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Digital futures: Definition (what), importance (why) and methods (how)

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Abstract

“Digital futures” as a research field that examines diverse, long-term future(s) scenarios influenced by digital technologies has been proposed in information systems. Here, based on the emerging literature on digital futures, we define what this term means, delineate it from related concepts such as digital transformation, articulate why the information systems field should take note and consider the study of digital futures, and provide an overview of approaches.

Keywords

Digital futures, future studies, future orientation, research direction, research approaches, digital transformation, information technology

Introduction

Digital technologies are shaping society’s possible future trajectories. The implications extend beyond all aspects of human activity to include societal, environmental, political, and business issues. However, our understanding and exploration of such possible ‘digital futures’, specifically in the information systems field, remains limited (Hovorka and Peter, 2021). The reasons for this apparent discrepancy are twofold. First, academically, they lie in the dominant epistemic view of IS research as ‘science’ (concerned with natural laws, focused on empirical evidence) (Hovorka and Peter, 2019; Nelson, 2016; Schlagwein, 2021a). Second, practically, the scale and nature of the impacts of digital technologies on society are much wider today (compared to what the field used to study) (Baiyere et al., 2023; Hovorka and Peter, 2019; Niederman, 2023).

Future studies, futures for short, is an interdisciplinary academic field concerned with studying possible futures. It has been proposed as a reference field for IS research for the study of digital futures (Niederman, 2023). Future studies go beyond the extrapolation of ‘predictive’ theory (as per Gregor’s (2006) taxonomy), which predicts the future (singular) essentially as an extension of the present. This view may limit flexibility in ‘predicting’ futures that are

intentionally created (future-making) (Whyte et al., 2022), unpredictable and unprecedented (Hovorka and Peter, 2021), and on longer time horizons (Gidley, 2017). Accordingly, an increasing number of IS researchers – as evident in multiple recent calls for papers and conference tracks (Hovorka et al., 2024; Yoo and Levina, 2025) – prefer a non-deterministic, pluralistic view, digital futures, to emphasize the many different futures and ways the narrative of the world could be written forward, designed, or imagined.

Interest in the broader implications of emerging technologies and critical debate has always been part of what we consider the ‘future orientation’ in the *Journal of Information Technology*. Two of four articles cited by a recent analysis as exemplar digital futures research in IS (Niederman, 2023) are published in our journal (Clarke, 2019; Willcocks, 2020).

As such, we feel it is time to explore the nature, significance, and study of digital futures through three fundamental questions: 1. What are digital futures, 2. Why

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should we study digital futures, and 3. How can we study digital futures? The responses to these questions allow us to make an editorial statement for the *Journal of Information Technology* as to our interest in digital futures research.

Definition – what are ‘digital futures?’

While in its early stages, a consensus is emerging about the meaning of ‘digital futures’. The term refers to exploring possible long-term futures centred on digital technologies, with equal consideration of technical, social, economic, and environmental aspects. Digital futures suggest the multiplicity of *futures* as a site of inquiry (Hovorka and Peter, 2021), with a qualifier to set the focus on *digital* phenomena (Baiyere et al., 2023).

The call to study the future academically dates back to H.G. Wells’s lecture *The Discovery of the Future*, delivered to the Royal Institution in 1902 (later published in *Nature* and as a book). Further, Wells famously complained in a BBC broadcast: ‘*It seems an odd thing to me that though we have thousands and thousands of professors and hundreds of thousands of students of history working upon the records of the past, there is not a single person anywhere who makes a whole-time job of estimating the future consequences of new inventions and new devices. There is not a single Professor of Foresight in the world. But why should there not be?*’ (Wells, 1932).

Ossip Flechtheim was the first professor of ‘futurology’, focusing on studying the future through interpretation and speculation in post-WWII Germany. In the 1950s, Gaston Berger founded the *Centre International de Prospective* in Paris, and Bertrand de Jouvenel later expanded on such ideas and founded the first futures journal. In the 1960s, the RAND Corporation, led by Herman Kahn, advanced scenario planning. The shift to the plural ‘futures studies’ in the 1970s was championed by thinkers like James Dator and Eleonora Masini. The foundation of the futures field is often dated to the 1973 establishment of the *World Futures Studies Federation* (for more detailed histories see Gidley, 2017; Son, 2015).

Today, futures studies is a transdisciplinary field exploring possible futures using diverse methodologies (discussed below). It integrates insights from philosophy, sociology, psychology, and economics, aiming to imagine and shape futures through informed action (Gidley, 2017). Prominent institutions such as *The Future of Humanity Institute*, Oxford, UK; *The Institute for the Future*, Palo Alto, USA; and the *Copenhagen Institute for Futures Studies*, as well as journals like *Futures*, *Journal of Futures Studies*, and *Technological Forecasting and Social Change* reflect the pluralism of futures approaches unified by a shared goal of proactive, long-term thinking.

Recently, Anthony Dunne and Fiona Raby’s book *Speculative Everything: Design, Fiction, and Social Dreaming* has been influential in the design field. The authors argue that design should move beyond solving problems and instead

create speculative scenarios that challenge the status quo. They propose using design fiction to explore alternative realities, addressing complex social, cultural, and ethical issues that might arise in the future. ‘Speculative design’ helps us imagine and discuss alternative futures (see further, Dunne and Raby, 2013; Tonkinwise, 2014). The ‘speculative design’ concept extends to information systems, which are designed and artificial (Simon, 1996).

The case has been made repeatedly that information systems should embrace futures studies (Gray and Hovav 1999; Hovorka and Peter, 2019; Niederman, 2023), with the specific term ‘digital futures’ proposed (Hylving et al., 2024; Schlagwein, 2021b; Wang et al., 2020; Yoo and Levina, 2025).

Why the plural ‘s’ of digital futures? The use of ‘futures’ rejects the deterministic notion of ‘the future’ as something pre-decided, thereby dismissing the view that the future is fully knowable. Futures studies see the view pre-determined future is essentially outdated and discredited (in alignment with most of philosophy, social sciences, and theoretical physics). The plural ‘futures’, as endorsed by the futures studies field, reflects that we cannot know the future with certainty, but also that there exists a set of possible futures that we can try to understand better. The ‘cone’ model of the future(s) – a cone of possible, potential, probable, and preferable futures starting from today – is often referenced as a mental model (Hancock and Bezold, 1994; Voros, 2003).

Is digital futures the same as technology or IT futures? Technology and IT have always played a core role in futures thinking (and science fiction). However, a recent shift in information systems research is to reframe previously narrowly defined IT topics as ‘digital’ topics. Through a careful analysis of etymology, ontology, and de facto use in scholarship, Baiyere et al. (2023) concluded that the term ‘digital (phenomena)’ is appropriate for phenomena where technological, economic, social, societal, and political aspects are equally relevant (as opposed to ‘IT (phenomena)’ focused on or prioritising technology). Based on this semantic distinction, the term ‘digital futures’ seems suitable for the study of futures centrally involving digital technologies yet not backgrounding their societal, environmental, political, etc., implications.

Is digital futures the same as digitalisation or digital transformation? Niederman notes that the difference lies in temporal orientation – are we concerned with the immediate or the long-term future(s)? (Niederman, 2023). Digitalisation and digital transformation can imply substantial changes but are concerned with relatively short-term (or already-occurring) changes (Baiyere et al., 2023; Currie et al., 2024). In contrast, digital futures encompass long-term possibilities that, while not arbitrary, cannot be rigorously extrapolated from the present and empirical data and instead require imagination, forward-thinking and pure reasoning, etc. (Schlagwein, 2021a). To highlight the radical uncertainties that cannot be addressed with empirical analysis but require imagination,

Hovorka and colleagues adopt the term ‘speculative’ futures to illustrate this meaning (Hovorka and Mueller, 2024; Hovorka and Peter, 2021).

The earliest references to ‘digital futures’, labelled as such, are found outside information systems. A notable use was in the European Commission’s Foresight Project *Digital Futures* (2011–13). Per its final report, the project aimed ‘to explore potential interactions between different areas of technology, human life, and global resources. Foresight has no ambition to predict the future as it will happen, but to explore different futures that might happen’ (p. 2). Additional uses include an early article in *Sociology*, which questions why sociology as a field has largely omitted to study what they call ‘digital futures?’ (with a cautionary question mark) (Halford et al., 2013). This work points to thinkers like Bijker, Feenberg, and Latour (work on the agency or construction of technologies). Similar calls have been echoed in futures studies (McKenzie, 2024).

Calls for digital futures studies have also been made in information systems. Chiasson et al. (2018) discuss philosophical foundations for studying and making future(s) in the context of information systems research. Hovorka and Peter (2019) suggest ‘doing future(s)’ as a research activity, as ‘academics provide a critical voice and participate in reframing and recalibrating the futures which we make through collective action’ (p. 6290). Wang et al. (2020) also provide an early concrete ‘futures’ analysis in content (on digital work) and explicitly use the term ‘digital futures’. Niederman (2023) suggests that IS has already used some future methods (e.g. Delphi method) and considers how and why the study of (digital) futures could and should be incorporated into ‘the MIS canon’.

As of 2024, interest in digital futures has increased. Conferences such as ICIS 2024 feature panels on digital futures. ACIS 2024’s theme is ‘*Digital Futures for a Sustainable Society*’. Describing it as ‘*digital futures for a sustainable society, it involves utilizing technology to address environmental, social, and economic challenges while ensuring that the benefits are inclusive and equitable*’ (acis.aaisnet.org). Similarly, ECIS 2024’s theme is ‘*People First: Constructing Digital Futures Together*’, defined the term like so: ‘*digital futures are not solely focused on technical capabilities, but should also consider ethical, social, and cultural implications*’ (ecis2024.eu). A recent call for papers on ‘*Designing Digital Futures*’ asks for work on

‘*envisioning alternative futures for technology and organisation through speculative design and critical storytelling*’ (Yoo and Levina, 2025).

Based on the above, we define that ‘digital futures’ is a research approach that studies multiple possible long-term futures with a specific focus on digital technologies, their societal implications, and the future realities they create, and typically sees those as amendable by human actions and technological design. This definition encompasses the three key elements mentioned earlier: 1. The future as a site of systematic inquiry moving beyond extrapolation of the present; 2. The pluralistic view acknowledging that futures are not knowable, yet also that they can be imagined and actively shaped; and 3. An emphasis on the broader societal implications of digital phenomena across technical, social, economic, and environmental dimensions. Table 1 distinguishes digital futures research from other types of future-oriented research.

Importance – why study digital Future(s)?

The study of digital futures is critical for information systems research as unprecedented technological transformations will reshape organisations, markets, and societies. Information systems no longer merely represent but create organisational, industrial, societal ‘digital’ realities (Baiyere et al. 2023; Baskerville et al. 2020). Cecez-Kecmanovic (2021) argues that ‘IS research that studies *processes and practices of digital transformation is implicated in the making of socio-technical realities*’. This view suggests researchers are not merely observers but active participants in shaping futures. Grover et al. (2024) ask IS research to provide ‘utopian, dystopian, and neutroplan’ AI futures, with the underlying key concern being if we want to have those futures in the first place. We outline four key reasons for pursuing digital futures research in IS, as indicated by the above references (Niederman 2023 provides a longer list).

Understanding intended and unintended long-term implications of digitalisation

Digitalisation and digital transformation fundamentally change how organisations and societies operate, requiring the careful study of emerging, alternative or possible worlds

Table 1. Labels for different types of futures research.

	General orientation	Focus on ‘IT’	Focus on ‘digital’
Shorter term or more predictable future(s)	Trend spotting (Gidley, 2017)	Technology adoption, change or forecasting (Baiyere et al., 2023; Gidley, 2017)	Digitalization / digital transformation (Baiyere et al., 2023)
Longer term or more speculative futures	Futures (Gidley, 2017)	Technology futures (Technology Futures Analysis Methods Working Group, 2004)	Digital futures

we create. As Baskerville et al. (2020) and Baiyere et al. (2023) argue, our reference space in practice has now ‘reversed its ontology’. While information systems and digital technologies were previously thought to represent data about the real world, they now often create, shape, and reshape the social and material world. This places a greater burden on IS researchers to act ‘*not as judges of the past, but of the future(s)*’ (Schlagwein, 2021a). Or, as a recent *Science* editorial notes (on science and technology in general), ‘*this is not a moment for stewards, but for leaders*’ (Parikh, 2020: p. 489).

Making digital innovations sustainable

A more positive or pragmatic outlook suggests that studies on digital futures will enable policymakers, as well as business and organizational leaders, to make strategic decisions that foster innovation in digital contexts and create value over the long term while being sustainable (e.g. consider the backlash many technology companies have received over what some have suggested were foreseeable problems, from the energy use of Bitcoin to the mental health impact of social media to concerns about AI). Baiyere et al. (2023) argue that through recombination, ‘*each digital object ... becomes a potential building block for creating another digital object via combining and (re)combining digital objects with near-infinite possibilities*’. However, as Cecez-Kecmanovic (2021) notes, choosing from these near-infinite possibilities must be guided by ‘*ethical principles, seeking socially desirable future outcomes*’ (some have called this digital responsibility). In other words, we want to encourage and support digital innovations underpinned by ethical considerations and judgements to ensure their long-term sustainability.

Actively creating preferable futures

A value-driven approach focuses on actively intervening to create better futures beyond predicting, analysing, or judging them. As Cecez-Kecmanovic (2021) argues, ‘*technological developments and digital transformation are not inevitable and could be otherwise. There are possibilities of different digitisation and socio-technical transformations [that seek] socially desirable future outcomes*’. In other words, Grover et al. (2024)’s ‘utopian, dystopian, and neutroplan’ futures are not naturally occurring and inevitable but rather actively selected, made or prevented, and designed through interested parties, collective action, including that of researchers.

IS field rising to the challenge

Several of the above contributions argue that the prominence of digital futures research presents a significant opportunity for the information systems field to establish intellectual

leadership in shaping technological and societal futures (Baiyere et al., 2023; Hovorka and Peter, 2021; Schlagwein, 2021b). Cecez-Kecmanovic (2021) argues, that ‘IS has a distinct capacity and an obligation’ to study digital futures. This capacity stems from IS’s historical engagement with digital and socio-technical phenomena, deep understanding of the co-constitutive relationship between technical and social elements (Baiyere et al., 2023; Cecez-Kecmanovic, 2021), and ability to bridge economic, technical, and social science perspectives. Digital futures offer IS the chance to serve as an intellectual engine by developing theoretical foundations and methodological approaches for studying digital futures (Hovorka and Peter, 2021). However, realising this opportunity requires IS to move beyond traditional empirical approaches focused on the present and past, to embrace new methodologies and theoretical perspectives suited for future-oriented research (Hovorka and Peter, 2021; Niederman, 2023). This actively involves accepting studies of ‘alternative worlds’, ‘possible futures’, ‘thought experiments’, and ‘counterfactual reasoning’ as legitimate tools, even though they may not be considered ‘science’ in a narrow definition and instead a part of ‘systematic inquiry’ and research as found in the humanities (Schlagwein, 2021b).

This last point then opens the question: What are methods that have been used or could be used in digital futures research?

Methods – how do we study digital future(s)?

Studying futures requires a methodological toolset that accommodates both analytical rigour and creative exploration. Future studies, the field, employs numerous methods to predict, imagine, explore, and shape potential futures and may provide a set of methods. Some of these methods have been used in IS research, but not others. IS research may develop its own methods. While the complete methodological toolkit is extensive, the following represents a subset of common methods to illustrate different temporal horizons and analytical purposes (based on Gidley, 2017; Halicka, 2016; Hovorka and Peter, 2019; Niederman, 2023).

Trend analysis builds on historical data and current patterns to provide a structured approach to understanding how developments might unfold in the near future. The method emphasizes quantitative forecasting and statistical analysis to project patterns and identify underlying drivers of change. (e.g. Armstrong, 2001).

Environmental/horizon scanning refers to identifying emerging issues, signals, and trends that could impact the future. This method involves the systematic surveillance of an organisation’s external environment to detect early signals of change, enabling rapid adaptation to emerging developments. (e.g. Choo, 1999).

The **Delphi method** uses structured communication between experts to develop consensus about future developments. Through multiple rounds of questionnaires, feedback, and revision, this method uses collective expertise while trying to minimize groupthink and social pressure. While based on empirical data, it is a method for technological forecasting including long-term. (e.g. [Linstone and Turoff, 1975](#))

Critical analysis examines power structures and assumptions underlying current trajectories and preferred futures based on ethical and value concerns. This approach focuses on deconstructing existing narratives and revealing whose interests are served by particular visions of the future, helping to identify alternatives that promote emancipation, often with reference to history and longer time horizons. (e.g. [Slaughter, 2004](#); [Wang et al., 2020](#); [Wang et al., 2024](#))

Backcasting starts with a desired future and works backward to identify steps needed to achieve this future. Unlike forecasting, which projects current trends forward, backcasting focuses on how to achieve specific desired outcomes, making it particularly valuable for deliberate, transformative change. While not necessarily critical in a critical theory sense, many applications of backcasting address social, sustainability, and environmental issues. (e.g. [Bibri, 2018](#); [Robinson, 1982](#))

Speculative or socio-technical imaginaries explore how collective visions of alternative, possible, or desirable futures shape current actions and innovations. This approach examines how societies can imagine their future technological and social arrangements and how these imaginaries influence present-day decision-making and development pathways. (e.g. [Hovorka and Mueller, 2024](#); [Jasanoff and Kim, 2009](#))

Narrative scenarios develop multiple plausible stories about possible futures to explore key uncertainties and their implications. The method creates several coherent but different future narratives, helping organisations or societies prepare for multiple possibilities with sensitivity to their cultural and interpretive dimensions. (e.g. [Raskin et al. 2002](#); [Wack, 1985](#))

Participatory, design and action research methods engage diverse stakeholders in collaborative future creation through structured processes, workshops, collaborative design and interventions. These approaches emphasize treat futures as an active process rather than just an analytical exercise ([Godet, 2001](#); [Voros, 2003](#)). Recently, the term ‘future-making’ ([Yelavich and Adams, 2014](#)) has become popular – including in management and organisation studies ([Pettit and Bennett, 2023](#); [Thompson and Byrne, 2021](#); [Wenzel, 2022](#); [Whyte et al., 2022](#)) – to refer to active and intentional participation in transformative practices. Information systems research has, of course, its own rich tradition of design- and action-oriented approaches, albeit often at different time horizons.

Based on [Gidley \(2013, 2017\)](#), we can approximately classify these approaches into what she calls positivist and singular-future, and different flavours of non-positivist and multiple-futures philosophical schools of future(s)-oriented research. In IS, quantitative-positivist work on futures would typically fall into the first category, while critical, interpretivist, and (some forms of) action and design research futures would typically fall into the second category. While short-term forecasting also predicts the future (and Delphi studies can have a longer term horizon), the ‘digital futures’ referred to by most would be in the second category in below [Table 2](#).

Concluding Remark(s)

The *Journal of Information Technology* welcomes research on ‘digital futures’, as described and defined above (offered in the hope of encouraging common terminology, but acknowledging that authors may use the term differently, or other terms to mean the same), and we are embracing both conventional and imaginative approaches. That is, we encourage rigorous studies rooted in empirical methodologies, such as trend analysis, environmental scanning, and Delphi techniques, but also more speculative, active, or creative approaches, including backcasting, narrative scenarios, critical analysis, and speculative design. The exploration of

Table 2. How to study the digital future.

Philosophy	Futures Approach	Underlying Meta-Theory	Research methods
Positivist approaches, science stance, “the future”	Probable future(s)	Positivism, empiricism	<ul style="list-style-type: none"> Quantitative forecasting and trend analysis Environment and horizon scanning Delphi method
Non-positivist approaches, humanities/social sciences stance, “multiple futures”	Preferred futures	Critical theory, deconstruction	<ul style="list-style-type: none"> Critical and historical analysis Backcasting
	Possible futures	Constructivism, interpretivism	<ul style="list-style-type: none"> Speculative or socio-technical imaginaries Narrative scenarios
	Prospective futures	Action, design	<ul style="list-style-type: none"> Participatory, design and action research methods/future-making

digital futures requires diverse perspectives, including prediction, but also the development of alternative target ideal or utopian visions (or the opposite, problematic and dystopian visions we aim to avoid), ensuring that digital innovations and technological advancements are made with comprehensive ethical, environmental, social, political, and cultural considerations. By fostering this pluralistic research agenda, this journal supports digital futures work that contributes meaningfully to academic discourse and digital trajectories, as well as innovations that shape sustainable and desirable (digital) futures.

Given the plurality outlined above, there is no set of hard criteria for what makes a ‘good’ digital futures analysis (see also Chiasson et al., 2018; Niederman, 2023; Phillips, 2021). Innovativeness, interestingness, novelty, and well-reasoned arguments about important and relevant digital futures – as judged by appropriate reviewers and editors – will, in many cases, take the place of empirical (methodological) rigour criteria in evaluating such work due to its conceptual nature (Hirschheim 2008). Prospective authors are advised to be clear with readers (including editors and reviewers) in specifying the nature of their work and to refer to existing writings (such as this editorial) that encourage and value digital futures research. We support work on digital futures within an inclusive and forward-looking understanding of the purpose and responsibility of studying digital and information technologies, their increased importance in the world, and in line with the mission of our journal.

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