# The Digital Undertow and Institutional Displacement: A Sociomaterial Approach

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## Abstract

As "the digital" becomes pervasive within organizations and industries, it is increasingly evident that how we live, work, connect, coordinate, and govern are being significantly changed by digitalization. Many of these digital transformations are highly visible and dramatic, involving a purposeful repositioning and restructuring of organizations and industries. But in addition to these direct and visible changes, we argue that processes of digitalization are also producing less visible transformations in core institutional values, norms, and rules, which are indirectly, yet more fundamentally, reconfiguring how organizations and industries perform. Referencing findings from two different sectors, we posit that the corollary effects of waves of digitalization — what we conceptualize as the "digital undertow" — are generating a set of dynamics that are displacing institutional apparatuses from their positions of primacy and authority within industries. We further suggest that our conventional toolkits for studying organizational phenomena are not well equipped to examining such corollary effects of digitalization. In addressing this challenge, we consider how the relational and performative theorizing of strong sociomateriality provides a powerful analytic for investigating these effects and we highlight how it offers valuable insights into the institutional displacements arising in the digital undertow.

## Introduction

In this paper, we consider important institutional changes that are underway in the contemporary digital era, but which, we argue, have been largely overlooked and understudied to date. Interest in digital transformation has tended to focus on novel and visible innovations in products, services, processes, and business models (Hinings et al. 2018; Nambisan et al. 2019). With much attention directed at these pronounced organizational events, it is easy to miss the less obvious changes occurring at some temporal and spatial remove from the main events. We have found in our research that while many of the digital shifts currently in progress are highly visible, manifesting as direct and dramatic transformations in work and organizing, processes of digitalization are also producing indirect and less visible forms of transformation that are proving to be institutionally consequential (Scott & Orlikowski 2022). Our research findings suggest that the effects of these indirect institutional changes are both serious and far-reaching.

Digitalization is generally portrayed as a primary player in the transformation of strategic business models and value chains, leading to the conspicuous displacement of labor, jobs, and skills (e.g., Acemoglu and Restrepo 2019; Sampson 2021). Such considerations of direct digital displacements are critically important, but as we will discuss, there are other significant, albeit more indirect, displacements at work in the digital era that also warrant investigation, ones that we characterize as *institutional displacements.* We use this term to refer to processes of digitalization that are unwittingly undermining core institutional values, norms, and rules, which over time are reconfiguring how organizations and industries perform.

We argue in this paper that many of our conventional toolkits — theoretical and methodological — for examining organizational phenomena are not well equipped to study the less obvious, indirect effects of digitalization. Developing the analytical capacity for identifying

and understanding institutional displacements requires a different approach to theorizing. In particular, we make the case here for a distinctive sociomaterial research approach — what has been termed "strong sociomateriality" (Cooren 2020; Jones 2014) — to theorize the dynamics that are producing institutional displacements over time and place. Strong sociomateriality draws on the relational and performative theorizing of Barad's (2007) agential realism. As detailed below, this approach provides analytically insightful ways of studying the more subtle, yet substantial, institutional shifts associated with contemporary digital transformations.

Before developing our theoretical arguments, we begin by offering examples from two empirical settings where significant institutional changes are under way in the wake of digitalization. We consider how these changes relate to existing literature on digitalization, and describe how the phenomena in these examples challenge the boundaries of previous concepts used to explore the unintended consequences of digital transformation (Majchrzak et al. 2016; Orlikowski 2000). We highlight how a strong sociomaterial research approach allows one to investigate and identify processes of indirect displacement that have been unobserved by other approaches. We then develop the notion of *digital undertow* as a way of drawing together the insights generated by a sociomaterial approach and propose a theorization of the dynamics of institutional displacement. We offer a general formulation of the concept here and end our paper by suggesting how its theoretical insights may provide a valuable basis from which organizational scholars can further examine institutional change in the digital era.

**Waves of Digitalization**

Scholars have often characterized surges in digital transformation as "waves of digitalization" (Boland et al. 2007; Tilson et al. 2010; Yoo et al. 2010a, 2010b). The metaphor of waves does considerable ideational work. Waves are powerful, dramatic, and highly visible, their energy

self-generating and relentless. Many of the narratives associated with digitalization depict sweeping and unstoppable organizational change. Resistance is futile; one either learns to ride the waves and reap the rewards or risks getting washed away. To a certain extent, this metaphor resonates with our lived experience of digital change, and the transformations of work and organizing being enacted on the ground (Bailey et al. 2022; Davis and Sinha 2021; Karunakaran et al. 2022; Lebovitz et al. 2022; Majchrzak et al. 2016). These digital transformations are widely evident across multiple industries, including, for example, book publishing and hospitality.

***Book Publishing.*** In a recent study, we examine how the book publishing industry has experienced multiple waves of digitalization over the past fifty years (Scott and Orlikowski 2022). We trace the early wave that digitized book warehouses and distribution supply chains in the late 1960s and 1970s, to the latest wave that digitized the book in 2007, an innovation which has swelled over the past 15 years, spawning a whole industry of eBook devices such as Kindles and Nooks, as well as eReading apps on smartphones, tablets, and personal computers. It is this latest wave that has churned up considerable tensions in the back offices of the book industry. Even as the growth of digitized books has brought significant direct changes in how and when books are published, sold, and read, other indirect changes generated by this wave of digitalization have also been substantial, even if less remarked upon. These indirect changes are manifesting in book standards — the industry-wide rules and guidelines that coordinate and regulate operations in the global book trade, and which have done so for decades. The most well-known and widely-used of these standards is the ISBN (International Standard Book Number).

The ISBN was initially developed in the late 1960s, ratified by ISO (International Standards Organization) in 1970, and revised and updated every five years since then, following a formal ISO process involving multiple stakeholders from across the global book trade. The ISBN

standard powerfully structured the book industry for over half a century and became widely acknowledged as "the most effective product identifier ever established" (Cairns 2009). But its status and success are now in jeopardy following a recent wave of digitalization that digitized the book and introduced a variety of new digital formats and digital distribution options. This wave of digitalization was aimed at the core product of the industry (the book) and was not intended to change or challenge book standards. But nevertheless, as we will theorize below, it has unwittingly generated significant challenges for book standards that are threatening the role and authority of the ISBN going forward.

***Hospitality.*** Over the past few decades, the hospitality industry has experienced a series of waves of digitalization beginning first with airline reservation systems in the 1960s (e.g., the Sabre system from American Airlines). These expanded in the late 1990s and early 2000s to digital travel platforms that provide online guides and reservation capabilities (e.g., Travelocity, Booking.com, and TripAdvisor) aimed at providing valuable services to travelers. In addition to offering destination information and booking services, these sites encourage users to post online comments about their experiences of hotels and restaurants in the form of reviews and ratings, which are then aggregated into rankings via the platforms' proprietary algorithms.

It is this latter development, the rise of anonymous online reviews and ratings along with algorithmic rankings, that has generated considerable tensions in the wake of digital waves. In this case, the tensions have arisen with respect to established hospitality accreditation schemes in the industry. Such schemes have over time become widely respected industry-wide judgment devices with formal and standardized criteria for auditing and evaluating the quality, reliability, and performance of hospitality services. Prominent and long-standing examples of such schemes

include the Michelin Guides, the UK-based AA (Automobile Association) star system, and various countries' official Tourist Board ratings systems.

Our research into the role and influence of TripAdvisor's digital travel platform within the hospitality industry (Orlikowski and Scott 2014; Scott and Orlikowski 2012) found that the wave of digitalization transforming travel services was not directed at or intended to change hospitality quality criteria. But as online travel platforms became increasingly dominated by hundreds of millions of user-generated reviews,[1] so the status and authority of established hospitality accreditation schemes were being undermined, and in some cases replaced. For example, in 2011, the UK government announced that it was discontinuing its official, inspection-based star-rating system (VisitBritain), in favor of consumer-led systems such as TripAdvisor, claiming "customer reviews posted online are more reliable" (Hastings 2011).

Both the cases of book publishing and hospitality highlight how digitalization is affecting institutional phenomena that are spatially and temporally distant from the focal attention of digital waves and their noticeable, near-term changes. Specifically, the innovation of digital books is challenging book industry standards, while the move to online travel services is threatening hospitality accreditation schemes. To make sense of these indirect and less visible changes, we found it useful to conceptualize the notion of the digital undertow.

## The Digital Undertow

While waves of digitalization are a distinctive and noticeable aspect of digital transformation, there are additional dynamics at work here. As we know, and keeping with the metaphor, waves comprise more than the sustained forward motion evident on the surface. Waves also, always and

[1] As of March 2023, TripAdvisor has more than 1 billion reviews and opinions about nearly 8 million businesses, and is available in 43 countries and 22 languages (https://tripadvisor.mediaroom.com/US-about-us).

everywhere, entail an undertow — the offshore-directed flow of water moving beneath the surface (Scott and Orlikowski 2022). Generated by and in relation to the waves, the flow of water constituting the undertow can generate considerable churn and momentum beneath the surface. While it may not be visible, it is often experienced — as anyone who has felt the pull of a strong ocean undertow around their legs can attest.

We suggest that waves of digitalization also entail an undertow — a powerful dynamic that we refer to as the "digital undertow" (Scott and Orlikowski 2022). So long as purposeful and ostensive programs of digital transformation — the waves — are in motion, the digital undertow will also have momentum because it remains in relation to the waves. The metaphor of waves and their undertow offers a useful path into considering the dynamic processes of the less visible and indirect institutional changes associated with digital transformation.

Investigations of digital transformation in the organizational literature have focused primarily on the prominent effects of digitalization efforts aimed at strategies, products, and services. Examples include digital waves that largely automated existing ways of working and operating, and more recent waves that are propelling new business models and restructuring organizational processes (Tilson et al. 2010; Yoo et al. 2010b). Not considered in these studies are the many unobserved *corollary effects* of digitalization that are manifesting elsewhere — metaphorically in the undertow — away from the dramatic waves on the surface that are claiming most of the attention. While out of sight, the consequences of these corollary effects are nevertheless substantial and extensive. We use the term "corollary effects" to articulate and differentiate the relational processes occurring in the undertow of waves of digitalization.

Our conceptualization of the digital undertow as a corollary effect of waves of digitalization contributes to but differs from the wide range of unintended consequences identified by prior

studies of technological change (Majchrzak et al. 2016; Orlikowski 2000). Unintended consequences are typically understood as outcomes that actors neither expected nor anticipated (McKinley and Scherer, 2000). Panayiotou et al. (2019: 12) write that "most of the literature treats unintended consequences as an unwanted organizational side effect that needs to be controlled." They propose treating unintended consequences as emergent effects arising across multiple organizational levels in response to tensions that necessarily accompany change projects. Whether regarded as negative side-effects or multilevel emergent changes, these views conceptualize unintended consequences as arising directly, albeit unintendedly, from specific implementations of organizational change. Our articulation of the digital undertow as corollary effects, in contrast, is not tied to such direct changes. Instead, the dynamics of the digital undertow arise indirectly, and at a remove from, the digitalization initiatives aimed at strategic transformations in products, services, or processes.

The general challenge with understanding the dynamics and consequences of the digital undertow is that it is hidden from view and distanced, both spatially and temporally, from where the visible program of digitalization is taking place. So, there is little attention focused on the undertow, and thus limited knowledge of the corollary effects that are being generated by digitalization or their consequences. We believe it is crucial to gain insights into the indirect and less visible institutional shifts associated with contemporary digital transformations because they produce conditions that configure future possibilities. We now turn towards conceptualizing an approach that we argue is particularly suited towards analyzing such shifts.

**Sociomaterial Research Approach**

Much of the previous organizational research has tended to treat technology either as a discrete entity or as a participant in mutually dependent ensembles of humans, organizations, and

artifacts (Orlikowski and Scott 2008). Interest in a third stream of research exploring sociomateriality has grown, motivated not only by the widespread recognition of technology's expanding role in contemporary life but also a growing awareness that digital phenomena always and everywhere materialize in practice. In our view, the material enactment of complex digital phenomena is not adequately addressed by prior analytical approaches. Over the last fifteen years or so, different versions of sociomateriality have emerged emphasizing multiple themes and aspects (Leonardi 2011, 2013; Venters et al. 2014; Wagner et al. 2010). Because waves of digitalization demand so much attention, the materialization of the digital undertow is easily overlooked, and we need an approach sensitized to consequential enactments that remain largely out of sight. We adopt here a "strong sociomateriality" (Cooren 2020; Jones 2014), which is premised on key ontological commitments to concepts such as entanglement and apparatus, and which provides an approach capable of identifying and accounting for spatially and temporally displaced digital relations/dynamics. As such, it offers, as a distinct approach, specific, analytically tractable ways of conceptualizing and investigating them.

**Sociomaterial entanglement.** Despite the growing interest in sociomateriality, in some important regards the separation of technology, work, and organization has persisted in organizational research. The typical approach for many organizational scholars has been to treat the social and the material as *empirically entangled* but ontologically separate (Leonardi 2011; Faulkner and Runde 2013; Mutch 2013; Hardy and Thomas 2015; Faraj and Pachidi 2021). Some regard this as a subtle distinction, but we believe the tendency to analyze separate entities, study mutually dependent ensembles, or investigate co-constitution is less effective in a world in which most work is "digital work" and always already materially enacted in practice (Orlikowski and Scott 2016).

We follow Barad (2003, 2007) in understanding sociomaterial entanglement to be ontological, as indicated by the absence of a hyphen in "sociomaterial." In his recent essay, Cooren (2020: 2) similarly observes that a sociomaterial approach "encourage[s] us to stop thinking about the material world as something ontologically separated or severed from the social world." However, he goes on to argue that the term "entanglement" is confusing (Cooren 2020: 6, emphasis in original):

> [T]the metaphor of entanglement implies, *by definition*, the existence of two different things that got entangled, even if their dis-entanglement is claimed to be impossible.

We suggest that the confusion rests not with the term, but with the reading of entanglement as metaphorical. Barad's conceptualization of entanglement, in contrast, references quantum theory which is premised on lack of independence. This is an ontological, or more specifically in Barad's terms, a relational ontological claim. As such, there is no question of different, pre-existing things that get tangled up. As Barad (2007: ix) writes:

> To be entangled is not simply to be intertwined with another, as in the joining of separate entities, but to lack an independent, self-contained existence.

Some have found this claim to be challenging, questioning how we are to analyze sociomaterial phenomena when the social and material are ontologically inseparable. To appreciate this core commitment, we begin with the idea resonant with a practice approach: that reality is constituted in practice. Barad's (2007) agential realism builds on this assumption to propose that the world manifests in and through ongoing material-discursive practices, or what we term sociomaterial practices. This leads to the stance of ontological inseparability which recognizes that for anything to exist, it must be materialized in specific times and places through actions, texts, models, codes, and so on. In contrast to the organizational literature on technology that, as mentioned, proposes separate and interacting entities or processes, a perspective that some have termed "weak sociomateriality" (Jones 2014, Cooren 2020), in our sociomaterial

theorizing there is no reckoning with distinct artifacts or properties in advance or indeed outside of practice. The guiding premise of agential realism is not only ontological inseparability but also ontological indeterminacy, which means that we cannot know what manifests until the sociomaterial enactment of practice produces an "agential cut" — Barad's (2003) term for specific materializations that enact phenomena by making particular boundaries and properties determinate-in-practice.

In our strong sociomaterial theorizing, inspired by Barad's (2007) agential realism, outcomes are not predetermined as we cannot take the manifestation of any phenomenon for granted. Rather, we must seek to understand where and how its boundaries and properties are enacted in ongoing sociomaterial practices and how such enactments become consequential. That is, we investigate how the agential cuts of multiple apparatuses perform certain realities by what they include and exclude, both 'here and now,' as well as 'then and there' as spatial and temporal relations extend beyond the near-term visible outcomes created by waves of digitalization.

**Apparatus.** This brings us to the agential realist notion of apparatus which vitalizes the processes of stabilization and change involved in institutionalization. Our sociomaterial approach takes as given that the world is differentiated and made meaningful through recurrent sociomaterial practices that over time become stabilized as *apparatuses* that probe and structure the reality they constitute. As Barad notes (2003: 816):

> Apparatuses are not inscription devices, scientific instruments set in place before the action happens, or machines that mediate the dialectic of resistance and accommodation. They are neither neutral probes of the natural world nor structures that deterministically impose some particular outcome. [As such,] apparatuses are not mere static arrangements in the world, but rather apparatuses are dynamic (re)configurings of the world.

With this in mind, we understand apparatuses as sociomaterial practices both proximate and distributed that become constitutive of phenomena — such as institutions — producing, reproducing, and transforming them over time. While ongoing sociomaterial practices enact

multiple apparatus with varying salience and scale, we are particularly interested in what we refer to as institutional apparatuses — the established industry-wide structuring mechanisms (e.g., rules, standards, protocols, norms, values, and measures) that coordinate and regulate the performance of activities, flows, and relations across an industry or sector. We have already highlighted two examples of such institutional apparatuses above — book standards and hospitality accreditation schemes. While industry structuring mechanisms primarily operate in the background, they are constitutive of everyday industry practices, enacting specific materializations with consequential outcomes. Attention to the fine-grained details of such material enactments is crucial to understanding how waves of digitalization influence the way industry-wide apparatuses stabilize and change institutional practices over time.

Making material enactments a focal point of analysis enables us to develop an account of what becomes included and excluded in apparatuses over time, and the consequences of these ongoing processes. This is important because both inclusions and exclusions are integral to understanding what comes to matter in practice. This vantage point leads to what we regard as a critical notion for the study of digitalization: constitutive exclusions. In Barad's (2013) terms, the agential cut performed by an apparatus is a "cutting together-apart," which recognizes that what is excluded remains entangled with what is included; hence, "*constitutive* exclusions." The agential cuts produced through apparatus do not produce "separate entities (and separate sets of concerns) with sharp edges … This is not a static relationality but a doing — the enactment of boundaries — that always entails constitutive exclusions and therefore requisite questions of accountability" (Barad 2007: 135).

Questions of accountability, and indeed of responsibility, are crucial for sociomaterial theorizing, motivating us to concentrate our efforts on the *making* of differences through

ontological in/exclusion and their consequentiality. Barad's (2007) neologism of an "onto-ethico-epistemology" may be a complex notion, but it points to a distinctive strength of agential realism: it coherently comprises an ontology (assumptions about reality), an epistemology (assumptions about knowing), and an ethics (assumptions about morality). In an era when digital phenomena involve opaque and distributed platforms with inscrutable, mutable, and executable algorithms that reinforce bias and produce novel discriminatory practices (Zuboff 2022), approaches that integrate concerns about the dynamics of inclusion *and* exclusion are particularly salient. What differentiates agential realist theorizing from prior approaches to the ethics of organizing is furthermore its concern with how exclusions are enacted in practice and become performative. Here, central to the agential realist notion of constitutive exclusions is the notion of relational performativity, which focuses attention "on the ongoing, dynamic, relational enactment of the world" (Orlikowski and Scott 2015: 700) and which materializes specific ethical distinctions and consequences. On this view, performativity is ontological, not only empirical.

In sum, strong sociomateriality is interested in accounting for how the entangled sociomaterial practices of specific apparatuses enact boundaries with certain performative outcomes. The commitment to viewing the world as materially enacted focuses us on understanding how and in what different conditions sociomaterial practices entail agential cuts that make specific boundaries and properties determinate-in-practice through their constitutive inclusions and exclusions. Drawing on this approach, our focus is on understanding how the agential cuts of institutional apparatuses become performative. More specifically, what difference do digitalization initiatives make to how industry structuring mechanisms coordinate and regulate the materializations of activities, flows, and relations across industries or sectors. What are the

corollary effects of such waves of digitalization and what institutional consequences manifest in the digital undertow.

The theoretical premise that holds the complex constructs of agential realism together is relational performativity. The claim that nothing exists independently is an ontological commitment that distinguishes strong sociomateriality inspired by agential realism from other approaches, pushing us to theorize differently. It focuses us on understanding that everything is always already in relation, entangled ontologically, and that specific sociomaterial enactments are performative, constituting the world in consequential ways. Such an approach enables us to analyze the deeply consequential indirect outcomes, or in our terms, corollary effects, emerging at a remove from the primary program of digitalization. We turn now to considering how the core ideas of strong sociomateriality have informed our understanding of digital transformation, enabling us to theorize the dynamics of the digital undertow and institutional displacement.

**Theorizing the Digital Undertow and Institutional Displacement**

In analyzing the dynamics of the digital undertow in relation to waves of digitalization across multiple sectors, we have found that momentum from the digital undertow is displacing the industry structuring mechanisms that shape activities and relations in those sectors. Moving strong sociomaterial priorities to the foreground, we reconsider how the digital shifts underway in the book and hospitality industries materialize in practice and the relational performativity of the constitutive exclusions that are produced.

In the book industry, the ISBN specifications are premised on books materializing as single, discrete, relatively fixed, bound, paper-based objects that move through a tangible supply chain from publishers via distributors and retailers to consumers. When books were digitized, they began materializing very differently, as digital files downloaded by consumers directly from

retailer websites and then displayed virtually on a variety of digital devices. With the premises of the ISBN specifications based on physical materializations of the book, digital books are constitutively excluded (i.e., they manifest outside the institutional apparatus of the ISBN). As a result, the extant ISBN specifications and digital materializations of the book are no longer in correspondence, challenging the role of standards in the global book trade. This lack of correspondence then undermines the continued capacity of the ISBN to coordinate and regulate the global supply chain, and thus perform effectively as an industry structuring mechanism. The digitalization of books has generated an unwitting yet substantial digital undertow that is displacing the ISBN, a premier international supply chain standard that has effectively structured and governed the book industry for decades (Scott and Orlikowski 2022).

We found the same dynamic at work within the hospitality industry, where hospitality accreditation schemes have been constituted by well-established assumptions, norms, and expectations about how hospitality services should be effectively assessed (e.g., inspections, certifications). When digitalization swept through the industry, giving rise to online reviews, ratings, and rankings on social media platforms, the practices of hospitality assessment began materializing differently (Orlikowski and Scott 2014). No longer dependent on "mystery guest" visits to hotels and restaurants, where in-person inspectors evaluate every aspect of the hospitality service armed with detailed checklists and spreadsheets,[2] online travel platforms allow valuation by anonymous users who post comments and rate (on a few general criteria) specific hotels and restaurants (which they may or may not have experienced in person). These

[2] The UK based Automobile Association (AA) hotel accreditation is a star rating system that is based on a detailed 65-page handbook of quality standards and criteria used in all inspections.

reviews and ratings are then algorithmically aggregated into overall rankings for all the establishments on the platforms.

Following digitalization, the lack of correspondence between the established accreditation schemes premised on physical materializations of formal inspections and the digital materializations of anonymous online valuations have challenged the role of the former as industry structuring mechanisms. As the official accreditation schemes constitutively exclude online user reviews, they are unable to compete with the powerful reach and range of online valuation platforms. And as a result, they lose capacity to effectively coordinate and regulate hotel and restaurant establishments now dealing with a daily onslaught of online reviews and algorithmic rankings (Orlikowski and Scott 2014). Indeed, as with the book industry, the digitalization of travel services has generated an unwitting yet substantial digital undertow that is displacing the established role and value of hospitality accreditation schemes in the contemporary digital era.

Looking across these changes in the book and hospitality industries, we see commonalities in how waves of digitalization are affecting phenomena that are not the focal attention of digital transformation. In both cases, the corollary effects of the waves of digitalization that are manifesting in the digital undertow are unwittingly undermining the status and authority of long-standing industry structuring mechanisms, leading to their institutional displacement.

Theorizing these dynamics with a strong sociomaterial approach, we understand the industry structuring mechanisms at work in the book and hospitality industries as institutional apparatuses that have been honed and revised to effectively structure industry-wide activities, flows, and relations associated with the core phenomena. Over time through recurrent sociomaterial

practices that produce effective and expected outcomes, they achieve a taken-for-granted and institutionalized status in the industry.

As institutional apparatuses, the practices constituting industry structuring mechanisms are sociomaterially entangled with the core phenomena they coordinate and regulate. That is, they perform in relation to how these core phenomena materialize in practice. In the book publishing industry, the ISBN book standard has been designed and adapted over time so that it corresponds to how the book materializes in practice. In the hospitality industry, the established hotel accreditation schemes have been designed and adapted over time to correspond to how the assessment of hotel services materializes in practice. Such sociomaterial entanglements of institutional apparatuses and the core phenomena they structure are performative, serving to constitute the global book trade and quality of hospitality services respectively over time.

When the recurrent practices of industry structuring mechanisms are in correspondence with core phenomena, their ongoing enactment maintains and reinforces the institutional apparatuses. However, as these core phenomena are digitized, tensions in the industry are generated because the institutional apparatuses are no longer in correspondence with how digitized core phenomena materialize. As a result, these phenomena are now constitutively excluded from the structuring assumptions, rules, and guidelines of the institutional apparatuses, which are no longer able to effectively coordinate and regulate the digitized operations. Initially, these challenges are experienced as *tactical tensions* that, as they build up over time, pressure the industry to revise the rules, norms, and boundaries of the industry structuring mechanisms to include the newly digitized core phenomena.

In response, industry organizations and key stakeholders may investigate and analyze possible modifications to the industry structuring mechanisms to assess whether and how they can begin

to accommodate digital materializations of the core phenomena. If suitable revisions are identified, modifications to the industry structuring mechanisms are made and as these become implemented on the ground they reconfigure industry rules, norms, and guidelines so that they include the industry's digitized core phenomena. With widespread adoption and use of the modifications in practice, the revised institutional apparatuses are reaffirmed and strengthened, and their capacity to structure industry-wide operations is reinforced.

However, when revisions to the industry structuring mechanisms are not attempted, or prove ineffectual, or fail to win widespread adoption and use in the industry, the persistent constitutive exclusions of digitized core phenomena from the institutional apparatuses undermine the relational dynamics of the sociomaterial practices that previously held sway. These exclusions generate what we characterize as *existential tensions* that threaten the status and authority of the established structuring mechanisms in the industry. If these tensions endure over time, the continued erosion of purpose, authority, and value of the industry structuring mechanisms leads to them being sidelined or replaced, resulting in their institutional displacement.

These dynamics of the digital undertow and institutional displacement are displayed in Figure 1. As waves of digitalization introduce digital innovations, they shift how core organizational phenomena such as products or services materialize in practice. The dependence of institutional apparatuses on how core phenomena materialize is often unseen and unacknowledged, creating conditions of possibility for institutional apparatuses to break down in relation to waves of digitalization. As core phenomena in an industry are digitized, their materializations are no longer in correspondence with the institutional apparatuses that coordinate and regulate them, and they are constitutively excluded from their purview. As the previously effective institutional

apparatuses are no longer able to accommodate and structure the novel materializations of core phenomena, their industry-wide structuring capacity is substantially challenged and undermined.

As we have seen in two specific industries, the failure of institutional apparatuses to perform effectively in the digital era is generating existential tensions for these apparatuses, threatening their purpose, value, and authority. Over time, the continued lack of correspondence of the apparatuses with the newly digitalized phenomena displaces the apparatuses from their primary and pivotal position of guiding, informing, coordinating, and regulating operations in the respective industry or sector. Importantly, these institutional displacements emerging in the digital undertow arise unwittingly, not as a direct result of intentional, strategic initiatives of digitalization, but as the corollary effects of digital transformations that were aimed elsewhere.

A strong sociomaterial approach provides a powerful way of theorizing the relational dynamics of the digital undertow and institutional displacement. These insights cannot be explained through established approaches to institutional and technological change because they do not consider material enactments and relational performativity. As such, they are unable to theorize how digital shifts in the materialization of phenomena entail agential cuts that produce different constitutive inclusions and exclusions over time, which become performatively consequential.

**Theoretical and Methodological Implications**

The notions of the digital undertow and institutional displacement contribute to our ways of understanding what is of concern and at stake in digital transformation. Much existing research attention has, as mentioned, focused on organizational changes in core business activities resulting from digital innovations. Our theorizing contributes to this literature by providing novel concepts and analytical tools that examine the indirect institutional changes accompanying

digitalization. As we have shown, the visible changes — both intended and unintended — that are manifesting on the surface of the waves are not the only transformations at work in the wake of digitalization. Corollary effects that arise in the digital undertow are generating unwitting institutional changes, which may become deeply consequential over time. These effects remain largely overlooked because they relate to taken-for-granted practices arising at some temporal and spatial distance from the visible, near-term digital waves. As we have seen, the digital undertow has the potential to disturb and disrupt established institutional apparatuses. Indeed, institutional displacements are already manifesting in certain sectors as primary industry structuring mechanisms lose their capacity to effectively regulate and coordinate operations on the ground.

Investigating the corollary effects of digitalization is difficult given their tendency to be out of sight and out of scope relative to the dominant and direct effects of digitalization. As described above, we propose that a sociomaterial approach informed by agential realism is particularly helpful and insightful in identifying the corollary effects of digitalization. In particular, it focuses us on materializations in practice and their shifts following digitalization. This emphasis highlights how the novel digital materializations enact different agential cuts with distinct constitutive exclusions, generating substantial tensions in practice. It is worth considering what a strong sociomaterial approach means for conducting research. We agree with Schultze et al. (2020) that sociomateriality entails distinctive methodologies. To illustrate this point, we offer a methodological overview of the research process we followed in our study of institutional displacement in the book publishing industry (Scott and Orlikowski 2022).

During our research fieldwork, we heard much about the material changes in core publishing operations being experienced as a result of book digitization. These included shifts in editorial

and marketing processes, along with changes in supply chains. Yet, as we proceeded to inquire further into how the digital materialization of books was shifting work practices, we became aware of troubles emerging in the back offices of the publishing industry. In particular, we found significant breakdowns and workarounds in practice associated with assigning metadata for books flowing through the global supply chain. Managing metadata for print books was typically regarded as an administrative chore, a non-essential routine to be performed by temporary office workers. With digitalization, however, managing metadata became complex, uncertain, and essential to the production and distribution of digital books. These findings ran counter to the front office accounts of digital transformation generating innovative possibilities for publishers, consumers, and the industry (e.g., novel channels, new content bundling opportunities, multiple formatting options, market segmentation, etc.).

Alerted to the substantial tensions manifesting on the ground, our research sought to understand how the shift to digital materializations of the book was generating multiple conflicting experiences and perspectives in book industry practices. Further inquiry led us to identify the specific and most serious instance of metadata problems — challenges with the book industry standard, the ISBN, which served as the primary book identifier for every book published around the world. In pursuing this direction, we learned that the ISBN, regarded by many experts as a world-leading example of a global industry structuring mechanism, was struggling in the face of contemporary waves of digitalization. And these struggles were clearly evident in the metadata troubles and failures we were learning about in publishers' back offices.

Drawing on the theme of genealogy in Barad's (2007) agential realism, we turned the temporal orientation of our study around, taking the present-day challenge with the ISBN as our starting point and problematizing it with the question: "how did we get here?" We began by

diagnosing the present situation (Hook 2005; Garland 2014), tracing over five decades of work by the ISBN structuring mechanism (as practiced both by publishers within the industry and by the ISO standards authorities) to understand the conditions of possibility that had produced the current crisis. We collected and reviewed historical archival material, including professional standards publications, ISO documentation on the ISBN, annual reports of regional and international standards bodies, white papers by industry professional associations, and an archive of trade press articles.

We sought to understand how the ISBN apparatus in practice had shaped and was shaped by industry practices in book publishing over time. In particular, our analysis focused us on the continuities and discontinuities in the sociomaterial enactments of the ISBN apparatus over time. By tracing when ISBN practices on the ground deviated from the official specifications of the standard, we became attuned to how ongoing revisions to the ISBN were undertaken in response to digital shifts in the book industry. Attending to what each revision of the ISBN apparatus included and excluded over time allowed us to better understand how changes in digitalization influenced the capacity of the ISBN to coordinate and regulate industry-wide activities, flows, and relations.

The notion of constitutive exclusions sensitized us specifically to where and how significant difficulties with the ISBN were manifesting in the back offices of the book industry. Noting that constitutive exclusions are always performative, we came to understand that these difficulties were being produced by the emerging lack of correspondence between digital materializations of the book and the ISBN specifications that continued to be premised on books materializing as bound, printed objects which move through a physical supply chain from publishers through retailers to consumers. We identified this lack of correspondence as producing a profound

existential challenge within the book industry, generating a significant displacement of the ISBN institutional apparatus in the digital era. In our view, what we had observed in our study was not well explained by existing vocabularies and theories of technological change. It highlighted critical indirect institutional changes stemming from waves of digitalization that were distanced from the core digital transformations and thus unseen and unremarked. Our theorization of these changes as corollary effects arising in the digital undertow emerged from our sociomaterial genealogical process that examined different materializations of the industry's core phenomenon (the book) in relation to the inclusions and exclusions performed over time by the apparatus in practice (the ISBN industry structuring mechanism). This allowed us to see why the most recent wave of digitalization was generating such significant challenges to the continued viability of the ISBN institutional apparatus in the book industry.

We believe the dynamics of the digital undertow and institutional displacement that we have conceptualized here for two different sectors experiencing waves of digitalization can usefully inform other institutional changes in the digital era. In particular, we expect that additional industry structuring mechanisms may be similarly affected as a corollary effect of digitalization and might benefit from the strong sociomaterial theoretical analysis we have presented here. For example, recent waves of digitalization in the financial sector have given rise to cryptocurrencies whose distinctive digital materializations depart significantly from materializations of currencies traditionally issued and managed by governments. As cryptocurrencies gain continued momentum, they challenge existing banking and securities regulations, which are premised on the materialization of fiat money in traditional financial institutions and thus constitutively exclude the novel digital materializations of cryptocurrencies. To the extent that the lack of correspondence between cryptocurrencies and the financial apparatuses intended to regulate and

coordinate currencies persists, significant tensions on the ground will be generated, and these may over time produce significant institutional crises and shifts in the financial sector.

Developing the capacity to investigate the range of transformations associated with digitalization is of particular concern as digital phenomena overflow our existing theoretical and analytical toolkits. Organizational studies of innovation and technological change have tended to focus on phenomena that are proximate in time and space to the program of digitalization. This focus overlooks the novel digital materializations manifesting in profoundly different ways and scales, and at different times and places, including materializations involving generative AI, inscrutable machine learning algorithms, cloud-based platforms, and distributed ledgers. These digital shifts in material enactments — with their distinctive, constitutive inclusions and exclusions — are likely to have far-reaching implications for institutionalized ways of working and organizing.

The focus on how materializations in practice change with digitalization and what different agential cuts are performed provides a powerful way of examining the ethical entailments of digital innovations. As noted, we regard strong sociomateriality as an onto-ethics, recognizing that agential cuts are always performative because they constitute different realities as their specific material enactments include and exclude multiple possibilities for action. This provides a way of inquiring into questions of fairness, responsibility, and accountability with respect to novel digital phenomena and the institutional challenges and consequences they generate. Such concerns are often handled separately as categories of corporate social responsibility or business ethics. The onto-ethical approach supported by relational and performative sociomaterial theorizing is not only a way to produce insightful accounts of how the digital undertow and

institutional displacements are enacted, it also makes ethical inquiry and ongoing problematization of constitutive exclusions integral to research agendas going forward.

## Conclusion

Prior research approaches to digital transformation are largely concerned with the strategic effects of digitalization, focusing on the interactions of technology and organizations. Through the research approach of strong sociomateriality, we have produced insights into critical institutional changes occurring over time beneath the surface of waves of digitalization. This allowed us to theorize the digital undertow as a corollary effect of digitalization and to identify the conditions and practices constituting institutional displacements across different sectors. We believe this articulation of the dynamics of the digital undertow contributes valuable insights to the literature on organizational transformation in the digital era, with broader relevance for organizational scholarship going forward.

Our research insight, that crucial institutional apparatuses which have long shaped and facilitated key ways of organizing are being challenged and undermined, is deeply unsettling. With so much at stake here, it is all the more important to develop innovative research practices capable of examining the multiple complexities and dynamics of digitalization, so as to better understand the institutional shifts underway — both above and below the water line. While the main effects of digitalization, manifesting as the splashy dramatic waves, tend to grab the headlines and our research attention, the changes beneath the surface of digital waves are just as consequential and yet they remain underexamined. As highlighted here, we believe a strong sociomaterial approach offers a powerful and generative approach that better equips us for the challenges of navigating both the waves and their undertow in our research studies of organizations in the digital era.

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**Figure 1: Process Model of Institutional Displacement**