we can assume that the data will be handled and shared with due consideration for the individual. In other words, in a truly democratic environment, we

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

should ascribe trust to the data user by default, especially if the data user's purported aim in collecting and using the relevant data is to enhance societal well-being (Bauman and Lyon, 2013). The socially constructed perception of fair use, however, is easy to break (Lupton and Michael, 2017). For instance, inadequate privacy and data protection policies can undermine general trust in state services, as can inbuilt discrimination and inequality; and a lack of transparency in services and systems can increase people's alienation from the state, thus generating more general distrust in the state as a data user. Importantly, while the dilemma of whether to trust the state arises at the individual level, a lack of trust may lead to resistance to state intervention, which in turn may compromise the state in its capacity to maintain social cohesion and guarantee security and well-being. Thus, the consequences of the individual's position spread out to the societal level, too.

Having presented these three dilemmas, it is crucial to reiterate that – according to the Habermasian perspective – the point is not to suggest that there is some correct solution to each dilemma that the society, state and individual should all arrive at. Rather, as is the case for democratic societies in general, questions about the state's (potential) implementation of digital and data-driven technologies for the purposes of ensuring security and well-being must be addressed via democratic discourse that takes into account both the potential of those technologies and the existing background of social norms and values. And, insofar as that discourse entails a negotiation between the perspectives of the society, the state and the individual, these dilemmas should form a central part of that discourse.

NOTE

1. Given the contentiousness of questions including whether machines or digital systems could ever be genuine artificially created intelligence and whether the current level of data analysis-based tools would qualify as such if it is possible, this chapter does not discuss artificial intelligence (AI) in specific detail. Having said that, since the current so-called AI systems are also enabled by the same kind of large datasets as other technologies discussed here, the same points extend to those systems.

REFERENCES

Antonius, N., and Rich, L. (2013). Discovering collection and analysis techniques for social media to improve public safety. *The International Technology Management Review*, *3*(1), 42–53. https://dx.doi.org/10.2991/itmr.2013.3.1.4

Aradau, C., and Blanke, T. (2021). Algorithmic surveillance and the political life of error. *Journal for the History of Knowledge*, *2*(1), 1–13. https://doi.org/10.5334/jhk.42

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Asgarinia, H. (2023). Big data as tracking technology and problems of the group and its members. In K. Macnish and A. Henschke (eds), *The Ethics of Surveillance in Times of Emergency* (pp. 60–75). Oxford University Press. https://doi.org/10.1093/oso/9780192864918.003.0005

Bauman, Z., and Lyon, D. (2013). *Liquid Surveillance*. Polity Press.

Braynea, S. (2017). Big data surveillance: the case of policing. *American Sociological Review*, *82*(5), 977–1008. https://doi.org/10.1177/0003122417725865

Benbouzid, B. (2019). Values and consequences in predictive machine evaluation. A sociology of predictive policing. *Science and Technology Studies*, *32*(4), 119–136. https://doi.org/10.23987/sts.66156

Bigo, D., and McCluskey, E. (2018). What is a PARIS approach to (In)securitization? Political anthropological research for international sociology. In A. Gheciu and W.C. Wohlforth (eds), *The Oxford Handbook of International Security* (pp. 116–130). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780198777854.013.9

Browning, J.G. (2024). Lawyers don't have disciplinary hearings – real lawyers do: the ethical risks and responses in using generative artificial intelligence. *Georgia State University Law Review*, *4*, 917–955.

Browning, J.G., and Shahrestani, A. (2019). Ghosts in the machine: algorithmic bias and the courts. *Computer and Internet Lawyer*, *36*(12), 1–7.

Celikates, R., and Flynn, J. (2023, winter). Critical theory (Frankfurt School). In E.N. Zalta and U. Nodelman (eds), *The Stanford Encyclopedia of Philosophy*. https://plato.stanford.edu/archives/win2023/entries/critical-theory/

Dakalbab, F., Talib, M.A., Waraga, O.A., Nassif, A.B., Abbas, S., and Nasir, Q. (2022). Artificial intelligence and crime prediction: a systematic literature review. *Social Sciences and Humanities Open*, *6*(1). https://doi.org/10.1016/j.ssaho.2022.100342

Dodd, V. (2025, 8 April). UK creating 'murder prediction' tool to identify people most likely to kill. *The Guardian*. https://www.theguardian.com/uk-news/2025/apr/08/uk-creating-prediction-tool-to-identify-people-most-likely-to-kill

Drewer, D., and Miladinova, V. (2017). The BIG DATA challenge: impact and opportunity of large quantities of information under the Europol Regulation. *Computer Law and Security Review*, *33*(3), 298–308. https://doi.org/10.1016/j.clsr.2017.03.006

Eley, G., and Palmowski, J. (2007). *Citizenship and National Identity in Twentieth-Century Germany*. Stanford University Press.

European Commission (n.d.). *Europe's Digital Decade: Digital Targets for 2030*. Retrieved 13 April 2025 from https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

European Commission (2021, March 9). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*. [2030 Digital Compass: the European way for the Digital Decade. Brussels, 9.3.2021 COM(2021) 118 final]. Retrieved 13 April 2025 from https://commission.europa.eu/system/files/2021-09/communication-digital-compass-2030_en.pdf

Frenzel, A., Muench, J.C., Bruckner, M.T., and Veit, D. (2021). Digitization or digitalization? Toward an understanding of definitions, use and application in IS research. *AMCIS 2021 Proceedings*, *18*. https://aisel.aisnet.org/amcis2021/adv_info_systems_general_track/adv_info_systems_general_track/18

Gerards, J., and Zuiderveen, F. (2021). Protected grounds and the system of nondiscrimination law in the context of algorithmic decision-making and artificial

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

intelligence. *Colorado Technology Law Journal*, *20*, 1–56. https://dx.doi.org/10.2139/ssrn.3723873

Giddens, A. (1990). *The Consequences of Modernity*. Stanford University Press.

Gradillas, M., and Thomas, L.D.W. (2025). Distinguishing digitization and digitalization: a systematic review and conceptual framework. *Journal of Product Innovation Management*, *42*(1), 112–143. https://doi.org/10.1111/jpim.12690

Habermas, J. (1984). *The Theory of Communicative Action, Vol. 1. Reasons and the Rationality of Society*. (T. McCarthy, Trans.). Beacon Press. (Original work published 1981).

Habermas, J. (1989). *The Structural Transformation of the Public Sphere*. (T. Burger and F. Lawrence, Trans.) Polity Press. (Original work published 1962).

Habermas, J. (1990). *Moral Consciousness and Communicative Action*. (T. Burger and F. Lawrence, Trans.) Polity Press. (Original work published 1983).

Habermas, J. (1992). *The Theory of Communicative Action, Vol. 2. Lifeworld and System: A Critique of Functional Reason*. (T. McCarthy, Trans.) Beacon Press. (Original work published 1981).

Hill, D., O'Connor, C.D., and Slane, A. (2022). Police use of facial recognition technology: the potential for engaging the public through co-constructed policy-making. *International Journal of Police Science and Management*, *24*(3), 325–335. https://doi.org/10.1177/14613557221089558

Hobbes, T. (2008). *Leviathan. Or the Matter, Forme, and Power of a Commonwealth Ecclesiasticall and Civil*. Atria Books. (Original work published 1651).

Howard, A., and Borenstein, J. (2018). The ugly truth about ourselves and our robot creations: the problem of bias and social inequity. *Science and Engineering Ethics*, *24*, 1521–1536. https://doi.org/10.1007/s11948-017-9975-2

Israni, E. (2017). Algorithmic due process: mistaken accountability and attribution in State v. Loomis. *Harvard Journal of Law and Technology*. https://jolt.law.harvard.edu/digest/algorithmic-due-process-mistaken-accountability-and-attribution-in-state-v-loomis-1

Kaun, A., Larsson, A.O., and Masso, A. (2023). Automating public administration: citizens' attitudes towards automated decision-making across Estonia, Sweden, and Germany. *Information, Communication and Society*, *27*(2), 314–332. https://doi.org/10.1080/1369118X.2023.2205493

Kitchin, R. (2014). Big Data, new epistemologies and paradigm shifts. *Big Data and Society*, 1–14. https://doi.org/10.1177/2053951714528481

Kumar Basak, S., Wotto, M., and Bélanger, P. (2018). E-learning, M-learning and D-learning: conceptual definition and comparative analysis. *E-Learning and Digital Media, 15*(4), 191–216. https://doi.org/10.1177/2042753018785180

Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., and Roig-Tierno, N. (2021). Digital Transformation: An Overview of the Current State of the Art of Research. *SAGE Open, 11*(3), 1–15. https://doi.org/10.1177/21582440211047576

Lahneman, W.J. (2016) IC data mining in the post-Snowden era. *International Journal of Intelligence and CounterIntelligence*, *29*(4), 700–723. https://doi.org/10.1080/08850607.2016.1148488

Larson, J., Mattu, S., Kirchner, L., and Angwin, J. (2016, 23 May). How we analyzed the COMPAS recidivism algorithm. *ProPublica*. https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm

Lupton, D., and Michael, M. (2017). 'Depends on who's got the data': public understandings of personal digital dataveillance. *Surveillance and Society*, *15*(2), 254–268. https://doi.org/10.24908/ss.v15i2.6332

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Mahon, B. (2009). *Knowledge is Power: A Short History of Official Data Collection in the UK*. Office for National Statistics. https://unstats.un.org/unsd/wsd/docs/UK_wsd_KnowledgeIsPower.pdf

Mair, J.L., Hayes, L.D., Campbell, A.K., and Sculthorpe, N. (2022). Should we use activity tracker data from smartphones and wearables to understand population physical activity patterns? *Journal for the Measurement of Physical Behaviour*, *5*(1), 3–7. https://doi.org/10.1123/jmpb.2021-0012

Marcuse, H. (1978). Some implications of modern technology. In A. Arato and E. Gebhardt, eds., *The Essential Frankfurt School Reader* (pp. 138–162). Bloomsbury Academic. (Original work published 1941).

Miller, S., and Smith, M. (2023). Combating Covid-19: surveillance, autonomy, and collective responsibility. In K. Macnish and A. Henschke (eds), *The Ethics of Surveillance in Times of Emergency* (pp. 47–59). Oxford University Press. https://doi.org/10.1093/oso/9780192864918.003.0004

Nishant, R., Schneckenberg, D., and Ravishankar, M. (2023). The formal rationality of artificial intelligence-based algorithms and the problem of bias. *Journal of Information Technology*, *39*(1), 19-40. https://doi.org/10.1177/02683962231176842

Nyhlén, S., and Gidlund, K.L. (2022). In conversation with digitalization: myths, fiction or professional imagining? *Information Polity*, *27*(3), 331–341. https://doi.org/10.3233/IP-200287

Oomen-Early J., and Early, A.D. (2015). Teaching in a millennial world: using new media tools to enhance health promotion pedagogy. *Pedagogy in Health Promotion*, *1*(2), 95–107. https://doi.org/10.1177/2373379915570041

Richterich, A. (2018). *The Big Data Agenda: Data Ethics and Critical Data Studies*. University of Westminster Press. http://doi.org/10.16997/book14

Rizer, A., and Watney, C. (2018). *Artificial Intelligence Can Make Our Jail System More Efficient, Equitable and Just* (24 February 2018). http://dx.doi.org/10.2139/ssrn.3129576

Rojas de Francisco, L., López-Sintas, J., and Álvarez, E. (2016). Social leisure in the digital age. *Loisir et Société / Society and Leisure*, *39*, 258–273. https://doi.org/10.1080/07053436.2016.1198598

Rousseau, J.-J. (1993). *The Social Contract and Discourse*. (G.D.H. Cole, Trans.) Dent Press. (Original work published 1762).

Safdar, M., Ullah, F., Khan, I., Ullah, F., and Khan, I.A. (2016). Function creep in surveillance techniques. *International Journal of Scientific Research in Science, Engineering and Technology*, *2*, 983–988. https://doi.org/10.32628/IJSRSET1622316

Schaurer, F., and Störger, J. (2013). The evolution of open source intelligence (OSINT). *Journal of U.S. Intelligence Studies*, *19*(3), 53–56. https://docslib.org/doc/11550316/the-evolution-of-open-source-intelligence-osint

Solvak, M., and Lauringson, A. (2024). A Case Study of the Public Sector Digital Ecosystem in Estonia. *Computer, 57*, 44–49. https://doi.org/10.1109/MC.2024.3375866

Soomro K., Bhutta, M.N.M., Khan, Z., and Tahir, M.A. (2019). Smart city big data analytics: an advanced review. *WIREs Data Mining and Knowledge Discovery*, *9*, e1319. https://doi.org/10.1002/widm.1319

Sorell, T. (2020). Policing with big data: matching vs crime prediction. In K. Macnish and K. Galliott (eds), *Big Data and Democracy* (pp. 57–70). Edinburgh University Press.

Sorell, T. (2023). Pandemic population surveillance: privacy and life-saving. In K. Macnish and A. Henschke (eds), *The Ethics of Surveillance in Times of Emergency*

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

(pp. 15–29). Oxford University Press. https://doi.org/10.1093/oso/9780192864918.003.0002

Šímová, T. (2022). A research framework for digital nomadism: a bibliometric study. *World Leisure Journal*, *65*(2), 175–191. https://doi.org/10.1080/16078055.2022.2134200

Waldman, A.E. (2018). *Privacy as Trust: Information Privacy for an Information Age*. Cambridge University Press. https://doi.org/10.1017/9781316888667

Yan, S., Kwan, Y.H., Tan, C.S., Thumboo, J., and Low, L.L. (2018). A systematic review of the clinical application of data-driven population segmentation analysis. *BMC Medical Research Methodology*, *18*(121). https://doi.org/10.1186/s12874-018-0584-9

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

10. Assistive robots in Italian and Norwegian healthcare: how do contextual conditions shape the path of innovation, and what implications does this have for policy?

Ivan Galligani and Gloria Ziglioli

INTRODUCTION

The increasing pressure on health systems due to an ageing population and growing care needs for chronicity, exacerbated by the progressive shortage of the formal and informal health workforce, pushes the recognition of the potential of digital technologies as key instruments for strengthening healthcare (Gómez-González and Gómez-Gutiérrez, 2020).

This chapter focuses on one of the most promising applications of new technologies in healthcare, namely assistive robotics used in rehabilitation practices. In this field, patients can be supported in the recovery of their motor and cognitive functions by different types of robots (Mohebbi, 2020). For example, exoskeletons and other prosthetic devices can support rehabilitation exercises and/or assist in performing daily activities during recovery. Moreover, other 'interactive' tools, such as haptic feedback devices combined with virtual reality, but also so-called 'social robots', can also be used to help patients through cognitive and sensorimotor stimulation.

Despite this potential, the actual use of these technologies is still scarce. This is not primarily due to the still insufficient technological readiness of robotic applications, but rather to the incomplete preparedness of the receiving political, social and organizational environments for these technologies. Firstly, building the regulatory framework necessary for robots use in healthcare is a complex endeavour, because it will impact on local financing and/or reimbursement of care services, as well as safety, security, liability, data management and privacy issues (Cresswell et al., 2018; Frennert et al., 2021).

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Secondly, at the field level, the introduction of robots presupposes the effective coordination of multiple actors – that is, research and development (R&D) companies, health managers, health organizations, professionals and end-users – whose actions must be oriented towards building a design–production–implementation mechanism adapted to the complexity of both technologies and user needs (Tuisku et al., 2023). Furthermore, the introduction of robots requires a mutual adaptation between technologies and organizational features and protocols (Pekkarinen et al., 2020). This means that for healthcare professionals the diffusion of these technologies will have an impact on established working practices. Particularly for those who perceive themselves as potentially most affected by innovation in their routines and status, this could trigger legitimate resistance (Nilsen et al., 2017). The literature shows that professionals (particularly nurses) are concerned about an undesirable reconfiguration of care work represented as a reduction of human contact, 'cold operationalisation' of care practices (Frennert et al., 2021) and subordination of professional activities to the needs of robots, thus displacing professionals as 'machines babysitters' (Hamblin, 2022).

For these reasons, effective deployment of assistive robots will require a proper socio-technical transition. Such a holistic transformative process involves 'sufficient changes' (as conceptualized in the introductory chapter of this book) in essential dimensions of healthcare systems and practices, including policy strategies, professional culture and operational procedures. It must build an enabling regulatory, organizational and social environment for these technologies that goes beyond the mere introduction of new technologies, fostering new practices capable of leveraging the potential of assistive robots to improve the well-being of patients, but also of the involved workers.

This chapter empirically contributes to the debate on the challenges affecting digital innovation in healthcare investigating how different socio-technical issues might shape the adoption of rehabilitation robots. We develop a comparative analysis of two European contexts, namely Italy and Norway, posing the following research questions:

RQ 1: Which and how do selected socio-technical dimensions shape the implementation of robotics in Norwegian and Italian healthcare systems?

RQ 2: What are the policy implications?

Particularly, we examine the role played by certain salient dimensions highlighted in the literature discussed above: (1) normative and financial frameworks; (2) prevalent design and adoption paths; and (3) professional practices.

We expect the use of rehabilitation robots in these two countries to show similarities due, on the one hand, to the influence of common trends pushing

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

towards technological innovation, and on the other, to a comparable organization of the two healthcare systems (see further). At the same time, we expect differences in implementation paths due to different institutional and cultural orientations related to care and innovation.

However, beyond some very context-specific issues, our analysis shows how both cases need more socio-technical efforts (that is, enhancing participation and coordination among actors) to accompany the technological transition. In this vein, our analysis tries to anticipate what preconditions have to be built for a greater and more effective uptake of rehabilitation robots.

ANALYTICAL FRAMEWORK, CASES AND RESEARCH DESIGN

In order to assess consolidation and scalability challenges, we adopt a forward-looking approach inspired by the anticipatory governance (AG) framework (Heo and Seo, 2021). The framework highlights the relevance of governance features, intended as rules, decision-making processes and modes of coordination between linked but autonomous actors (as a characteristic element of modern healthcare systems), and the capacity of organizations and individuals to perform the planned actions. To assess these dimensions, the perspective of AG connects current trends with previous experiences, thus making it possible to anticipate future roadblocks from the analysis of the past (Betti and Maino, 2023).

Accordingly, our analysis is based on an exploration of the current experiences and recent institutional and policy changes in each related local context at stake. The analytic intersection of robot implementation experience and broader contextual trends helps to delineate a scenario of future challenges and necessary changes for the consolidation of robots in the sector of our interest. Thus, the chapter proposes a comparative qualitative study, which integrates policy document analysis and field research with selected stakeholders in two countries: Italy and Norway.

Italy has one of the oldest populations worldwide and its familist culture drives high reliance on family-based and informal social support for care provision (Ranci and Sabatinelli, 2014). In contrast, Norway's population remains slightly younger, even though the proportion of elderly has increased in recent years (Ringard et al., 2013). Moreover, the Norwegian 'caring state' (Leira, 1992) which aims to reduces people's dependency on care from the family, combined with a distinctly cultural trait of individual autonomy, and robust investment in technology innovation, have so far generated different types of ageing-related care needs and expectations.

In terms of healthcare organization, both countries show a universalist and mainly public-funded model, but characterized by high decentralization of

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

governance. Indeed, while the state allocates resources and defines organizational standards, regional levels are responsible for the planning and provision of healthcare (Ricciardi and Tarricone, 2021; Jacobsen and Mekki, 2012).

With regard to digital uptake in healthcare, Italy has recently relaunched its investments in the sector, first with the launch of the national electronic health record (in 2015) and then, with the National Recovery and Resilience Plan (NRRP), by investing mainly in telemedicine. On the other hand, Norway, which is one of the countries with the highest spending on healthcare as a percentage of gross domestic product (GDP), has invested substantially in the national welfare technology programme in the past ten years. Moreover, Norway presents an even longer history with telemedicine, as well as an already developed e-Health framework in its healthcare sector. Additionally, following the 2019 white paper 'The Health Industry', the Norwegian government (the Ministry of Trade, Industry and Fisheries and the Ministry of Health and Care Services) released in August 2023 a roadmap aimed at strengthening the health industry in Norway, where predominance is given to technological solutions development, test, implementation and integration in healthcare.

Focusing specifically on healthcare robotics, Italy is the third-largest market in Europe (Duch-Brown et al., 2021), thus making it one of the most important markets for the sector worldwide. In addition, several companies and research institutes of excellence that develop these technologies operate in the country. Also, the Norwegian medical robotics industry is noteworthy, covering 24.6 per cent of the national robotic industry, thus being the largest share of robotics products produced in Norway (Statista, 2024). Furthermore, the healthcare industry is a driver of the development and adoption of robots – especially collaborative robots (cobots) – and this is made possible by the six largest hospitals being research hospitals connected to universities which provide innovation and research development (Søraa and Fostervold, 2021).

Therefore, we first investigate the regulatory and policy framework by means of relevant policy documentation for each country. Additionally, we conducted interviews with local experts in the implementation of robotics in healthcare to deepen and contextualize the analysis.

For the Italian case, a total of 13 actors were contacted: seven distinguished clinician experts in robotics (three of them are university professors), four representatives of third sector organizations (TSOs) with experience in the implementation of robotics; and two trade union representatives of the medical and nursing sector.

For the Norwegian case, four individual interviews were conducted, covering the expertise of robotics research (one of them also had extensive previous experience as an occupational therapist), and healthcare professionals specialized in nursing and rehabilitation.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Finally, by using Italy and Norway as cases representing top-performing health systems with high potential for the diffusion of assistive robots, this study aims to explore selected critical factors that might hinder a large-scale diffusion of these technologies outside research labs and futuristic clinical centers.

IN-COUNTRY ANALYSIS

This section discusses the Italian and Norwegian cases separately, delving into the three selected comparative dimensions: (1) the normative and financial framework; (2) the prevalent design and adoption model; and (3) professional practices.

Italy[1]

Normative and financial frameworks

The Italian National Health Service (NHS) features a multilevel character (Ricciardi and Tarricone, 2021). The state defines the general regulations, and the regions are responsible for setting local organizational standards and planning health objectives. The government allocates funding to the regions annually, but the latter may also use resources derived from their own taxation. Finally, health service delivery is organized at the level of sub-regional entities: the health districts.

In order to maintain a sufficient level of homogeneity in the rights guaranteed to citizens even in a highly decentralized system, the state defines a set of services that the regions must guarantee: the Essential Levels of Care (ELC) (DPCM 29 November 2001). The list is periodically updated, most recently in 2017 (DPCM 12 January 2017). On that occasion, rehabilitation services 'assisted by robotic technologies' were included in the list, thus recognizing the possibility for public services to provide robotics-enabled therapy, or the possibility for the patient to be reimbursed by the NHS in cases of provision by private agencies. Although this fact may be an important driver for the dissemination of these therapies, the actual provision is hindered by several factors. One of these is the non-exhaustive definition contained in the ELC. As stated by an interviewed expert:

> we do not know clearly which instruments and which robotic therapy protocols are covered by the definition. It depends if we consider the instrument or the therapeutic function. For example, can robotic rehabilitation be carried out only with mechanical, 'physical' applications, or also with virtual reality? This is crucial because the category includes services that have very different costs, but from the point of view of the ELCs they are priced in the same way. (Rehabilitation expert #1)

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Moreover, the issues of the pricing of services raises further problems. The first is that, even for those therapeutic applications in which robotics has proven to be better than traditional therapy in terms of outcomes, the former is still more expensive than the latter. Consequently, since the public provider is only reimbursed on the basis of the standard price, it has no incentive to purchase instruments that offer better but more expensive outcomes. Moreover, in the context of the persistent defunding of the Italian NHS (Ricciardi and Tarricone, 2021), most regions and/or local health authorities cannot afford to invest in expensive technological innovations. All of this means that, to date, the diffusion of these technologies can only be possible in private agencies, which have more resources to purchase technologies in order to 'compete with each other to meet the demand for innovative treatments' (Clinician #1). Moreover, this mechanism is also driven by the public sector itself, 'which can prescribe robotic rehabilitation but cannot provide it – not having resources – so this is carried out by private agencies accredited with the NHS' (ibid.).

Moving to private users, although the purchase of domotics and robotic devices is subject to a tax incentive (that is, reduction of value-added tax), it is evident that only a few users can afford the expense due to the still high cost of the devices. Moreover, the option of autonomous purchase by individual users risks being ineffective. In fact, as confirmed by all the clinical developers interviewed, these instruments to date can only perform very specific functions. In this sense, as the president of a users' association points out: 'the individual may buy a tool that serves him for a lifetime, but in the case of rehabilitation, needs usually change as the health condition evolves, so different robots should be bought little by little' (TSO #1).

The prevalent design and adoption model

As reconstructed by Wright (2024), European institutions have strongly pushed research in health robotics over the last two decades. Funding lines such as cohesion policies, and the Horizon Europe programme, are among the most widely used sources for the development of health robotics. In addition, the salience of objectives related to the digital transition in European Union (EU) initiatives such as the Next Generation EU, InvestEU and EU4Health, creates further spaces for the sector to intercept fundings.

Given that national and regional resources are quite limited, it is not surprising that the development of these technologies in Italy has mainly been based on the acquisition of funds through (EU-based) competitive calls.

However, as already noted by Wright, this mainly 'grant-led' development mechanism also has negative side effects. The first issue is the nature of the mechanism of the 'call competition' that pushes for the formulation of the most innovative proposals, with the highest added value of technological advancement, without, however, the necessary consideration of the concrete

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

possibilities of adoption in actual services. As one of our clinicians interviewed reported, there is often a mismatch between the interests of the actors involved in research projects, and between them and their clinical counterparts in the field, who are often not involved:

> A problem encountered in scaling up pilots is that we are often not used to thinking from the beginning to the scalability of the solutions. Usually, in research projects, the focus is on experimenting with the most 'futuristic' technologies because the researcher needs to publish, the companies need to be perceived as 'innovators' to acquire resources, and 'frontline' clinicians are involved later only to test already designed instruments. (R&D clinician #1)

While this mechanism pushes for technological development, it also confines its dissemination mainly to the private sector, the only ones that (also for the financial reasons discussed above) can afford to participate in development projects and then employ innovative instruments in their high-quality care services.

In conclusion, what has been said in these sections highlights many risks in terms of social sustainability (that is, access to these technologies by a wider public of patients), and a possible increase in the already existing inequalities in service provision between public and private health actors.

Professional practices

As the literature has shown extensively (Frennert et al., 2021; Tuisku et al., 2023), a key factor for the deployment of robotics in healthcare is the commitment of the professionals called upon to use them in the field, as well as of patients, both preconditions which cannot be taken for granted. Our exploratory research also reveals that professionals are often poorly informed about these technologies, and sometimes even intimidated by them:

> in my experience I have found that many therapists are afraid to approach robotic devices because they are not adequately trained. Just recently, a young rehabilitator turned down a job offer from me because she felt 'uncomfortable' when she saw the equipment we use. (Rehabilitation expert #2)
>
> It has to be said that in the health sector the story of the robot threatening a profession is very present. From nurses, in particular, we have found so many resistances. You have to explain well why you use the robot and what it can help with. You have to be clear in informing that this technology is a support and not a replacement for humans. (R&D clinician #1)

Consequently, many participants assert the need of extensive information and training to foster 'acceptability' among professionals, as well as to enhance the capacity to take advantage of the technologies in work practices

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

(Johansson-Pajala et al., 2020). Furthermore, appropriate training of professionals also enables them to empower the patients themselves, because:

> operators are not only called upon to use robots, but they also must help people use these instruments. They have to be able to accompany the user, so that the user is not afraid, and uses it correctly, etc. This is important because the robot is not a drug that is simply prescribed and taken. And many users obviously do not have the necessary skills. (TSO #2)

Moreover, after overcoming initial concerns and training professionals, there is no doubt that much work remains to be done to revise care models to really take advantage of robotic technologies. This effort must ensure that both the effectiveness of care and the working conditions of professionals are increased. In this perspective, a recent Consensus Conference between the National Health Agency (Istituto Superiore di Sanità) and national rehabilitation societies attempted to define the principles on which to base the use of these technologies. The CICERONE Consensus Conference on Robotic Rehabilitation (2022) stated that the introduction of these instruments in care practices must always ensure the principle of 'human centrality'. It stated that doctor–patient relationship and the human control over the process is a non-amendable constituent of the robot-enabled therapy. It must ensure the continuous involvement of the (adequately trained) human in the operativity of the system (that is, 'human-in-the-loop'), ensuring that the system/machine can operate 'autonomously' but with the possibility for the human to intervene in any time (that is, 'human oversight'). Moreover, the affirmation of human centrality can also be an effective strategy to respond to the problem of 'machine babysitters' (Hamblin, 2022), because robots designed and used in this way can truly take on the function of instruments supporting the concrete needs of professionals.

Norway

Normative and financial frameworks

The Norwegian healthcare system is semi-decentralized, distributing care responsibilities among the state, the counties and the municipalities. Healthcare is regulated, supervised and financed by the government through the Ministry of Health. In 2002 the state took back from the counties the responsibility for specialized care, which is currently administrated by four Regional Health Authorities (RHAs; *helseforetak* in Norwegian). Municipalities are responsible for primary care, for which the central government allocates funding in the form of block grants and earmarked grants conditional for specific purposes. Both RHAs and municipalities have responsibility for the investment in, respectively, hospital and primary care infrastructures and facilities. For the

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

scope of this study, it must be said that rehabilitation is provided at the primary (physiotherapy, occupational therapy, and so on) and secondary (specialized rehabilitation) levels (Ringard et al., 2013).

Highly digitalized healthcare services have been defined as one of the main goals and desired future image of the patient-centred health and care services since the beginning of 2000. The National Health and Hospital Plan 2020–2023 and the Helse Omsorg 21 strategy (healthcare, in English) create a comprehensive national effort for research and innovation within health and care. A content analysis of these policy documents does not reveal specific mentions of 'robotics' and 'healthcare robotics'. However, the generic terms employed such as 'new solutions for the health sector', 'technological solutions for use in patient treatment', coupled with the establishment of a health technology scheme (*helseteknologiordningen*, in Norwegian) and the 2024 newly established Norwegian Directorate for Medical Products (DMP) allow healthcare robotics to be understood as solutions included in this wider domain. This interpretation has also been confirmed by some of the participants, whose reported experiences include the use of robotics from 2018 to 2019. Moreover, a recent study on media representation of healthcare robotics in Norway highlighted an increased media coverage of robotics from 2015 to 2019 (Solberg and Kirchhoff, 2024), further supporting the notion that in the Norwegian healthcare context, robotics falls under the general domain of technological solutions.

Yet, this definition issue can be considered a source of confusion and definitively a cautious approach to classification. A more critical perspective has been raised by one of the interviewees, who claims that:

> the regulatory system – the government – does not seem to have knowledge about robotic assistance. What is known about and commonly portrayed, is the scary or catastrophic image of robots in healthcare, because of the present literature. (Occupational therapist #1)

Indeed, if these technologies are included under the welfare technology umbrella, then municipalities would have the responsibility for their implementation and management. Alternatively, if robotics were to be included under the assistive technology umbrella, the responsibility would shift to the Norwegian Labour and Welfare Administration (NAV). This unresolved issue and ambiguity is an element that hinders further development of robotics technology.

Lastly, according to another researcher interviewed, the inclusion of robotics in primary care services for instance is hampered by stringent certifications requirements and standards compliance. In fact, to obtain the official label of

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

'medical devices', these robotic solutions must satisfy very strict standards, which are very difficult to fulfil.

Overall, this classification challenge not only affects administrative responsibilities but also influences the development, adoption and integration of robotic technologies in healthcare settings. Notwithstanding, robotic technologies like '*helse* toys' are more frequently employed in medical settings. '*Helse* toys' are typically designed for therapeutic and educational purposes in healthcare. They are often used to engage patients in recovery activities, and they are not subject to the same stringent regulatory requirements as medical devices.

The prevalent design and adoption model

Similarly to Italy, also in Norway the development of robotics was sustained by EU research funding (for example, the Robotics4EU project funded by the Horizon2020 programme). Unlike Italy, however, central Norwegian administrations demonstrate a strong commitment towards health robotics development. The Norwegian Innovation Council and the Norwegian Research Council are central agencies supporting and significantly investing in healthcare robotics and social robotics research in Norway. Just to give few examples, the Human Interactive Robotics for Healthcare (HIRo) project is funded by the Research Council of Norway, bringing together specialized and primary care organizations and a private company as partners for developing and testing the humanoid robot EVE R3 for assistance in healthcare settings. By following the same strategy of bringing together Norwegian companies, public organizations, and academic experts, the LIFEBOTS-Exchange-Extended (LEE) project is also funded by the Research Council of Norway, aiming to envision the future of robotics in the healthcare sector.

More interestingly for the scope of this research, as emerged during the interviews, there is an explicit central strategy, mainly expressed through guidelines and fundings, that promotes and incentivizes a close and mutual beneficial cooperation between healthcare institutions and tech-innovation companies. This is systematized in a mechanism called 'testbed' (Kielo-Viljamaa et al. 2022). This strategy has been developed at Sunnaas Hospital – the country's largest specialist hospital in rehabilitation – and involves using the hospital facility as a platform to develop, test and implement healthcare technologies, including robotics. The leader of the testbed at Sunnaas said:

> Reality check is fundamental, otherwise they [the companies] might come up with un-useful tech solutions, and no one gains results out of it. With testbed we follow the entire journey and provide services from consulting to clinical trials. Indeed, clinical evidence is mandatory before the product can be put in the market. Most of the tech-med companies that reach us out have prototypes, so they follow all the steps of the testbed process: from the first meeting to the clinical stage. (Healthcare manager #1)

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

The testbed mechanism appears to be quite characteristic of the 'Norwegian way' of conceiving the development model of healthcare innovations. The testbed key aspects of collaboration and co-development among multiple actors focus on actual users' needs and conditions, integration with existing services and testing technological solutions in real-world environments, which can considerably improve healthcare robotics outcomes. Healthcare professionals' and end-users' involvement in robotics technology solutions design is crucial. According to the interviewees for the Norwegian case, 'involvement of professionals' must be an explicit working method in the research application, as it is key for obtaining research funding from the Norwegian Research Council.

A systematic content analysis of Norwegian universities' websites revealed an increasing production of scientific research targeting healthcare robotics from multidisciplinary research groups, showing the national academic and societal sensitivity to issues extending beyond the engineering, design and development of robot technologies. The work of these research groups spans a wide range of applications, from more physical robots (EVE) to humanoid robots (Pepper), and social and assistive robots (TIAGo). Additionally, as is the case of TIAGo and EVE, they are used as research platforms. The versatility and adaptability nature of these robots is said to make them ideal to explore complex research questions, theoretical concepts, and practical, real scenarios concerning human–robot collaboration.

These research groups have been instrumental in fostering collaboration between academia, healthcare institutions and enterprises, thus leading to effective trials, pilot tests and actual innovative solutions in healthcare. Lastly, researchers in these groups actively engage in ethical discussions about the implementation of robotics in healthcare, addressing multiple issues such as patient privacy, data security and human–robot interaction dynamics.

Professional practices

Despite the promising practices discussed above, problems still remain in addressing that technological innovation in healthcare might be counteracted by competing values and needs, different knowledge bases, and sometimes incompatible assumptions of various stakeholders. These frictions and challenges inevitably generate divergencies and different valuations of robotic interventions (Solberg and Kirchhoff, 2024).

The interviews with Norwegian researchers and healthcare professionals working with robotics highlight that the level of acceptance changes according to the tasks associated to the robot. Indeed, despite some reporting a need for robots in their everyday practices, Norwegian healthcare professionals overall appear to be quite sceptical towards robotics in healthcare. This is said to be potentially attributed to an actual fragmentation of and scarce homogeneity

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

among different information systems, which have been adding extra work for professionals so far.

Despite robotic assistance constituting one opportunity to alleviate high workload (Rø Eitrheim et al., 2023), the cognitive costs – that is, learning efforts – to make these technologies accepted and working are still high among healthcare personnel. The interviews interpreted together with a selected relevant literature in the field suggest that Norwegian professionals believe that it 'is always better when humans are involved'. Additionally, opinions appear different towards fully autonomous or tele-operated robots, with the latter favoured in comparison.

Lastly, because an interesting suggestion given by some interviewees relates to healthcare education as a starting point for guiding changes in the professional community towards higher degree of acceptance of robotics technology, we checked the course curricula of the Norwegian universities. Robotics in healthcare as a study subject is more common in engineering or computer science programmes, rather than as mandatory courses or elective modules in medical or nursing curricula. This gap in healthcare education appears fundamental to be filled, in order to construct and spread a more integrated approach to robotics in nursing programmes, potentially advancing acceptance and effective implementation of robotic technologies in Norwegian healthcare settings.

CROSS-COUNTRY COMPARATIVE ANALYSIS AND ANTICIPATION OF NEEDED PRECONDITIONS

The main themes identified by our comparative analysis are synthesized in Table 10.1. We present them associated with the selected dimensions we aimed to investigate, categorizing them as enabling (+) and hindering (-) factors. Therefore, for each dimension of analysis, we anticipate the policy preconditions to be resolved in the near future for a greater uptake of robotics in rehabilitation and healthcare (summarized in Table 10.2).

Normative and Financial Frameworks

The social and macro-economic framework in both countries shows drivers and hindrances. Italy has recently increased its national investments in the digital transformation of the healthcare sector due to the conspicuous budget allocated from the EU under the NRRP. Moreover, since 2017, the country has included robotics-enabled rehabilitation among the guaranteed Essential Levels of Care. However, the current definition of robotics technology within the ELC framework lacks specificity, leading to ambiguity regarding the consideration of instruments and their functions. Robotics technology indeed

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Table 10.1 Enablers and constraining factors identified in Italy and Norway

Dimensions of analysis	Italy: case study	Norway: case study
Country framework	(+) Recent national investments (NRRP) for the digital uptake of healthcare	(+) Established and substantial investments for the digitalization of health and social care (e.g. telemedicine and welfare technology programmes)
	(+) Inclusion of robot-enabled rehabilitation in guaranteed ELC	
	(-) Ambiguity in ELC definition	(-) Ambiguity in government's definition of robotics technologies and related positioning in the realm of public healthcare services
	(-) Misalignment between cost of technologies and spending capacity of public health agencies	
Development model	(+) Many research groups and funded projects (mainly by EU institutions)	(+) Commitment of central administration and proper national strategy of development
	(-) Overemphasis on technological development over usability in ordinary contexts	(+) Testbed principles and practices
	(-) Limited involvement of end-users	(+) Prioritization and strong incentive towards involvement of professionals and end-users
Professional practices	(+) Widespread consensus at professional level on an operational framework oriented towards 'human-centrality'	(-) Scepticism of professionals
		(-) Information and training needs
	(-) Information and training needs	(-) Need to revise tertiary educational programmes
	(-) Need to revise tertiary educational programmes	

includes different tools and instruments that also significantly vary in their costs. Grouping these technologies under the same pricing model – that of ELCs – when the public health sector has increasingly limited spending capacity represents another obstacle for the widespread use of health robotics in the Italian context.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Table 10.2 Anticipatory governance themes in Italy and Norway

Future themes for policy	Italy: case study	Norway: case study	Motivations and aims
Revision of the normative framework for health robots	Establish a clear definition of robotics technology that considers diversity of instruments and their costs	Establish a clear definition of robotics technology that considers diversity of instruments and their costs	Establish a coherent public model for delivering robotics service within healthcare
Revision of the normative framework for health robots	-	Decision about which service/institution is responsible for robotics	Establish a coherent public model for delivering robotics service within healthcare
Adapting and strengthening healthcare organization for robotics	Establish a specific technology diffusion strategy at national level	-	Establish a coherent public model for delivering robotics service within healthcare
Adapting and strengthening healthcare organization for robotics	Provide appropriate public fundings for the technological uptake in healthcare	-	Establish a coherent public model for delivering robotics service within healthcare
Adapting and strengthening healthcare organization for robotics	Targeting research investments towards clinical feasibility and effectiveness	Targeting research investments towards clinical feasibility and effectiveness	Increase alignment between technologic development and healthcare needs
Innovation of frontline practices	Work on service integration, overcoming both fragmentation and ambiguities regarding responsibilities	Work on service integration, overcoming both fragmentation and ambiguities regarding responsibilities	Revise care organization and practices to take advantage of technologies while safeguarding both the quality of care provided and the working conditions of professionals

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Future themes for policy	Italy: case study	Norway: case study	Motivations and aims
Innovation of frontline practices	Promote the human-centric principle in the revision of care practices	Promote the human-centric principle in the revision of care practices	Revise care organization and practices to take advantage of technologies while safeguarding both the quality of care provided and the working conditions of professionals
Educational programmes	Working on university-level educational programmes for nursing and healthcare professions to include elective courses on robotics	Working on university-level educational programmes for nursing and healthcare professions to include elective courses on robotics	Reduce disparities in knowledge and skills among professionals across geographical regions and healthcare settings

Also in Norway, the expansion of robotics is hindered by the lack of a clear classification and positioning within the broader spectrum of public healthcare services, which consequently impacts upon funding allocation, implementation strategies and the overall integration of these advanced technologies into existing healthcare services. Nevertheless, Norwegian policymakers are pioneers in digital innovation in healthcare. Norway's ten-year experience with welfare technology solutions and an even longer history with telemedicine, as well as an already developed e-Health framework in its healthcare sector, are significant examples. Although robotics in healthcare could be seen as another innovation to be implemented through top-down decisions, a longer and more consolidated exposure to digitalization of healthcare narratives and digitalized healthcare services can be an enabling factor for implementing robotics in the Norwegian context.

For these reasons, the analysis of Italy and Norway indicated both differences in a few characteristics, but also similar problems, highlighting the overriding need for governments to define in detail the concrete areas of application of these instruments in existing care services.

Furthermore, Italy should follow the Norwegian example in defining a specific (and adequately funded) strategy for the dissemination of these

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

technologies, as it has recently done with regard to telemedicine (Cascini et al., 2023). Moreover, this strategy should be accompanied by a strong incentive to make the development model more participative (as in the case of the Norwegian testbed model) and thus make the instruments more suitable for a greater diffusion in 'non-excellent' services.

Then, for both countries, once the enabling environment has been built, it is necessary to provide public health agencies with the appropriate financial resources to acquire technologies. This element will be particularly critical for Italy, which is constantly subject to the risk of a return to austerity in public spending (including for healthcare) after the end of the NRRP.

Development Models

The robotics development model in Italy is highly dependent on EU grants and funded research projects, against the background of national and regional limited resources for acquiring and autonomously covering the cost of developing and integrating these technologies into ordinary services. Nevertheless, national Centres of Excellence conduct groundbreaking research with also international echoes and impacts. However, both the structure of the international EU calls and the national engineering-oriented model might impede the concrete development of robotics technologies, whereas they overemphasize the technical dimension of the development over usability in ordinary, existing services. Furthermore, the current development model is characterized by a limited involvement of actual and potential end-users, which negatively impacts upon the applicability and adoption of robotic technologies.

The Norwegian development model is substantially different, not only in a wider and deeper directing action of central administration (government, Research Council of Norway and Norwegian Innovation Council) but also in promoting a more user-centric approach. The testbed principles and practices, where the Sunnaas Hospital, specialized in rehabilitation, is a frontrunner, appear to be a winning strategy in this regard as well as a driving factor for robotics in healthcare. Robotics technology development, design, implementation and integration in healthcare services require highly collaborative effort and dialogue, where priority is given to the involvement of professionals and end-users. This is motivated by the necessity of developing and clinically testing technological solutions that are useful, tailored, and more easily adaptable to existing working realities.

Apart from these differences, in terms of policy recommendations, both countries could make a greater effort to strengthen and better target their development models. A first pillar could be the construction of a larger evidence base on the effectiveness of these instruments than is currently available (CICERONE, 2022). Thus, we claim that larger research funding should

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

be redirected more towards clinical feasibility and effectiveness rather than technological development itself. Having consolidated evidence on the most promising applicative areas, it is from these that policymaking might start to focus efforts on the embedding of robotics in healthcare services. This means targeting investments in applications with a higher probability of success (thus limiting political and organizational costs). From this basis, other applications can be added with less effort, relying on the enabling framework built during the previous steps.

Professional Practices

Professionals' opinions and practices are quite similar in both cases. Robotics technology is often perceived as a threat to their professionalism and status. As we showed, this perception stems from concerns about the potential devaluation of human work and expertise in healthcare practices; also sometimes leading to the fear of humans' replacement enabled by technologies.

Additionally, the rapid advancement of robotic technologies requires the time and ability of professionals to acquire the necessary knowledge and skills for mastering these technologies and for making them work in their practical implementation. However, this learning process is often challenging from the professionals' perspective because it adds extra work to already demanding care work. In this perspective, both countries must invest more strongly in training professionals about these new technologies, not only by providing reskilling programmes, but also starting with tertiary education, which in both countries is lacking in this dimension.

Even more, both countries need to make a major organizational effort to revise their service models in such a way that permits them to take advantage of technology while safeguarding both the quality of care provided and the working conditions of professionals. Thus, strengthening participatory experiences in technology development and management is a facilitating factor. From the bottom level, the developers–users collaboration would allow companies to take advantage of the expertise of frontline workers, in particular by gaining knowledge of the constraints, but also of the valuable practices, related to different operational contexts. Furthermore, a more participatory process would also prevent the emergence of resistance from workers, because their concerns would be considered, and because the instruments would be designed for their specific professional needs.

Moreover, in the multilevel feature that characterizes healthcare service organizations in both countries, top and middle-level commitment would also be worthwhile. In addition to what has been said in relation to regulatory frameworks and financial incentives, administrations and professional bodies can play a role in promoting organizational principles that then 'spread' and

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

take root at the local level as well. In this perspective, the Italian reflective practice carried out by scientific societies and professional orders with regard to the preferred models for adopting these technologies (that is, the Consensus Conference; CICERONE, 2022), could be an experience to be taken as an example in Norway. Through these practices of reflexivity, professional organizations can expect to influence the direction, modalities and 'meaning' of the inclusion of new technologies in their daily practices.

CONCLUSIVE REMARKS

Our analysis has shown that, in both countries, a greater diffusion of robotics in the rehabilitation and care sector presupposes transformative actions on various institutional and operational barriers. Robotics has the potential to promote a significant change in medical practices, exploiting the synergy between human and mechanical work, and thus redefining the entire rehabilitation service model. At the same time, these 'street-level' changes require a multilevel transition process, in which various preconditions which are situated at various levels (regulatory, financial, organizational, practical-professional) align to enable the diffusion of these technologies in ordinary services, outside laboratories and contexts of excellence.

In essence, in line with the framework adopted in this book, our analysis confirms that transitions, although potentially disruptive in their consequences, are instead the result of small incremental changes, which gradually allow first the creation of the transformative element (that is, technology) and then the social context in which this element can be embedded. To ensure that this process is not, on the one hand, unjustifiably slow, and on the other, negative in its consequences, a greater effort is needed from the public sector in governing the transition; more than has been done so far.

NOTE

1. The analysis of the Italian case is based on a study conducted as part of the Fit4MedROB project (funded by the Italian NRRP's complementary fund - CUP: PNC0000007). A detailed analysis of these results is provided in Galligani and Natali (2025).

REFERENCES

Betti, M., and Maino, F. (2023). Preventing organizational failures in the digital health systems: insights from tuscany regional health system. *Z'GuG Zeitschrift für Gemeinwirtschaft und Gemeinwohl*, 46(4), 472–486.

Cascini, F., Gentili, A., Melnyk, A., Beccia, F., Causio, F.A., Solimene, V., Battilomo, S., Paone, S., Borghini, A., Bartolo, Chiarolla, E.M., and Ricciardi, W. (2023). A

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

new digital model for the Italian Integrated Home Care: strengths, barriers, and future implications. *Frontiers in Public Health*, 11, 1292442.

CICERONE (2022). *La riabilitazione assistita da robot e dispositivi elettromagnetici per le persone con disabilità di origine neurologica*. Conferenza Nazionale di Consenso ISS, SIMFER e SIR.

Cresswell, K., Cunningham-Burley, S., and Sheikh, A. (2018). Health care robotics: qualitative exploration of key challenges and future directions. *Journal of Medical Internet Research*, 20(7).

Duch-Brown, N., Rossetti, F., and Haarburger, R. (2021). *Evolution of the EU Market Share of Robotics: Data and Methodology.* Publications Office of the European Union.

Frennert, S., Aminoff, H., and Östlund, B. (2021). Technological frames and care robots in eldercare. *International Journal of Social Robotics*, 13, 311–325.

Galligani, I., and Natali, D. (2025). Verso la Robotica in Sanità? Il caso toscano tra fattori facilitanti e inibenti. *Politiche Sociali/Social Policies*, 3/2025, 749-767.

Gómez-González, E., and Gómez-Gutiérrez, E. (2020). *Artificial Intelligence in Medicine and Healthcare: Applications, Availability and Societal Impact*. JRC Science for Policy Report (EUR 30197 EN), European Commission.

Hamblin K.A. (2022), Technology in care systems: displacing, reshaping, reinstating or degrading roles? *New Technology, Work and Employment*, 37(1), 41–58.

Heo, K., and Seo, Y. (2021). Anticipatory governance for newcomers: lessons learned from the UK, the Netherlands, Finland, and Korea. *European Journal of Futures Research*, 9, 1–14.

Jacobsen, F.F., and Mekki, T.E. (2012). Health and the changing welfare state in Norway: a focus on municipal health care for elderly sick. *Ageing International*, 37, 125–142.

Johansson-Pajala, R.M., Thommes, K., Hoppe, J.A., Tuisku, O., Hennala, L., Pekkarinen, S., Melkas, H., and Gustafsson, C. (2020). Care robot orientation: what, who and how? Potential users' perceptions. *International Journal of Social Robots*, 2, 1103–1117.

Kielo-Viljamaa, E., Collanus, E., Lahtiranta, J., and Tuomisto, A. (2022). Maturity of health care testbeds – a qualitative mapping at the Nordic context. *Finnish Journal of eHealth and eWelfare*, 14(1), 92–103.

Leira, A. (1992) *Welfare States and Working Mothers: The Scandinavian Experience.* Cambridge University Press.

Lupiáñez-Villanueva, F., Gunderson, F., Vitiello, S., Febrer, N., Folkvord, F., Chabanier, L., Filali, N., Hamonic, R., Achard, E., Couret, H., Arredondo, M.T., Cabrera, M.F., García, R., López, L., Merino, B., and Fico G. (2022). *Study on Health Data, Digital Health and Artificial Intelligence in Healthcare.* Publications Office of the European Union.

Mohebbi, A. (2020). Human–robot interaction in rehabilitation and assistance: a review. *Current Robotics Reports*, 1(3), 131–144.

Nilsen, E., Dugstad, J., Heide, H., Gullslett, M.K., and Eide, T. (2017). Exploring resistance to implementation of welfare technology in municipal healthcare services – a longitudinal case study. *BMC Health Services Research*, 16(1), 1–14.

Pekkarinen, S., Hennala, L., Tuisku, O., Gustafsson, C., Johansson-Pajala, R.M., Thommes, K., Hoppe, J.A., and Melkas, H. (2020). Embedding care robots into society and practice: socio-technical considerations. *Futures*, 122.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Ranci, C., and Sabatinelli, S. (2014). Long-term and child care policies in Italy between familism and privatisation. In: León, M. (ed.), *The Transformation of Care in European Societies.* Palgrave Macmillan.

Ricciardi, W., and Tarricone, R. (2021). The evolution of the Italian national health service. *The Lancet*, 398(10317), 2193–2206.

Ringard, A., Sagan, A., Saunes, I.S., and Lindahl, A.K. (2013). Norway: health system review. *European Observatory on Health Systems and Policies*, 15(8).

Rø Eitrheim, M.H., Kaarstad, M., Sørensen, L., and Berg, K. (2023). Workload of rehabilitation healthcare personnel when assisted by a robot. *Proceedings of the 33rd European Safety and Reliability Conference (ESREL 2023).*

Solberg, M., and Kirchhoff, R. (2024). Media representations of healthcare robotics in Norway 2000–2020: a topic modeling approach. *Social Science Computer Review*, 42(3), 636–660.

Søraa, R.A., and Fostervold, M.E. (2021). Social domestication of service robots: the secret lives of Automated Guided Vehicles (AGVs) at a Norwegian hospital. *International Journal of Human-Computer Studies*, 15(2), 102621.

Tuisku O., Parjanen S., Hyypiä M., and Pekkarinen S. (2023). Managing changes in the environment of human–robot interaction and welfare services. *Information Technology and Management*, 1–18.

Wright, J. (2024). Comparing public funding approaches to the development and commercialization of care robots in the European Union and Japan. *Innovation: The European Journal of Social Science Research*, *37*(2), 499–514.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

11. Artificial intelligence, professions and the meaning of work

Mateja Vodiškar and Caroline Ruiner

INTRODUCTION

The nature of work has undergone substantial transformations over the centuries, influenced by technological, economic and social changes. The digital revolution, characterized by the rise of computers and the internet, has profoundly altered the professional landscape (Brynjolfsson and McAfee, 2014). The integration of artificial intelligence (AI) into various industries is pushing the boundaries of what constitutes work, with automation taking over routine tasks and AI augmenting human capabilities in more complex roles. This shift raises important questions about the future of professions and the skills required to thrive in an AI-driven economy (Oliveira and Figueiredo, 2024; Susskind and Susskind, 2015). Professions demand specialized knowledge, acquired through extensive education and practical training, and are often regulated by standards and ethics to serve the best interests of clients or society. Unlike other occupations, professionals have autonomy in decision-making and are accountable to governing bodies or associations that ensure ongoing competence (Abbott, 1988; Evetts, 2013; Freidson, 2001).

AI's integration into professional domains is not just about efficiency and productivity; it fundamentally alters the roles of professionals. In the medical field, AI is being used to enhance diagnostic accuracy, personalize treatment plans and optimize administrative workflows (Jiang et al., 2017). Similarly, in the legal field, AI has been employed to automate tasks such as document review, legal research and even predicting case outcomes (Surden, 2019). As AI continues to advance, it challenges traditional notions of expertise and authority. Understanding the intersection of AI and professions is crucial for preparing the workforce for the future (Martinez et al., 2019).

Professions such as medicine and law have traditionally been grounded in years of education, practical experience and a deep understanding of ethical principles. However, the growing presence of AI in these fields raises questions

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

about the nature of professional competence. As AI systems become more capable of performing complex tasks that were once the exclusive domain of highly skilled professionals, the role of human skill is being redefined (Makridakis, 2017). For instance, in medicine, AI's ability to analyze medical images with high accuracy has led to concerns about the future role of radiologists and other specialists (Topol, 2019). Also, AI systems in legal practice can analyze vast amounts of legal documents in a fraction of the time that it would take a human lawyer, leading some to question whether AI might eventually surpass human capabilities in certain areas (Susskind, 2019). These shifts necessitate a re-evaluation of what it means to be a highly skilled professional in the age of AI.

Professional identity is closely tied to the values, norms and self-conception that professionals develop regarding their role and responsibilities within their profession. The integration of AI into professional practice has the potential to disrupt this identity, as professionals wrestle with the implications of sharing their roles with machines. Physicians may face a shift in their role from diagnosticians to managers of AI-driven diagnostic tools, potentially altering their identity as healers and decision-makers (Fleming, 2018). For lawyers, the use of AI in legal research and predictive analytics may challenge their self-perception as the primary interpreters of law and arbiters of justice (Susskind, 2019). These changes could have profound implications for how professionals see themselves and their work in a world where AI plays an increasingly prominent role.

Meaningful work is a concept that has gained significant attention in recent years, particularly in the context of technological change (Symon and Whiting, 2019). Defined as work that is personally fulfilling, socially valuable, and aligned with an individual's values and sense of purpose, meaningful work is a critical component of professional satisfaction and well-being (Steger et al., 2012). The rise of AI in professional settings raises important questions about how the nature of meaningful work might be changing. When AI takes over tasks that professionals once found meaningful, such as diagnosing patients or crafting legal arguments, it raises concerns about whether these professionals will still find their work fulfilling. Alternatively, AI could potentially free up professionals to focus on more meaningful aspects of their work, such as patient care or client counselling (Brougham and Haar, 2018).

The impact of AI on meaningful work is unclear, bringing both positive and negative outcomes. AI may either enhance or diminish work satisfaction depending on how it is employed (Bankins and Formosa, 2023). If AI takes over routine tasks, it could free individuals for more engaging roles, enriching their sense of purpose. Conversely, replacing complex, stimulating tasks could reduce work meaningfulness (Brougham and Haar, 2018; Scripter, 2024). AI can also generate new tasks, but these may be lower-skilled, reducing purpose

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

(West, 2018). Alternatively, AI could augment human skills, automating mundane work and enabling employees to focus on higher-level tasks, thus enhancing their roles (Frey and Osborne, 2017). Overall, AI's impact depends on which tasks it automates and how it reshapes job roles (Bankins and Formosa, 2023). While AI's potential to transform work is acknowledged, the extent to which it creates or diminishes meaningfulness remains underexplored.

In this context, we address the following research question: How does the integration of AI systems affect professionals' perception of meaningful work? To explore this question, this chapter presents findings from a qualitative study that involved qualitative interviews with physicians and lawyers. The aim was to capture the professionals' perspectives on the integration of AI into their respective fields, which are both characterized by high-stakes decision-making processes that can significantly alter roles and responsibilities. Qualitative research is particularly well suited to this inquiry, as it allows for a nuanced understanding of complex phenomena such as professional identity and meaningful work, which are shaped by individual experiences, values and social contexts (Creswell and Poth, 2016). In healthcare, the introduction of AI has been shown to enhance clinical decision-making, potentially transforming physician–patient interactions and the competencies required for effective practice (Russell et al., 2023; Samhammer et al., 2022). Similarly, in the legal domain, the lack of a clear regulatory framework for AI poses challenges that can reshape the profession, compelling practitioners to navigate the complexities of AI's implications on legal standards and client representation (Nunnelley et al., 2024; Xudaybergenov, 2023). By engaging directly with professionals experiencing AI integration, this study provides insights into the spectrum of attitudes—ranging from scepticism to enthusiasm—among healthcare and legal professionals regarding AI's role in their work, thereby enriching the qualitative data necessary for understanding how AI influences perceptions of meaningful work across these professions. Furthermore, the empirical focus on physicians and lawyers allows for a comparative analysis of how different professional cultures respond to AI integration, yielding insights into broader societal implications related to trust, accountability and the evolving nature of professional identity (Aquino et al., 2023; Chalutz Ben-Gal, 2023). Thus, the selection of medicine and law as focal points for this study is justified by their critical engagement with AI, diverse professional attitudes and the potential for comparative analysis.

Similarities between the two professions include a long, specialized education, which involves attending a university. Both physicians and lawyers have a high ethical responsibility towards their patients (in the case of physicians) or clients (in the case of lawyers). Both professions work directly in the interest of their patients or clients. They provide specialized advice and care based on the specific needs of those they serve. Differences lie in the activities themselves.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

While physicians focus on medical diagnosis, treatment and prevention of diseases to maintain or restore the health of patients, lawyers advise and represent their clients in legal matters, safeguarding and enforcing their legal interests.

The analysis is grounded in the concepts of professional identity and meaningful work. Professional identity theory emphasizes the importance of understanding how individuals see themselves in relation to their work and how this identity is constructed and maintained over time (Ibarra, 1999). In the context of AI, this theory helps to explain how AI at work may impact upon professionals' self-conception and sense of purpose. The concept of meaningful work provides a lens through which to examine how AI might affect the intrinsic and extrinsic rewards that professionals derive from their work (Rosso et al., 2010). Together, this framework guides the analysis of the interview data and helps to illuminate the broader implications of AI for the future of professions and meaningful work.

CONCEPTUAL FOUNDATIONS

Professions and Professional Identity

Professions are defined by a set of specialized skills, knowledge and standards that differentiate them from other types of work. They typically have regulatory bodies which ensure that members meet established standards of competence and ethics (Suddaby and Viale, 2011). Professional identity refers to how individuals perceive themselves within their profession and how they fit within its values, roles and norms (Trede et al., 2012). It is both a personal and a social construct, shaped through education, practice and interactions with colleagues (Ibarra, 1999). Developing a professional identity is crucial because it influences career satisfaction, job performance and ethical decision-making (Slay and Smith, 2011).

Professional identity formation begins during formal education, where individuals are introduced to the norms and values of their profession (Trede et al., 2012). The process is dynamic, evolving throughout their career as they encounter new experiences, challenges and roles (Chreim et al., 2007). A strong professional identity can foster resilience, particularly in challenging work environments (Caza and Creary, 2016).

In digital work environments, professions are evolving due to technological advances, globalization and changing societal expectations (Noordegraaf, 2020). These shifts require professionals to continuously adapt their identities to remain relevant and effective (Caza and Creary, 2016).

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Digitalization and AI in Professional Work

Digitization, digitalization and digital transformation are critical concepts in understanding the modern society (Brennen and Kreiss, 2016). Digitization refers to converting analogue information into digital formats for storage, processing and transmission via information and communication technology (ICT) tools. Digitalization encompasses the broader implications of integrating digital tools into social and organizational practices, including changes in communication methods and business processes, often involving automation (Wilkesmann et al., 2020). Digital transformation, however, represents a more extensive societal shift, where digital technologies drive strategic changes that reshape value creation, requiring organizations to navigate structural changes and potential barriers for effective implementation (Pinheiro et al., 2023). The concepts of digitization, digitalization and digital transformation are intricately connected with the development and application of AI within organizations. AI plays a crucial role in advancing each of these processes, particularly in the realm of digital transformation. As digitization converts analogue information into digital formats, AI can enhance the processing and analysis of this data, enabling more efficient storage, retrieval and utilization of information (Brynjolfsson and Mitchell, 2017).

AI refers to the ability of machines to perform tasks that would usually require human intelligence, such as language understanding, problem-solving, reasoning and learning from experience (Wang, 2019). Advances in AI, especially in machine learning, robotics and data analysis, accelerate the development of information technology (IT) systems across various sectors, including healthcare, law, finance and education (Russell and Norvig, 2020).

Conceptualizing Meaningful Work

Meaningful work refers to the significance of a work goal or purpose in connection to an individual's personal ideals or standards (Spreitzer, 1995), and it embodies the personal importance of a key social activity: one of the largest uses of adults' waking hours, and a primary setting where individuals strive to achieve their life aspirations (Lysova et al., 2019). It is a concept which encapsulates the idea that work should not only provide economic benefits but also contribute to personal fulfilment, societal well-being and a sense of purpose (Bailey et al., 2017). Traditionally, meaningful work has been associated with intrinsic factors such as autonomy, skill variety, task significance and opportunities for personal growth (Hackman and Oldham, 1976). Scientists have long argued that meaningful work is essential for individual identity and social cohesion, as it fosters a sense of belonging and purpose within the broader societal framework (Rosso et al., 2010).

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

AI can augment human capabilities, allowing individuals to focus on more complex, creative and value-driven tasks that machines cannot replicate (Brynjolfsson and McAfee, 2014). This shift has the potential to inject new meaning into work by freeing individuals from everyday tasks and enabling them to engage in more intellectually stimulating activities (Wilson and Daugherty, 2018).

The Dual Role of AI: Threat and Opportunity for Meaningful Work of Professions

The dual nature of AI as both a threat and an opportunity to meaningful work highlights the need for a nuanced understanding of its implications. On one hand, AI can lead to the dehumanization of work by reducing the need for human intervention and diminishing the value of human skills and judgement (Susskind, 2019). On the other hand, AI's ability to handle routine tasks can empower workers by allowing them to focus on more meaningful aspects of their jobs, such as problem-solving, creativity and interpersonal interactions (Bessen, 2018). This shift has the potential to contribute to a more fulfilling work experience, provided that workers are given the necessary support and training to adapt to these new roles (Arntz et al., 2019).

Existing research suggests that AI's ability to handle repetitive and everyday tasks can indeed free up time for professionals to engage in more meaningful work, such as complex problem-solving and client or patient interaction (Susskind, 2019; Topol, 2019; Susskind and Susskind, 2015). However, there are also concerns that AI might diminish the meaningfulness of work by reducing the role of human judgement and creativity in professional tasks (McGinnis and Pearce, 2019). Moreover, the reliance on AI could also raise ethical concerns, as the lack of transparency in AI decision-making processes might lead to a loss of trust in the professional–client relationship, which is a crucial source of meaning for many professionals (Jiang et al., 2017).

The introduction of AI into the workplace has been found to influence professionals' perception of meaningful work by reducing cognitive load and enabling employees to focus on more complex, creative tasks that machines cannot replicate (Brynjolfsson and Mitchell, 2017). However, AI-driven automation of routine tasks can sometimes lead to a sense of reduced job significance, as professionals may feel displaced or undervalued in roles that they once performed manually (Davenport and Ronanki, 2018). Research suggests that AI's ability to augment decision-making processes enhances job satisfaction by providing employees with more accurate data, enabling better-informed decisions and increasing their perception of job relevance (Huang et al., 2019).

Studies show that professionals in AI-augmented environments often experience enhanced job complexity and skill utilization, which can boost their

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

sense of purpose and engagement (Wilson and Daugherty, 2018). On the other hand, AI's potential to deskill certain professions by automating knowledge-intensive tasks has raised concerns about the long-term impact on the meaningfulness of specialized careers (Acemoglu and Restrepo, 2019). Overall, the impact of AI on perceptions of meaningful work appears to be contingent on the balance between task augmentation and task replacement, with greater augmentation being linked to more positive work experiences (Brougham and Haar, 2018).

METHODS

Research Approach: Interviews with Physicians and Lawyers

In order to examine how integration of AI systems affects professionals' perception of meaningful work, we conducted ten problem-centred interviews with physicians and lawyers to analyze the effects of AI use on meaningful work of professionals (Witzel and Reiter, 2012).

In the medical profession, meaningful work is typically associated with the capability to care for others, alleviate suffering and contribute to the well-being of patients (Steger et al., 2012). Physicians often derive meaning from the human connection that they establish with patients, the sense of purpose in diagnosing and treating illnesses, and the intellectual fulfilment of engaging in complex medical decision-making (Frankl, 1985). However, the increasing bureaucratic demands and the emphasis on efficiency and productivity in healthcare can sometimes detract from these sources of meaning, leading to frustration and a sense of alienation among medical professionals (Shanafelt et al., 2015).

In the legal profession, meaningful work is often associated with the ability to advocate for justice, uphold the rule of law and make a positive impact on society. Lawyers may find meaning in their work through the intellectual challenge it presents, the opportunities for problem-solving, and the sense of duty and responsibility that comes with representing clients and ensuring that legal processes are fair and equitable (Rhode, 2015).

In the medical field, AI applications have been equally transformative. AI has been integrated into diagnostic processes, treatment planning and patient monitoring, among other areas. AI-driven diagnostic tools, such as those based on machine learning algorithms, have shown high accuracy in detecting diseases from medical images, often surpassing human experts (Esteva et al., 2017). In treatment planning, AI personalizes treatment protocols by analyzing patient data and predicting treatment responses (Topol, 2019). AI's role in patient monitoring is also expanding, with the development of wearable devices and remote monitoring systems that utilize AI to track patient health in

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

real time, enabling more proactive and personalized healthcare (Krittanawong et al., 2022). In this sense, in the medical profession, AI's ability to handle routine diagnostic and monitoring tasks has freed up time for physicians to engage more deeply with patient care (Topol, 2019). Yet, there are also concerns about the reliability of AI systems, the potential erosion of clinical skills, and the ethical implications of AI in healthcare, particularly regarding patient privacy and the transparency of AI-driven decisions (Jiang et al., 2017).

In the legal profession, AI has been primarily utilized for tasks such as legal research, contract analysis and predictive analytics. Legal research, traditionally a time-consuming process, has been significantly streamlined through AI-powered tools that can quickly sift through vast amounts of legal documents and case law to provide relevant information (Hildebrandt, 2020). Contract analysis has similarly benefited from AI, with algorithms capable of reviewing and extracting pertinent clauses from large volumes of contracts, thereby reducing the time and effort required from lawyers (McGinnis and Pearce, 2019). Predictive analytics uses AI to forecast case outcomes, helping lawyers to strategize and clients to assess litigation risks (Susskind, 2019). The impact of AI on the day-to-day tasks of physicians and lawyers is significant. For lawyers, AI has reduced the time spent on routine tasks such as document review and legal research, allowing them to focus on more complex and strategic aspects of their work (Remus and Levy, 2017). However, this shift has also raised concerns about the potential for job displacement and the de-skilling of legal professionals, as AI takes over tasks traditionally performed by junior lawyers and paralegals (McGinnis and Pearce, 2019).

We recruited interviewees through previous field contacts, and cold calling. Selection criteria were: (1) their occupation in one of the fields mentioned (health care, law); (2) work experience of at least three years; and (3) experience in the use of AI systems at work. Interview sample characteristics are summarized in Table 11.1.

The interview guidelines were developed based on the literature on meaningful work and taking into account recent technological developments. We started with an open-ended prompt about current activities to elicit focused narratives. This was followed by open-ended key questions covering relevant topics such as the use of AI systems in work processes, relevant work characteristics and meaningfulness. The interviews were digitally recorded, transcribed, and anonymized for systematic analysis. The average duration of the interviews was approximately 35 minutes.

Analysis Process

The analysis is based on a qualitative content analysis (Mayring, 2014) using MAXQDA software. Table 11.2 provides a list of codes. We used both an

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Table 11.1 Interview sample characteristics

Interviewee	Job description	Gender	Year of birth	Work experience (years)
Physician 1 (P1)	Specialist	M	1984	12
Physician 2 (P2)	Medical director and senior physician	M	1987	12
Physician 3 (P3)	Senior physician	M	1985	8
Physician 4 (P4)	Consultant	M	1992	5
Physician 5 (P5)	Senior physician	M	1988	10
Lawyer 1 (L1)	Lawyer/Partner	W	1979	17
Lawyer 2 (L2)	Lawyer	W	1991	5
Lawyer 3 (L3)	Lawyer/Partner	W	1985	12
Lawyer 4 (L4)	Lawyer/Partner	M	1971	24
Lawyer 5 (L5)	Lawyer/Partner	M	1973	22

inductive approach for developing categories and a deductive method for applying them. Through regular discussions, the categories were defined, and the overall system was further developed, with key quotations identified for each category. The interview excerpts were translated from German into English.

EMPIRICAL FINDINGS

The Impact of AI on Professional Workflow and Efficiency

The empirical results show that physicians and lawyers perceive AI systems as valuable tools that enhance various aspects of their work. AI is primarily utilized for enhancing literature analysis, refining text and generating drafts of academic papers. This allows researchers to focus on content accuracy while leveraging AI's ability to structure and format documents efficiently:

> I try to use it to work on scientific questions, I use it to make corrections to written texts, and I get information about things that can be improved in texts, also in terms of content, and I get help with analysing literature. (P2:5)

AI's use extends into clinical diagnostics and therapy recommendations. For instance, in ambiguous medical cases, AI can suggest diagnoses and treatment options, such as optimal antibiotic therapies based on specific pathogens. This can enhance clinical decision-making by providing alternative perspectives that may not be immediately apparent to human practitioners:

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Table 11.2 List of codes

Main category	Subcategory	When to apply
Current activity	Typical working day	Assign when interviewees describe their usual daily routine, schedules or common tasks during a regular workday. This includes recurring activities or the general structure of their working hours.
Current activity	Work tasks	Apply when interviewee specifically describe tasks they perform as part of their job, focusing on the actual work being done.
Current activity	Current activity	Assign when interviewees are discussing what they are currently working on or focusing on at the time of the interview, such as specific ongoing projects or immediate tasks.
Understanding the role of AI	Change through AI	Apply when interviewees discuss how AI has changed or is expected to change their job, workplace or industry, in terms of processes, efficiency or job roles.
Understanding the role of AI	Effects of AI in everyday working life	Assign when interviewees mention specific ways that AI influences or impacts upon their daily work routines or tasks. This includes positive, neutral or negative effects.
Understanding the role of AI	Understanding AI	Use when interviewees explain their own understanding or knowledge of AI, capabilities, limitations, and how it works. This might involve discussions about what AI is and how it operates in their specific context.
Perceived impact on professional identity	Uniquely human aspects of professional work	Apply when interviewees emphasize aspects of their work that they believe are inherently human and cannot be replaced by AI, such as empathy, creativity or ethical decision-making.
Perceived impact on professional identity	Perception and integration of AI in the workplace	Use when interviewees discuss how AI is perceived in their workplace (e.g., as a positive tool, a threat or neutral) and how it is being integrated into daily operations.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Main category	Subcategory	When to apply
Perceived impact on professional identity	Impact of AI on professional identity	Assign when interviewees reflect on how the introduction or presence of AI affects their sense of professional identity or role, including any changes to how they view themselves in their job.
Overall impact on the meaningfulness	Meaningfulness of the profession	Apply when interviewees discuss how their job or profession still holds value or meaning, especially in the context of AI's growing role in the workplace.
Overall impact on the meaningfulness	Role of human interaction	Use when interviewees talk about the importance of human interaction in their job, especially in areas that AI cannot replicate, such as personal connections, teamwork or client relations.
Overall impact on the meaningfulness	General impact of AI on meaningfulness	Assign when interviewees discuss AI's overall influence on how meaningful they perceive their work to be, either enhancing, diminishing or having no effect on it.
Future prospects and development of the profession	Opportunities and risks	Apply when interviewees talk about the potential opportunities (e.g., career growth, innovation) or risks (e.g., job loss, ethical concerns) posed by AI for their profession.
Future prospects and development of the profession	Future of the profession	Use when interviewees reflect on the future direction of their profession, especially in light of AI's advancement and integration. This includes both optimistic and pessimistic views.

> For example, if I have a patient who has unclear symptoms, where I don't know exactly what they're suffering from, for example, unclear abdominal pain, then I use AI to give me direction or just to help me, because it often happens that AI recommends things that you don't even know about, because it just has a higher level of intelligence. (P4:9)

In surgical preparation and simulation, AI aids in visualizing patient-specific anatomical variations, ensuring that surgical interventions are oncologically sound. Such machine learning-based systems are increasingly integrated into preoperative planning, improving the precision of surgical procedures.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Additionally, AI is explored for automating patient management processes, streamlining tasks such as appointment scheduling, which can free up valuable time for patient care:

> Here in Thoracic surgery, we have the problem that the anatomy is not always the same. In other words, the anatomy that we know from the anatomy books is only the same in about 15–20% of cases. This is the case with patients. And if we then want to define which part of the lung we need or want to remove, it is difficult to deduce from the CT images whether this part that we want to remove actually makes sense from an oncological point of view. That's why software that makes it possible to visualize the anatomical counterparts and check whether this actually makes sense is very useful and very helpful. (P5:8)

The legal field sees AI blurring the lines between traditional software and autonomous systems, particularly in areas such as trademark law. Here, AI's capacity to make judgements, such as assessing trademark infringement, highlights its growing potential for more complex decision-making tasks:

> A further development is then already, so to speak, and that is not yet so mature that it is already in use as standard, AI software that virtually checks the Internet for legal violations on a daily basis and then gives us reports, virtually takes over the research work. (L1:9)

Another shift in the legal field describes how advanced machine techniques streamline the process of reviewing documents, further minimizing the need for human involvement in initial data gathering and analysis:

> I no longer read at all, but I use machine techniques to take data points, such as Control F or a Google Search and then do that a bit on steroids, so to speak, and then go through documents with technology. (L5:6)

Across these professions, AI acts as both a tool for efficiency and a decision-support system, with the promise of further integration and automation in the future.

Redefining Professional Identity in the Age of AI

The implementation of AI systems has had varying impacts on professionals' daily tasks in medical and legal settings. In clinical environments, automation of repetitive tasks, such as managing patient data and prescribing medications, has significantly streamlined workflows. Previously time-consuming processes, such as manually documenting therapies or preparing treatments, can now be completed quickly with just a few clicks. Real-time data analysis

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

also allows for more efficient patient monitoring, leading to substantial time savings for healthcare workers:

> In the past, we did all the therapy, for example, from the patient, that was paper, just paper, tablet, in front of patient, in front of doctor, we just have to bring each medication forward. And that took a lot, a lot, a lot of time, a lot of time. (P1:16)

AI also plays a transformative role in surgical preparation. By automating preoperative planning, surgeons can customize procedures to individual patients, potentially improving long-term outcomes:

> It allows me to concentrate much more on each patient, it saves me time on the one hand, and on the other hand I can tailor the operation itself, the surgical technique, much more to the patient. (P5:10)

In legal practice, the interviewees report that AI has become essential for increasing efficiency. It allows lawyers to quickly generate overviews, perform repetitive tasks and streamline documentation processes. This has become crucial for maintaining competitiveness in an industry where clients are unwilling to pay for labour-intensive manual work:

> So far, it's been absolutely supportive for us. You have to use this software to stay competitive, because otherwise you would basically have to do the work yourself and we always charge by the hour and no client is willing to pay for this work if you were to do it all by hand. In other words, we are absolutely dependent on this software, which is becoming more and more intelligent. (L1:11)

The growing reliance on AI in legal practice reflects a broader shift toward optimizing workflows, not only to meet client demands but also to enhance job satisfaction by reducing time spent on routine, non-critical tasks:

> So as this is just a tool for me, nothing has changed. It has become a bit more satisfying because you have to spend less time on work that doesn't directly affect the result. (L4:36)

Both physicians and lawyers increasingly use AI to automate and enhance tasks – from literature analysis, clinical diagnostics and surgical planning to legal document review and trademark evaluation – streamlining workflows and improving decision-making. This integration of AI not only boosts efficiency but also redefines professional roles by allowing experts to concentrate on more critical aspects of their work.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Sense of Meaning and Purpose in Professional Roles

For the interviewees, a key theme for the meaning of work is the interaction with patients and clients, together with the professional satisfaction. The human connection is seen as vital in delivering personalized care and providing emotional support, which technology and AI cannot replace:

> I have to talk to patients. And that brings us a lot. Even if they're grateful, we get a lot out of it. They say thank you very much. You saved my life, for example. That's why we studied for 25 years. (P1:25)
>
> It makes sense for me to deliver a good performance. I have certain expectations of myself. I wouldn't be able to sleep well if I were to say that I've just somehow banged it out linguistically and I don't really care. But my aim is actually to do it as well as I can and help someone. (P3:15)

Work–life integration and passion for the profession also play a role. This personal commitment provides them with a sense of stability and achievement, fuelling their passion for continuous development:

> Yes, to put it simply, I see my work as the goal of my life. So, for me, work is, I'm a workaholic. I'm always working because I like it. And when I'm not working, I just feel bad. That's why I get up because I love my work. And I don't see it as work at all, but really as my life. So, I always want to develop through my work. (P4:21)

Additionally, organizational and systemic aspects contribute to or detract from work satisfaction. Respondents recognize that while mundane or bureaucratic tasks are necessary, reducing these through digital or human support systems would increase job satisfaction and academic engagement, ultimately leading to more impactful delivery:

> The more we do it, the greater the satisfaction, not only for the patient, but I feel it myself when I know that I've actually achieved something. I think surgery has the advantage that you can see the results of the work immediately, but also the satisfaction and dissatisfaction at the same time. (P5:16)

By streamlining routine tasks through both digital solutions and efficient practices, the professionals interviewed not only enhance their perception of meaningful work but also gain a clearer sense of accomplishment:

> I think the advantages are certainly increased efficiency and the avoidance of errors. This makes the work more meaningful because you avoid redundant work. (L4:39)

In summary, AI predominantly enhances efficiency and can improve meaningful work when actively integrated. However, its implementation must be

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

approached with caution, ensuring that human expertise remains an indispensable element in maintaining high standards of quality, ethical decision-making and meaningful professional engagement. While AI primarily serves to augment efficiency and can contribute to enhancing meaningful work through the automation of routine tasks, it also raises concerns regarding the potential erosion of human cognitive functions. These concerns are particularly relevant in relation to the extent of AI integration, as over-reliance on automated systems may diminish critical thinking and problem-solving roles traditionally fulfilled by human professionals. In both medicine and law, AI has the potential to act as a supportive element that enhances the meaningful, interpersonal and cognitive dimensions of these professions.

DISCUSSION

The aim of this chapter was to analyze how the integration of AI systems affects professionals' perception of meaningful work. The empirical findings reveal a nuanced relationship between AI integration and meaningful work in both medical and legal fields (Davenport and Ronanki, 2018). On the one hand, AI enhances efficiency, allowing physicians and lawyers to focus on more complex, value-adding tasks without sacrificing the core elements that render their work meaningful (Brynjolfsson and McAfee, 2014). On the other hand, the integration of AI highlights notable differences in how each profession adapts to technological advancements. In medicine, AI is primarily leveraged to enhance clinical decision-making – diagnosing ambiguous conditions and personalizing surgical preparations – which directly impacts upon patient care and outcomes (Russell et al., 2023; Samhammer et al., 2022). In contrast, the legal field utilizes AI to streamline document review and automate research tasks, thereby boosting operational efficiency without significantly altering client interactions (Nunnelley et al., 2024; Xudaybergenov, 2023). However, these adaptations bring distinct concerns: physicians worry about maintaining the human connection with patients amidst increasing automation, while lawyers are more focused on the implications of AI for workflow efficiency and the potential reduction in human oversight in legal judgments (Ho and Caals, 2021; Weidener and Fischer, 2024). Ultimately, this divergence underscores how AI's impact on professional identity varies: emphasizing interpersonal relationships in medicine, and efficiency coupled with accuracy in legal processes (Migliorini and Moreira, 2025; Petersson et al., 2022).

AI's ability to automate routine tasks such as literature analysis, text refinement and clinical data processing is perceived positively by both professions, as it streamlines workflows and increases productivity (Kaplan and Haenlein, 2019). This aligns with existing literature that highlights the time-saving benefits of AI in professional settings, particularly in fields requiring extensive

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

data analysis, such as medicine and law (Davenport and Ronanki, 2018). By reducing cognitive load in areas such as documentation or basic diagnostics, AI allows professionals to devote more time to tasks that are intellectually and emotionally fulfilling, which contributes to a deeper sense of professional satisfaction (Smith, 2018). For example, in healthcare, physicians can focus more on patient interactions, which they identify as a key source of meaningfulness in their work (Topol, 2019). Similarly, in the legal field, AI helps lawyers to handle routine legal work efficiently, freeing them to concentrate on strategic thinking and personalized client interactions (Susskind and Susskind, 2015).

However, the discussion also reveals a tension between AI's efficiency and its potential to reduce the cognitive contributions of professionals. Physicians express apprehension that excessive dependence on AI for clinical decisions might dilute the quality of care by minimizing human judgement, a concern supported by research suggesting that overuse of decision-support systems can weaken critical thinking skills (Topol, 2019). Alongside this caution, healthcare technologies such as telemedicine, electronic health records and remote monitoring can improve patient care and access, though protecting privacy, preserving autonomy and maintaining the doctor–patient relationship remain essential. Active engagement with AI, rather than blind trust, is crucial to ensuring that technology enhances rather than diminishes professionals' intellectual involvement (Wachter et al., 2017).

Ultimately, the perceived impact of AI on meaningful work appears contingent on how it is integrated (Susskind and Susskind, 2015), especially considering that individuals engaged in meaningful work experience improved well-being and performance (Allan et al., 2019). AI that is employed as a supportive tool – one that enhances human decision-making and allows professionals to focus on higher-order tasks – can increase meaning (Kaplan and Haenlein, 2019). Thus, the balance between AI efficiency and the retention of human expertise and empathy is key to ensuring that AI contributes positively to the meaningfulness of professional life (Topol, 2019).

This chapter sought to answer the research question: 'How does the integration of AI systems affect professionals' perception of meaningful work?' Our results indicate that integrating AI systems is reshaping job roles by automating routine tasks and necessitating new, higher-order skills for effective collaboration with these technologies. On the one hand, this is potentially leading to a decrease in patient interaction and oversight. On the other hand, this entails the potential to further develop work and daily routines in the sense of engaging in patient interaction as well as in creative and strategic work. This depends on professionals actively and reflectively shaping their work and daily tasks and dealing competently with AI. Consequently, this shift enables professionals to focus on more personalized, creative and strategic work, which enhances their

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

perception of meaningful work by aligning daily tasks more closely with their intrinsic motivations and long-term professional growth.

The findings from this research offer significant contributions to the ongoing discourse on AI's role in reshaping professional work, particularly in fields such as law and healthcare. Prior to this study, much of the literature emphasized AI's potential to boost efficiency and automate routine tasks. Our research adds a deeper understanding of how AI's integration into complex professional environments impacts the subjective experience of meaningful work. It highlights that AI is not just a tool for increasing productivity but can also influence the very nature of job satisfaction and professional identity.

A key insight from these results is the dual nature of AI's influence; while it can free professionals from routine tasks, allowing them to focus on more fulfilling, complex work, it also introduces a tension regarding the potential erosion of cognitive engagement. The apprehension surrounding the over-reliance on AI reveals a previously underexplored aspect of how technology might impact upon the intellectual autonomy and decision-making skills of professionals. The direction that AI takes in reshaping professional work depends on its role: whether it serves as a supportive tool or a replacement for human judgement. Integration strategies that emphasize collaboration with AI allow professionals to retain cognitive engagement and focus on complex tasks, enhancing their sense of purpose and satisfaction. Conversely, excessive reliance on AI without active human input risks eroding critical thinking skills and diminishing the intellectual autonomy essential to meaningful work.

CONCLUSION

This chapter has explored how the integration of AI systems affects professionals' perception of meaningful work. It offers broader insights into how technology reshapes the nature of meaningful work beyond traditional productivity advances. This research reveals that AI's integration can both liberate workers from routine tasks and risk reducing intellectual engagement, a balance relevant to any domain involving complex decision-making. Additionally, it underscores the importance of designing AI systems to support human expertise and autonomy rather than to erode them, a lesson applicable across fields prioritizing creativity and professional identity.

This study has several limitations that suggest directions for future research. First, the qualitative approach, while valuable for exploring in-depth perspectives, was limited by a small, Germany-based sample. Future research could enhance the robustness of these insights by employing a larger, more diverse sample and incorporating quantitative methods. Expanding the scope internationally and including additional professions would also provide a more comprehensive understanding of the phenomenon. Furthermore, an emerging area

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

of investigation could be exploring job crafting strategies that professionals develop in response to AI integration, examining how individuals proactively reshape their work roles and cognitive approaches to maintain meaningful engagement with technology. This approach would provide deeper insights into individual agency and adaptive responses to technological transformations. Moreover, this study focused solely on the perspectives of professionals, which may not fully capture the broader dynamics of organizational structures or client and patient experiences. Including the viewpoints of organizational representatives and clients or patients would present a more holistic view. Finally, using single-point qualitative research limits the insight to a moment in time; thus, a longitudinal approach, such as a diary study, would allow future researchers to explore changes over time, allowing for a deeper understanding of these experiences.

The future of work in the age of AI presents both challenges and opportunities for meaningful work. As AI technologies continue to evolve and reshape the nature of work, it is essential to consider the sociological implications of these changes for individuals, organizations and society as a whole. The integration of AI into the workplace raises important questions about the role of technology in shaping social relationships, and the broader societal impact of technological change (Ford, 2015).

One of the key challenges in this context is ensuring that the benefits of AI are equitably distributed across society, and that marginalized groups are not disproportionately affected by job displacement and deskilling (Noble, 2018). This requires a collaborative effort between policymakers, organizations and civil society to develop strategies that promote inclusive growth and social well-being (West, 2018). Another critical challenge is addressing the ethical and social dimensions of AI, ensuring that these technologies are designed and implemented in a manner that aligns with the values and goals of society (Floridi et al., 2018).

The relationship between AI and meaningful work is complex and multifaceted, encompassing both challenges and opportunities for individuals, organizations and society. By adopting a proactive and inclusive approach to managing the impact of AI on work, organizations can create a more meaningful and fulfilling work experience for their employees, and contribute to a more equitable and just society.

REFERENCES

Abbott, A. (1988). *The system of professions: An essay on the division of expert labour.* University of Chicago Press.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Acemoglu, D., and Restrepo, P. (2019). Automation and new tasks: How technology displaces and reinstates labor. *Journal of Economic Perspectives*, *33*(2), 3–30. https://doi.org/10.1257/jep.33.2.3

Allan, B.A., Batz-Barbarich, C., Sterling, H.M., and Tay, L. (2019). Outcomes of meaningful work: A meta-analysis. *Journal of Management Studies*, *56*(3), 500–528. https://doi.org/10.1111/joms.12406

Aquino, Y.S.J., et al. (2023). Utopia versus dystopia: professional perspectives on the impact of healthcare artificial intelligence on clinical roles and skills. *International Journal of Medical Informatics*, *169*, 104903. https://doi.org/10.1016/j.ijmedinf.2022.104903

Arntz, M., Gregory, T., and Zierahn, U. (2019). Digitization and the future of work: Macroeconomic consequences. In Zimmermann, K. (ed), *Handbook of Labor, Human Resources and Population Economics* (pp. 1–29). Springer International Publishing.

Bailey, C., Madden, A., Alfes, K., and Fletcher, L. (2017). The meaning, antecedents and outcomes of employee engagement: A narrative synthesis. *International Journal of Management Reviews*, *19*(1), 31–53. https://doi.org/10.1111/ijmr.12077

Bankins, S., and Formosa, P. (2023). The ethical implications of artificial intelligence (AI) for meaningful work. *Journal of Business Ethics*, 1–16. https://doi.org/10.1007/s10551-023-05339-7

Bessen, J. (2018). *AI and jobs: The role of demand*. NBER Working Paper 24235 (2018), https://doi.org/10.3386/w24235.

Brennen, J.S., and Kreiss, D. (2016). Digitalization. In K.B. Jensen, E.W. Rothenbuhler, J.D. Pooley, and R.T. Craig (eds), *The International Encyclopedia of Communication Theory and Philosophy*. Wiley-Blackwell. https://doi.org/10.1002/9781118766804.wbiect111

Brougham, D., and Haar, J. (2018). Smart technology, artificial intelligence, robotics, and algorithms (STARA): Employees' perceptions of our future workplace. *Journal of Management and Organization*, *24*(2), 239–257. https://doi.org/10.1017/jmo.2016.55

Brynjolfsson, E., and McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. WW Norton and Company.

Brynjolfsson, E., and Mitchell, T. (2017). What can machine learning do? Workforce implications. *Science*, *358*(6370), 1530–1534. https://doi.org/10.1126/science.aap8062

Caza, B.B., and Creary, S. (2016). The construction of professional identity. In A. Wilkinson, D. Hislop, & C. Coupland (eds), *Perspectives on contemporary professional work* (pp. 259–285). Edward Elgar Publishing.

Chalutz Ben-Gal, H. (2023). Artificial intelligence (AI) acceptance in primary care during the coronavirus pandemic: what is the role of patients' gender, age and health awareness? A two-phase pilot study. *Frontiers in Public Health*, *10*, 931225. https://doi.org/10.3389/fpubh.2022.931225

Chreim, S., Williams, B. E., and Hinings, C.R. (2007). Interlevel influences on the reconstruction of professional role identity. *Academy of Management Journal*, *50*(6), 1515–1539. https://doi.org/10.5465/amj.2007.28226248

Creswell, J.W., and Poth, C.N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. SAGE Publications.

Davenport, T.H., and Ronanki, R. (2018). Artificial intelligence for the real world. *Harvard Business Review*, *96*(1), 108–116.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Esteva, A., et al. (2017). Dermatologist-level classification of skin cancer with deep neural networks. *Nature*, *542*(7639), 115–118.
Evetts, J. (2013). Professionalism: Value and ideology. *Current Sociology*, *61*(5–6), 778–796. https://doi.org/10.1177/0011392113479316
Fleming, N. (2018). How artificial intelligence is changing drug discovery. *Nature*, *557*(7706), S55–S55.
Floridi, L., et al. (2018). AI4People – An ethical framework for a good AI society: Opportunities, risks, principles, and recommendations. *Minds and Machines*, *28*, 689–707.
Ford, M. (2015). *Rise of the robots*. Basic Books.
Frankl, V.E. (1985). *Man's search for meaning*. Simon & Schuster.
Freidson, E. (2001). *Professionalism: The third logic*. Polity Press.
Frey, C.B., and Osborne, M.A. (2017). The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, *114*, 254–280.
Hackman, J.R., and Oldham, G.R. (1976). Motivation through the design of work: Test of a theory. *Organizational Behavior and Human Performance*, *16*(2), 250–279. https://doi.org/10.1016/0030-5073(76)90016-7
Hildebrandt, M. (2020). *Law for computer scientists and other folk*. Oxford University Press.
Ho, C.W.L., and Caals, K. (2021). A call for an ethics and governance action plan to harness the power of artificial intelligence and digitalization in nephrology. *Seminars in Nephrology*, *41*(3), 282–293. https://doi.org/10.1016/j.semnephrol.2021.05.009
Huang, M.H., Rust, R., and Maksimovic, V. (2019). The feeling economy: Managing in the next generation of artificial intelligence (AI). *California Management Review*, *61*(4), 43–65. https://doi.org/10.1177/0008125619863436
Ibarra, H. (1999). Provisional selves: Experimenting with image and identity in professional adaptation. *Administrative Science Quarterly*, *44*(4), 764–791.
Jiang, F., et al. (2017). Artificial intelligence in healthcare: Past, present and future. *Stroke and Vascular Neurology*, *2*(4). https://doi.org/10.1136/svn-2017-000101
Kaplan, A., and Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business Horizons*, *62*(1), 15–25. https://doi.org/10.1016/j.bushor.2018.08.004
Krittanawong, C., et al. (2022). Artificial intelligence and cardiovascular genetics. *Life*, *12*(2), 279.
Lysova, E.I., Allan, B.A., Dik, B.J., Duffy, R.D., and Steger, M.F. (2019). Fostering meaningful work in organizations: A multi-level review and integration. *Journal of Vocational Behavior*, *110*, 374–389. https://doi.org/10.1016/j.jvb.2018.07.004
Makridakis, S. (2017). The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms. *Futures*, *90*, 46–60.
Martinez, D., Malyska, N., Streilein, B., Caceres, R., Campbell, W., Dagli, C. and Thornton, J. (2019). Artificial intelligence: Short history, present developments, and future outlook. *Massachusetts Institute of Technology.*
Mayring, P. (2014). *Qualitative content analysis: theoretical foundation, basic procedures and software solution*. https://nbn-resolving.org/urn:nbn:de:0168-ssoar-395173
McGinnis, J.O., and Pearce, R.G. (2019). The great disruption: How machine intelligence will transform the role of lawyers in the delivery of legal services.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Actual Problems of Economics and Law 1230–1250. https://doi.org/10.21202/1993-047X.13.2019.2.1230-1250

Migliorini, S., and Moreira, J.I. (2025). The case for nurturing AI literacy in law schools. *Asian Journal of Legal Education*, *12*(1), 7–24. https://doi.org/10.1177/23220058241265613

Noble, S.U. (2018). *Algorithms of oppression: How search engines reinforce racism*. New York, USA: New York University Press. https://doi.org/10.18574/nyu/9781479833641.001.0001

Noordegraaf, M. (2020). Protective or connective professionalism? How connected professionals can (still) act as autonomous and authoritative experts. *Journal of Professions and Organization*, *7*(2), 205–223. https://doi.org/10.1093/jpo/joaa011

Nunnelley, S., et al. (2024). Cracking the code: A scoping review to unite disciplines in tackling legal issues in health artificial intelligence. *medRxiv*, 2024–2004. https://doi.org/10.1101/2024.04.22.24305806

Oliveira, A.L., and Figueiredo, M.A.T. (2024). Artificial intelligence: Historical context and state of the art. In H. Sousa Antunes, P.M. Freitas, A.L. Oliveira, C. Martins Pereira, E. Vaz de Sequeira, and L. Barreto Xavier (eds), *Multidisciplinary Perspectives on* artificial intelligence *and the law* (Law, Governance and Technology Series*,* Vol. 58, pp. 3–24). Springer. https://doi.org/10.1007/978-3-031-41264-6_1

Petersson, L., et al. (2022). Challenges to implementing artificial intelligence in healthcare: A qualitative interview study with healthcare leaders in Sweden. *BMC Health Services Research*, *22*(1), 850. https://doi.org/10.1186/s12913-022-08215-8

Pinheiro, R., Tømte, C.E., Barman, L., Degn, L., and Geschwind, L. (2023). Digital transformations in nordic higher education: A step towards unpacking a multifaceted and emergent phenomenon. In R. Pinheiro, C. Edelhard Tømte, L. Barman, L. Degn, and L. Geschwind (eds) *Digital Transformations in Nordic Higher Education* (pp. 3–26). Palgrave Macmillan. https://doi.org/10.1007/978-3-031-27758-0_1

Remus, D., and Levy, F. (2017). Can robots be lawyers: Computers, lawyers, and the practice of law. *Georgetown Journal of Legal Ethics*, *30*, 501. https://doi.org/10.2139/ssrn.2701092

Rhode, D.L. (2015). *The trouble with lawyers*. Oxford University Press.

Rosso, B.D., Dekas, K.H., and Wrzesniewski, A. (2010). On the meaning of work: A theoretical integration and review. *Research in Organizational Behavior*, *30*, 91–127. https://doi.org/10.1016/j.riob.2010.09.001

Russell, R.G., et al. (2023). Competencies for the use of artificial intelligence-based tools by health care professionals. *Academic Medicine*, *98*(3), 348–356. https://doi.org/10.1097/ACM.0000000000004963

Russell, S., and Norvig, P. (2020). *Artificial intelligence: A modern approach (4th edition)*. Pearson.

Samhammer, D., et al. (2022). 'Nothing works without the doctor:' Physicians' perception of clinical decision-making and artificial intelligence. *Frontiers in Medicine*, *9*, 1016366. https://doi.org/10.3389/fmed.2022.1016366

Scripter, L. (2025). The achievement gap thesis reconsidered: artificial intelligence, automation, and meaningful work. *AI and Society*, *40*(1), 89–102. https://doi.org/10.1007/s00146-023-01828-5

Shanafelt, T.D., et al. (2015). Changes in burnout and satisfaction with work–life balance in physicians and the general US working population between 2011 and 2014. *Mayo Clinic Proceedings*, *90*(12), 1600–1613.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Slay, H.S., and Smith, D.A. (2011). Professional identity construction: Using narrative to understand the negotiation of professional and stigmatized cultural identities. *Human Relations*, *64*(1), 85–107. https://doi.org/10.1177/0018726710384290

Smith, G. (2018). *The AI delusion*. Oxford University Press.

Spreitzer, G.M. (1995). Psychological empowerment in the workplace: Dimensions, measurement, and validation. *Academy of Management Journal*, *38*(5), 1442–1465. https://doi.org/10.5465/256865

Steger, M.F., Dik, B.J., and Duffy, R.D. (2012). Measuring meaningful work: The work and meaning inventory (WAMI). *Journal of Career Assessment*, *20*(3), 322–337.

Suddaby, R., and Viale, T. (2011). Professionals and field-level change: Institutional work and the professional project. *Current Sociology*, *59*(4), 423–442. https://doi.org/10.1177/0011392111402586

Surden, H. (2019). Artificial intelligence and law: An overview. *Georgia State University Law Review*, *35*(4), 1305–1337. https://readingroom.law.gsu.edu/gsulr/vol35/iss4/8.

Susskind, R. (2019). *Online courts and the future of justice*. Oxford University Press.

Susskind, R.E., and Susskind, D. (2015). *The future of the professions: How technology will transform the work of human experts*. Oxford University Press.

Symon, G., and Whiting, R. (2019). The sociomaterial negotiation of social entrepreneurs' meaningful work. *Journal of Management Studies*, *56*(3), 655–684. https://doi.org/10.1111/joms.12421

Topol, E.J. (2019). High-performance medicine: The convergence of human and artificial intelligence. *Nature Medicine*, *25*(1), 44–56. https://doi.org/10.1038/s41591-018-0300-7

Trede, F., Macklin, R., and Bridges, D. (2012). Professional identity development: A review of the higher education literature. *Studies in Higher Education*, *37*(3), 365–384. https://doi.org/10.1080/03075079.2010.521237

Wachter, S., Mittelstadt, B., and Floridi, L. (2017). Why a right to explanation of automated decision-making does not exist in the general data protection regulation. *International Data Privacy Law*, *7*(2), 76–99. https://doi.org/10.1093/idpl/ipx005

Wang, P. (2019). On defining artificial intelligence. *Journal of Artificial General Intelligence*, *10*, 1–37. https://doi.org/10.2478/jagi-2019-0002

Weidener, L., and Fischer, M. (2024). Role of ethics in developing AI-based applications in medicine: insights from expert interviews and discussion of implications. *JMIR AI*, *3*(1), e51204. https://doi.org/10.2196/51204

West, D.M. (2018). *The future of work: Robots, AI, and automation*. Brookings Institution Press.

Wilkesmann, M., Ruiner, C., Apitzsch, B., and Salloch, S. (2020). I want to break free – German locum physicians between managerialism and professionalism. *Professions and Professionalism*, *10*(1), 1–17. https://doi.org/10.7577/pp.312

Wilson, H.J., and Daugherty, P.R. (2018). Collaborative intelligence: Humans and AI are joining forces. *Harvard Business Review*, *96*(4), 114–123.

Witzel, A., and Reiter, H. (2012). *The problem-centred interview.* SAGE Publications.

Xudaybergenov, A. (2023). Toward legal recognition of artificial intelligence proposals for limited subject of law status. *International Journal of Law and Policy*, *1*(4). https://doi.org/10.59022/ijlp.55

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

12. Artificial intelligence and inclusive education: a critical look from a pedagogical perspective

Silvia Zanazzi and Cathrine E. Tømte

INTRODUCTION

Technology is neither good nor bad; nor is it neutral

(Melvin Kranzberg)

In his 1986 study on the 'laws of technology', Kranzberg argued that every technological innovation is an open door, not forcing us to enter but inviting us into a new environment. If we decide to cross the threshold, the layout of the corridors and rooms does not impose a predetermined path on us, but suggests a sense of direction.

Technological developments have environmental, social and human consequences that go far beyond the immediate goals of the technology itself. Every technological innovation arises from necessity and, at the same time, generates new needs that must be addressed, triggering deep and pervasive processes of change. As a 'very human activity' (Kranzberg, 1986), technology must be governed by human values. We should shape its impact, ensuring ethical and sustainable outcomes. Context and guiding principles are crucial in determining technology's effect (Floridi and Cabitza, 2021; Floridi, 2022).

Experts, researchers and advocates in the field have expressed concerns about artificial intelligence (AI) potentially making education less inclusive. These authors argue that AI systems can inadvertently perpetuate or exacerbate discrimination and biases in the data on which they are trained (UNESCO, 2019, 2021, 2023; UN, 2021; Baker and Hawn, 2022; Selwyn, 2022; EDF, 2023; Idowu, 2024). Some consider it important to specify that AI ethics is a highly complex matter, extending well beyond data and computational systems. The cognitive and value-based assumptions underlying AI policies, decisions and practices also significantly determine their ethical and inclusionary outcomes.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Therefore, when addressing AI ethics in education, it is essential to uphold the fundamental ethics of education itself and carefully consider pedagogical strategies (Holmes et al., 2021).

On the other hand, many emphasize that AI has the potential to play a positive role in promoting diversity and inclusivity in education when implemented with a deliberate focus (OECD, 2019, 2022; Panciroli et al., 2020; Holmes et al., 2021; Holmes et al., 2022; European Union, 2022; Holmes and Tuomi, 2022; Chandra Kruse et al., 2023; Holmes and Porayska-Pomsta, 2023).

The intersection of school, disability and AI is an important and evolving area (UN, 2021). AI can be instrumental in developing assistive technologies and building inclusive learning, relationship and socialization environments and experiences that address the needs of all individuals, including those with disabilities.

There are opportunities and challenges deriving from the use of AI in education. Proper training for educators and ongoing evaluation of AI systems is crucial to ensure that technologies enhance, rather than hinder, the goal of inclusive education (Knox et al., 2019). Research and the critical analysis of its results from a pedagogical perspective can make an incisive contribution to achieving this objective.

This chapter focuses on AI's possible impact on inclusive education, and our ways of thinking and acting toward differences. Specifically, we answer the following research question: Is it possible to realize virtuous synergies of thought and action between human intelligence, AI and inclusive education? We believe that this question is important because, despite ongoing studies and experiments showing AI's high potential for inclusion, the discourse on artificial intelligence is influenced by technical considerations and market logic that could lead in directions which are not functional to education and its priorities.

Extensive literature exists across various disciplines on the intricate interplay between AI, disability and inclusive education. However, as highlighted by research conducted so far, there is a lack of contributions that can summarize the crucial points to monitor from an educational and inclusive perspective. Our chapter addresses this gap, aiming to provide an overview and offer an evaluation supported by scientific evidence. This chapter is informed by analysing research and international projects, as well as public guidelines and recommendations on AI and inclusive education.

DEFINITIONS AND PREMISES

AI, Generative AI, AI-EdTech

AI involves developing methods for learning from data, representing knowledge, and performing reasoning to build computer systems capable of handling

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

tasks requiring human intelligence. Core areas of AI research include techniques for learning, reasoning, problem-solving, planning, language comprehension and visual perception (Horvitz and Michell, 2024). AI also involves deploying computational algorithms and machine learning techniques to analyse vast datasets, discern patterns and derive actionable insights.

Generative AI represents an area within AI with a compelling technology that has been popularized by ChatGPT (Lim et al., 2023). Here we follow the definition of generative AI as suggested by Lim et al. (2023: 2): 'Generative AI can be defined as a technology that (i) leverages deep learning models to (ii) generate human-like content (e.g., images, words) in response to (iii) complex and varied prompts (e.g., languages, instructions, questions)'.

In their paper, the authors further argue that it is important to distinguish generative AI from related AI concepts. For example, they suggest that while conversational AI focuses on human-like interactions using predefined responses, generative AI can also create original content in its responses, going beyond its explicit programming. Furthermore, they highlight that generative AI is only sometimes conversational, and some conversational AI models can also generate content. Hybrid models, such as ChatGPT, integrate both generative and conversational AI to expand functionality (Lim et al., 2023: 2–3).

In educational contexts, another concept has emerged during the last decades: AI-based educational technology (AI-EdTech) (Holmes et al., 2022; Viberg et al., 2024). Viberg and colleagues argue that its use has even further accelerated in education and evolved in late 2022 with the rapid uptake of generative AI technologies, spurred by the popularity of OpenAI's ChatGPT (Viberg et al., 2024). AI-EdTech can enhance student's learning outcomes, critical thinking and problem-solving abilities (Wu and Yang, 2022) by offering real-time feedback and personalized learning pathways.

Inclusive Education

Inclusive education embodies an education system that includes all students, and welcomes and supports them to learn, whoever they are, and whatever their abilities or requirements. Inclusive education improves learning for all children: those with and without disabilities. It promotes understanding, reduces prejudice and strengthens social integration. It ensures that children with disabilities are equipped to work and contribute economically and socially to their communities (UNICEF, 2017). As conceptualized by the Index for Inclusion (Booth and Ainscow, 2011), the currently most prevalent instrument globally for evaluating the inclusivity of educational settings, fostering school inclusion signifies incrementally developing inclusive cultures, policies and practices by pinpointing and dismantling barriers to learning and participation for every individual, together with building facilitators for the full participation

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

and highest possible development of everyone. The conceptual reference is the social model of disability (Oliver, 1990), based on the belief that disability arises from society's failure to provide adequate services to specific population sectors, and to remove barriers that prevent their full participation. In this framework, inclusion is a collective journey toward equality, a path to boundless growth in learning and participation for all.

Ethics

Throughout our discussion, we consistently adhere to the internationally recognized ethical principles governing AI use: AI must benefit the well-being of people; AI systems must be designed to respect the rule of law, human rights, democratic values, the value of differences; the necessary protections and human intervention where necessary must always be provided to guarantee justice and fairness. Human intelligence must always govern the processes, from conception to solution design, creation, use and evaluation, to guarantee inclusiveness, as well as the fairness and transparency of the sources (UNICEF, 2017; OECD, 2019, 2022; UN, 2021; EU, 2022; UNESCO, 2023, 2021, 2019, 2015; European Union Parliament, 2024).

The goal should be not only mere technological development, but also the promotion of a culture of co-design: for this purpose, the active involvement of people with disabilities, with their experiences, knowledge and needs, from the first steps and along the entire path, is essential (EDF, 2023). In a context that can guarantee these premises, AI could play a crucial role in developing technologies capable of meeting the needs of every individual.

METHODOLOGY AND ANALYTICAL APPROACH

This chapter is based on a review of a purposeful sampling (Suri, 2011) on research literature on AI and inclusive education, and an analysis of some current initiatives covering technological developments for social and educational inclusion powered by AI. For the research review, we prioritized articles and texts by experts from various disciplines, including education and educational technology, philosophy, sociology, history and the humanities, more broadly, and left out contributions that analyse AI from a purely technical standpoint. Our approach resonates with what has been framed as 'configurative reviews' (Gough et al., 2012). These types of reviews aim to identify patterns provided by heterogeneity and to seek sufficient cases to explore them rather than striving for an exhaustive search.

Consequently, we searched for literature in databases such as Google Scholar and Scopus, and for peer-reviewed articles in specialized academic journals, among them the *International Journal of Artificial Intelligence in Education*,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

and for special issues dedicated to AI in education journals. This means that we included relevant literature familiar to the authors and performed a snowball sampling through these initial methods.

We also included an edited book on AI and inclusive education (*Artificial intelligence and inclusive education*: *Speculative futures and emerging practices*; Knox et al., 2019) and recent outlets on AI and education from academic publishers. Among these, we included works with a philosophical foundation that address the topic of artificial intelligence with a specific focus on ethical and metacognitive aspects. Lastly, we considered the main international public guidelines and AI and inclusive education recommendations from the European Disability Forum (EDF), the European Union (EU) and the European Union Parliament, the Organisation for Economic Co-operation and Development (OECD), the United Nations (UN), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United Nation Children's Fund (UNICEF).

We applied a thematic analysis (Braun and Clarke, 2012) to map the current state of AI in inclusive education, identifying key trends and potential challenges. The review is structured around the themes that emerged from our inductive reading of the selected literature, combined with topics and debates that the authors were already familiar with, reflecting a deductive approach (de Andradre et al., 2023).

We additionally analysed a purposeful sample of ongoing international projects in the areas of sensory disabilities, intellectual disabilities and learning disorders, to capture the state of the art in technological developments for social and educational inclusion powered by AI. The projects were selected from the web, using the platform CORDIS for EU-funded initiatives (keywords: AI and disability), and from the 2023 Rome Accessibility Days conference[1] to include some privately funded initiatives.

RESULTS

This section examines the findings of our review on the topic of AI, disability and inclusive education. For clarity purposes, it has been divided into two subsections. The first focuses on scientific literature, highlighting the main research areas and themes; the second describes some relevant international projects that, based on scientific studies, aim to develop AI-based systems and applications to promote learning and inclusion for people with disabilities.

Scientific Literature on AI and Inclusive Education

We have identified three main themes in our literature review:

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

1. benefits and risks of using pedagogical agents, tutor robots and AI-based learning systems for inclusive education;
2. the need for synergies between AI and human intelligence to make technological developments truly effective for inclusive education; and
3. AI in special pedagogy to address special educational needs.

In this subsection, we summarize the content of the analysed sources concerning these themes.

Benefits and risks

In the studies, researchers examine the use of pedagogical agents, tutor robots and AI-based learning systems, highlighting both potential benefits, such as personalized learning and support for students with disabilities, and risks, such as algorithmic discrimination and the exacerbation of existing inequalities. Results emphasize the need for an inclusive and ethical approach to developing and implementing AI in education, ensuring equity and justice in access to learning opportunities. The studies address topics such as data privacy, personalized learning, the evaluation of the AI systems' effectiveness and the risk of digital colonialism (Binns, 2018; Akgun and Greenhow, 2022; Liu et al., 2022; Alam, 2023; Farooqi et al., 2024).

Synergies

Moreover, the academic debate offers a forward-looking perspective on the future of AI in inclusive education, hypothesizing a possible integration between human and AI for more efficient and effective learning. In most studies, authors argue that the community of researchers, practitioners and developers must engage in an open dialogue on ethical principles to guide the future development of technologies and practices in this field (Knox et al., 2019; Holmes et al., 2021; Markauskaite et al., 2022; Holmes and Tuomi, 2022; Holmes et al., 2022; Holmes and Porayska-Pomsta, 2023).

AI in special pedagogy to address special educational needs

A recently published study in the *International Journal of Artificial Intelligence in Education* (Yang et al. 2024) analyses the use of AI in special education from 2013 to 2023. Through bibliometric analysis, the study identifies emerging trends, key themes, developments and the evolution of the field. The study shows exponential research growth, increasingly focusing on AI's role in enhancing learning and inclusion for students with special needs. The results highlight the importance of developing AI-based teaching strategies, such as game-based learning and problem-based learning, and using tools such as interactive simulations and educational robots. The authors highlight the importance of comprehensive technological training for teachers,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

increased funding for technological infrastructure and strong leadership to facilitate technology integration into special education. Initiatives targeting underserved communities aim to promote equity and access to transformative resources (Yang et al., 2024).

Several studies explore the challenges and complexities involved in developing adaptive learning environments, highlighting the intricacy of modelling. Various types of modelling are examined – knowledge domain modelling, producing a schematic overview of the knowledge domain; student modelling, creating an abstract representation of a student's state, typically in terms of cognitive abilities, affective state and interests; and pedagogical modelling, identifying pedagogical strategies that drive student learning – each with its complexities and challenges. The literature warns against seeking simplistic solutions that may fail to account for the complex interplay of these factors. Pragmatic approaches that acknowledge necessary trade-offs, consider potential biases in data, and rely on thorough analysis to identify and address problematic system behaviours, are deemed more functional. Moreover, designers need to weigh the potential benefits to student learning against the costs involved in implementation, content creation, data maintenance and computational demands (Pelánek, 2024).

Research further explores how AI is being used to help students with learning disabilities to improve their academic learning. There are differences in the level of technology integration, from simple substitution to complete redefinition of the learning process. A study utilizes the SAMR-LD (Substitution, Augmentation, Modification, Redefinition – Learning Disabilities) model to specifically analyse how technology, particularly AI, integrates with learning activities to support and enhance learning for students with learning disabilities. As one progresses through the levels of integration in the model, technology becomes increasingly integrated with the learning process in a transformative way, with the highest level representing a total transformation of learning in a way that would not be possible without technology. The research in this field highlights the potential of AI technologies to support students with learning disabilities but also emphasizes the need for further research to fully understand their impact and develop even more effective solutions (Panjwani-Charania and Zhai, 2024).

Studies also address chatbots, which are currently available and operational to assist learners with disabilities or specific learning difficulties, offering personal support systems tailored to the individual's disability needs (Gupta and Chen, 2022; Labadze et al., 2023; De Marco et al., 2024). Additionally, they can act as virtual assistants by providing students with guidance and resources. According to a recently published literature review, including 45 articles (Davar et al., 2025), ChatGPT and similar AI chatbots serve as valuable virtual tutors, facilitating personalized learning experiences across various

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

subjects and activities. They clarify texts because they can rephrase them in different ways and summarize content by highlighting key concepts. In addition, chatbots assist students in written communication, for example, enriching and presenting it in a more correct form. Chatbots facilitate an active learning environment by providing responsive answers and spontaneous suggestions, establishing a framework for interactive education. Simultaneously, they assist educators in course development, evaluation and research, and administrators in streamlining various repetitive tasks. Conversely, there are risks related to data security and privacy, as well as ethical implications concerning academic integrity. The literature review, in fact, revealed that chatbots are prone to generating inaccurate and misleading information, including incorrect citations.

Some studies focus on the use of chatbots for neurodiverse students, including individuals with autism, ADHD, Tourette's syndrome and dyslexia, who often face challenges in communication, social interaction and sensory processing, leading to educational disengagement. The hypothesis is that chatbots can provide personalized learning experiences tailored to the unique needs of each student (Porayska-Pomsta et al., 2018; Ali et al., 2020; Cha et al., 2021; Mateos-Sanchez et al., 2022; Alvarado et al., 2023; Bertacchini et al., 2023; Gu et al., 2024). For example, Mukherjee (2025) applies self-determination theory (SDT) to demonstrate how chatbots can foster competency, autonomy and relatedness in neurodiverse students, thereby addressing common educational barriers such as academic difficulties, limited independence and social isolation. Despite the potential, the study notes that empirical research exploring the application of chatbots for neurodiverse learners is still limited.

International Projects

Numerous ongoing experiments worldwide use AI to support people with sensory disabilities. The 2023 Accessibility Days in Rome showcased AI's innovative potential in improving the lives of people with disabilities, as experts and industry leaders discussed various applications. As an example, a project managed by the company QuestIT, in partnership with the University of Siena, the Italian National Research Council, and Gruppo SILIS (Group for the Study and Information of the Italian Sign Language) developed an artificial assistant capable of communicating with people in Italian Sign Language, through an appropriately trained avatar.[2] Although it is difficult to picture these avatars facilitating classroom lessons, they could be programmed to converse about educational topics, providing valuable assistance for students' academic pursuits.

For people with visual impairments, useful applications are already available to improve their level of autonomy and quality of life. For example, Seeing AI is a free app that 'narrates the world' around a person. Designed with and

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

for the blind and visually impaired, it assists them with daily tasks from reading to describing photos to identifying objects and more. The app continues to evolve as AI research advances. Saquib Shaikh, a blind software engineer, describes, in a webinar organized by Microsoft,[3] the potential of Seeing AI and other AI-based solutions. He asserts that 'technology can level the playing field, creating a more inclusive world for everyone'. He compares people with disabilities to hackers, as they break systems by seeking solutions to their challenges. According to Shaikh, AI-based technologies could allow the creation of 'assistive agents', accompanying blind people in daily life, understanding their needs and filling the gap between what they can do and each situation they find themselves in:

> this little assistant one day will travel with us, through the world, in our pockets, on our wearables, in the metaverse, in our laptops. We are starting from a niche community, but I believe this will be the norm in the future: we designed for one, we made it happen, and now it's part of the mainstream.

Numerous projects worldwide aim to harness AI's potential for individuals with visual impairments, often building upon existing systems and tools. For instance, Be My Eyes[4] is an app that connects blind users with sighted volunteers via live video calls. Images or texts are captured, read and described by the volunteer, who may only sometimes be available due to the voluntary nature of the service. This limitation can be partially overcome through AI, which allows users to send images to receive accurate descriptions of their surroundings. Another interesting example is Envision Glasses.[5] These specialized glasses are equipped with a camera and can identify objects, read text and provide valuable information through voice commands. They enable users to gather information about their environment, thereby enhancing their independence and understanding of the world around them.

AI is also being tested in neurodevelopmental disorders, learning disabilities and attention disorders. European projects are under way to develop adaptive and personalized educational tutoring systems tailored to individual needs. For example, Mathisis, an acronym for 'Managing affective learning through intelligent atoms and smart interaction', is a Horizon project completed in 2019 that involved 18 European countries to develop educational support tools for children with learning difficulties, ADHD and autism spectrum disorders.[6] The platform is connected to a webcam and uses AI to recognize students' emotional states and attention levels, adjusting the difficulty of exercises accordingly. We call this 'affective computing': the system uses AI to recognize human emotions. However, affective computing has been called into question by the EU AI Act, enacted in 2024 (European Union Parliament, 2024), which has raised complex issues by classifying any emotion recognition

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

system as 'high risk'. The results, although varied and influenced by the early stages of the development of the applications, suggest that this platform could significantly enhance students' learning journeys.

Another example is the Vrailexia project,[7] which involves various European universities, training centres, companies, professionals from different disciplines and fields, and associations. The project aims to develop innovative AI-based learning support tools for dyslexic university students, ensuring equal access and opportunities for success during their academic careers. The project group is developing the BeSpecial platform. This AI-powered platform can suggest the most appropriate support methodologies for dyslexic students based on their specific needs, automatically personalizing and adapting the content. Additionally, work is under way to create a shared online repository containing all digital modules, resources, tools and materials to facilitate the implementation of innovative teaching and learning methods centred on the needs of dyslexic students. The repository will host all the training and teaching materials developed during the project and by trained teachers.

AI can significantly promote school and social inclusion and self-determination for individuals with profound and multiple intellectual disabilities (PMID). For example, the Horizon Insension project[8] is building a platform to process information gathered around people with PMID. To this end, advanced technologies such as facial expression recognition, behavioural pattern recognition, speech recognition, non-intrusive monitoring of physiological parameters, and the Internet of Things (IoT) are being developed and tested.

AI is trained to capture and interpret people's signals, to communicate their needs and preferences. Following this line, systems can be developed that allow people with PMID to act, enabling them to make their own choices and exercise the maximum possible autonomy. Equally importantly, systems can allow the people who interact with them to understand them better.

An experiment is currently under way in a kindergarten in Poznan, Poland. Pawel is a child with post-encephalitic quadriplegia, epilepsy and low vision, and is non-verbal. He is unable to communicate through facial expressions, gestures or signs. His hearing is intact, and he enjoys listening to music, audiobooks, and being around people. When something bothers him, such as a sudden noise, Pawel finds a way to express his discomfort. However, understanding his needs can be very difficult for those who do not know him as well as his parents or teacher. In these cases, AI can be trained through long-term monitoring to capture and interpret the signals that people send to communicate their needs and preferences. Experiencing self-efficacy and realizing their needs can be met strengthens self-confidence and improves quality of life.

Technology cannot and should not replace human interaction, but it can be enriched and facilitated. As Professor Frölich, a member of the Insension project team, states:

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

> we have a lot to learn from this research, and we could get closer to people with PIMD in a way that was previously impossible. On the other hand, we must also be aware that we are opening a black box without knowing what is inside. We do not yet know how this way of communicating or collecting information will influence the relationship. It could also have negative effects. Ethical responsibility in this type of experimentation is fundamental.[9]

DISCUSSION

The thematic analysis of the research literature has highlighted some critical issues in how AI is conceived for inclusive education, which is further explored in this section. For clarity's sake, the section is divided into two subsections: the first refers specifically to the principles of inclusive education, while the second explores, more generally, the way artificial intelligence is understood in relation to human intelligence. The cognitive distortions detected in the literature can strongly impact upon the educational field and how technological transformations are addressed in schools and teaching processes.

AI and Inclusive Education: Connected, or Disconnected?

The advent of generative AI is transforming the landscape of education and schooling, raising new questions about the role of teachers, about 'what [and how] it is useful to learn today' (Mari, 2024[10]), and about the very purpose and goals of education. A concerning trend is the growing disconnect between AI development and the broader goals of inclusive education. The current discourse, often dominated by profit-driven AI companies, prioritizes optimization. Education is reduced to individual skill acquisition, and complex educational challenges are addressed like commercial problems. For example, while valuable, the concept of 'student-centred education' can become reductive if it neglects the importance of building a shared 'common ground' for collective growth. Inclusive education is fundamentally a political choice that requires active, collective and democratic participation (Knox et al., 2019).

In contrast to the reductive and partial view of AI's role in education, an emerging line of research offers a more nuanced perspective. These contributions challenge dystopian visions of schools where robots replace teachers and education becomes devoid of meaning, purpose and relationships. They strongly emphasize the importance of human connection for meaningful learning experiences (Biesta, 2012; Knox et al.,, 2019).

The debate surrounding AI in education centres on personalization, which proponents argue can address long-standing challenges through data-driven solutions. Adaptive software and intelligent tutoring systems often assume that education is most effective when tailored to individual student needs. Data-driven technologies can intensify this trend that narrows the scope of learning

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

by prioritizing individual skill acquisition over collective participation and agency. This approach positions the individual as the primary source of information, and it subordinates education to innate human characteristics revealed through data collection. Biesta has coined the term 'learnification' to describe this process of social displacement toward the individual (Biesta, 2012: 36; Knox et al., 2019: 6). This raises the question of whether and to what extent it is possible to promote active, collective and democratic forms of participation in an education system based on personalization (Knox et al., 2019).

While personalized support might initially appear to promote educational inclusion, it can inadvertently reinforce the notion of 'special education' for those perceived as different. Recent perspectives in inclusive pedagogy emphasize the limitations of such approaches. Instead of focusing on one-to-one relationships, inclusive education aims to foster a dialogue that authentically promotes equality among all students. This involves embracing the 'disorder' of differences and diversity as a valuable aspect of the educational experience rather than something that needs to be eliminated for efficiency (Knox et al., 2019). At the core of inclusive pedagogy is the concept of community value. The international community recognizes that inclusive education goes beyond a utilitarian approach, embracing the multiple dimensions of human existence (UNESCO, 2015).

While AI can offer technical solutions, it is essential to recognize that inclusion challenges are deeply rooted in societal structures. AI alone cannot solve these problems. The success of AI for inclusion depends on understanding that AI is not a solution. AI and inclusive education have the potential for a fruitful partnership, but this future requires a human-centred approach. To envision genuinely inclusive education incorporating AI, we must first acknowledge the inherent biases present in our existing systems and models of inclusion. These systems, whether educational, clinical or related to social justice, are not objective truths but rather reflections of our understanding of the world, shaped by our current knowledge and the social and power structures that surround us (Selwyn, 2022).

AI should not be viewed as a standalone 'solution' or a panacea for educational challenges. Instead, it should be seen as a self-reflection and societal analysis tool. By examining ourselves and our society through the lens of AI, we can gain valuable insights into the extent to which our current practices are truly inclusive. AI must be co-created by various stakeholders. Ultimately, humans must remain responsible for decision-making in AI systems and in the broader educational and social systems where AI is applied (Porayska-Pomsta and Rajendran, 2019).

In order to realize an AI that is fully aligned with the goals of inclusive education, we need to shift our thinking. Critics argue that AI promotes quantification, objectification and lack of responsibility. However, the danger lies

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

not in AI itself but in the processes of 'erosion' of responsibility hidden behind quantification, decision-making algorithms and, most of all, in the representation of education as neutral and apolitical. It is crucial to understand that technology is not neutral and that simply collecting data and analysing it cannot 'correct' educational problems. Every technological process involves human decisions that optimize the technology for specific purposes (Frankish and Ramsay, 2017).

While the dominant discourse on AI in education often prioritizes cost reduction, efficiency and time saving, reflecting neoliberal policies, these values are not inherently necessary (Rowe, 2019). Education, like AI, is a potent tool for advancing individual and community rights, development and self-determination.

The concept of self-determination is particularly critical for individuals with disabilities. Consequently, we must carefully consider potential risks associated with technologies: the design of environments and tools specifically intended for people with disabilities can be interpreted as potentially segregating if they are not integrated into broader strategies for social participation and relationship building. There is also a fine line between involvement, training and conditioning, because it is only possible to design a technology by intentionally controlling and directing what a person does or can/cannot do. To safeguard a vision of human differences as a value, and not as deviations to be corrected, the design and use of tools must always involve a vigilant eye and careful consideration of the ultimate goals: self-determination and improving people's quality of life.

AI: A Mirror for Human Intelligence

> No other epoch has accumulated so great and varied a store of knowledge concerning man as the present one. No other epoch has succeeded in presenting its knowledge of man so forcibly and so captivatingly as ours, and no other has succeeded in making this knowledge so quickly and easily accessible. But also, no epoch is less sure of its knowledge of what man is than the present one. In no other epoch has man appeared so mysterious as in ours (Heidegger, 1962: 206).

These words resonate deeply in our modern age of rapid technological change. We, as authors, are among the last generations to have experienced the transition from an analogue to a digital world. Those born after us have only known a world where the lines between the real and virtual are increasingly blurred. In this post-digital era, there is a pressing need to contemplate the human condition, shrouded in mystery. Technological imagination, with its utopias and dystopias, mirrors the reality we are immersed in: contradictions, the search

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

for meaning and direction, the ambiguities, and the vital need to understand how and in what ways human beings are genuinely different from machines:

> At a time when generative intelligences … seem capable of creating content comparable to that of human beings, we feel lost. Have we become obsolete? Will the brain be able to compete with computers equipped with new algorithms? Is there something that machines do not have? Moreover, the most disturbing question is, are we becoming machines ourselves? (Manzotti and Rossi, 2023: 5[11])

Studying AI can serve as a 'mirror', deepening our understanding of human intelligence, ourselves and the world (Knox et al., 2019; Friesen, 2020; Floridi and Cabitza, 2021; Manzotti and Rossi, 2023; Mari, 2024).

Cognitive biases become evident in our understanding and comprehension of AI. It is worthwhile to analyse and delve deeper into these biases. The first distortion is the tendency to mechanize human thought. Intelligence is seen as dependent solely on the organization of a system and its operation in terms of 'manipulating symbols': thinking and calculating are fundamentally the same thing. This distortion may be rooted in the history of the concept of mind, which developed from the 17th century onwards in parallel with modern science and mathematics (Haugeland, 1985) and the conception of reasoning as a mechanical process. In the literature, especially but not only in philosophy, there are thought experiments that show how this thesis is untenable. If a process/system is mechanical, it cannot reason; if it reasons, it cannot be mechanical. It is impossible to demonstrate the existence of meaning in a physical and mechanical universe. The human mind is not a geometric design.

Our understanding of the world is a form of knowledge transcending rule-based systems. The statistical calculations employed in machine learning differ fundamentally from the phenomenological human learning process. While AI can simulate human decision-making, it lacks the flexibility, contextual awareness, empathy and complex moral reasoning that characterize human intelligence.

The second distortion is the inverse tendency, that is, the humanization of the machine: AI is the ability of machines to perform tasks that require intelligence when carried out by humans. The machine 'imitates' the person in carrying out these tasks. Conversely, the rise of AI signifies a separation, not a union, between action and intelligence (Floridi and Cabitza, 2021). This is exemplified by the speed and efficiency with which machines can execute tasks that would demand human intelligence if performed by people. It is crucial to recognize that machines accomplish these tasks not by mimicking human thought processes, but by employing distinct methods that achieve similar or superior outcomes without relying on intelligence.

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

CONCLUSIONS

While hypotheses are being formulated and experiments conducted in environments committed to research and technological advancement, AI is transitioning from a purely scientific domain to a practical reality, permeating our daily lives. As a tool for addressing everyday challenges, AI has the potential to transform our society profoundly. The emergence of generative AI is reshaping the education landscape, prompting us to reconsider the fundamental meaning and purpose of schooling (Holmes and Tuomi, 2022).

The discourse on AI in inclusive education, outlined in the preceding sections, has revealed reductive thinking patterns rooted in fragmented and utilitarian views of knowledge. Technological determinism could lead us to believe that the future of education depends on technological changes rather than educational practices or ethical considerations (Aleman et al., 2024).

Is it possible, instead, to realize virtuous synergies of thought and action between human intelligence, AI, and inclusive education?

To answer our research question with a solid evidence, much more work is needed on multiple fronts: technological developments, which currently suggest great potential but still lack satisfactory concrete results; theoretical reflection, which helps to build perspectives compatible with the paradigm of educational and social inclusion; and empirical research in school and educational contexts, which requires exploratory studies, large-scale surveys and experimental studies to assess the real impact of the introduction of AI on learning, socialization and relationships.

We can now delve deeper into our research question with further inquiries that contribute to outlining future avenues for theoretical and empirical research.

Can research contribute to developing technologies that fully capture the essence of inclusive education and facilitate the creation of cultures, policies, and practices (Booth and Ainscow, 2011) that are genuinely inclusive? If so, how?

This question, too, has yet to be definitively answered. More large-scale research is needed to substantiate wide-ranging policy decisions and reforms. It is essential to pilot AI solutions in educational contexts, assessing and refining them as needed. The experimentation and dissemination of successful practices can serve as a foundation for broader considerations.

A collaborative approach is paramount, given AI's immense and largely unexplored educational potential. Teachers should be actively involved in all stages of AI development, from design and implementation to evaluation, to ensure that these technologies support educational goals and values (Rowe,

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

2019). Such collaboration fosters open dialogue and enables the exploration of diverse educational possibilities.

A successful integration of AI into education necessitates a symbiotic relationship between technology and human expertise. By actively involving teachers in AI development and recognizing their unique contributions, we can create a learning environment that leverages AI's power while preserving the essential role of human educators.

In what ways will the integration of artificial intelligence reshape the role of teachers and educators? Is there a danger that teachers and the teaching profession will be diminished and marginalized in their essential function of collaboratively developing knowledge, skills, and character with their students?

Addressing this question requires phenomenological research to understand the subjective experiences, perceptions and expectations of those involved in educational contexts. Furthermore, participatory and emancipatory action research is essential to critically examine the value-based assumptions underlying educational practices, fostering awareness of roles and integrating social and technological changes into mental models and practices (Mouta et al., 2023).

Empowering teachers is essential during this delicate transition phase, and action research can significantly contribute to achieving this goal. The tendency to 'learnification' (Biesta, 2012), reducing teachers to mere 'facilitators' driven by educational technologies, must be resisted. By valuing teachers' agency, we can restore trust in their ability to co-construct knowledge within meaningful educational relationships. Biesta and Miedema (2002) argues that teaching is a vital education component, and teachers play a crucial role in shaping the learning experience.

Furthermore, it would be desirable to involve in research the learners, both with and without disabilities, to understand and embrace their perspectives, gather their feedback and solicit their proposals for improvement. Indeed, the inclusive education paradigm is grounded in removing barriers and introducing facilitators to learning and participation for all. To what extent does AI facilitate or create additional barriers? This question can only be answered by actively listening to the voices of learners.

The introduction of AI in education will undoubtedly impact the processes of knowledge construction, both individually and collectively. How can we foster critical thinking, an inherently human ability that AI cannot replicate, during this transformation?

Integrating digital technologies, particularly AI, into education necessitates a balanced approach that combines constructive engagement with critical reflection from teachers, school leaders, students and parents. Research methodologies should be interdisciplinary or transdisciplinary, examining issues from various viewpoints. The academic, educational, and research

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

communities must be on guard to prevent market forces, the interests, and the perspectives of producers and developers from becoming the dominant factors. Technologies must be employed with a keen understanding of pedagogical principles and the nuances of knowledge construction. Promoting the conscious, critical and creative use of digital tools means resisting the notion that knowledge is solely comprised of data devoid of theoretical underpinnings. It involves developing the ability to evaluate information critically and avoid superficial interpretations of reality. Furthermore, it entails countering the reductionist tendencies and authoritarian dangers accompanying the widespread use of digital technologies.

The pervasive influence of digital technologies and the rise of AI are rapidly transforming our behaviours, perceptions, sensibilities, thoughts and social interactions. Technology actively shapes our world. Education plays a crucial role in navigating this paradigm shift and preventing the emergence of a 'digital panopticon' (Byung-Chul, 2015). Instead, digital technologies can foster social participation and cultivate critical thinking.

From this perspective, any endeavour to understand AI is inherently an exploration of freedom.

NOTES

1. https://accessibilitydays.it/2023
2. https://accessibilitydays.it/2023/sessione/digital-accessibility-il-primo-artificial-human-che-conosce-la-lingua-dei-segni-italiana
3. www.youtube.com/watch?v=KfmC1PAe8o8
4. https://www.bemyeyes.com
5. https://www.letsenvision.com/glasses/home
6. https://cordis.europa.eu/project/id/687772/results
7. https://vrailexia.eu
8. https://www.insension.eu
9. From the video *ICT system for detection and interpretation of non-symbolic behaviors of people with PIMD* (https://www.insension.eu).
10. The translation from Italian into English is the author's work.
11. The translation from Italian into English is the author's work.

REFERENCES

Akgun, S., and Greenhow, C. (2022), Artificial intelligence in education: addressing ethical challenges in K-12 settings. *AI Ethics*, 2, 431–440, https://doi.org/10.1007/s43681-021-00096-7

Alam, A. (2023), Harnessing the power of AI to create intelligent tutoring systems for enhanced classroom experience and improved learning outcomes. In Rajakumar, G., Du, K.L., and Rocha, Á. (eds), *Intelligent Communication Technologies and Virtual Mobile Networks. ICICV 2023. Lecture Notes on Data Engineering and*

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Communications Technologies (pp. 571–591), https://doi.org/10.1007/978-981-99-1767-9_42

Aleman, E., Dilek, M., and Baran, E. (2024), Generative AI as a mirror: educators exploring and challenging dominant discourses about the future of AI in education. In *ICLS 2024 Proceedings* (pp. 857–864), https://2024.isls.org/proceedings/

Ali, M.R., Razavi, S.Z., Langevin, R., Al Mamun, A., Kane, B., Rawassizadeh, R., and Hoque, E. (2020), A virtual conversational agent for teens with autism spectrum disorder: experimental results and design lessons. In *Proceedings of the 20th ACM International Conference on Intelligent Virtual Agents* (pp. 1–8), https://doi.org/10.1145/3383652.3423900

Alvarado, Y., Guerrero, R., and Serón, F. (2023), Inclusive learning through immersive virtual reality and semantic embodied conversational agent: a case study in children with autism. *Journal of Computer Science and Technology*, 23(2), https://doi.org/10.24215/16666038.23.e09

Baker, R.S., and Hawn, A. (2022), Algorithmic bias in education. *International Journal of Artificial Intelligence in Education*, 32, 1052–1092, https://doi.org/10.1007/s40593-021-00285-9

Bertacchini, F., Demarco, F., Scuro, C., Pantano, P., and Bilotta, E. (2023), A social robot connected with ChatGPT to improve cognitive functioning in ASD subjects. *Frontiers in Psychology*, 14, https://doi.org/10.3389/fpsyg.2023.1232177

Biesta, G. (2012), Giving teaching back to education: responding to the disappearance of the teacher. *Phenomenology and Practice*, 6(2), 35–49, https://doi.org/10.29173/pandpr19860

Biesta, G., and Miedema S. (2002), Instruction or pedagogy? The need for a transformative conception of education. *Teaching and Teacher Education*, 18(2), 173–181, https://doi.org/10.1016/S0742-051X(01)00062-2

Binns, R. (2018). Fairness in machine learning: lessons from political philosophy. In *Proceedings of the 1st Conference on Fairness, Accountability and Transparency* (pp. 149–159), https://proceedings.mlr.press/v81/binns18a.html

Booth, T., and Ainscow, M. (2011), *Index for Inclusion: Developing Learning and Participation in Schools*. Bristol: Centre for Studies on Inclusive Education

Braun, V., and Clarke, V. (2012), *Thematic Analysis*. American Psychological Association

Byung-Chul, H. (2015), *The Transparency Society*. Stanford, CA: Stanford University Press

Cha, I., Kim, S.I., Hong, H., Yoo, H., and Lim, Y.K. (2021), Exploring the use of a voice-based conversational agent to empower adolescents with autism spectrum disorder. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (pp. 1–15), https://doi.org/10.1145/3411764.3445116

Chandra Kruse, L., Bergener, K., Conboy, K., Lundström, J.E., Maedche, A., Sarker, S., Seeber, I., Stein, A., and Tømte, C.E. (2023), Understanding the digital companions of our future generation. *Communications of the Association for Information Systems*, 52, 465–479, https://doi.org/10.17705/1CAIS.05218

Davar, N.F., Dewan, M.A.A., and Zhang, X. (2025), AI chatbots in education: challenges and opportunities. *Information*, 16(235), https://doi.org/10.3390/info16030235

de Andrade, L.H.A., Thomas, D.A. and Laterza, V. (2023), The rise of EdTech platforms in higher education: mapping themes from emerging critical literature. In Pinheiro, R., Tømte, C.E., Barman, L., Degn, L., and Geschwind, L. (eds), *Digital Transformations in Nordic Higher Education* (pp. 27–51). Cham: Palgrave Macmillan, https://doi.org/10.1007/978-3-031-27758-0_2

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

De Marco, V., Sciarrone, F., and Temperini, M. (2024), TutorChat: a chatbot for the support to dyslexic learner's activity through generative AI. In *International Conference on Advanced Learning Technologies* (pp. 155–157), 10.1109/ICALT61570.2024.00051

European Disability Forum (EDF) (2023), *Understanding Artificial Intelligence – And How It Affects the Disability Community,* https://www.edf-feph.org/understanding-artificial-intelligence-and-how-it-affects-the-disability-community/

European Union (2022), *Ethical Guidelines on the Use of Artificial Intelligence (AI) and Data in Teaching and Learning for Educators*, https://education.ec.europa.eu/news/ethical-guidelines-on-the-use-of-artificial-intelligence-and-data-in-teaching-and-learning-for-educators

European Union Parliament (2024), *Artificial Intelligence Act*, https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2021)698792

Farooqi, M.T.K., Amanat, I., and Awan, S.M. (2024), Ethical considerations and challenges in the integration of artificial intelligence in education: a systematic review. *Journal of Excellence in Management Sciences*, 3(4), 35–50, 10.69565/jems.v3i4.314

Floridi, L. (2022), *Etica dell'intelligenza artificiale. Sviluppi, opportunità, sfide*. Milano: Raffaello Cortina

Floridi, L., and Cabitza, F. (2021), *Intelligenza artificiale. L'uso delle nuove macchine*. Milano: Bompiani

Frankish, K., and Ramsay, W.M. (2017), *The Cambridge Handbook of Artificial Intelligence*. Cambridge: Cambridge University Press

Friesen, N. (2020), The technological imaginary in education: myth and enlightenment in 'personalized learning'. In Stocchetti, M. (ed.), *The Digital Age and Its Discontents*. Helsinki: Helsinki University Press (pp. 141–159), https://doi.org/10.33134/HUP-4-8

Gough, D., Thomas, J., and Oliver, S. (2012), Clarifying differences between review designs and methods. *Systematic Reviews*, 1(28), https://doi.org/10.1186/2046-4053-1-28

Gu, P., Xu, F., Chen, L., Ma., Z., Zhang, M., and Zhang, Y. (2024), Technological affordances and applications of chatbots for conversational skill interventions in autism: a scoping review. *Education and Information Technologies*, https://doi.org/10.1007/s10639-024-13191-z

Gupta, S., and Chen, Y. (2022), Supporting inclusive learning using chatbots? A chatbot-led interview study. *Journal of Information Systems Education*, 33(1), 98–108, https://jise.org/Volume33/n1/JISE2022v33n1pp98-108.html

Haugeland, J. (1985), *Intelligenza artificiale*. Torino: Bollati Boringhieri

Heidegger, M. (1962), *Kant and the Problem of Metaphysics*. Bloomington, IN: Indiana University Press, https://archive.org/details/kantproblemofmet00heid/page/n5/mode/2up?view=theater

Holmes, W., Persson, J., Chounta, I.A., Wasson, B., and Dimitrova, V. (2022), *Artificial Intelligence and Education: A Critical View through the Lens of Human Rights, Democracy and the Rule of Law*. Strasbourg: Council of Europe

Holmes, W., and Porayska-Pomsta, K. (eds) (2023), *The Ethics of AI in Education. Practices, Challenges, and Debates*. London: Routledge

Holmes, W., Porayska-Pomsta, K., Holstein, K., Sutherland, E., Baker, T., Buckingham Shum, S., Santos, O.C., Rodrigo, M.M.T., Cukurova, M., Bittencourt, I.I., and Koedinger, K. (2021), Ethics of AI in education: towards a community-wide

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

framework. *International Journal of Artificial Intelligence in Education*, 32, 504–526, https://doi.org/10.1007/s40593-021000239-1.

Holmes, W., and Tuomi, I. (2022), State of the art and practice in AI in education. *European Journal of Education*, 57(4), 542–570, https://doi.org/10.1111/ejed.12533

Horvitz, E., and Mitchell, T.M. (2024), Scientific progress in artificial intelligence: history, status, and futures. In Jamieson, K.H., Mazza, A.M. and Kearney, W. (eds), *Realizing the Promise and Minimizing the Perils of AI for Science and the Scientific Community*. Philadelphia, PA: University of Pennsylvania Press, pp.147–193.

Idowu, J.A. (2024), Debiasing education algorithms. *International Journal of Artificial Intelligence in Education*. https://doi.org/10.1007/s40593-023-00389-4

Knox, J., Wang, Y., and Gallagher, M. (eds) (2019), *Artificial Intelligence and Inclusive Education: Speculative Futures and Emerging Practices*. Singapore: Springer

Kranzberg, M. (1986), Technology and history: 'Kranzberg's laws'. *Society for the History of Technology*, 27(3), 544–560, https://www.cs.ucdavis.edu/~koehl/Teaching/ECS188/PDF_files/Kranzberg.pdf

Labadze, L., Grigolia, M., and Machaidze, L. (2023), Role of AI chatbots in education: systematic literature review. *International Journal of Educational Technology in Higher Education*, 20(56), https://doi.org/10.1186/s41239-023-00426-1

Lim, W.M., Gunasekara, A., Pallant, J.L., Pallant, J.I., and Pechenkina, E. (2023), Generative AI and the future of education: Ragnarök or reformation? A paradoxical perspective from management educators. *The International Journal of Management Education*, 21(2), https://doi.org/10.1016/j.ijme.2023.100790

Liu, Y., Chen, L. and Yao, Z. (2022), The application of artificial intelligence assistant to deep learning in teachers' teaching and students' learning processes. *Frontiers in Psychology*, 13:929175. https://doi.org/10.3389/fpsyg.2022.929175.

Manzotti, R., and Rossi, S. (2023), *Io and Ia: Mente, Cervello e GPT*. Soveria Mannelli: Rubbettino

Markauskaite, M., Marrone, R., Poquet, O., Knight, S., Martinez-Maldonado, R., Howard, S., Tondeur, J., De Laat, M., Buckingham Shum, S., Gašević, D., and Siemens, G. (2022), Rethinking the entwinement between artificial intelligence and human learning: what capabilities do learners need for a world with AI? *Computers and Education: Artificial Intelligence*, 3, https://doi.org/10.1016/j.caeai.2022.100056

Mari, L. (2024), *L'intelligenza artificiale di Dostoevskij: Riflessioni sul futuro, la conoscenza, la responsabilità umana*. Milano: Il Sole 24 Ore

Mateos-Sanchez, M., Melo, A.C., Blanco, L.S., and García, A.M.F. (2022), Chatbot, as educational and inclusive tool for people with intellectual disabilities. *Sustainability*, 14(3), https://doi.org/10.3390/su14031520

Mouta, A., Pinto-Llorente, A.M., and Torrecilla-Sánchez, E.M. (2023), Uncovering blind spots in education ethics: insights from a systematic literature review on artificial intelligence in education. *International Journal of Artificial Intelligence in Education*, https://doi.org/10.1007/s40593-023-00384-9

Mukherjee, U. (2025), Neurodiverse education and chatbots as personalized learning tools: opening the research agenda. *Journal of Informatics Education and Research*, 5(1), 775–798, https://doi.org/10.52783/jier.v5i1.2065

OECD (2019), *Artificial Intelligence in Society*, https://www.oecd-ilibrary.org/science-and-technology/artificial-intelligence-in-society_eedfee77-en

OECD (2022), *OECD Framework for the Classification of AI Systems,* https://www.oecd.org/publications/oecd-framework-for-the-classification-of-ai-systems-cb6d9eca-en.htm

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Oliver, M. (1990), *The Politics of Disablement*. London: Palgrave Macmillan
Panciroli, C., Rivoltella, P.C., Gabbrielli, M., and Zawacki Richter, O. (2020), Artificial Intelligence and education: new research perspectives. *Form@re – Open Journal per la formazione in rete*, 20(3), http://dx.doi.org/10.13128/form-10210
Panjwani-Charania, S. and Zhai, X. (2024), AI for students with learning disabilities: a systematic review. In Zhai, X., and Krajcik, J. (eds), *Uses of Artificial Intelligence in STEM Education*. Oxford: Oxford University Press
Pelánek, R. (2024), Adaptive learning is hard: challenges, nuances, and trade-offs in modeling. *International Journal of Artificial Intelligence in Education*, https://doi.org/10.1007/s40593-024-00400-6
Porayska-Pomsta, K., Alcorn, A.M., Avramides, K., Beale, S., Bernardini, S., Foster, M.E., and Smith, T.J. (2018), Blending human and artificial intelligence to support autistic children's social communication skills. *ACM Transactions on Computer-Human Interaction (TOCHI)*, 25(6), 1–35, https://doi.org/10.1145/3271484
Porayska-Pomsta, K., and Rajendran, G. (2019), Accountability in human and artificial intelligence decision-making as the basis for diversity and educational inclusion. In Knox, J., Wang, Y., and Gallagher, M. (eds), *Artificial Intelligence and Inclusive Education: Speculative Futures and Emerging Practices* (pp. 39–59). Singapore: Springer
Rowe, M. (2019), Shaping our algorithms before they shape us. In Knox, J., Wang, Y., and Gallagher, M. (eds), *Artificial Intelligence and Inclusive Education: Speculative Futures and Emerging Practices* (pp. 151–163). Singapore: Springer
Selwyn, N. (2022), The future of AI and education: some cautionary notes. *European Journal of Education*, 57(4), 531–691, https://doi.org/10.1111/ejed.12532
Suri, H. (2011), Purposeful sampling in qualitative research synthesis. *Qualitative Research Journal*, 11(2), 63–75, https://doi.org/10.3316/QRJ1102063
UN (2021), *Report of the Special Rapporteur on the Rights of Persons with Disabilities*, https://www.ohchr.org/en/calls-for-input/2021/report-special-rapporteur-rights-persons-disabilities-artificial-intelligence
UNESCO (2015), *Education 2030: Incheon Declaration and Framework for Action for the Implementation of Sustainable Development Goal 4: Ensure Inclusive and Equitable Quality Education and Promote Lifelong Learning*, https://unesdoc.unesco.org/ark:/48223/pf0000245656
UNESCO (2019), *Beijing Consensus on Artificial Intelligence and Education*, https://unesdoc.unesco.org/ark:/48223/pf0000368303
UNESCO (2021), *Recommendation on the Ethics of Artificial Intelligence*, www.unesco.org/en/artificial-intelligence/recommendation-ethics
UNESCO (2023), *Guidance for Generative AI in Education and Research*, https://www.unesco.org/en/articles/guidance-generative-ai-education-and-research
UNICEF (2017), *Inclusive Education. Including Children with Disabilities in Quality Learning: What Needs to be Done?* https://www.unicef.org/eca/sites/unicef.org.eca/files/IE_summary_accessible_220917_brief.pdf
Viberg, O., Cukurova, M., Feldman-Maggor, Y., Alexandron, G., Shirai, S., Kanemune, S., Wasson, B., Tømte, C., Spikol, D., Milrad, M., Coleho, R., and Kizilcec, R.F. (2024), What explains teachers' trust in AI in education across six countries? *International Journal of Artificial Intelligence in Education*, https://doi.org/10.1007/s40593-024-00433-x

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Wu, S.Y., and Yang, K.K. (2022), The effectiveness of teacher support for students' learning of artificial intelligence popular science activities. *Frontiers in Psychology*, 13, https://doi.org/10.3389/fpsyg.2022.868623

Yang, Y., Chen, L., He, W., Sun, D., and Zobeida Salas-Pilco, S. (2024), Artificial intelligence for enhancing special education for K-12: a decade of trends, themes, and global insights (2013–2023). *International Journal of Artificial Intelligence in Education*, https://doi.org/10.1007/s40593-024-00422-0

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Index

4E (embodied, embedded, enactive and extended) cognitive and perceptual processes 26

Accra, Ghana, AI smart city initiatives in 81, 82–3
action research 168
  participatory and emancipatory 259–60
active learning environments 251
adaptive learning environments 250
affective computing 253
Africa
  AI in the governance of smart cities in 8–9, 11, 76–8, 79, 80
    effective AI development 90–92
    future of 89–90
  digital divide in 88
  rapid urbanisation in 78
  transportation systems in cities in 79
    see also Accra, Ghana; Johannesburg, South Africa; Nairobi, Kenya; Praia, Cape Verde
Age of Nervousness 27
agency
  human 163–4
  of professional teachers 163–6
  temporal dimensions of 164
AI 2, 26
  active engagement with 237
  automation of routine tasks 222, 223, 227, 235, 236, 237, 238
  compliance
    regulatory 40
    substantive 39
    symbolic 39
  debates 1
  definition of 57, 245–6
  diagnostic tools 228
  and digitalisation in professional work 226
  distribution of the benefits of 239
  in e-participation 129
  ethical and social dimensions of 239
  future research 53
  general 67
  in the governance of smart cities in Africa 8–9, 11, 76–8, 79, 80
    constraints to using 87–9
    effective AI development 90–92
    future of 89–90
  in healthcare 224
  human centred and sustainable 7
    impact on
    professional identity 10, 12, 236
    professional workflow and efficiency 230–233
  in inclusive education 11, 12, 244, 258
  integration into industries and professional domains 222
  literature on 78
  and maritime law 8
  and meaningful work 223, 227–8, 236, 237, 239
  as a mirror for human intelligence 257–8
  mutual insurance 69–71
  narrow 67
  over-reliance on 238
  personification of 65–8
    ontological perspective 66
  policy–implementation gap 52
  public governance of 8
AI Act 2, 8, 38, 39, 58, 253
    Dutch municipalities
    actions taken to raise AI awareness 48
    adoption of 38

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

approaches taken to implement 51–2
awareness of obligations in 47–8
changes made to comply with 48
implications and requirements for 41–7
policy–implementation gap 39
AI-based educational technology (AI-EdTech) 246
AI ethics 39, 244
in education 245
AI liens 68–9
AI literacy 46, 91–2
AI models, hybrid 246
AI projects, active community engagement in 91
AI systems
autonomous capabilities 57
definition of 42
diverse applications of 58
general purpose (GPAI) 44–5
high risk 43–4, 45
integration into society 56
legal requirements for implementation of 47
with limited or no risk 44
measures and purpose 45–7
purpose and risk clarification 43
risks of harm associated with 58, 71
ships and 56, 57–60
single purpose (SPAI) 44
sophistication categories 57
with an unacceptable risk 43
algorithm registers 50–51
algorithms 7, 68, 88
risk assessment 191
Alt, D. 166
ancient writing societies 22
anticipatory governance framework 204
Aradau, C. 191
Aristotle 23
Arnstein, S.R. 128
artificial intelligence (AI) *see* AI
Asgarinia, H. 195
assistive robots
deployment of 203
used in rehabilitation practices 202
autism spectrum disorder (ASD) 161
automated data analysis 196
automated decision-making 191
autopoiesis 25, 28

Bailey, G.D. 6
Bari, Italy, citizen e-participation in 145
Benbouzid, B. 192
Benjamin, R. 91
Berns, A. 162, 166–7
BeSpecial platform 253
biases
cognitive 258
inbuilt 191–3
Biesta, G 255, 260
big data, in e-participation 129
Blanke, T. 191
blockchain technologies 9, 12, 118
accessibility challenges 122
and citizenship 113
case studies 119–21
theoretical outline 114–19
future research 123
literacy issues 123
overview of 114–16
transformation of politics through 123–4
transparency and privacy 122
The Bold Buccleugh (ship) 62

Cambridge Analytical scandal 7
cameras 23
Canadian Aviator 61
Cape Verde *see* Praia, Cape Verde
capitalism, surveillance 88
CardBoard goggles 170, 173
Casey, M.J. 114, 116
Castells, M. 26, 114
catastrophes 20, 21, 24–5
concept of 31
digitalisation as 22
of human society 16–17
media 24, 27, 32
of modern society 31
CCTV cameras 85, 90, 195
chatbots, in education 250–251
ChatGPT 246
in education 251
Checa-Domene, L. 162
CICERONE Consensus Conference on Robotic Rehabilitation 209
citizen e-participation 126
analysis of studies of 131–43

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

bottlenecks 134, 142
categories 142
citizens–government tensions 139–40, 146–9
ICT barriers 141, 149–51
and technical issues 151
transparency 135–8, 143–5
knowledge base 151
trust and 144–5
in urban mobility policy development 9, 12, 127, 129–30
citizen participation 128
digital 100
MatkaHupi citizen participation project 150
citizen participation scale 128
citizens
help with digital health services required by 105–7
non-digital and partially digital 103–5
citizens–government tensions 139–40, 146–9
inadequate fit 148
motivation of citizens 146–7
citizenship
blockchain technologies and 113
case studies 119–21
theoretical outline 114–19
civil 116
cultural 9, 117, 122
ledger-based 9, 12, 118–19, 122
political 116
social 116–17
civic participation, governing of citizen–technology interactions for successful 130–131
civil citizenship 116
civil rights 117
cognitive biases 258
cohesion policies 207
collaborative robots (cobots) 205
communication 8, 112, 117
dissemination of 19
meaning of 117–18
communication technologies 20–22, 113
societal responses to introduction of new 24
communication theory 187–9
community value 256
COMPAS system 193
compliance theory, symbolic versus substantive 39
configurative reviews 247
contract analysis 229
conversational AI 246
CoSpaces Edu (now Delightex Edu) 163, 166, 173, 176, 177
COVID-19 pandemic 195
critical theory 184, 186
communicative turn 184
perspective on technology 185
critical urban studies 81, 86, 87
cryptography 122
cultural citizenship 9, 117, 122
cultural form 22, 24, 25
culture, function of 22
cybersecurity risks 58
Cypherpunks 115

data 18, 24
ownership of 190
data analysis
real-time 233–4
systems 194
data analytics-based decision-making systems, removing unfairness from 193
data collection 88, 122–3, 190
online 150
data-driven solutions 191–5
data processing 19
datasets, content of 192
Delightex Edu (formerly CoSpaces Edu) 163, 166, 173, 176, 177
democracy 112
direct 151
participatory 148
Denmark 100, 101, 107
digitalisation policies 102
digital citizen participation 100
see also citizen e-participation
digital citizens 4, 6, 9
non-digital and partially 103–5
in Norway 11
digital citizenship 11
governance and 5–7
nine elements of 6
digital communication 3
digital data 190
digital dataset analysis 192

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

benefits of 191
digital divide
in Africa 88
in Nordic countries 103
digital exclusion 100, 103
digital governance 8, 11
digital helpers, nurses as 101
digital inclusion, barriers to 103–4
digital media 19, 29
digital participation 6
digital platforms 3
digital public services 100
digital revolution 222
digital skills 104
digital technologies 3, 7, 112
employment and 4
governance of 77, 90
influence of 260
integration into education 260
nurses helping citizens with 105–7
use of 24
digital transformation
and AI 226
application to social challenges 4
need for responsible governance of 109–10
responsible and ethical 7–8
social science research on 4
digital work environments 225
digitalisation 2, 4, 11, 31, 185, 189
and AI in professional work 226
as a medium for disseminating communication 22
potential of 190
sociological framework to address questions of 17–20
sociological theory of 16
digitisation 2, 31, 185, 189, 226
digitalisation vs 17–18
potential of 190
as a subject of sociological research 24
valuation studies 30
digitised society, phenomena of 28
Dijk, J. van 124
direct democracy, model of 151
direct liability mechanism 60–61
disabilities
self-determination for individuals with 256
sensory 251
social model of 247
discrimination
racial 193
through AI 88
dissemination media 19
doctors *see* physicians
drones 52
Drucker, Peter 17
dyslexic university students 253

e-governance dynamics 130
e-participation 129
see also citizen e-participation
earthquake detection algorithm 192
education 161
adaptive 176
AI ethics in 245
and AI in African cities 89
barriers to implementing digital resources in 162
empirical research 259
impact of digital technologies on 3
integration of AI into 259
integration of digital technologies into 260
special education needs *see* SEN education
student-centred 255
virtual reality (VR) approaches to 161
see also inclusive education
electricity, implications of the discovery of 28
electronic IDs 102
electronic media 18, 19, 27
electronic media society 22
emerging technologies 12
Emirbayer, M. 164
empirical research, in school and education contexts 259
energy management, and AI in African cities 90
England, *in personam* claim 62
Envision Glasses 252
Estonia
blockchain technologies in 120–121
online public services 190
ethics 195–7
AI 39, 244, 245
blockchain technologies 122

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

governing AI use 247
of using data analysis to ensure state security 184
in using data-driven technologies for internal security 10
ethics boards 91
European Agenda 2030 161
European Maritime Safety Agency 58
European Parliament, Resolution of 2017 65
European Union (EU)
AI Act *see* AI Act
AI Liability Directive 58
data strategy 100
digital agenda 190
digital transition initiatives 207
digital vision to enhance justice system 186
Product Liability Directive 58, 59

facial recognition systems 43, 86, 191, 195
in Johannesburg, South Africa 84
in Nairobi, Kenya 85
in Praia, Cape Verde 83
fair use 197
fault-based liability 67
Fest, I. 39, 40
Finland, digitalisation policies 102
Flusser, Vilém 23
Flyverbom, M. 77, 88, 90
Fontana, F. 129
form 30
notion of 23
Franceschini, S. 148
Frankfurt School 184
Frewer, L.J. 128
function creep 195

General Data Protection Regulation (GDPR) 46, 150
generative AI 246, 255, 258
geo-mapping 150
Gerards, J. 193
Giddens, A. 190
global financial system crash 115
Global North 78
governance 8
and digital citizenship 5–7
Governance and Security in a Digitalising Society research group 42
Granier, B. 130

Habermas, Juergen 184
communication theory 10, 12, 187–9
Hall, D. 117
head-mounted display (HMD) 170, 173, 175
health services, access to, in Norway and Denmark 102
healthcare
and AI 224
in African cities 89
digitalised 205, 210
organisation of 204–5
use of data in 194–5
healthcare robotics 202–4, 205
developmental models 217–18
in healthcare education 213
normative and financial frameworks 213–17
in Norway 210, 213
pricing of 207
professional practices 218–19
scientific research targeting 212
training of professionals 208–9
heath data, activity tracker 190
Heath, M.K. 6
Heider, Fritz 18, 23
Hinostroza-Paredes, Y. 163
Hinton, Geoffrey 1
Hobbes, Thomas 187
Horizon Europe programme 207
Horizon Insension project 253
human agency 163–4
human intelligence 257–8
Human Interactive Robotics for Healthcare (HIRo) project 211
humanoid robots 211
hybrid AI models 246

ICT
application to citizen e-participation 151
system problems 149–51
IDs, electronic 102
immersive learning resources 178
immersive technologies 12, 161, 168, 177

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

in SEN education 161, 162, 166, 179
barriers to implementing 162, 177
didactical approaches 165
potential benefits 162
teacher-training courses using 179
in personam method 60–61
in rem proceedings 60, 61
inclusion 247
inclusive education 246–7, 255
AI in 11, 12, 244, 258
Index for Inclusion 246
The Indian Grace No. 2 (ship) 62
insurance
marine 63–5
market 63
mutual 63, 69–71
protection and indemnity (P&I) insurance 63, 64
intellectual disabilities, profound and multiple 253–4
intelligence 258
internal security 186–7, 190–191
international projects, on AI and inclusive education 251–4
'Internet of Information' 112, 113, 115
'Internet of Value' 115
inverse tendency 258
Irani, L. 91
Italian National Health Service (NHS) 206
Italy
AI to support people with sensory disabilities in 251–2
anticipatory governance themes 215–16
digital uptake in healthcare in 205
enabling and constraining factors in 214
Essential Levels of Care (ELC) 206
healthcare organisation in 204–5
healthcare robotics in 205
normative and financial frameworks 206–7
prevalent design and adoption model 207–8
professional practices 208–9
robotics development model 217

Johannesburg, South Africa
AI smart city initiatives in 81, 83–4
integration of AI into electricity and transport management 86
jurisdictions, in operation of ships and AI systems 59

Kant, Immanuel 28, 32
Kaun, A. 191
Kenya *see* Nairobi, Kenya
Khattib, H. 166
Kitchin, R. 191
Klaus, E. 114, 117, 118, 119
knowledge construction 260
knowledge domain modelling 250
Kranzberg, Melvin 244
Kudo, H. 130

language, invention of 21
Latour, Bruno 26
law enforcement, AI applications in 91
Laws of Form (Spencer-Brown) 23
lawyers 225
interviews with 230
perception of AI as tools 230
view of AI in legal field 224
learnification 255, 260
learning disabilities
AI and 250
SAMR-LD (Substitution, Augmentation, Modification, Redefinition – Learning Disabilities) model 250
learning environments
active 251
adaptive 250
learning resources, designing personalised 178
ledger-based citizenship 9, 12, 118–19, 122
legal field
AI in 222, 223, 224, 229, 233, 234, 236
meaningful work in 228
legal research 229
liability
for AI systems 59–60
fault-based 67
Liechtenstein, blockchain technologies in 119–20, 121
LIFEBOTS-Exchange-Extended (LEE) project 211

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

lifeworld 189
Lim, W.M. 246
limited memory programs 57
literacy issues, blockchain technologies 123
living labs 148–9
Loomis vs State 193
Luhmann, Niklas 18, 20, 22, 23, 25, 31
Lünenborg, M. 114, 117, 118, 119

machine learning-based systems 232
machines, humanisation of 258
McLuhan, Marshall 18, 23, 28
Mahon, B. 190
The Malek Adhel (ship) 62
Marcuse, Herbert 184
marine insurance, and third-party liabilities 63–5
maritime law 8, 11, 56
  chain of responsibility 59
  liability regime 60–65
  transferable principles to AI 65–71
maritime liens (direct liability mechanism) 60–61, 68–9
market insurance 63
Marletto, G. 148
Marshall, Thomas 114, 116, 117, 119, 121
Marx, Karl 184
Mathisis (Horizon project) 253
MatkaHupi citizen participation project 150
meaningful work 223, 225, 226–7, 239
  AI and 227–8, 237, 239
media 18
  approach to digitalisation 30
  catastrophes 24, 27, 32
  concept of 22–4
  dissemination media 18
  electronic 18, 19, 22, 27
  perception 32
  success 18, 19, 32
  symbolic media of interchange 18
medical field
  AI in 222, 223, 228–9, 236
  meaningful work in 228
medium *see* media
meta-governance 5–6
Microsoft 49
Midtgård, T.M. 103
Miedema, S. 260
Miller, S. 195
mind, concept of 258
Mische, A. 164
modelling
  knowledge domain modelling 250
  pedagogical modelling 250
  student modelling 250
modern printing press societies 22
modern society, catastrophe of 31
Mossberger, K. 6
motivation, for citizen e-participation 146–7
Mukherjee, U. 251
municipalities in The Netherlands *see* The Netherlands
mutual funds 70
mutual insurance 63
  in the AI domain 69–71

Nairobi, Kenya, AI smart city initiatives in 81, 85, 86
Nakamoto, Satoshi 115, 116
The Netherlands
  AI Act
    approaches taken to implement 51–2
    awareness of obligations in 47–8
    changes made to comply with 48
    implications and requirements for 41–7
  Court of Audit 43, 50
  Dutch DPA (Autoriteit Persoonsgegevens) 46
  municipalities
    actions taken to raise AI awareness 48, 49
    awareness of AI Act obligations 49
    changes in AI over time (second survey) 49
    use of AI 42
  National Algorithm Register 50–51
netizens 4
network theory 28
networks 26
Neumann, John von 27
neurodiverse students, use of chatbots for 251
Nordic countries
  background to digital policies in 101–3

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

digital divide in 103
national digitalisation strategies 100
norms 186, 189
Norway 101
anticipatory governance themes 215–16
Bank ID 102–3, 104
digital citizens in 9, 11
digital uptake in healthcare in 205
enabling and constraining factors in 214
digitalisation policies 102
electronic IDs 102
healthcare organisation in 204–5
healthcare robotics in 205
hindrance of expansion of 216
healthcare system 209
Helse Omsorg 21 strategy 210
National Health and Hospital Plan 2020– 2023 210
normative and financial frameworks 209–11
prevalent design and adoption model 211–12
professional practices 212–13
public services in 102
robotics development model 217
robotics in primary care services 211
Sunnaas Hospital 211, 217
Norwegian Directorate for Medical Products (DMP) 210
Norwegian Innovation Council 211
Norwegian Nurses Association 107
Norwegian Research Council 211, 212
nurses
as digital helpers 101, 107–9
help required by patients 105–7
skills and guidelines for 109–10
unpaid work by 108
NViVo (software) 170

Ogden, Michael 4
online data collection 150

P&I clubs 63–4, 69, 70
Parsons, Talcott 18, 20, 29, 30
participatory democracy 148
patient management processes 233
pedagogical modelling 250
perception media 32
personalisation 255
personhood, legal conception of 66
personification, doctrine of 61–3
physicians 225
interviews with 230
perception of AI as tools 230
view of AI in medicine 224
political citizenship 116
politics, blockchain technologies and 123–4
postcolonial theory 80, 87
and AI adoption in African cities 86
power outages, in sub-Saharan Africa 88
power relations, between the government and citizens 128
Praia, Cape Verde, AI smart city initiatives in 81, 83
predictive analytics 229
Pretty, J. 128
printing press 22
PRISM programme 194
PRISMA 2020 approach 131–43
privacy issues 123
privacy risks 88
professional identity 223
in the age of AI 233–4
professions and 225
professional identity theory 225
professional roles, sense of meaning and purpose in 235–6
professional teacher agency 163–6, 177–8
professional work, digitalisation and AI in 226
professions, and professional identity 225
profound and multiple intellectual disabilities (PMID) 253–4
protection and indemnity (P&I) insurance 63, 64
public health 102
public participation 128

qualitative research 224

racial discrimination 193
real-time data analysis 233–4
reasoning, conception of 258
recursion 29–31
regulatory bodies 225

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

rehabilitation 210
  assistive robots used in 202
rehabilitation robots 203, 204, 206–7
remote learning 4
research, qualitative 224
Ribble, M. 6
Ringholm, T. 128
risk
  associated with AI systems
    physical 58
    social 58
risk assessment algorithms, in pre-trial decisions 191
risk distribution models 63–5
Rizer, A. 191
robotic therapy protocols 207
robots
  collaborative robots (cobots) 205
  humanoid 211
  implementation in Italian and Norwegian healthcare 10, 12
  legal status of 65
  social 202
Rousseau, Jean Jacques 187, 188
Rowe, G. 128

Sæbø, Ø. 126
Safdar, M. 195
safety
  enhanced analysis needed for 194–5
  societal 188
SAMR-LD (Substitution, Augmentation, Modification, Redefinition – Learning Disabilities) model 250
science and technology studies (STS) 80
  and deployment of AI in African cities 85, 86
scientific literature, on AI and inclusive education 249–51
security issues, blockchain technologies 122
Seeing AI 252
self-determination, for individuals with disabilities 256
self-determination theory (SDT) 251
self-driving vehicles 57
self-organisation, principle of 27
semantics, societal 26
SEN education 9–10, 161, 162–3
  immersive technologies in 161, 162, 166, 179
    barriers to implementing 162, 177
    didactical approaches 165
    potential benefits 162
  training course on implementation of VR and AR technologies 162–3
SEN students
  responses to virtual and immersive learning resources 163, 171–3
    dialogue starter 172
    excitement 171–2
    subject goal fulfilled 172
    technical or physical strain 172–3
sensory disabilities, use of AI to support people with 251
Shaikh, Saquib 252
ships
  AI systems and 56, 57–60
  autonomous capabilities 57
  as legal entities 61–3
  personification of 61–3, 66
Simondon, Gilbert 23
smart cities 76, 129
  in Africa 77, 79
  definition of 128–9
  effective AI use in smart city governance 90–92
  literature on 78
smart grids 79
smart waste management systems 90
smart water management systems 79
Smith, M. 195
social citizenship 116–17
social discourse 186
social discrimination, through AI 88
social forms 31
social media 4
social media platforms 3
  control of privacy preferences 192
social model of disability 247
social robots 202
social security numbers 103
social stories 178
social systems, differentiation in 25
society
  interdependence of large-scale processes within 29
  relationship between media and 18
sociological systems theory 28

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

sociological theory 26, 29, 30
of catastrophic media 32
view of individuals 29
SOS project 100–1, 107
South Korea, movement-tracking app on phones 195
special education needs education *see* SEN education
special education needs students *see* SEN students
Spencer-Brown, George 23
stakeholders
in AI systems 59
in the maritime industry 59
state security 188
Statewatch 186
structure form 22, 24, 25, 27
student-centred education 255
student modelling 250
subjectivity, in decision-making processes 191, 194
success media 18, 19, 32
Sunak, Rishi 186
Sunnaas Hospital, Norway 211, 217
surgical preparation
AI in 234
and simulation 232
surveillance capitalism 88
surveillance systems, AI-driven 90
Sustainable Development Goals (SDGs) 161
Sustainable Urban Mobility Plan (SUMP) 144
Sweden, digitalisation policies 102
Switzerland, blockchain technologies in 120, 121
symbolic versus substantive compliance theory 39
systems world 189

Tapscott, A. 115
Tapscott, D. 115
TCP/IP protocol 112
teachers
perceived educational outcomes of immersive learning resource 175–7
professional agency 163–6
in-service learning processes 173–4
technological developments 185, 259
consequences of 244
telemedicine 89, 205, 217
telos 22
terrorism, international fight against 194
testbeds 211–12
thematic analysis 170
theoretical reflection 259
third-party liabilities, marine insurance and 63–5
thought experiments 258
Toom, A. 164, 177, 178
Toronto School of Communication 20
trademark law 233
traffic accident analysis system 193
traffic management 85, 89
in Accra, Ghana 82
and AI in African cities 89
transformations 2
transformative technologies 185
transparency 143–4
trust
ascribed to data users 197
and citizen e-participation 144–5

United Kingdom (UK)
AI policies 58
'murder prediction' tool 186–7
United States (US)
admiralty practice 61
AI policies 58
racial discrimination and bias in 193
unpaid work, in nursing 108
urban mobility 126
evolution of citizen e-participation in 129–30
urban mobility policy, challenges in 127
urban technology 129

Valero-Franco, C. 162, 166–7
values 30, 186, 189
Vial, G. 2–3
Viberg, O. 246
Vigna, P. 114, 116
virtual reality (VR)
approaches to education 161
goggles 170
visual impairments, potential of AI for people with 252
Vrailexia project 253

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/

Waldman, A.E. 197
Watney, C. 191
Web 2.0 technologies 112, 115
Web of Science (WoS) database 132
welfare services, applying for in Norway and Denmark 102
well-being
  enhanced analysis needed for 194–5
  societal 188
White, Harrison C. 26
Whitehead, Alfred North 23
Winthereik, B.R. 108
work, future of 239
work satisfaction 235
Wright, J. 207, 208
writing, invention of 21–2

Zuboff, S. 79, 88
Zug, Switzerland 120
Zuiderveen, F. 193

Cathrine E. Tømte, Jarle Trondal, Alexander Ruser, and Gloria Ziglioli - 9781035361229
Downloaded from https://www.elgaronline.com/ at 07/23/2026 03:00:06PM
via Open Access. This is an open access work distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (https://creativecommons.org/licenses/by-nc-nd/4.0/) license.
https://creativecommons.org/licenses/by-nc-nd/4.0/