Responsible Digital Transformation for a Sustainable Society

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Abstract

In the ever-evolving area of digital transformation, following responsible and sustainable practices is essential. This editorial article discusses the importance of responsible digital transformation, emphasizing the need for academia, private and public organizations, civil society, and individuals to work together in developing digital business models that generate shared value while addressing societal challenges. The article highlights the emergence of corporate digital responsibility (CDR) and the shift from industry 4.0 to industry 5.0, which focuses on human-centric approaches and human-AI partnerships. Furthermore, it underscores the need for interdisciplinary research and systematic approaches encompassing various dimensions of sustainability. By integrating sustainable ICT principles into digital transformation initiatives, organizations can contribute to a more sustainable and responsible digital future. The suggestions in this paper, coupled with the nice research contributions included in the special issue, seek to offer a broader foundation to support responsible digital transformations for sustainable societies.

Keywords Responsible digital transformation · Responsible AI · Responsible digitalization · sustainability · human-centered AI · industry 5.0

1 Introduction

Digital transformation remains a topic of significant interest both for academia and practice as the development of sustainable societies is a key target for the different actors involved in various ways. Studying the role of emerging technologies and their applications can lead to new or revised theoretical toolkits, methods, and philosophical approaches used to design and develop improved solutions to societal challenges with both business and social value (Kraus et al., 2022; Mikalef et al., 2020; Pappas et al., 2018). To fully realize such value and bring business and

societal change, it is necessary for the different actors, such as academia, private and public organizations, civil society, and individuals, to work together. It is imperative to adopt digital business models that not only enhance accuracy and efficiency, but also address societal challenges and generate shared value that has a positive impact on society and its individual actors. It is necessary to acknowledge that value can be generated through a variety of means and can be quantified using a range of metrics. The generation of shared value or co-created value can result in increased benefits for all stakeholders involved in digital transformation.

To achieve broader objectives, that go beyond the economic-related ones, digital transformations should be designed in a responsible manner to benefit all actors. It will take at least a few years to be able to evaluate the impact of Covid-19, during which we saw a surge in digital transformation efforts as a response to the challenges from the pandemic, on business and society. While there is consensus on the need for responsible design, development, and implementation of technology, research is still ongoing on how to achieve this, with IS literature currently focusing largely on Artificial Intelligence (AI). This includes Responsible AI (RAI) (Dennehy et al., 2023; Mikalef et al., 2022; Shneiderman, 2021; Vassilakopoulou et al., 2022), Explainable AI

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(XAI) (Arrieta et al., 2020; Meske et al., 2022), human-centered AI (Shneiderman, 2020) inclusive AI (Nouri, 2021). In their editorial, Vassilakopoulou et al. (2022) highlight three different streams of research on RAI from computer science, human-computer interaction, and philosophy and ethics and propose their own definition. While there are similarities among them, depending on the discipline different aspects of AI are highlighted.

At the same time, there is no clear definition for what entails responsible digital transformation, and it is a less commonly used term (Zhang & Hon, 2020). However, considering how emerging technologies and especially AI have influenced digital transformation, and vice versa, several aspects of RAI would be relevant for responsible digital transformation. Responsible digital transformation can be seen as a process of integrating digital technology into a business in a way that is ethical, sustainable, and respectful of human values and society. It involves considering the potential consequences of technological change on individuals and communities, and taking steps to minimize any negative impacts. This may involve engagement of different actors, to understand the needs and concerns of different groups, as well as developing policies and practices that promote responsible use of technology. Responsible digital transformation involves using digital tools and processes to create shared value in a way that is mindful of the long-term consequences for people and the planet.

While research on digital transformation has been soaring the past few years, the term responsible digital transformation is not frequently used in research articles. A Google Scholar search returns around 100 results, out of which less than half are somewhat relevant. A similar search on Scopus results in only 10 results, all published after 2020, in journals, conference proceedings, or book chapters. Similar results occur for the term responsible digitalization, which is also attracting some attention. At the same time, the World Economic Forum (WEF) had several initiatives focusing on responsible digital transformation as part of their actions to shape the future of digital economy and society (O'Halloran & Griffin, 2019). They discuss a framework regarding the impacts from five emerging digital developments that are cyber-resilience, data privacy, the internet of things (IoT), blockchain and AI. Furthermore, large consulting companies such as Deloitte and Accenture have been promoting responsible digital transformation either for achieving a higher net income in financial services (O'Reilly, 2021) or at a more general level for achieving social impact (Accenture, 2019).

Organizations and companies are now going beyond their traditional Corporate Social Responsibility strategies and are developing their corporate digital responsibility (CDR), that refers to shared values and norms regarding the creation and operation of digital technology and data (Lobschat et al., 2021; Wirtz et al., 2022). At the same time, the European Commission through its strategy for data seeks to be a leader in the data economy by harnessing the potential of the ever-increasing amount of data, for business and social value (European Commission, 2020). Generating shared value that can impact companies, organizations, consumers, and the society overall is necessary to enable responsible digital transformations (Pappas et al., 2018), needed to deal with the vast streams of customer data as well as the inherent omnipresence, opacity, and complexity of digital technologies. A good example are data marketplaces, that are platforms that allow companies to buy and sell data and enable value co-creation by facilitating the exchange of data between different parties, leading to new insights and business opportunities. This requires companies to ensure that they are using data in a responsible manner, thus respecting customer privacy, ensuring transparency, and avoiding biases or discrimination among others.

As digital technologies are quickly evolving, a shift from the automation and digitalization of industry 4.0 to industry 5.0 is occurring. Industry 5.0 complements Industry 4.0 by taking a more human-centric approach as it seeks to integrate the benefits of advanced digital technologies with the creativity and problem-solving abilities of human workers. This involves leveraging technology (AI, IoT, Robotics) to enhance the ability of workers to collaborate, innovate and develop new solutions to complex challenges, creating human/AI partnerships and reshaping work and service automation (Faraj et al., 2018; Vassilakopoulou et al., 2023), raising also the question on how to educate for responsible digital transformation (Dennehy et al., 2023; Grøder et al., 2022). The latter is critical considering the increasing need the past decade for more IT students (Blumberg et al., 2023; Mikalef et al., 2018; Pappas et al., 2017) The latest developments with *OpenAI*'s chatbot "ChatGPT" and Google's Bard are excellent examples of how generative AI can enable such partnerships, enhance productivity, lead to replacement of human employees and the creation of new different jobs (Hatzius et al., 2023). Thus, the effects of generative AI on knowledge acquisition and digital transformation need further research (Dwivedi et al., 2023), in order to better understand how they can enable responsible digital transformation and support the creation of sustainable societies.

Finally, the need to create more sustainable societies, increases the importance for interdisciplinary research and systematic approaches that encompass various dimensions of sustainability, including environmental, economic, social, and technical aspects (Bibri & Krogstie, 2017; Pappas et al., 2018). Specifically, in IS research, while studies so far consider all dimensions of sustainability, the environmental

dimension plays a key role as all the other dimensions are typically considered together the environmental dimension, suggesting that more work is required on social, economic, as well as technical aspect (Veit & Thatcher, 2023). While digitalization has changed numerous aspects of our daily lives with multiple innovations, when we consider the number of natural resources required for these innovations, we should consider if they solve more problems compared to the ones that they create (idem). Thus, responsible digital transformations (or responsible digitalization) may lead us to creating more sustainable societies, however they require the design and development of sustainable ICT. By integrating the principles of sustainable ICT into the design, development, and implementation of digital transformation initiatives, organizations can contribute to a more sustainable and responsible digital future.

2 Focus of the Special Issue

The main objective of this special issue is to provide theoretical discussion and empirical support to better understand digital transformation for a sustainable society in the 21st century and to develop a research agenda for the future. The call for papers generated a large number of submissions but not all of them met the criteria of this special issue. After two or three rounds of review, fifteen papers were finally accepted. Due to space restrictions, out of the fifteen papers that were handled by the guest editors, nine are selected to appear in this special issue of Information Systems Frontiers. The rest appear in a regular issue of Information Systems Frontiers.

The papers appearing here cover different perspectives of how different emerging technologies (AI, ML, big data and business analytics), their applications as well as the various actors involved the process can pave the way towards successful digital transformation and the creation of sustainable societies. The papers consider different aspects of the digital transformation and sustainability (DTS) model (data actors, capabilities, value creation, business and societal change) (Pappas et al., 2018), employ different methods of analysis (mixed methods, quantitative, qualitative, fsQCA) and contribute to *digital transformation for a sustainable society in the 21st century.*

The paper from Vassilakopoulou and Hustad (2023) examines the digital divide, which refers to the unequal distribution of access to information and communication resources such as the internet, computers, and smartphones. The authors argue that addressing the digital divide requires more than just providing access to these resources. They suggest that digital inequality is related to non-digital inequality, which is based on socio-economic resources,

such as income and education level. The authors highlight the importance of addressing digital divides to create sustainable, digital societies. To achieve this, the paper reviews existing research on the digital divide in technologically advanced countries and economies. The authors identify contributing factors and propose ways to address the divide. Based on the results, the authors propose a research agenda that includes the development of new models to better understand digital inequalities, a closer examination of the impact of interventions to address digital divides, and a stronger connection between research on digital divides and research on sustainability. Overall, the paper emphasizes the importance of understanding and addressing digital divides, as they can have a significant impact on socio-economic equality and the development of sustainable, digital societies.

In their paper Dwivedi et al. (2023) investigates the impact of social media on digital transformation and sustainable societies. The authors provide a comprehensive analysis of the use of social media by business-to-business (B2B) companies, exploring various aspects such as the effects of social media, social media tools, adoption and barriers to social media use, social media strategies, and measuring the effectiveness of social media use. The study connects with the DTS model (Pappas et al., 2018), which examines the impact of digital transformation on society, and emphasizes the importance of social media for both companies and society as stakeholders. The paper highlights the role of social media in driving business and societal change towards successful digital transformation and sustainable societies. The authors examine the impact of social media use on B2B companies, emphasizing the need for companies to adopt effective social media strategies to remain competitive and achieve their sustainability goals. The paper also identifies barriers to social media use and proposes ways to overcome these barriers. Overall, the paper contributes to our understanding of the impact of social media on digital transformation and sustainable societies. The authors provide insights into the use of social media by B2B companies, highlighting the importance of effective social media strategies for achieving sustainable business practices and societal change.

In their paper Margherita and Braccini (2023) investigate the value creation of Industry 4.0 (I40) technologies in flexible manufacturing from a sustainability perspective. While the benefits of I40 technologies in terms of technical and economic performance have been widely studied, their sustainability has received less attention. To address this gap, the authors combine IT value theory with the concept of sustainability, which includes economic, environmental, and social dimensions. The authors conduct a multiple case study of four Italian manufacturing organizations that

have successfully implemented I40 technologies in flexible manufacturing. They examine how the organizations create sustainable value through the use of I40 technologies, focusing on the worker-centric approach where the workforce is involved in continuously fine-tuning and improving the technologies and processes. The paper concludes that I40 technologies can create sustainable organizational value when they are used in a worker-centric approach. This approach allows the workforce to be involved in the development and implementation of I40 technologies, which helps to ensure that the technologies are aligned with the organization's goals and objectives. In this way, the authors demonstrate the importance of considering the social dimension of sustainability in the implementation of I40 technologies in flexible manufacturing. Overall, the paper highlights the need to consider sustainability as an important factor in the implementation of I40 technologies in flexible manufacturing. It emphasizes the role of a worker-centric approach in creating sustainable value and contributing to the long-term success of the organization.

In their paper Soto Setzke et al. (2023) focus on digital service innovation (DSI) and digital transformation strategies, with a particular emphasis on understanding DSI failure. The authors employ a configurational research approach to identify interdependencies between factors and provide insights into the individual factors that contribute to successful DSI. The authors argue that there is a limited understanding of the combinations of digital transformation strategies that lead to successful DSI in established organizations. To address this gap, they conduct a case study analysis of digital transformation strategies in seven established organizations from various industries. Through this analysis, they reveal several configurations of digital transformation strategies that can lead to either successful or unsuccessful DSI. They also show that the threat of digital disruption can hinder innovation and that strategic partnerships can be useful for organizations facing this threat, while those with competitive advantages may prefer to rely on "do-it-yourself" approaches. Overall, the paper provides valuable insights into the complex interplay of digital transformation strategies and DSI success, emphasizing the importance of considering the specific context and goals of the organization. The configurational research approach used in the study allows for a deeper understanding of the interdependencies between factors and highlights the need for a tailored approach to digital transformation. The findings of the study can inform the development of effective digital transformation strategies for organizations across industries. This paper performs fuzzy-set Qualitative Comparative Analysis (fsQCA) (Ragin, 2008) on interview data. While it has been more common to see articles employing fsQCA on questionnaire data (Pappas & Woodside, 2021),

more studies are needed with other types of data, especially interview data. The paper from (Soto Setzke et al., 2023) offers a good exemplary of how to code data for configurational analysis.

The paper from Bacon et al. (2023) explores the conditions for successful knowledge exchange across inter-organizational ecosystem partnerships. Such partnerships are becoming increasingly common for open innovation, but the literature lacks empirical evidence of the importance of and interdependencies between the conditions for successful knowledge exchange. The study uses a mixed-method approach, combining questionnaires and interviews with ecosystem stakeholders, to identify the conditions responsible for knowledge transfer success. The interpretive structural modeling technique is used to create a hierarchical structure of these conditions, while fuzzy-set qualitative comparative analysis (fsQCA) is used to analyze the configurations and combinations of these conditions that lead to success. The study finds that there are multiple mutually exclusive pathways to knowledge transfer success, which can be grouped into three solution types. The study highlights the interrelated nature of the knowledge transfer conditions and provides implications for future research in this area. This is the second paper in this special issue that employs fsQCA on questionnaire data, as part of its mixed-method approach.

In their paper (Nasiri et al., 2023) aimed to identify the crucial factors that enable small and medium-sized enterprises (SMEs) to leverage digital innovation opportunities. To achieve this, they conducted a survey of 280 SMEs in the service and manufacturing sectors in Finland and analyzed the data using quantitative research methods. The results of the study highlighted the significance of certain digital-related capabilities that were necessary for SMEs to implement digital innovations in their market offerings and business processes. These capabilities included human, collaboration, technical, and innovation capabilities, with different combinations of these capabilities being more important for market offerings versus business processes. The research contributes to our understanding of the evolving digital ecosystem and how digitalized business environments can be leveraged by SMEs to drive successful digital innovation outcomes. The study also emphasizes the importance of understanding and adapting capabilities to achieve successful digital innovation in both innovation outcomes and processes.

This paper from Ferreira et al. (2023) explores the relationship between Big Data companies and society, with a specific focus on the concept of legitimacy. Legitimacy is defined as a judgment regarding whether an entity, such as a company, is suitable and appropriate for society. The authors examine four case studies where Big Data companies

encountered challenges to their legitimacy. The research indicates that digital transformations necessitate companies to balance disrupting social norms and values with conforming to them. Big Data companies encounter a tension between the potential benefits and costs of their disruptive business models. The study employs a multiple case study approach to gain insights into the relationship between Big Data companies and society, and the challenges they face to their legitimacy.

In their paper (Marikyan et al., 2023), conduct a quantitative user study to explore how users cope with technology when it falls short of their initial expectations. They apply Cognitive Dissonance Theory to understand the impact of negative emotions, such as anger, guilt, and regret, on users' coping mechanisms to reduce dissonance. The study finds that when technology fails to meet expectations, users may experience negative disconfirmation, which can lead to satisfaction. The authors also highlight the interrelationships among emotional, cognitive, and behavioral factors that occur after the evaluation of technology performance. The study provides insights into expectation-disconfirmation and cognitive dissonance in technology use and contributes to the ongoing discussion in this field.

The paper from Schulz et al. (2023) explores the concept of value co-creation in the context of D2D mobility integrators, which are service providers that aim to offer a seamless and integrated mobility experience to customers by combining various mobility services, such as car-sharing and public transport. The article notes that, despite the potential benefits of value co-creation, there has been a lack of empirical evidence regarding its implementation in the mobility sector. To address this gap, the article uses Activity Theory as a framework to conceptualize value co-creation between mobility providers and D2D mobility integrators. The study is based on a qualitative analysis of the German mobility sector, which identifies several inhibitors of value co-creation from the perspective of mobility providers. The inhibitors identified include issues related to trust, power dynamics, and the perceived benefits of value co-creation. The article suggests that these inhibitors can serve as triggers for adaptations that lead to the formation of a value co-creation relationship. Through this process, mobility providers and D2D mobility integrators can work together to create a more integrated and seamless mobility experience for customers. Overall, the study provides valuable insights into the potential barriers and facilitators of value co-creation in the context of D2D mobility integrators, highlighting the importance of understanding the perspectives and motivations of different stakeholders in the mobility ecosystem.

3 Conclusions and the Way Ahead

In conclusion, responsible digital transformation for sustainable societies is of paramount importance, as it holds the potential to reshape our world for the better. However, its complexity cannot be overstated, as it involves navigating the intricate interplay between technological advancements, environmental concerns, ethical considerations, and social implications. By embracing a holistic and interdisciplinary approach, we can address these complexities and harness the power of digital technologies to create a more inclusive, equitable, and sustainable future for all. The latter requires designing inclusive solutions, that will be available to all. This starts by providing access to a diverse group of users, then ensuring their engaged participation, that will eventually lead to empowered success (Patrick & Hollenbeck, 2021). Information systems are central to this transformation, and this special issue seeks to publish theoretically-grounded research that will advance our understanding of how to create a sustainable society through their impact on these systems. Below, we highlight several areas that require particular attention, both by research and practice, and propose research questions to facilitate these research directions.

Responsible AI and its Integration in Digital Transformation: Investigate the ethical, social, and environmental implications of AI-driven digital transformations. Research can focus on developing and refining responsible AI frameworks, identifying best practices, and evaluating their impact on various stakeholders, industries, and society at large.

1. How can we design digital transformation processes that are driven by AI to ensure they are ethically, socially, and environmentally responsible?
2. Which best practices can be employed for the implementation of responsible AI across various industries and sectors?
3. How can the impact of responsible AI on stakeholders and society as a whole be assessed and measured?
4. What are the primary challenges and obstacles in adopting responsible AI within digital transformation initiatives?
5. How can cross-disciplinary collaboration promote the development and successful implementation of responsible AI frameworks?

Human-centric approaches to Industry 5.0: Examine the implications of integrating advanced digital technologies with human creativity and problem-solving abilities. Research can explore how this human-centric approach

influences collaboration, innovation, and the development of new solutions to complex challenges, ultimately contributing to responsible digital transformation.

1. How can organizations efficiently merge human creativity and problem-solving skills with cutting-edge digital technologies within Industry 5.0?
2. What are the essential elements that lead to successful human-AI collaboration in a human-focused Industry 5.0 environment?
3. In what ways do human-focused approaches to Industry 5.0 affect innovation, productivity, and employee satisfaction?
4. What are the potential risks and challenges associated with incorporating human-focused approaches in Industry 5.0, and how can they be addressed?
5. How can educational and training programs be modified to prepare the workforce for human-focused digital transformation in Industry 5.0?

Corporate Digital Responsibility (CDR): Investigate the development, implementation, and impact of CDR strategies in organizations, focusing on shared values and norms regarding the creation and operation of digital technology and data. Research can explore how companies can balance economic goals with ethical, social, and environmental considerations in their digital transformation processes.

1. How can organizations establish and execute effective CDR strategies that strike a balance between economic objectives and ethical, social, and environmental concerns?
2. What are the key contributing factors to successful CDR implementation, and what are the primary challenges organizations encounter?
3. How do CDR strategies influence organizational performance, stakeholder contentment, and competitive advantage?
4. How can companies evaluate and communicate the results of their CDR initiatives to stakeholders and the wider public?
5. What is the role of regulatory frameworks and industry standards in encouraging and enforcing CDR best practices?

Data privacy, security, and responsible data marketplaces: Study the challenges and best practices in ensuring responsible use of data in the age of data marketplaces. Research can explore data protection standards, regulatory frameworks, and the development of technologies that ensure transparency, privacy, and the prevention of biases or discrimination in data-driven decision-making.

1. What are the main challenges organizations must overcome in ensuring data privacy and protection in the context of data marketplaces, and how can these challenges be tackled?
2. How can regulatory frameworks and industry standards foster responsible data exchange in data marketplaces?
3. What are the best practices for promoting transparency, privacy, and bias prevention in data-driven decision-making processes?
4. How can innovative technologies (e.g., blockchain) contribute to secure, transparent, and accountable data marketplaces?
5. How can organizations find a balance between the advantages of data sharing and the necessity to safeguard the privacy and security of individuals and businesses?

Educating for responsible digital transformation: Investigate how educational institutions can integrate responsible digital transformation principles into their curricula and training programs. Research can examine the development of interdisciplinary approaches, new pedagogies, and innovative teaching methods that equip students with the necessary skills and knowledge to contribute to sustainable societies in the digital age.

1. How can educational institutions effectively incorporate responsible digital transformation principles into their curricula and training programs?
2. Which interdisciplinary methods, pedagogies, and instructional techniques are most successful for training future leaders and professionals in responsible digital transformation?
3. How can educators determine and evaluate the efficacy of responsible digital transformation education initiatives?
4. What are the primary barriers and challenges educational institutions face in implementing responsible digital transformation education, and how can they be addressed?
5. How can partnerships between academia, industry, and policymakers advance the development and distribution of responsible digital transformation education and training?

Sustainable ICT: Understand the synergistic and harmonic interplay between humans and ICT in the context of creating sustainable digital ecosystems that address environmental, social, and economic challenges. More focus is needed to investigate the design, implementation, and evaluation of digital solutions that drive sustainability, responsible digital transformation, and long-term societal impact.

1. How can we effectively integrate interdisciplinary approaches to identify and address the environmental, social, economic, and technical dimensions of sustainable ICT and responsible digital transformation?
2. What are the best practices and key success factors for designing and implementing human-AI collaboration models that support sustainable digital ecosystems and responsible digital transformation initiatives?
3. How can organizations develop comprehensive assessment frameworks to measure and optimize the sustainability impact of their digital transformation projects, considering the entire lifecycle of ICT products and services?
4. In what ways can inclusive stakeholder engagement and co-creation contribute to the development of innovative solutions that address the multifaceted challenges of sustainable ICT and responsible digital transformation?
5. How can capacity building and education initiatives be designed to foster the development of skills and competencies needed for responsible digital transformation and sustainable ICT, while promoting interdisciplinary collaboration, critical thinking, and problem-solving abilities?

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