



CATCHWORD

# Digital Responsibility

## A Multilevel Framework for Responsible Digitalization

Matthias Trier · Dennis Kundisch · Daniel Beverungen · Oliver Müller ·  
Guido Schryen · Milad Mirbabaie · Simon Trang

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### 1 The Relevance of Digital Responsibility

The profound and transformative proliferation of digital technologies and processes reflects in the ongoing stream of research on digital transformation (Li et al. 2018; Markus and Rowe 2023). This transformation deeply permeates into everyday day life (Hess et al. 2014) and brings about novel questions and comprehensive challenges for individuals, organizations and societies: Actors such as consumers, employees, or citizens can benefit from new opportunities but also face risks. Digital markets, services, and technologies develop faster than their regulation. Enterprises and work contexts are changing fundamentally, political engagement and governmental institutions face novel situations. In this context, “technologies are not mere aids but are powerful forces acting to reshape human activity, create new cultures and new worlds” (Hassan et al. 2018, p. 4). They are not neutral but laden with human, cultural and social values (Capurro 2009).

In order to avoid negative implications of these fast-paced changes, to respect relevant values and attain a higher life quality, information systems (IS) researchers have to understand the *consequences* of the digital

transformation process comprehensively and contribute to its design in a *responsible* way. An illustrative example are artificial intelligence chatbots based on large language models that are offered by companies without fully understanding how they may negatively affect information transparency or information processing capabilities of users. Such normative challenges are articulated in the emerging discourse on the concept of “digital responsibility” (DR). Drawing on Thorun (2018) and Wade (2020), we define DR as efforts of stakeholders such as individuals, corporations or public institutions to contribute to a sustainable, more inclusive, fair, and value-based digital society (or digitalization in general) beyond the legal minimum.

DR is an important topic with the potential to mark a second wave of a more reflected digital transformation process that recognizes possible unintended long-term consequences or indirect stakeholders. As such, it differs in focus from the related Corporate Social Responsibility and its objective to mitigate negative impacts of corporate practices on socially and environmentally relevant issues (Maignan and Ralston 2002; Mihale-Wilson et al. 2021). DR is receiving increasing recognition by political parties, companies and business associations. For example, groups of companies in the German speaking countries are gathering to agree on organizational measures that ensure Corporate Digital Responsibility (CDR; z.B. <https://www.bvdw.org/der-bvdw/gremien/digital-responsibility>, also cf. Mueller 2022). Others are framing a joint agenda (charta-digitale-vernetzung.de) or are building task forces such as the German commission for data ethics (<https://datenethikkommission.de/en/>). On an international level, the Coalition for Digital Environmental Sustainability (CODES) is focusing on advancing digital sustainability with a focus on environmentally and socially sustainable

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M. Trier (✉) · D. Kundisch · D. Beverungen · O. Müller ·  
G. Schryen · M. Mirbabaie · S. Trang  
Department of Information Systems, Paderborn University,  
Warburger Strasse 100, Paderborn, Germany  
e-mail: trier@upb.de

development. Scientific perspectives on DR can potentially complement the above initiatives so that science becomes a more visible contributor and guide for responsible design of the societal transformation, as a second-order objective of digital transformation. However, beyond conceptualizations of digital ethics (e.g., Jobin et al. 2019) or CDR (e.g., Lobschat et al. 2021; Mueller 2022), the core elements of DR still need to be integrated into a structured framework that can be systematically linked to IS research themes. It is further unspecified how individual, organizational or societal stakeholders relate to DR or have to take responsibility, e.g., in terms of governance efforts.

To contribute to a more systematic conceptualization, we first introduce eight key principles of DR that we have derived from the contributions of practitioners and academics to the emerging DR discourse. We then show how these principles are discussed in a broad range of IS research fields. Based on this systematic exploration, we provide an overview of existing contributions to attain DR in the IS discipline, discuss the role of responsibility at the individual, corporate and societal level, and finally address avenues for future research.

## 2 DR Principles

Political and organizational white papers as well as the emerging academic literature on corporate responsibility and digital ethics propose and discuss a series of norms and principles that should guide the design of information systems and the behavior of key stakeholders. This implies that such norms are also relevant for the researchers that explore user behavior and information systems. From a research philosophy perspective, the increasing emphasis on digital responsibility is thus also a call for increasing the attention on the *axiological*, value-related dimension of IS research (Hassan et al. 2018) that examines norms (which can be grounded in moral philosophy) in order to guide digital transformation efforts and the researchers studying them. Drawing on the emerging discussion of guiding principles for digital ethics (e.g., Jobin et al. 2019) and corporate digital responsibility (e.g., Cooper et al. 2015) and based on the abstract conceptualization of Wood (1991), we define a *DR principle* as a fundamental and value-based normative requirement that motivates actors to attain responsible digital transformation. Such a principle can serve as a normative proposition that guides behavior and governs evaluation efforts of practitioners but also of researchers. We discuss how the principles can be applied to IS research fields in the next section.

We examined more than 20 contributions to the emerging DR discourse and identified various norms and principles that researchers propose or discuss. Based on

this rather incoherent set, we categorized a shortlist of eight *normative DR principles* with varying relevance and operationalization. For example, we integrated the concepts “exclusion” (Lobschat et al. 2019), “access”, “participation mechanisms” (Thorun 2018), “group discrimination” (Yeung 2018) and “civic engagement” (Jones and Mitchel 2018) into the DR principle of participation. While the resulting list specifies the main principles, we note that this process does not necessarily lead to an integration of existing concepts into a comprehensive moral philosophy of responsibility principles and their interdependencies. A tabular overview of relevant publications and our derivation of DR principles is provided in Table 1. We now introduce the resulting eight fundamental DR principles as they appeared in the literature in more detail and provide key references as well as the related concepts used in the literature.

1. *Sustainability Principle* On the corporate level, a major aspect of sustainability relates to possible *environmental requirements* like the trade-off between power consumption and added value by new digital services, e.g., for adding artificial intelligence methods that require computational power (BVDW 2019). A related concept is *sustainable automation* (Orbik and Zozulakova 2019). Another aspect is the responsibility to ensure quality and security for *critical systems* (Advenica 2020). Planned or unplanned damage made to critical systems can cause irreversible damage to both environment and society. On the societal level, sustainability is often discussed in terms of political incentives to adopt appropriate technologies and processes.
2. *Participation Principle* On the level of personal and corporate digital responsibility, the principle of participation addresses the requirement of *involving a broad and diverse range of individuals* as relevant stakeholders in digital environments, e.g., as users in software engineering efforts, or as citizens in digital processes of democratic opinion forming (Janssen et al. 2012). On the societal level of DR, this principle relates to *digital divide* (Lythreathis et al. 2022) and inclusion (Jamil 2021). Further related concepts discussed in the literature include for example *civic engagement* (Jones and Mitchell 2016) or *group discrimination* (Yeung 2018).
3. *Functionality Principle* On the governmental level, it is not enough to regulate technical progress through legal restrictions. Additionally, legal or ethical frameworks guide the development of new technologies for the benefit of the general public (Advenica 2020; Whiting and Pritchard 2017). Correspondingly, on the corporate level, the functionality principle requires that

**Table 1** Overview of principles levels of DR, underlying concepts in the literature and levels addressed in the literature

| DR Principle   | Related Concepts identified in the Literature   | Sources mentioning the DR Principle   | PDR Level | CDR Level | SDR Level |
|----------------|---|---|-----------|-----------|-----------|
| Sustainability | Sustainability, Sustainable Automation  | Advencia (2020)*; BVDW (2020)*; Orbik and Zozulakova (2019)   |           | X         | X         |
| Participation  | Inclusion, Digital Divide, Customer Empowerment, Inclusion, Social Good, Participation, Justice and Fairness Civic Engagement, Exclusion; Access, Participation Mechanisms, Accessibility, Group Discrimination & Bias, Power Assymetry | BVDW (2020)*; Cooper et al. (2015)*; Cullen (2001); Janssen et al. (2012); Jobin et al. (2019); Jones and Mitchell (2016); Lobschat et al. (2019); Mihale-Wilson et al. (2021); Orbik and Zozulakova (2019); PWC (2020)*; Royakkers et al. (2018); The Internet Commission (2019)*; Thorun (2018); Whiting and Pritchard (2017); Yeung (2018) | X         | X         | X         |
| Functionality  | Functionality, Ethical Design & Innovation, Employment, Wellbeing, Unethical System Design  | Advencia (2020)*; Allem and Ferrara (2018); BVDW (2020)*; The Internet Commission (2019)*; The Internet Commission (2019)*  |           | X         | X         |
| Data Privacy   | Privacy, Surveillance, Non-maleficence, Data Security, Security, Safety, Surveillance   | Advencia (2020)*; BVDW (2020)*; Capurro (2009); Franzke et al. (2020)*; Janssen et al. (2012); Jobin et al. (2019); Lobschat et al. (2019); Mihale-Wilson et al. (2021); Orbik and Zozulakova (2019); PWC (2020)*; The Internet Commission (2019)*; Thorun (2018); Whiting and Pritchard (2017); Yeung (2018)                                 | X         | X         | X         |
| Transparency   | Transparency, Education & Awareness, Information & Transparency, Transparency vs Privacy Tradeoff, Truth, Providing no Explanation  | Allem and Ferrara (2018); Cooper et al. (2015)*; Franzke et al. (2020)*; Jobin et al. (2019); Lobschat et al. (2019); Mihale-Wilson et al. (2021); PWC (2020)*; The Internet Commission (2019)*; Thorun (2018); Yeung (2018)  | X         | X         | X         |
| Fairness       | Customer Empowerment, Fair value Exchange, Honesty, Justice, Unbiased AI, Balance of Power, (Fair) Value Exchange   | Cooper et al. (2015)*; Jobin et al. (2019); Orbik and Zozulakova (2019); Royakkers et al. (2018); The Internet Commission (2019)*   | X         | X         | X         |
| Norms/Values   | Wellbeing & Empowerment, Trust, Well-being, Autonomy, Respect, Norms & Values, Value, Health, Norms, Human Dignity, Data Ethics, Ethical Norms, Replacing Human Values & Public Values  | BVDW (2020)*; Franzke et al. (2020)*; Jobin et al. (2019); Jones and Mitchell (2016); Lobschat et al. (2019); Orbik and Zozulakova (2019); PWC (2020)*; Royakkers et al. (2018); The Internet Commission (2019)*; Whiting and Pritchard (2017); Yeung (2018)  |           | X         | X         |
| Accountability | Stewardship, Accountability, Responsibility & Accountability, Governance, Data Ownership  | Cooper et al. (2015)*; Hamilton and Benjamin (2019); Jobin et al. (2019); Mihale-Wilson et al. (2021); Orbik and Zozulakova (2019); Thorun (2018); Yeung (2018)   |           | X         | X         |

X: level is addressed

\*denotes a White Paper (the rest are academic papers)

companies *accommodate articulated societal needs* in their development of new or *refined system functionalities*, devised to meet DR requirements. Here, the requirement is to balance the unregulated development of such digital functionalities with DR needs (Advenica 2020). Concepts that relate to this principle include *ethical design* (BVDW 2020; Yeung 2018) or *functionality contributions to wellbeing* (The Internet Commission 2019).

4. **Data Privacy Principle** On the personal level, the principle of data privacy addresses the responsibility of and requirement for individuals to define public and

*private digital spaces* in their digital participation and separate them (Whiting and Pritchard 2017). Users should carefully evaluate if a specific type of information should be considered private or public (Whiting and Pritchard 2017). Moreover, the digital age requires individuals to share certain data with the public for the good of a larger group of people, such as medical data to fight future diseases (BVDW 2019). On the corporate level, companies need to provide users with the option of *informational self-determination*. Individuals should be empowered to establish and manage a self-souvereign identity (Feulner et al. 2022). On the

societal level, political institutions develop the appropriate legal context to preserve data privacy. Further related concepts that pertain to this DR principle include *surveillance* (Capurro 2009), *non-maleficence* (Jobin et al. 2019), *safety* or *security* (Thorun 2018; The Internet Commission 2019).

5. *Transparency Principle* On the individual DR level, users should be aware of the value of their data for society and share them (in anonymized form) with the appropriate institutions for the good of society, for scientific and technical progress as well as for public safety (BVDW 2019). On the corporate level, transparency is appreciated by users and helps to build trust in digital services, especially in services that utilize artificial intelligence (AI). To allow users to *understand* decisions made or the entire *decision-making process*, AI systems should be designed such that their output appears *self-explaining* as well as *plausible*, and can be easily understood (Feulner et al. 2022). While this may run counter to profit-maximization objectives, there seems to be a global consensus about the requirement of transparency in responsible digital systems (Jobin et al. 2019). Transparency might further oppose data privacy needs (PWC 2020; Advenica 2020). On the governmental level, the *publication of data* used for political decision-making can be retraced by committed digital citizens (Janssen et al. 2012). This might cause an increase in support for political leaders. Further underlying concepts that have been attributed to transparency include education and awareness (Thorun 2018).
6. *Fairness Principle* On the personal level, individuals need to *respect intellectual property* of others (Capurro 2009), honoring what The Internet Commission (2019) refers to as *honesty*. This principle requires respectful and *fair treatment of other individual participants* in the digital world, as a necessary basis for a strong digital society. Fairness at a corporate DR level includes, e.g., the *pricing* of services. Further, prices should be designed in such a way that certain groups in a society are not systematically excluded from participation (Cullen 2001). Furthermore, the services offered should themselves deliver fair results. Here, the data basis and the functionality of the algorithms used should be visible and comprehensible for the user (Jobin et al. 2019; PWC 2020). Especially regarding AI, there is ongoing public discussion about avoiding *biases* and discrimination in AI (Ferrer et al. 2021; Orbik and Zozulakova 2019). On the governmental level, fairness requires that people from all countries or social classes can equally participate in a digital society and are able to make themselves heard (Selwyn and Facer 2007). Further concepts that relate to this principle include customer *empowerment*, fair *value exchange* (Cooper et al. 2015) or *justice* (Jobin et al. 2019),
7. *Norms & Values Principle* On the corporate level, the norms & values principle requires that companies consider various *human norms and values* as an additional guidance on product development (cf. Spiekermann 2023). For example, *trust* of consumers constitutes a relevant value for individuals and thus a value-adding property (Thorun 2018; Orbik and Zuzulakova 2019) for companies. Another example is user *autonomy* and *well-being*. Honoring this principle will further ensure compliance with related *ethical standards* (Lobschat et al. 2019; Spiekermann et al. 2022). Such a process includes human value-oriented impact assessments before a digital service is created, as well as the continuous refinement of that technology (Whittle et al. 2019; Lobschat et al. 2019). On the governmental level, the consideration of *digital norms and values* allows the formation of a digital society beyond the borders of individual countries (Whiting and Pritchard 2017). To this end, a global consensus must be reached as to what such normative standards should look like (Jobin et al. 2019). These standards will then offer pioneers in the digital society (e.g., companies) an orientation to designing their own guidelines and actions even before the implementation of specific national laws (PWC 2020). The principle relates to further human value-related concepts such as *autonomy* (Jobin et al. 2019) or *respect* (Jones and Mitchell 2016).
8. *Accountability Principle* Finally, the accountability principle addresses the question of *who* looks after the implementation of DR. This need to *govern* responsibility for the careful planning and testing of digital products increases with people integrating digital services more and more into everyday life and becoming more dependent on them (Hamilton and Benjamin 2019). On the corporate level, firms should define roles, norms and governance processes and live up to digital responsibility beyond what is legally required (Yeung 2018; Jobin et al. 2019). On the governmental level, the creation of a legal framework makes it possible to assess liability in the event of failure of critical digital services (BVDW 2019). Furthermore, national and international organizations should be held responsible for ensuring that less privileged countries get the same chance to participate in a global digital world (Cullen 2001). Underlying concepts used in the literature involve *stewardship* (Cooper et al. 2015), *governance* (Thorun 2018) or *data ownership* (Orbik and Zozulakova 2019).



When analyzing the discussion of DR principles in the literature, we also noted that authors often address responsibility implicitly on three different levels. They explore the requirements, accountabilities, necessary tasks or risks for individuals, for companies, or for the society and policy making at large. Table 1 presents an overview and shows that even though some principles are not yet discussed from the perspective of individuals, most principles are already discussed at the three interdependent levels of Personal (PDR), Corporate (CDR) and Societal Digital Responsibility (SDR).

PDR, as the first level, describes relevant requirements and commitments for *individual* participants in digital life. For example, a digital society requires individuals to participate and debate online (Janssen et al. 2012), share knowledge (BVDW 2019), decide about contributing data or preserving privacy, or treat others with respect. PDR is essential for the digitalization of democratic processes such as open government (Janssen et al. 2012), providing user-generated market contributions such as data or reviews, or participation in digital markets.

CDR can be defined “as the set of shared values and norms guiding an organization’s operations with respect to [...] main processes related to digital technology and data.” (Lobschat et al. 2019). A firm’s compliance with CDR aims at more sustainable operations and a global competitive advantage, as customers have been found to appreciate and value (perceived) CDR compliance (Orbik and Zozulakova 2019). Most importantly, CDR encourages organizations to develop new and sustainable processes to grant users a fair, transparent, and inclusive chance to participate digitally. While the implementation of transformation processes towards CDR compliance poses several hurdles for companies, successful implementation comes along with business advantages as well. It increases the trust of customers in companies that are perceived to acknowledge responsibility principles – especially when handling personal data (Thorun 2018). This trust leads to increasing loyalty, which in turn is in the economic interest of the operating company. Finally, SDR denotes the political contribution of state and supra-state institutions to a sustainable digitalization beyond the compliance with existing regulations.

After outlining the eight main principles of DR and how DR comprises further interdependent levels beyond CDR, we now aim to link the general discussion of principles closer to the academic research fields in order to assess in more detail in which way DR principles are already considered by IS researchers and what relevant gaps can be noted.

### 3 DR Principles in Current IS Research

In the IS research field, there is an emerging academic discourse that discusses general *theoretical frameworks* and respective methodological standards for required contributions of companies to achieve sustainable corporate digital transformation (Lobschat et al. 2019; BVDW 2020; Mueller 2022). To complement these abstract conceptualizations, we now investigate to what extent the normative DR principles have explicitly or at least implicitly been addressed in a broad range of existing IS research themes. This overview points out principles that are broadly adopted as well as relevant gaps and thus outlines existing and potential academic advances towards more responsible digitalization.

It has to be noted that the IS field is very dynamic and evolves constantly. Various studies argue that it does not have a universally accepted canon of stable and coherently connected research subjects (Banville and Landry 1989; Bryant 2008; Khan and Trier 2019). Determining the subjects to which we apply the normative DR perspective is thus no objective or systematic categorization of existing IS themes, and topics may even partially overlap (e.g., responsible media practices and future work contexts). We derived our themes from different sources such as categorizations based on topic modeling (e.g., Goyal et al. 2018; Aghakhani and Asllani 2020) or the themes of long-standing tracks at the main conferences of the Association of Information Systems (AIS). To ensure sufficient competence in the analysis, we further involved co-authors with a long-standing engagement in different IS fields. While we aimed for broad coverage, the list may not be complete as further themes might exist or emerge. As a result, we consolidated seven broad IS research themes which we now analyze for *existing* contributions towards responsible digital transformation, as well as for apparent gaps in fields where no DR principle was comprehensively addressed yet.

1. *Digital Competence Acquisition & Learning* The acquisition of digital competences and digital learning processes by employees and the broader population is an important prerequisite for active participation, for digital citizenship and for mitigating unbalancing ‘digital divide’ effects (addressing the *participation principle*). This requires a comprehensive understanding of user or consumer requirements (Jones and Mitchell 2016). The lack of digital technology skills correlates with negative attitudes towards IT (Cullen 2001) and exclusion (Selwyn and Facer 2007). Research on digital responsibility in the context of competence acquisition is linked to research subjects

such as computer-supported cooperative work, knowledge management and e-learning.

2. *Responsible Media Practices* A responsible, fair and considerate use of digital media (without bullying, infringement of copyrights or data protection rules) by private and professional users is relevant for a constructive media discourse. In this context, digital citizenship is a community-oriented behavior, in which users show empathy for each other and experience meaningful interaction via digital technologies (Jones and Mitchell 2016). Media practices span multiple levels as organizations rely on their employees who engage in digital interaction with customers. Related research into the resulting implications for humans has a long tradition of addressing DR-related principles. Most salient are articles that discuss the DR principle of perceived *privacy* as a threatened value (*value and norms principle*) or even an illusion in social networking contexts (Zheleva and Getoor 2009). Scholars have revealed that personal information disclosed by job candidates on social media sites is sought and used by prospective employers to discriminate applicants (Acquisti and Fong 2020), demonstrating the importance of *fairness* in responsible human resource management. The principle of *fairness* has further been linked to the so-called Fairness Doctrine that the US government is considering in order to mitigate hate speech and disinformation (Napoli 2021) in order to establish a better environment for individuals. Related to that are studies of polarization processes in social media networks (e.g., Hillmann and Trier 2012). Not focusing on social media in particular but on the perceptions of individuals in organizational settings (and thus related to the digital work theme further below), Richter et al. (2020) implicitly relate to the *participation principle* as the necessity for defining software functionality that considers human values. The authors observe a prototype's positive impact on the employees' social connectedness by allowing for social appraisal and by improving their sense of sharing and involvement through media. The notion of *technostress* as an ethical concern is a frequent subject of research on social media and addresses to the *norms and values* principle. For instance, Salo et al. (2022) explored how social media's constant notifications and connection in social media (on smartphones) result in intensified use as a precursor of technostress. These examples of prior studies demonstrate that research on communication practices, e.g., in social media contexts, links to various DR principles and provides theoretical explanations of a series of individual and social implications that help us understand user behaviors.
3. *Designing responsible Future Work Contexts* Closely related to studies on media practices and competence acquisition, existing research on organizational digital work contexts addresses the DR principles of *participation* and *fairness*. Organizational environments ("future work") create new social and psychological demands for employees and lead to changing conditions. For example, electronic monitoring systems, robots, teleconferencing, and wearable computing devices will lead to significant worker dislocation (Cascio and Montealegre 2016). Here, system design (*functionality principle*) needs to consider broader values such as responsibility, inclusivity, and explainability of the systems (Mercer 2019), relating to the DR principles *accountability*, *participation* and *transparency*. High ethical standards concerning data and a desire to be transparent about decision inputs are required to ensure confidence among employees (Mercer 2019). A related topic is the influence of algorithmic management (Moehlmann et al. 2021). Technostress is not only a concern in studies of media practices (as discussed above), but also matters for digital work settings and has been a core research element in IS research in recent years (Maier et al. 2019). In this context, user values such as autonomy (DR principle *norms and values*) and the DR principle of *participation* may even create paradoxical situations where more autonomy on how to spend workdays leads to less autonomy and more technostress as people felt a need to demonstrate commitment and availability by means of higher responsiveness and reachability (Mazmanian et al. 2013; Richter 2020). A better understanding of digital detox mechanisms can also contribute to mitigate technostress in the context of future work. Well-being is an important DR-related value and a key element while designing the future of work. Research on digital responsibility in the context of future work contexts is linked to research subjects such as computer-supported cooperative work and knowledge management, social media use, decision making or information systems development.
4. *Informational Privacy and Security* Research on informational *privacy* and protection of private consumers addresses important concerns in the context of an increasing penetration of private life worlds with digital technologies (Advenica 2020; Whiting and Pritchard 2017). While we already alluded to privacy as a relevant topic of research on media practices, the eminent role of this DR principle in IS research is reflected in the emergence of a dedicated privacy research theme that directly adopts the *privacy* DR principle as its core construct. We already noted that privacy research is grounding in the view that

companies need to consider customer norms and values as a point of departure for their product development (Spiekermann 2023; *norms & values principle*). Connected to the topic of media practices, the concept of data markets, a business model where individuals can trade their personal data strategically, links privacy to self-determination and to the transparent awareness of the actual value of personal data and its potential ethical or social implications (Spiekermann et al. 2015). Such concepts also allude to a fair participation of sovereign end users (*participation principle*). At the same time, it is important to not overburden individuals with informational self-determination. Here, privacy needs are in a trade-off with the value that can be derived from voluntary and conscious disclosure. A fair balance has to be attained between individual freedom, market-based rules (such as subsidies or taxes) and legal regulations. In this context, governmental regulation frameworks such as the General Data Protection Regulation (GDPR) illustrate the application of the *functionality principle* to specify how privacy-observing software and data handling need to be established to preserve user needs. A somewhat related discourse that we subsume under the theme of Informational Privacy and Security is research on Open Data Use. Here, the access to an increasing volume of data necessitates a discussion of responsible and fair use of such data (fairness principle) and the open provision of data or digital commons (Janssen et al. 2012; Ahlgren et al. 2016). Open data provision further makes it possible to counter digital divide effects (participation principle). Examples of other research areas that are linked to this topic are data privacy and service management.

5. *Responsible use of algorithms and AI methods* In recent years we have witnessed major breakthroughs in the development and application of machine learning and artificial intelligence (AI) technologies. As these technologies continue to advance, more high-stake decisions in sensitive domains like healthcare, finance, or law will be supported, or even created autonomously, e.g., as an extension for human cognitive systems (Hamilton and Benjamin 2019). This may result in unmanaged risks and unintended negative consequences (Nagboel et al. 2021; BVDW 2019). At the same time, the underlying algorithms are becoming increasingly complex. Modern deep neural networks consist of hundreds of millions of parameters that interact in non-linear ways. Hence, it is virtually impossible for users, and even data scientists, to comprehend these models and explain their outputs. Already more than two decades ago, IS researchers recognized the need for explaining the logic and

outputs of intelligent black-box systems to users (*transparency principle*) in order to increase their acceptance and effective use (Gregor and Benbasat 1999). In 2018, the European Commission even include a “right to explanation” in the GDPR (alluding to the *functionality principle*). Similar regulations with smaller scope exist in the United States (e.g., Equal Credit Opportunity Act). These developments sparked increased interest in research on explainable AI (XAI) in both computer science (e.g., Riberio et al. 2016; Lundberg and Lee 2017) and IS (e.g., Martens and Provost 2014; Kucklick and Mueller 2023). Correspondingly, there is a need for legislation to hold providers responsible for possible risks or violations (Yeung 2018), including malicious use (Jobin et al. 2019). The current lack of rules calls for the establishment of standard criteria for the development of methods that are traceable and explainable, to increase trust (as a DR value) and *transparency* (BVDW 2019; Jobin et al. 2019).

Intertwined with the black box issue is the observation that some machine learning models have been found to be unfairly biased against certain subpopulations (*fairness principle*), for example, particular genders or races (Barocas et al. 2022). Often, the models have learned these biases from tainted training data, which in turn were generated by humans. However, there are also more subtle sources of biases, sometimes caused by acting too economically during the model development process, such as, sample size disparities, skewed sampling procedures, or bad data quality (Barocas and Selbst 2016). Although cases of discrimination through algorithms often cause big headlines (e.g., Crawford 2016), the DR principle of fairness is relatively new on the agenda of IS researchers and CIOs (e.g., Teodorescu et al. 2021; von Zahn et al. 2021). A final example of the relevance of DR principles in the context of algorithms and AI is concerned with the environmental costs of large-scale machine learning-based systems (*sustainability principle*). For example, it has been estimated that training GPT-3, a large language model from OpenAI and predecessor of ChatGPT, produced 552 tons of CO<sub>2</sub> emissions (Patterson et al. 2022), the equivalent of more than 500 economy class flights from Frankfurt to New York City. However, the latest generation of so-called foundation models have robust generalization capabilities and, hence, do not need to be retrained for every new task. Likewise, using these models for inference or prediction consumes just a fraction of the emissions compared to training. Nonetheless, data centers consume about three percent of the global electricity supply. Hence, we need innovations in algorithms and hardware (Green IT),

but also business processes and working routines (Green IS), in order to be able to leverage intelligent algorithms and systems in more sustainable ways.

6. *Digital Service* Service refers to “the application of specialized competences (operant resources – knowledge and skills), through deeds, processes, and performances for the benefit of another entity or the entity itself” (Vargo and Lusch 2008 p. 26). IT has enabled new categories of service, including *digital service* that substantially builds on digital technologies as resources, as enablers of service processes, or as parts of value propositions – and *smart service* that is based on using physical devices that are digitally networked and used as boundary-objects in smart service systems (Beverungen et al. 2017, 2019). Little has service science so far considered the increasingly important role of digital responsibility on this way, culminating in two illustrative observations. First, current service systems engineering methods still overemphasize the importance of economic profitability, while downplaying the role of ecological or social responsibility of service; for instance, the current industry standard DIN SPEC 33453 neither prescribes the consideration of work contexts imposed on service personnel (*accountability principle*), nor does it quantify or recognize the ecological footprint associated with new value propositions (*sustainability principle*) in a service engineering project. Second, the service literature evolved from regarding service providers and service customers as roles involved in value co-creation to considering actor-to-actor networks as a locus of service innovation (Lusch and Nambisan 2015). Still, the co-creation of value overemphasizes the economic roles of institutions as resource integrators rather than the social roles played by humans (*norms & value principle*, *functionality principle*). Considering DR principles more broadly motivates engineering service systems that are more inclusive, acknowledging groups of people beyond the goal of maximizing customer lifetime value for service providers. Putting human needs – not economic value – center-stage might also mean to identify and resolve restrictions (Becker et al. 2023) which inhibit value co-creation for disadvantaged people in particular. Levelling restrictions or regulating functionality requirements might help to reach new customers in addition to developing entirely new value propositions (*functionality*, *participation and accountability principle*). First discussions on how to integrate DR principles such as privacy or fairness into a service context have recently been emerging, with a focus on the role of data acquisition and data analytics in a service system (Wirtz et al. 2023). While firms still apply a “digital responsibility calculus” that levels

costs and benefits of implementing DR principles, there are first calls to shift the attention from “an extreme profit orientation” to a more prominent role of DR (Wirtz et al. 2023, pp. 182 and 186).

7. *Business Models for Networked Customers* The business model concept has reached global recognition during the last two decades. Business models are now clearly associated with securing and expanding competitive advantage in business practice and have become a mature, yet interdisciplinary field of research (as documented in recent review articles, e.g., Veit et al. 2014; Wirtz et al. 2016; Massa et al. 2017). The DR principle *sustainability* mandates that organizations integrate social and environmental issues in their digitalization strategies. There is an increasingly important line of enquiry in the literature that focuses on the concept of sustainable business models as well as on methods, languages, and tools to develop sustainable business models (e.g., Jablonski et al. 2020; Schoormann et al. 2021; Wit and Pylak 2020). They in turn would support the diffusion of sustainable offerings, namely offerings that include social and environmental value creation (e.g., Schaltegger et al. 2016). Sustainable business models differ from more economic- or profit-focused business models in at least three ways (Luedeke-Freund et al. 2016). (1) They conceive business as an engine of societal progress (e.g., via their offerings, alluding to the *functionality principle*) (2) they include a broader notion of value (*norms & values principle*), and (3) they adopt a multi-stakeholder, system-level perspective on value creation (*participation principle*). Thus, sustainable business models and their systematic development challenge the traditional understanding to merely consider the notions of value, of value creation as well as of the main stakeholders. Interestingly, for the most part, digital transformation and sustainable transformation have been separately studied with respect to business models (i.e., either with a focus on *digital* business models or on *sustainable* business models) instead of explicitly taking an integrated view (recently also referred to as “twin transformation”). Notable exceptions include, for example, Riso and Morrone 2023; Estrada and Reyes Alvarez 2023; El Hilali et al. 2020.

#### 4 Research Framework for Responsible Digitalization

While the discussed list of IS research fields is not necessarily exhaustive (for the reasons noted above) and further DR-related academic contexts may be conceived, we have illustrated how a broad range of IS research themes already



**Fig. 1** DR Cube — A framework of DR principles, research themes and levels of stakeholders



have addressed various DR principles. In particular research on informational privacy has a long-standing tradition that grounds in the values and norms principle, directly concentrates on the privacy principle and relates to regulated functionality or increased participation. Other principles such as transparency has recently gained impressive momentum in the context of research on explainable algorithms and AI. We also note that certain principles bridge multiple research themes. For example, the principle of responsible participation offers a link for research on media practices, competence acquisition, digital work and services. This demonstrates the need for a broader conceptual understanding of the participation principle as a fundamental part of media-based involvement of users in novel services. We also noted that the theme of digital service has untapped potential for a more comprehensive analysis of the influence of DR, as the various research calls suggests. In sum, we can state that the IS field contributes in important ways to our understanding of responsible digital transformation. Our analysis of research themes suggests that the concept of DR helps to bring together important current research efforts under one umbrella while pointing out several useful interrelations across themes.

With the principles, themes and levels we have now attained an overview of all required aspects that should guide information systems towards a more systematic consideration of and contribution to digital responsibility. In order to address the responsibility-related implications of digital transformation, academics can reflect on their adopted research strategy and identify relevant existing or novel contributions to attain the objective of a responsible digital transformation process. Research themes provide a useful starting point, as, for example, the analysis of the

digital service theme demonstrates. Related research efforts that address DR principles on different layers are pointed out above, effectively creating a three-dimensional matrix that we refer to as the *DR cube* (Fig. 1). It draws together the eight DR principles, seven themes and three levels (representing three types of stakeholders or accountable entities). This indicates that the DR principles are examined on different levels and with regards to different research themes.

The DR cube can serve as a starting point for a more systematic and coherent discussion of certain principles and their application to research themes, e.g., by linking themes in which similar principles are discussed and uncovering their interdependencies or differences. The level dimension emphasizes that the discourse needs to advance beyond the prevalent company focus of CDR to include further levels and stakeholders. In particular, as far as regulating accountability and governance is concerned, the interplay of individuals (e.g., as users, employees or customers), corporations and governments (or societies) needs to be addressed. Here, the perspective of digital markets may offer an interesting nexus that can link participating individuals with organizations that may be regulated by public institutions to protect individual and societal interests. The interplay of the three levels is further supported by the observation that digital transformation requires a perspective between business, society, and technology (Van Veldhoven et al. 2022) and that digital transformation methodologies need to link issues occurring at the individual, corporate, and the societal level (Alt 2019). Similarly, this call also points to the importance of considering an ecosystems view (Stahl 2022) to study DR. This spans across the levels and emphasizes their connections, thus allowing for a better framing of important

questions regarding responsible political participation, economic justice or appropriate human autonomy (Stahl 2022).

In conclusion, the discourse on DR amplifies a series of DR principles that shed light on comprehensive challenges on the *personal, corporate and societal* level that arise from the digital transformation process and are addressed in several existing IS research themes. While other norm systems or topic categorizations are conceivable and our analysis thus can only present a tentative synthesis, gathering the eight proposed DR principles and analyzing seven IS research themes illustrates that IS research already contributes to a more responsible digital transformation process from various perspectives. The fact that DR principles often bridge IS themes suggests that DR can facilitate the integration of various smaller discourses, also enabling a higher internal coherence of IS research (Khan and Trier 2019). Explicating the DR principles and integrating them into one framework in a transparent way may help future research to study the related implications of digitalization more systematically, link principles across themes, explore currently unaddressed DR principles as potential gaps and identify important answers, thus – through IS research contributions and engagement in practice – paving the way towards a more reflected and responsible second stage of digital transformation.

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