The Digital Transformation Conundrum: Labels, Definitions, Phenomena, and Theories

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The Digital Transformation Conundrum: Labels, Definitions, Phenomena, and Theories

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Abstract

The forthcoming *JAIS* special issue on "Envisioning Digital Transformation" is predicated on the assumption that theoretical diversity would be a good thing for the IS field. But making sense of theoretical diversity requires either a common frame of reference or crystal clarity about concept definitions and the phenomena to which they point. In this editorial, we argue that the IS field still lacks the conceptual and empirical clarity needed to benefit from theoretical diversity about digital transformation. The digital transformation label has been applied to the evolution of technology, as well as to the evolution of organizations and society. It has been used to refer to change in entities or processes and to processes of change. It has been used to refer to particular technological artifacts and to particular kinds of data and processing power. This type of diversity risks obscuring the value of diverse theoretical formulations. Only through clear distinctions and precise labeling of older and new phenomena can the IS field fully benefit from new theories and theoretical elaborations about digital transformation.

1   Introduction

With our forthcoming *JAIS* Special Issue, our primary goal was to promote diversity in theorizing and theoretical statements about digital transformation (Markus & Rowe, 2021). The more we engage with this topic, the more deeply we are convinced that our field does not yet have all the elements needed to cope with the diversity of theorizing about digital transformation. In this editorial, we share our evolving thoughts about what such a foundation may require, but, first, we need to explain why we are concerned and what we think is at stake for our field.

Perhaps the most fundamental question for IS scholars is whether we understand "digital transformation" as a new label for an existing phenomenon (e.g., IT-enabled organizational change) or a label that refers to a fundamentally new phenomenon. Let us be clear, there is nothing inherently wrong with creating or adopting new labels for an existing phenomenon from time to time. Human language does not remain static. Old words take on new meanings, new words come into being, and things like "electronic data processing" become renamed things like "information systems" or "information technology." For IS scholars to adopt new terminology for phenomena we already study can help us stay connected with nonacademic stakeholders and can signal that the empirical context of a study is current, for example, involving the use of wearable devices, say, instead of mainframe accounting systems.

But mindless use of new concept labels can create very real problems for academic fields. Adoption of labels like "recommender systems" or "business analytics" can condition future scholars to ignore relevant prior scholarship on "decision support systems," for example. Conversely, if "automated decision-making" is actually a distinctly different phenomenon from

"decision support," then it is an intellectual error (Kirchherr [2022] calls it "scholarly bullshit") to relabel even excellent research on "decision support" as being about "automated decision-making," because that "decision support" research "does not truly add to the body of knowledge on the subject" (Kirchherr, 2022) of "automated decision-making."

2 Using Concept Labels Is Playing with Fire

Labeling concepts has crucial implications for the coherence of a field's theorizing. If a phenomenon is really new, then theories developed for older phenomena will not apply to the new phenomenon in some important way. In fact, to say that a phenomenon is new is itself a proto-theory—it's a statement of hypothesis that the phenomenon does not play out the same way that earlier phenomena did. Thus, new phenomena demand new theorizing to explain or interpret them. Of course, earlier phenomena may also benefit from new theorizing, but there is no guarantee that new theories developed for new phenomena will be applicable to or useful for dealing with old phenomena. Thus, it's crucially important to be clear about the labels we apply to what we study.

As an example of our points here, consider the differences between the familiar western wildfire and the firestorms that have devastated California in recent years (Duane, 2020). Equations that predictably modeled western wildfires were developed in the 1970s, programmed for PCs in the 1990s, and enhanced with detailed geographic data by 2009, enabling their widespread use by firefighters. However, as early as 1994, it was clear that these theoretical tools did not work for firestorms, and could not be modified to do so, because "not only is the size and severity increasing, but the nature of the fire is changing" (Duane, 2020). Accordingly, a new software environment is presently being developed to model and manage the two different kinds of fires. We sketch out this example in Table 1 below.

Analogously, if digital transformation is a new and distinctly different phenomenon than, say, IT-enabled organizational change (about which our field knows so much), then it must be the case that existing theories of change are deficient in some way and that new theories are required. Thus, it seems clear to us that a compelling priority for IS scholars is to clearly define digital transformation in a way that differentiates it from neighboring concepts such as digital innovation or IT-enabled organizational change. We do not all need to define digital transformation the same way.[1] But not being clear on our individual definitions invites collective incoherence and "scholarly bullshit" (Kirschherr, 2022) of all types. Clear definitions of core phenomena are the *sine qua non* of sound theoretical development and knowledge accumulation (Rivard, 2014; 2021). Typically, without such clarity, there can be no clear definition of the contextual boundaries of the theory (Rivard, 2021) and no conceptual clarity (Suddaby, 2010).

Table 1. Original and Transformed Phenomena and Theories: California Wildfire Example (Source: Duane, 2020)

	Phenomenon	Theory of the phenomenon
Original phenomenon	Classical western wildfire • Wide but narrow band of flames advancing slowly with low severity through light surface fuels	Driven by wind, ground slope, and available fuels • Simulated and modeled as equations in 1970s • PC programs available in 1990s • Comprehensive geographic data available by 2009
Transformed phenomenon	Plume-driven mass fire or firestorm • Straight and tall, fast-spreading, rotating fire tornados consuming heavy fuels, torching entire trees, leaping from crown to crown, and throwing off firebrands far from the core fire, igniting new blazes that may merge, intensify, and burn for long periods	Driven by the fire's own convective column: rising heat hot enough to redirect wind and weather, burning much hotter and spreading faster • Cannot be accurately modeled by the equations that predict the spread of classic western wildfires

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[1] We also agree that, despite its apparent ambiguity, digital transformation can be a useful concept label for certain purposes such as policy (Chen & King, 2022), but this can only be the case if it is based on a clear abstraction process that helps understand what this higher-level concept is grouping at lower level, and if this grouping is done consistently, in a rational way.

Table 2. Definitions of Digital Transformation in IS and Other Fields

Definition	Journal / discipline
"a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies" (Vial, 2019, p. 121)	*Journal of Strategic Information Systems* / IS
"a transformation 'precipitated by a transformational information technology' … involves fundamental changes in business processes operational routines, and organizational capabilities, as well as entering new markets or exiting current markets" (Li et al., 2018, p. 1130)	*Information Systems Journal* / IS
"a holistic form of business transformation enabled by information systems (IS) that is accompanied by fundamental economic and technological changes at both the organizational and industry-level" (Chanias et al. 2019, p. 17)	*Journal of Strategic Information Systems* / IS
"the use of new digital technologies (social media, mobile, analytics or embedded devices) to enable major business improvements such as enhancing customer experience, streamlining operations, or creating new business models" (Warner & Wäger, 2019, p. 326)	*Long Range Planning* / strategic management
"the transformational or disruptive implications of digital technologies for businesses (new business models, new types of products/services, new types of customer experiences) … to indicate how existing companies may need to radically transform themselves" (Nambisan et al., 2019, p. 1)	*Research Policy* / innovation management
"includes the networking of actors such as businesses and customers across all value-added chain segments, and the application of new technologies … in order to increase the performance and reach of a company" (Schallmo et al., 2017, p. 4)	*International Journal of Innovation /* innovation management
In line with Hess et al., 2016: "an organizational change triggered by digital technologies" (Nadkarni & Prügl, 2021, p. 236)	*Management Review Quarterly*/ management
"an organizational change that is triggered and shaped by the widespread diffusion of digital technologies" (Hanelt et al. 2021, p. 1160)	*Journal of Management Studies* / management

3 Digital Transformation Has Multiple Definitions and Phenomenal Referents

So, where are we today with respect to the definition of digital transformation? Despite a few widely cited articles that have reviewed literature (Vial, 2019) or compared digital transformation with IT-enabled organizational change (Wessel et al., 2021), the literature as a whole exhibits little coherence. The challenges of making sense of the literature are exacerbated by the fact that multiple disciplines have co-opted the concept and redefined it to suit their own purposes (see Table 2).

It is not our place to assert our definition of digital transformation here. Instead, we wish to point to the variability in existing definitions as questions that deserve careful consideration and justified answers from all scholars working in this domain. First, what is it that is transforming or being transformed? Second, what does transformation mean? Third, what is meant by digital? Fourth, what is the role of the digital in the change or transformation? Let's consider some of the options on the first three questions now, deferring the fourth to a later time.

3.1 What Is the Object of Transformation?

Perhaps the sharpest cleavage in the literature concerns a focus on the transformation of technology versus on the transformation of people, social systems, or social processes. Some of the literature on digital transformation addresses the striking, even exponential, evolution in technological capabilities (Lyytinen & Rose, 2003) that is giving us ChatGPT today and may give us quantum computing tomorrow. This research has clear affinities with work on "technology transitions" in the innovation management literature (Geels, 2002; Hekkert et al., 2007).

Many other scholars acknowledge, but push to the background, changes in technology to focus primarily on human and social entities or processes. For these scholars, digital transformation refers to what is happening, because of the digital, to workers or work, to organizations or organizing, and to industrial fields (Vitari & Ravarini, 2009) like banking or societal processes like organizing and collective action (Majchrzak et al., 2016; Rosa, 2003).

Both technology transformation and societal transformation deserve theorization, but it strains plausibility to think that all theories of technology

transformation will apply equally well to organizational and societal changes triggered by IT (and vice versa). Accordingly, it seems to us that scholars should be clear on their primary object of theorizing—technology versus technology-in-use and its implications.

Further cleavages exist within the literature on the organizational and societal changes that accompany (or are triggered or enabled by) technological evolution. Some view digital transformation primarily as planned or intentional action by managers or entrepreneurs, some view it as a complex emergent process, and still others view it as a combination of the two. Furthermore, some scholars focus on the *transformation of processes* (e.g., work) *or of entities* (e.g., organizations), whereas others focus on the *processes of transformation*. Again, it is doubtful whether any one theory could address all these facets of digital transformation. Thus, it behooves scholars to define clearly that to which they think the label of digital transformation refers.

3.2 What Does Transformation Mean?

In the English language, the word transformation both denotes and connotes something different from mere change. Just google the definition, and you'll find synonyms like "metamorphosis," "complete change in appearance or character," or "major or radical change in form." A similar distinction can be found in the management literature on radical versus incremental organizational change. Transformation is to change as a firestorm is to a wildfire.

This emphasis on qualitative or step-functional difference, as opposed to minor or incremental change, is essential linguistically to the concept of transformation, and it obliges those who use the word to justify its use. Admittedly, this can be challenging to do, and it often requires explicit reference to time. This can be seen in the organizational change literature in which some scholars acknowledge that repeated incremental changes over time can eventually result in transformation. One way to justify the label of transformation is to show that an entity or process observed at time $t2$ is significantly different in deep structure (Besson & Rowe, 2012) than it was at time $t1$. For example, a change in an organization's business

model from product-oriented to service-oriented (along with concomitant alternations in roles, logics, management processes, rewards, etc.) could be justified as an instance of transformation defined as deep structure change.

Of course, the English language term transformation also refers to "the act or process of transforming" (e.g., involving managerial initiatives) or "the state of being transformed." These alternative meanings shift the emphasis away from deep structure changes toward dynamics and events. For instance, to justify claims about a state of being transformed, one might point to recurrent manifestations of previously rare activities. To concretize claims about the process of transformation, one might point to events (such as crashes, collapses, IPOs, takeovers, etc.—Drummond, 2003) that punctuate the flow of organizational experience into "before" and "after."

Transformation can justifiably mean several different things, but it cannot (meaningfully) mean everything, including just plain change. If, as we do, you value theoretical diversity, you will likely agree that clear definitions are essential for the integration of knowledge.

3.3 What Is Meant by Digital?

The term digital strikes us as particularly important for IS scholars to clearly define. After all, digital computers have been around since the 1940s. In addition, the term digital has been in widespread use since at least the late 1990s (Negroponte, 1995). If the term digital covers all non-analog computation, then it's dubious to claim that digital (as in transformation) is a new phenomenon versus a new label for what we in the IS field have studied all along. On the other hand, since quantum computing can hardly be called digital, it appears that the digital concept may not have much staying power!

Among those who advance digital transformation as a new phenomenon (newer than the 1990s), we see two quite different types of discourse—one that emphasizes a particular type of technological system and another that emphasizes massive amounts of data of various types and the corresponding processing power (See Table 3).

Table 3. Contrasting Characterizations of the Digital

Digital as technology or system	Digital as "Big Data" and processing power
• SMACIT (vs. ERP)	• Convergence of data types and decoupling effects
• Infrastructure (vs. applications)	• Volume, variety, and velocity
• Centralized or decentralized platforms	• AI and algorithmic decision-making
• New organizing logic (e.g., modularity, combinability, and generativity)	• Distributed processes

The examples below contrast the digital (in transformation) with the non-digital in ways that emphasize a particular kind of technology or system:

- Social media, social, mobile, analytical, cloud technologies, and the Internet of Things (SMACIT) (Sebastian et al., 2017) vs. ERP within enterprises (Wessel et al. 2021)[2]

- Infrastructure or backbone vs. discrete applications (Furstenau et al., 2019)

- Centralized (e.g., machine learning) vs. decentralized (e.g., blockchain) platforms (Vergne 2021) vs. applications

- New types of new organizing logic of digital innovation: Reprogrammability and the self-referential nature of digital services and content enable a new organizing logic of digital innovation that results in modularity, combinability, and generativity of the product architecture in which the digital is embedded (Yoo et al., 2010; Hassan 2021; Kreps, 2021). Ultimately, whereas "the flexibility of a modular product … produces differences in degree, the generativity of a layered modular product … produces differences in kind" (Yoo et al., 2010, p. 729).

By contrast, the digital (in transformation) has been differentiated from the non-digital in terms of massive volumes of various data types and the corresponding processing power:

- Convergence of various types of digital content (e.g., audio, video, text, image). All digital representation formats can be treated as data on the same networks and on various digital devices. This also refers to the "homogenization of all data" (Yoo et al., 2010), but is fundamentally based on what Grover (2018) called a "decoupling" effect, i.e., the ability to separate (0, 1) content from the (packaging) delivery system and, at the same, time to syndicate all forms of content.

- Volume, variety, velocity, and veracity of (big) data is allowed by increasing processing power (Abbasi et al., 2016): The self-producing appetite for information search broadens to various types of content and leads to big data processing. However, analyzing data in motion and data cleaning is challenging and requires always more processing power.

- AI, machine learning, algorithmic decision-making (Kane et al., 2021; Koukouvinou & Holmström, 2022)

- Distributed processes: Interconnections among systems developed/operated by different organizational entities (Arthur, 2017).

Both of these views of the digital are plausible, but they seem to us to pull in different directions, making it challenging for our field to compare and contrast theories and synthesize the body of knowledge. In addition, there may be other, better, definitions of the digital. Conceptualizing digital resources as resources that exhibit modular design, encapsulated value, and a programmatic interface may allow for clearer distinctions between IT-enabled transformation and digital transformation (Piccoli et al., 2022). Increased clarity of definition will become increasingly pivotal for capitalizing on the diversity of theories and empirical research.

4 Conclusion

For people who have lived as long as we authors have, it is hard to doubt the fact of transformation. But what is transforming? Is it technology, is it society, or is the process of change itself that is transforming? And is it really new, or is it something that we in IS have studied since the 1970s with a new label? If it's new, then when did the new begin? Circa 1995 with the World Wide Web, circa 2008 with the iPhone, or circa 2022 with the emergence of ChatGPT and its cousins? Further, by what criteria do we differentiate the new, the digital, and transformation from their opposites?

These are among the questions that we in IS must grapple with to make sense of the burgeoning diversity—of theory, method, and empirical context—in the literature on digital transformation. It is certainly premature to impose strict limits today on what should be counted in and what can be counted out. But it hardly seems out of line to demand greater precision in and justification of the definitions we each choose. Such choices have implications. Explicitly stating and debating them will help ensure that we do not: (1) discard valuable prior knowledge that lacks today's trendy labels, (2) fail to recognize what is truly new and why, or (3) create "scholarly bullshit" through the unthinking use of terms.

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[2] Interestingly and somehow ironically for those who argue that ERP systems are not relevant to digital transformation, those who put forward SMACIT argue that successful digital transformation is not just based on SMACIT digital strategy but cannot be executed without two other IT-enabled assets: an operational backbone (typically an ERP system!) for business efficiency and a digital service platform for agility and rapid innovation (Sebastian et al., 2017).

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