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Theorising the Digital Artefact in Dark Sides Research

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Abstract. Rapid advancements in the sophistication and diffusion of advanced digital technologies such as AI warrant repose to consider their unintended consequences or 'dark sides'. While more attention has been directed towards the ethical implications of disruptive technologies, discussions on the underlying materiality of the digital artefacts are often missing. In this article, we call for IS researchers to better conceptualise how technical objects contribute towards the emergence of negative outcomes for users, either intentionally or unintentionally. Examples are provided of conceptual and empirical papers that have sought to open the 'black box' of technology to elucidate this issue. We propose sociomateriality as a theoretical lens to guide studies in this area and present a future research agenda that encourages novel methodological approaches such as design science to uncover the dark side of emerging digital artefacts.

Keywords: digital technologies, unintended consequences, sociomateriality, IT artefact, responsibility, design science, research agenda.

1 Introduction

Digital technologies are often developed and marketed under the premise that their use is positive for organisations and society - leading to productivity gains, enhanced social connections, and value creation (McCarthy et al., 2023). While IS literature has also largely focused on the ‘bright sides’ or benefits of IT use, senior scholars have more recently observed a gradual shift from positivity to negativity about technology (Myers, 2021; Negwneyama et al., 2023) as epitomised by the emerging stream of research on ‘dark sides of IT’ (Tarafdar et al., 2013; Turel et al., 2019).

The large-scale diffusion of IT across both our workplaces and private spaces has raised concerns about new risks and negative consequences for both individuals and collectives (Salo et al., 2022). For instance, smartphones’ internet connectivity and diverse suite of applications can create multiple pathways to problematic and compulsive IT usage behaviours (Busch and McCarthy, 2021; Serenko and Turel, 2020, 2021). This can culminate in adverse outcomes such as emotional health issues (e.g., anxiety, depression, loneliness), physical ailments (e.g., technostress, hypertension, poor sleep quality), data injustices (e.g., privacy infringements from surveillance capitalism), and performance impacts (e.g., neglecting social interactions, and obligations in the workplace) (McCarthy et al., 2023; Pirkkalainen et al., 2019; Shi et al., 2023; Wang and Lee, 2020; Zuboff, 2019). These impacts become all the more concerning when one considers the emergence of ‘technology addiction’ where users develop a psychological dependence on maladaptive usage behaviours which transcend volitional control (Turel et al., 2011; Serenko and Turel, 2020; 2021).

While the ‘dark sides’ of technology continue to garner attention from Information Systems (IS) scholars, we believe there is an urgent need for increased focus towards the digital artefact’s role in problematic usage behaviours. Notwithstanding the many notable contributions from IS researchers, our understanding of the role of digital artefacts in dark side phenomena remains nascent, with many issues yet to be addressed. The digital artefact is a core part of the information systems discipline (Chatterjee et al., 2020). However, conceptualisations of materiality in existing studies on dark-side phenomena are often unclear. Encouraging further theorisation of materiality can stimulate new research and help individuals, organisations, and society prevent and respond to undesirable technology behaviour.

The purpose of our special issue in the Scandinavian Journal of Information Systems “*The Dark Side of IS: The Role of the IT Artefact*” was to provide a forum for IS researchers to advance our understanding of how digital artefacts contribute towards adverse aspects of technology use. Each of the accepted papers points toward different concerns surrounding the materiality of artefacts including digital colonialism (Kroeze, 2025), the role of obligations in technostress (Stana and Nicolajsen, 2025), and the evolution of untrustworthy IT artefacts in digital ecosystems (Thompson, Samson, and Kurnia, 2025). In this editorial, we provide further reflection on the theme of our special issue and discuss potential ‘directions of travel’ that researchers can follow to develop new contributions in this area.

The remainder of the editorial is structured as follows. In Section 2, we provide an overview of how digital artefacts are conceptualised in IS research, drawing on sociomateriality as a lens. We then offer different perspectives on how digital artefacts contribute towards the dark side by building on a summary of the articles included in our special issue. Section 4 then presents a novel research agenda for future studies in this area going forward while Section 5 brings the paper to a close.

2 Conceptualising the Digital Artefact

The digital artefact (also referred to as the IT artefact) has been debated as the conceptual core of the IS field, differentiating it from reference disciplines such as social science and management (Sarker et al., 2019). Despite this, ambiguities as to what a digital artefact is (or isn't) have plagued this debate, with some asserting that it is a technical solution while others arguing for the perspective of social artefacts or information artefacts (Chatterjee et al., 2021). Based on a review of IS literature and General Systems Theory, Chatterjee et al. (2021) take a reconciliatory approach to identify four meta-principles of the digital artefact:

1. Composed of inter-related and permeable subsystems combined in a holistic and synergistic manner
2. Comprising of a purposive system that seeks multiple goals through multiple paths (multifinality and equifinality)
3. An open system that receives inputs from the environment and produces outputs for that environment
4. Composed of mutually adaptable subsystems for promoting dynamic equilibrium and managing entropy.

They assert that General Systems Theory can offer a holistic framework to understand digital artefacts by conceptualising system boundaries, hierarchies, and the multiple purposes that it supports e.g., instrumental and humanistic goals (Chatterjee et al., 2021). This can include ecosystems of legitimate organisations and cyber criminals (Kraemer-Mbula et al., 2013), as well as intended (e.g., productivity gains from GenAI) and unintended consequences (e.g., skills erosion through cognitive automation) (Rinta-Kahila et al., 2024).

Another lens that can help IS scholars better conceptualise the digital artefact in dark sides research is sociomateriality which directs attention towards interdependencies between the social (human actors that interact with each other and pursue objectives) and the material (non-human objects that materialise through practice) (Faulkner & Runde, 2013; Leonardi, 2013; Orlikowski, 2007; Suchman, 2007). Sociomateriality research can broadly be categorised according to two perspectives. Firstly, the 'strong' view, as advocated by authors such as Orlikowski (2007, 2010) and Orlikowski and Scott (2008), sees the social and material as mutually constituted, and argues that one only exists in relationship with the other. This assertion is based on an agential realist foundation that the form, attributes, and capabilities of human and technological entities only emerge through the inter-penetration between

social and material, with their relations and boundaries enacted in practice within the immediate setting. In other words, phenomena only come into existence through socio-material intra-action in practice, and therefore social and material entities only have inherent properties with, rather than independent of each other (Jones, 2014; Orlikowski, 2007). The entailments that arise from the social and material are “*contingent, dynamic, multiple, and indeterminate*”, as are the practices they produce (Orlikowski, 2007, pg. 1445). Furthermore, the relations and boundaries between the social and material are being continuously enacted rather than given, an idea otherwise referred to as performativity (Jones, 2014).

In contrast, the critical realist perspective of sociomateriality allows the researcher to consider both the social and material as analytically distinct yet interrelated in practice. The ‘weak’ perspective of sociomateriality still recognises the notions of materiality, inseparability, performativity, relationality, and practices, however, a different interpretation is presented (Jones, 2014). In this way, it qualifies the notions put forward by authors adopting a strong perspective, such as Orlikowski (2007), rather than contradicting them. The main points of departure however are that the weak perspective would reject that the social and material are inextricably linked and that the properties of objects are only acquired through their enactment (Leonardi, 2010; Faulkner and Runde, 2013). The weak perspective also takes a different view of the stability of socio-material entanglements and argues that they tend to become institutionalised in certain circumstances. This allows entanglements to radically change in practice but assumes that entities can also move towards persistence. Finally, the weak perspective disagrees with strong sociomateriality’s primary focus on the situated instances of action and asserts that social structure persists beyond the present. This allows a socio-material practice to be studied as “*macro-level stability and micro-level variation*” (Jones, 2014; pg. 919). Weak sociomateriality considers how materiality persists beyond the immediate time and place, and pre-exists any relation between the social and material. Therefore, the researcher could study pre-existing conditions of materiality which can affect the particularly situated enactment of materiality within a practice (Jones, 2014).

One approach is not necessarily superior to the other as both have distinct strengths and limitations depending on the context in which they are used (Leonardi, 2013). By leveraging both perspectives, researchers can generate new insights into the “black box” of emerging technologies, including their design features (weak sociomateriality) and use cases in practice (strong sociomateriality). For instance, untangling the materiality of digital artefacts can help us understand developers’ intentions (both benevolent and malevolent) as well as scenarios where digital artefacts are repurposed by users to create unintended consequences (e.g., AI systems for cybercrime). This can also extend to the use of data. For instance, biased datasets may lead to discrimination and the marginalisation of certain user groups, either intentionally or unintentionally.

We next point towards additional dark sides of digital artefacts building on a review of empirical and conceptual studies in this area.

3 The Dark Side of Digital Artefacts

The term “*dark side*” must be problematised since it can imply that negative consequences are peripheral or unintended outcomes of digital artefacts primarily designed for positive purposes (Masiero, 2023a). In response to this assumption, Masiero (2023a) argues for the concept of “*dark matter*,” which suggests that negative consequences of technology usage can stem from intentional embedding within the design of digital artefacts themselves. As a result, the author calls for a reevaluation of how we understand and address the impacts of digital artefacts, advocating for a more critical examination of inherent injustices in technological design. Aligned with this perspective, the papers included in our special issue offer additional fresh perspectives on the role of materiality in dark side phenomena.

In the first paper, “*Digital Coloniality: An Ubuntu Perspective*”, Jan Kroeze (2025) discusses the concept of digital coloniality as the unintended yet harmful consequences of using global software in Indigenous communities without adaptations for local cultures. The conceptual paper provides examples of this phenomenon as one of the dark sides of information systems (IS) regarding design, implementation and usage. Using an Ubuntu lens, Kroeze (2025) demonstrates the adverse effects of certain digital artefacts in sub-Saharan African contexts. Suggestions are further made for adjusting software applications to better align them with Ubuntu values. The paper not only challenges stereotypical assumptions about the global adoption of software but also makes a case for African voices to be heard in the IS discourse around the negative impact of digital artefacts. Kroeze (2025) explores various theoretical frameworks that may guide research into the decolonisation of IT and IS. Furthermore, the paper contributes to IS ethics by proposing an “Ubuntu IS Ethics Ripple” as opposed to a “Western Ethics Ripple,” highlighting the distinction between the core focus of Western and sub-Saharan ethics. Kroeze (2025) argues that Ubuntu ethics can enhance global ethical standards by emphasising the significance of immediate communities and underscoring the importance of local communities’ involvement in the creation and implementation of digital artefacts.

In the second paper, “*From Duty to Distress: A Sociological Exploration of Technostress in Organizations through the Lens of Obligations*”, Raluca A. Stana and Hanne Westh Nicolajsen theorise digital artefacts as both sources of technostress and obligations that employees face in the modern digital workplaces. While traditional technostress research has largely focused on the technological environment and, to a lesser extent, the social context, their study explores obligations related to technology use in organizational settings. Using a sociological lens, the study qualitatively explores how workplace obligations such as maintaining productivity, managing complex ICT systems, and adapting to new tools relate to the commonly cited technostress dimensions (e.g., invasion and overload). The research contributes to the special issue’s focus by highlighting how these often overlooked obligations significantly affect employees’ well-being and productivity. By identifying obligation-driven habits and the dual role of ICTs as both productivity enablers and sources of stress, the study draws attention to the need for organizations to take

an active role in addressing technostress. When left unaddressed, employees feel obligated to handle technostress on their own. However, it is important that organizations and leaders also take responsibility for dealing with technostress effectively (Ertiö et al., 2024).

In the third paper, “*Neither Fair nor Legal: How and Why Untrustworthy Digital Ecosystems Evolve*”, Catherine Thompson, Daniel Samson, and Sherah Kurnia (2025) explore how and why technology artefacts, and the ecosystems of which they are part, may evolve to cause harm to users either accidentally or by design. The paper conceptualises untrustworthiness as an ecosystem-level dark side phenomenon that emerges from the artefact’s interaction with its context and the values it is imprinted with. These encoded values are both expressed and observable in the artefact’s operation. Studying them grants access to the ecosystem in which the artefact was conceived, including its underpinning belief structures. Value-laden technologies cannot be morally neutral, and the authors argue for formal moral evaluation that allows for the actions of an untrustworthy technology in the real world to be held to account. Untrustworthy technologies are capable of systemic and societal-level harms and are particularly dangerous in low-optionality, high-consequence settings such as social welfare programmes. The study illustrates one such case, developing a critical realist account of the forces that birthed and sustained the Australian social welfare scandal known as Robodebt. Thompson et al. (2025) contribute the concept of untrustworthy technology to the dark side canon, suggesting models and techniques to guide inquiry, and providing causal reasoning techniques to the developing fields of algorithmic and data justice.

4 Research Agenda

We next present recommendations for future research directions to tease out the relevance of materiality in the “dark side” phenomena. The remainder of this section introduces eight themes that can guide future studies in this area (see Table 1).

Theme one calls on researchers to challenge the assumptions of existing dark side phenomena by following the sensibilities of phenomenon-driven problematization (Monteiro et al., 2022). Future works can seek to theorise materiality and the pathways/trajectories leading to problematic technology use by making “*the invisible visible*” in dark side phenomena (cf., Monteiro et al., 2022). This includes opening our theorisation efforts to new empirical settings such as the metaverse, augmented reality, and virtual reality, to reveal the unintended consequences of new disruptive technologies. However, while IT and its applications have changed much in the past 20 years, we suggest that future work should build upon and extend, not repeat, previous insights and show us what is new (cf., Kautz et al., 2007).

<i>Theme</i>	<i>Description</i>	<i>Research Questions</i>
1. Theorising ‘dark’ materiality	New theories, conceptual models, and ethical frameworks (e.g., social justice) are needed to provide a deeper understanding of materiality in dark side phenomena.	<i>How do digital artefacts contribute to the production or reproduction of dark-sided phenomena?</i>
2. Method innovations for studying problematic digital artefacts	Novel methods such as action research, journey mapping, and Ecological Momentary Assessment can provide new insights into problematic technology use and the longitudinal influence of digital artefacts.	<i>How do different research methods compare in capturing the dark side of digital artefacts and their impact on users?</i>
3. Opening the “black box” of IT	Further research is needed to understand the design features and IT-related characteristics that trigger/contribute to negative effects or help resolve the key issues associated with use.	<i>What design patterns of digital artefacts contribute to transparency or lack thereof?</i>
4. Design Science Research (DSR) for the dark side	We call for the development of design principles that prevent users, organisations, and society from engaging in problematic behaviours within voluntary and involuntary IT use contexts.	<i>What design principles mitigate problematic IT use?</i>
5. Foresight studies and utopian/dystopian visions	Research is needed on the dark side of emerging technologies such as AI (e.g., ChatGPT), the metaverse, digital twins, augmented reality, and deepfakes.	<i>How do emerging technologies such as the metaverse contribute to new forms of technostress?</i>
6. User re-appropriation of IT materiality and unintended consequences	We encourage further work on the unintended consequences of digital artefacts including deception and malicious use, new technostressors, technology-mediated addiction, cyberbullying, monitoring/surveillance and privacy issues.	<i>Why do users reappropriate the materiality of digital artefacts for deception and other malicious purposes?</i>
7. Policy agendas for enabling the ‘bright side’	Policy agendas are needed to guide efforts in enhancing data justice and control mechanisms to mitigate problematic technology use (e.g., digital locks, digital nudging and sludging).	<i>How can digital artefact design features be regulated to prevent problematic use?</i>
8. Context in dark side research	Context-specific (e.g., cultural, geographical, industry, educational settings) studies are needed to provide new understandings of the digital artefact in dark side phenomena.	<i>How do cultural and geographical contexts influence the dark side of digital artefacts?</i>

Table 1. Research Agenda

Theme two focuses on methodological innovation for studying ‘dark side’ topics such as problematic IT use and technology addiction. In addition to the more traditional focus on behavioural and conceptual research, we call for an increased focus on novel methods such as action research and Ecological

Momentary Assessment studies that provide an improved understanding of the evolving nature of negative effects from digital artefacts including the ways they influence and/or help resolve issues. To date, studies in this area have primarily been based on cross-sectional surveys, using self-reported data from student subjects (e.g., Busch & McCarthy, 2021). Going forward, we call for longitudinal studies and mixed methods research to overcome the limitations of self-reported usage at a point in time. Researchers can seek to leverage a variety of data collection techniques including artefact usage data captured by the operating system (Xu et al., 2022). Journey mapping and user touchpoints (McCarthy et al., 2024) can also provide fresh perspectives on how unintended consequences emerge and inform early interventions that mitigate risks before they become more difficult to control.

Theme three calls for the conceptualisation and critical examination of digital artefacts, of which certain parts are visible to the public and the remaining parts are hidden, metaphorically referred to as “black boxes of IT” (Gosiewska et al., 2021). When digital artefacts are tasked with making significant decisions or surveillance, their opaque nature challenges organisational and societal governance. However, several salient questions remain such as: how should digital artefacts be “opened”?, Can digital artefacts always be “opened”?, and what does it mean for a digital artefact to be black-boxed?

Theme four addresses the potential problematic design of digital artefacts, leading to users engaging in problematic behaviours within both voluntary and involuntary IT use contexts (Masiero, 2023a). In voluntary settings, users may adopt practices that over time evolve into negative behaviours due to the digital artefacts’ underlying design features. In settings where technology usage is mandatory, the design of the technology may lead to ethical dilemmas or compliance without understanding. Design principles guiding responsible development may reduce risks and promote well-being.

Theme five asserts the importance of critically appraising the utopian and dystopian futures that digital technologies create. This calls on IS researchers to act as an independent voice that balances the commercial interests and profit motive of IT companies with a need to protect the human dignity of users. This can centre on debating the technological imperative philosophy of many Big Tech companies such as Meta, Apple, Amazon, Google, and Microsoft, where IT advancements are seen as inevitable and essential. Critical research can question the ethical implications of these developments and debate their value (Myers and Klein, 2011).

Theme six calls for innovative Design Science Research (DSR) studies that aim to develop design principles that explain the role of digital artefacts in dark side phenomena. We also encourage researchers to acknowledge the connections between their work and the long tradition of related studies on design theorising in Scandinavia (Lytinen, 2024). This includes contributions about the changing nature of work, AI’s implications for workers etc. which builds on rich literature in information systems, participatory design, socio-technical systems, and sociology of work.

Theme seven asserts the importance of policy in regulating the consequences of digital artefacts to minimise harm to individuals, organisations, and society. As digital artefacts continue to permeate our daily

lives—from opaque algorithms that decide what appears on our social media feed to explicit controls embedded in digital services—there is a growing need for policy agendas prioritising data justice and ethical design features (Masiero, 2023a). This is essential to ensure that ethical considerations guide digital innovations (Stahl, 2011) as well as the networks that create them (McCarthy et al., 2025).

Lastly, theme eight calls for context-sensitive studies to understand the factors that shape actors' perceptions (appraisals and responses) of dark side phenomena and materiality within a specific setting (McCarthy et al., 2023). This extends to the need for Indigenous theories that reflect cultural understandings of IT and its role in such as the Global South (Masiero, 2023b).

5 Conclusion

Going forward, we believe the rise of ubiquitous and disruptive technologies such as Artificial Intelligence will bring new significance to the study of dark side phenomena in the IS field. While these systems will no doubt bring many benefits, their introduction can also create new risks as a Pandora's box of unintended consequences that we may yet be unaware of. Already the increased sophistication of AI video generation and voice simulation tools warrant a pause for reflection on new worrying threats they pose for cybercrime and disinformation that may threaten global politics and the social fabric of society as a whole. As we move beyond the experiment phase of AI adoption, utopian visions may quickly turn dystopian if we as researchers do not proactively study the material nature of these advanced technologies and their potential impacts.

We hope that this special issue inspires future generations of IS scholars to push the boundaries of dark-side research and open up the 'black box' of technology. The articles included in our special issue offer important contributions to both academics and practitioners focused on the ethical implications of digital technologies. The authors' discussion of issues such as inclusion and marginalisation through the embedding of cultural perspectives in the design of IT (Kroeze, 2025), holistic perspectives to combat technostress that consider technical and sociological aspects (Stana and Nicolajsen, 2025) and the evolution of untrustworthy technology artefacts, and digital ecosystems (Thompson et al., 2025), all warrant careful consideration.

Emanating from this, our research agenda encourages both theoretical and methodological pluralism to shine a new light on the contribution of digital artefacts to unintended consequences such as these. Lenses such as sociomateriality, General Systems Theory, and Indigenous approaches can add new insights to the discourse. In addition, the adoption of methodological approaches such as Design Science Research, Ecological Momentary Assessment, and journey mapping can bring new perspectives on areas such as technology addiction, online gambling, and AI surveillance to name but a few.

We hope that this special issue provokes new debates and research directions in the years to come, with the ultimate goal of enhancing the bright sides of IT to make the world a better place.

About the Special Issue Editors

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