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EDITORIAL

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Digital Resilience: A Conceptual Framework for Information Systems Research

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Abstract

In this editorial, we explore the role of IS in shaping the capacity to recover from exogenous shocks. Based on a synthesis of existing literature, we discuss the interplay between IS and resilience, as examined by various streams of research, and consolidate these insights under the banner of "digital resilience." Our exploration culminates in a new conceptual framework of digital resilience from which we formulate avenues for future research. Through this work, we aim to encourage and support further research and practical strategies focused on digital resilience, ultimately strengthening our collective capacity to navigate the diverse disruptions of our shared future.

Keywords: Digital Resilience, Exogenous Shocks, Crisis, Capacity, Conceptual Framework

1 Introduction

The imperative of building resilience against exogenous shocks has been highlighted by a series of recent extreme events. This prominence comes at a time when severe weather-related events such as droughts, bushfires, and floods continue to disrupt lives, reinforcing the urgency of addressing an escalating climate crisis and its potential for catastrophic consequences. Parallel to these environmental challenges, society faces a number of sociopolitical disruptions, including the shift to hybrid work environments, political unrest, and economic volatility, as well as technological shocks such as large-scale coordinated cyberattacks. The convergence of these events not only hampers global development but perpetuates a cycle of crisis. These instances, while not exhaustive, indicate an increasing frequency and severity of extreme circumstances confronting society at a global scale (Heeks & Ospina, 2019; Nauck et al., 2021). They highlight the complex environmental, technological, economic, and geopolitical risks with which society is currently grappling.

Resilience in the face of exogenous shocks, particularly following the accelerated digitalization witnessed in recent years (Gkeredakis et al., 2021; Rai, 2020), increasingly involves the effective leveraging of information systems (IS). From the use of data analytics and artificial intelligence to facilitate early interventions in emergencies (Pietz et al., 2020; Sipior, 2020) to the deployment of digital social innovation for delivering emergency assistance to marginalized communities (Deganis et al., 2021), our recent experiences underscore the importance of harnessing IS for recovery from disruptions. This editorial is motivated by the need to better understand the intertwined role of IS underpinning our resilience to exogenous shocks. We aim to offer a lens through which novel IS phenomena related to resilience can be explored.

Accordingly, we conduct a review of the literature and discuss *what has been done and found* regarding the interplay between IS and resilience. We then synthesize insights from relevant studies to discuss *what they mean*, specifically highlighting opportunities to consolidate different streams of research under the overarching concept of *digital resilience*. Based on our

synthesis, we propose a new conceptualization for digital resilience—which we define as *the capacity of individuals, organizations, and communities to recover from exogenous shocks, through the design, deployment, and use of IS.* Drawing on this conceptualization, we derive several avenues for future research advancing IS thought leadership on important agendas of digital resilience.

2 Resilience in IS Research

2.1 Resilient Properties

Existing IS research has investigated the resilient properties of social (e.g., psychological traits of individuals) and technological (e.g., physical characteristics of a technology) systems (Heeks & Ospina, 2019; Sakurai & Chughtai, 2020). Most studies focus on exploring the attributes that make an IS resilient (Heeks & Ospina, 2019). These studies see resilience "manifested as a capability of a[n] [IT] system itself" (Floetgen et al., 2021, p. 305). Properties such as flexibility (Li & Chan, 2019), smartness (Velsberg et al., 2020), and recovery speed (Floetgen et al., 2021) have been highlighted as attributes that enable an IS to withstand external stressors, maintain operations, and bounce back from disruptions (Heeks & Ospina, 2019).

From a social perspective, several IS studies have delved into the traits of organizational actors underpinning organizational resilience. The ability of individuals to perceive potential threats, detect imminent threats, and activate a response have been characterized as key enablers for organizational resilience (Floetgen et al., 2021). At the community level, traits such as trust, interdependence (Goldstein, 2012), and access to local knowledge (Shepherd & Williams, 2014) have been characterized as the building blocks of community resilience. In general, the resilience of social actors is demonstrated through their ability to reduce the negative impact of disruptions and accelerate recovery (Floetgen et al., 2021).

Embracing the sociotechnical orientation of IS research, a handful of studies have identified different social and technological attributes that enable the resilience of a broader system, such as an organization or a community (Malgonde et al., 2023; Sakurai & Chughtai, 2020). For example, Heeks and Ospina (2019) proposed a combination of IS features (technological) and action enablers (social) that facilitate community resilience in the specific domain of ICT for development. Other studies have explored how resilient traits among social actors influence their adoption of a specific IS (e.g., Cho et al., 2007; Park et al., 2015) or vice versa—where resilient IS systems serve as an enabler for resilience at the organizational level (Heeks & Ospina, 2019). Taken together, the current IS literature on resilience has primarily focused on delineating the attributes that enable resilience across technological, individual, organizational, and community levels. However, there have been limited attempts to conceptually distinguish resilience from the attributes that enable it.

2.2 IS for Resilience

Beyond examining the properties of a resilient system, IS research has explored the design, deployment, and use of IS for recovery from exogenous shocks, contributing insights into the strategic responses and collective actions initiated during extreme circumstances that are facilitated through the effective leveraging of IS. This line of research is often called crisis (or disaster) management research by IS scholars (Abbasi et al., 2021; Eismann et al., 2021; Pan et al., 2012). We consider its relevance to the resilience discourse through their (often implicit) focus on resilience as an outcome—manifested as a successful recovery from crises enabled through the effective design, deployment, and use of IS.

A prominent theme that has emerged in this research stream is the strategic deployment and use of digital tools by organizational actors for recovery during crises. Several empirical studies have explored how IS resources, including existing digital infrastructure, tools, and services, are coordinated and deployed to maintain communication and operational continuity during crises such as the COVID-19 pandemic and the SARS outbreak (e.g., Henningsson et al., 2021; Leidner et al., 2009 respectively). Given the urgency and uncertainties inherent in such scenarios, the success of these coordination efforts relies on a combination of technological and organizational factors, such as the efficient coordination of expertise (Guo et al., 2020), agility, and stakeholder commitment (Leidner et al., 2009).

Another recurrent theme is the adaptation of widely accessible technologies, such as social media platforms, by individuals and communities to navigate crisis situations. A few studies have discussed the use of social media platforms, such as Twitter and Facebook, in facilitating activities critical for crisis recovery. These activities include real-time information sharing, effective communication, and collective actions during various emergency situations, ranging from tsunamis to earthquakes (Eismann et al., 2021; Leong et al., 2015; Martínez-Rojas et al., 2018; Rao et al., 2020; Tim et al., 2017). In these studies, digital platforms are often leveraged by affected individuals and communities as an alternative channel (Tim et al., 2017) or a frugal option (Floetgen et al., 2021) for self-help, collaboration, and empowerment during crises (Leong et al., 2015; Tim et al., 2017). Fundamental to the successful use of digital platforms in crisis recovery are individuals' abilities to locate and engage with relevant online communities

(Eismann et al., 2021), curate real-time information (Tim et al., 2017), and manage information accuracy (Bae et al., 2021).

While most of the studies discussed above do not explicitly engage with "resilience," they offer glimpses into how individuals, organizations, and communities can leverage IS to mitigate stressors and uncertainties, restore normal operations, and adapt to new demands arising from unfamiliar crisis situations—all of which are manifestations of resilience (Floetgen et al., 2021; Sakurai & Chughtai, 2020). The insights these studies provide into the mechanisms of designing, deploying, and using IS within the specific context of shocks also inform our understanding of the catalysts and processes underpinning IS activities that support recovery. There has been limited integration, however, across this body of work and the IS resilience literature discussed previously.

3 Conceptualizing Digital Resilience

3.1 From IS and Resilience to Digital Resilience

The objective of this editorial is to synthesize insights from these different streams of research under an "umbrella" concept and, by doing so, propose a new IS research agenda that both *encompasses* and *extends* current perspectives to illuminate new conceptual and practical research opportunities regarding resilience. In furthering this objective, we propose the use of the term *digital resilience*. This term has seen increased engagement in recent academic and practitioner publications, with its relevance highlighted in several editorials and calls for papers (Boh et al., 2023; Boh et al., 2020; Rai, 2020). We support this emerging dialogue, recognizing both the relevance and significance of digital resilience as a global agenda and the myriad opportunities for IS scholarship to contribute to this discourse.

This editorial represents our attempt to establish conceptual clarity for digital resilience through a synthesis of existing IS literature on resilient properties, resilience as an outcome, and digital resilience. An analysis of existing research reveals that digital resilience remains a nascent and underdeveloped concept. Across the handful of studies that have explicitly engaged with the term "digital resilience," only a few have provided a definition. We consolidate their different interpretations in Table 1. In some cases, digital resilience is used as a tangential theme or an undefined descriptor (Benitez et al., 2023; Tim et al., 2021; Zhang et al., in press) or interchangeably with other terms such as IT resilience (Liu et al., 2023). The absence of a clear conceptualization poses several challenges for such a nascent field of research. It makes it challenging to align the heterogeneous perspectives and findings presented in different studies. It also hinders new research from building on not only on the emerging dialogue on digital resilience but also on insights accumulated from years of resilience and crisis research in the IS domain. Against this backdrop, we consider it essential to establish a clear conceptual scaffolding on digital resilience to align relevant research efforts, broaden existing perspectives, and facilitate more programmatic investigations into the interplay between IS and resilience.

3.2 Conceptualizing Digital Resilience: A Capacity Perspective

Existing research has defined resilience as an "ability," "capability," and "capacity" (Duchek, 2020; Tremblay et al., 2023). The often interchangeable use of these terms in the literature (Duchek, 2020) has led to ambiguous conceptual delineations of resilience. To bring clarity to the concept of digital resilience, we present Table 2, which outlines the distinctions between the ability, capability, and capacity perspectives, as informed by the existing resilience literature. We then provide examples from IS studies to illustrate how the different perspectives have been adopted to explain the role of IS in resilience phenomena.

Table 1. Definitions of Digital Resilience Compiled from Existing Studies

IS study	Definition of digital resilience
Boh et al. (2023)	"Capabilities developed through the use of digital technologies to absorb major shocks, adapt to disruptions, and transform to a new stable state" (p. 344)
Liu et al. (2023)	"Designing, deploying, and using information systems to prevent, resist, and recover from disruptions" (p. 394)
Park et al. (2023)	"Investment, usage, and governance of IT in a way that affords organizations the capabilities to offer high-quality services and maintain customer satisfaction, similar to what they offer under normal conditions, during a crisis" (p. 452)
Tremblay et al. (2023)	"Dynamic capability of an organization to deploy data, technology, and analytics to anticipate, rebound, and learn from a shock" (p. 426)

Table 2. Distinguishing between the Ability, Capability, and Capacity Perspectives on Resilience

	Ability	Capability	Capacity
Definition	A specific skill that an individual, team, or organization possesses.	"Competencies [of a system] that are built by combining resources" (Baker et al., 2011, p. 303)	Upper bounds of what a system can achieve or endure.
In explaining resilience	This perspective focuses on the foundational enablers of resilience, without necessarily expanding on how the abilities are orchestrated to enable resilience (Heeks & Ospina, 2019).	This perspective focuses on understanding the combined competencies of a system (Duchek, 2020), resulting from pooling resources and abilities, that are needed to enable resilience.	This perspective focuses on the limits of a system's resilience. Capacity extends beyond the mere presence of specific capabilities (Linnenluecke, 2017); it is a relational concept tied to the context and intended outcome. A capacity lens considers resilience as contingent on the nature of the shocks encountered, the conditions of a system when shocks occur, the recovery needs, and how capabilities are deployed and leveraged.
Examples from IS research	The ability to use digital tools effectively is seen as an enabler of resilience. For example, Bae et al. (2021) identified the ability of individuals to manage information accuracy in social media use as an important factor that influences individuals' engagement in disease prevention behaviors during a pandemic.	The capability to leverage relevant IS resources and abilities to support response and recovery activities is studied as a mechanism that enables resilience. For example, Leidner et al. (2009) discussed the capabilities of actors in a public service agency to coordinate existing IT infrastructure, collaborative networks, and IT abilities in responding to two natural disasters.	The full extent or limit of system-wide resilience, contingent upon the contextual challenges and the IS design, deployment, and/or use strategies employed, is conceptualized as digital resilience. For example, Tim et al. (in press) presented a design research study situated in a pandemic context. The study discussed the nature of shocks encountered by healthcare actors in a pandemic and identified interventions that promoted the actors' capacity to recover from such shocks by improving their processes in designing new IS solutions.

In this editorial, we adopt a capacity perspective to conceptualize digital resilience and define it as the capacity of individuals, organizations, and communities to recover from exogenous shocks through the design, deployment, and use of IS. Capacity is typically defined as the maximum level at which a system can perform. This perspective can be traced back to the roots of resilience in the fields of ecology, engineering, and psychology, where resilience is considered to be the capacity of a material, person, or social system to endure, adapt, and rebound from sudden shocks (Comfort et al., 2010). Translating this concept for IS research, we unpack digital resilience as the capacity of individuals, organizations, and communities to recover from shocks by drawing upon the appropriate assets and abilities to perform specific IS design, deployment, and use activities that serve recovery objectives. This conceptualization encapsulates both the properties of technological systems (i.e., assets) and the attributes of social actors (i.e., abilities), which have been highlighted by existing research as key enablers of a system's resilience capacity (Heeks & Ospina, 2019). Beyond identifying the "what" of resilience, this conceptualization also captures the "how" of resilience by placing emphasis on the IS activities made possible through harnessing relevant assets and abilities.

For example, the digital resilience of a community could be interpreted as its capacity to recover from a natural disaster by using IS to coordinate crisis responders. Such capacity may involve successfully capitalizing on preexisting *assets* (e.g., social media platforms) and *abilities* (e.g., the skill in using digital platforms to disseminate knowledge) to enable the distribution of real-time information (IS use *activity*) to facilitate continued communication during a disaster (*recovery from shocks*).

Two studies in particular have informed our conceptualization of the building blocks of resilience. Drawing on an empirical study, Leidner et al. (2009), identified a set of IS and non-IS assets and capabilities that organizational actors employ in their crisis response activities. The paper unpacks the multifaceted role of IS in the process, conceptualizing IS as an asset, capability, and enabler of coordination activities in organizational responses to crises. In their study on platform ecosystem resilience,[1] Floetgen et al. (2021, p. 315) proposed three key components as essential for understanding this subcategory of digital resilience: "what is used to build resilience," "how resilience is being built," and the outcomes of the actions described as the "extent of resilience impact."

Embracing a capacity lens on digital resilience allows us to move beyond existing definitions that foreground either the resilient properties of social and/or technological systems or perceive resilience as merely an outcome. This perspective facilitates the convergence of existing research streams, as resilient properties and IS processes discussed in current research are mapped onto the constituent elements of digital resilience and conceptualized as assets, abilities, and activities. Instead of seeing these elements as isolated, this lens also facilitates investigations into how they interact and collectively contribute to outcomes that represent resilience. We further elaborate on these outcomes in the next section.

In Table 3, we adopt our proposed conceptualization as a lens to analyze existing literature, identifying the various assets and abilities leveraged to perform IS design, deployment, and use activities supporting recovery goals. Notably, most of these studies do not explicitly conceptualize their findings within the context of digital resilience. Nevertheless, our interpretation of these findings provides a snapshot that illuminates the inherent conditions, resources, and competencies involved in the design, deployment, and use of IS for recovery from exogenous shocks—offering initial insights into what we have learned regarding the building blocks of digital resilience.

Table 3. Mapping Existing Literature onto the Constituent Elements of Digital Resilience

	Digital resilience as the capacity of individuals, organizations, and communities to recover from shocks by drawing upon assets and abilities to effectively design, deploy, and use IS		
	Designing IS	**Deploying IS**	**Using IS**
Assets	• The capacity of an organization to cope with a disaster is influenced, in part, by the availability of ontology-based evaluation models to inform the effective design of natural disaster management websites (Chou et al., 2014)	• The capacity of an organization to withstand the negative impacts of a disaster is influenced, in part, by the availability of disaster management systems with high interoperability efficiency (Chen et al., 2013)	• The capacity of an organization to adapt to a crisis is influenced, in part, by the availability of existing IT infrastructure as a crisis response resource (Calloway & Keen, 1996)
Abilities	• The capacity of an organization to adapt to a crisis involves drawing upon the ability to design and deploy grassroots digital innovation "outside the frameworks of strategic plans and compensation systems" swiftly (Rai 2020, p. vi)	• The capacity of an organization to realize information continuity following disasters involves drawing upon the ability to improvise in deploying different IS solutions to address unexpected information flow challenges (Day et al., 2009) • The capacity of an organization to realize business continuity during a crisis involves drawing upon the ability to collaborate with external parties such as vendors to appropriate existing digital infrastructure rapidly (Henningsson et al., 2021)	• The capacity of a community to maintain interactions during a disaster involves drawing upon the ability to manage information accuracy in social media use (Bae et al., 2021) • The capacity of small businesses to adapt to a crisis involves drawing upon the ability to tap into external expertise to support rapid digital transformation (Mandviwalla & Flanagan, 2021)

[1] Platform ecosystem resilience is defined as "leveraging socio-technical factors of digital platforms and ecosystems frugally to design, deploy and use situation-specific responses to prepare for, endure and adapt by capturing new opportunities and engaging in transformative activities to cope with exogenous shocks and become resilient for future disruptions." (Floetgen et al. 2021, p. 315)

3.3 Exogenous Shocks and Associated Digital Resilience Phenomena

The focus on exogenous shocks is a defining attribute of digital resilience, one that distinguishes it from related concepts such as digital transformation and digital agility (see Table 4). Exogenous shocks can be described as the intense impact introduced by low-probability but high-consequence event(s) (Carugati et al., 2020)—events that depart "from the usual, routine-like experiences of an organisation" (Henningsson et al., 2021, p. 138), that "disrupt businesses across industries and societal activities across locations" (Boh et al., 2020, p. 1), and/or cause "a major threat to one or several actors, individual or organisational" (Carugati et al., 2020, p. 763). Digital resilience encapsulates IS phenomena situated within the specific context of shocks. It encompasses the unique motivations, IS design principles, deployment strategies, and use considerations that are geared toward recovering from such shocks. Establishing conceptual clarity for digital resilience therefore necessitates a discussion on the characteristics of exogenous shocks and the unique IS phenomena that emerge within such contexts.

The unpredictability inherent in the duration, trajectory, and magnitude of a shock presents a formidable challenge for affected entities, potentially precipitating a crisis if the challenge is too significant to cope with. Crises represent periods or states of instability (Syed, 2019)—critical "turning points," where external shocks jeopardize an organization's core objectives, disrupt regular operations, and generate high levels of uncertainty (Rai, 2020; Sniezek et al., 2002). These uncertainties (are perceived as) threatening an organization's high-priority goals (Eismann et al., 2021) and imposing decision-making pressure under strict time constraints (Oh et al., 2013; Sniezek et al., 2002). A crisis often has longer-term implications and requires substantial management efforts (Syed, 2019). Figure 1 illustrates the relationships of extreme events, shocks, and crises within our conceptualization of digital resilience.

Table 4. Digital Resilience and Other Relevant IS Concepts

Attributes	Digital agility	Digital transformation	Dynamic capability	Absorptive capacity	Digital resilience
Definition	"The capability of a unit to capitalize on opportunities/threats induced by generative digital technologies under constrained or unfolding time frame" (Salmela et al., 2022, p. 1089)	"Using digital technology in order to (re)define a value proposition and to change the identity of the firm" (Wessel et al., 2021, p. 120)	"The firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al., 1997, p. 516)	"The ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends" (Cohen & Levinthal, 1990, p. 128)	The capacity of individuals, organizations, and communities to recover from exogenous shocks, through the design, deployment, and use of IS
Impetus	Existing or foreseeable opportunities and/or threats brought about by digital technologies (Salmela et al., 2022)	Existing or foreseeable opportunities and/or threats brought about by digital technologies (Wessel et al., 2021)	Existing or foreseeable opportunities and/or threats in the business environment (Steininger et al., 2022)	New external knowledge (Roberts et al., 2012)	Exogenous shocks (social, environmental, technological, economic, and geopolitical)
Intended Outcomes	• Adapt rapidly • Capitalize on immediate opportunities	• Redefine value propositions • Create new identity	• Sustain competitive advantage	• Transform and exploit new knowledge to improve current performance	• Minimize disturbances and maintain stability • Adjust to new conditions • Advance to a stronger state

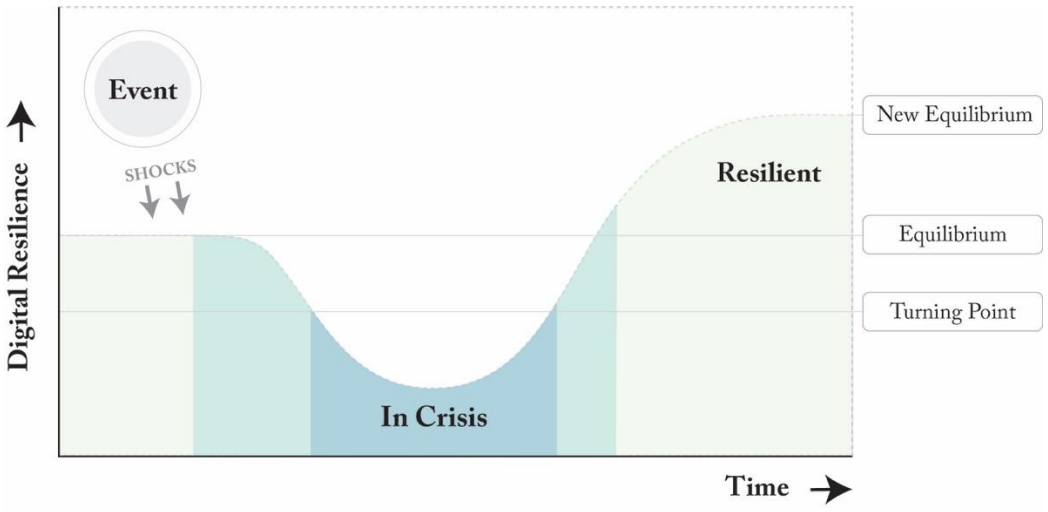

Figure 1. Extreme Events, Shocks, and Crises as Conceptualized in this Editorial

During a crisis, the abnormal situation (Sniezek et al., 2002) provokes collective anxiety, prompts improvised group behaviors, and necessitates adaptive collaboration among the impacted individuals and organizations (Oh et al., 2013). Impacted individuals may lose their sense of safety and predictability (Park et al., 2015) as existing routine practices become inoperative (Oh et al., 2013). In such situations, digital resilience becomes crucial.

Drawing on the proposed capacity perspective, we suggest that examining digital resilience phenomena requires understanding the capacity of individuals, organizations, and communities to effectuate a successful recovery from these shocks through the effective leveraging of IS. Based on a synthesis of relevant research, we found that successful recovery from shocks is manifested through the realization of continuity, adaptation, and/or advancement.

Continuity is characterized by robustness in withstanding shocks and maintaining stability amid crises. Several existing IS studies have made explicit connections between business continuity and resilience (Liu et al., 2023; Park et al., 2015; Park et al., 2023). In this context, resilience is depicted as the successful safeguarding of an organization's essential functions during a crisis to minimize disruptions to stakeholders (Carugati et al., 2020). This form of resilience can manifest in two ways (Duchek, 2020). First, there are instances in which shocks transpire but do not significantly interfere with the normal operations of individuals and/or organizations, implying a coping capacity (Boh et al., 2023; Duchek, 2020). In such scenarios, resilience is observed in that the impacts of such shocks do not materialize (Darkow, 2019) and the normal processes continue unabated (Tremblay et al., 2023). Second, there are instances where shocks cause significant impacts but the affected individuals and organizations demonstrate resilience through recovering from the crisis and returning to their normal state (Heeks & Ospina, 2019). The concept of digital resilience encompasses the capacity to achieve such continuity through leveraging IS. Several examples can be drawn from existing studies that discuss how the continuity of communications, product availability, and service provision were realized following exogenous shocks through the use of IS. We summarize some of these relevant studies in Table 5.

Beyond maintaining continuity and returning to a state of normalcy, recent events and studies have underlined that resilience involves being able to innovate and establish new practices to adapt to shifting circumstances (Duchek, 2020; Sakurai & Chughtai, 2020). This observation brings us to the next facet of recovery: adaptation. *Adaptation* encapsulates the adjustment of existing practices or the invention of new ones to navigate the emerging demands arising from crises through the design, deployment, and/or use of IS. It involves more than the continuation of existing practices; rather, it demands the successful modification of existing practices or even the creation of new ones to address the emergent requirements presented by crises (Carugati et al., 2020; Hacker et al., 2020). As Masten and Obradović (2006, p. 14) succinctly described, resilience is about the emergence of "positive patterns of adaptation in the context of adversity." Beyond conducting business as usual, resilience is demonstrated when a system effectively reorganizes its functions and processes to recover from shocks (Heeks & Ospina, 2019). Existing research has also noted that adaptations do not occur in a vacuum; they depend on a stable foundation. For example, Chen et al. (2011) elucidated the interconnection between continuity and adaptation, discussing how IS can be used to balance the dichotomy of increasing individual autonomy for situational judgment and enhancing centralized control for organizational stability during a large-scale disease outbreak.

The third facet, *advancement*, encapsulates the transformative aspect of resilience. Here, resilience is not about returning to the pre-crisis state or creating temporary, adaptive measures but about establishing a persisting "new normal" (Floetgen et al., 2021, p. 305). When managed effectively, crises are not merely an abnormality to be endured but an opportunity for transformation (Boh et al., 2023; Henningsson et al., 2021). This facet of recovery underscores the capacity to evolve and transform beyond crises through long-term resilience-building strategies to counter both acute and chronic crises. The digital resilience demonstrated during the COVID-19 pandemic, from the permanent transformation of organizational structures to new digital practices and the swift deployment of grassroots innovations, serves as an example of the possibility of achieving transformations and "building forward better" from crisis situations (Sakurai & Chughtai, 2020). Advancement represents the enhanced individual and organizational capacity to cope with future crises by drawing upon successful learning and responses to adversities.

Drawing from the discussions above, we introduce a conceptual framework of digital resilience, as depicted in Figure 2. The objective of this framework is to advance conceptual clarity for digital resilience and to guide future work in this significant field. In the following section, we outline several opportunities for further research informed by the new conceptualization.

Table 5. Insights from Existing IS Studies on Digital Resilience across Three Facets of Recovery

Recovery	Example IS studies
Continuity	*Using IS for continuity*: Tremblay et al. (2023) proposed that the online reputation of physicians and positive physician-patient conversations on online health community platforms promote physicians' use of these platforms. The use of these platforms facilitates service continuity during crisis situations. Kotlarsky et al. (2020) discussed the practices an organizational IT function enacted to coordinate their work and maintain the provisioning of reliable IT services during emergency conditions.
Adaptation	*Designing IS for adaptation*: Sakurai and Chughtai (2020) highlighted how cities designed new systems using existing, basic digital tools to organize and manage new crisis response tasks in place of national systems designated for crisis management. Day et al. (2009) proposed design principles for supply chain solutions to address new information flow challenges that emerge during disasters.
Advancement	*Using IS for advancement*: Henningsson et al. (2021) discussed the actualization of digital affordances in response to a rare event and the creation of new ways of working, business models, and strategic priorities throughout the recovery journey. Hacker et al. (2020) discussed the use of web conferencing systems during periods of disaster-induced physical isolation that created a new "virtual togetherness" that enables new social activities to occur.

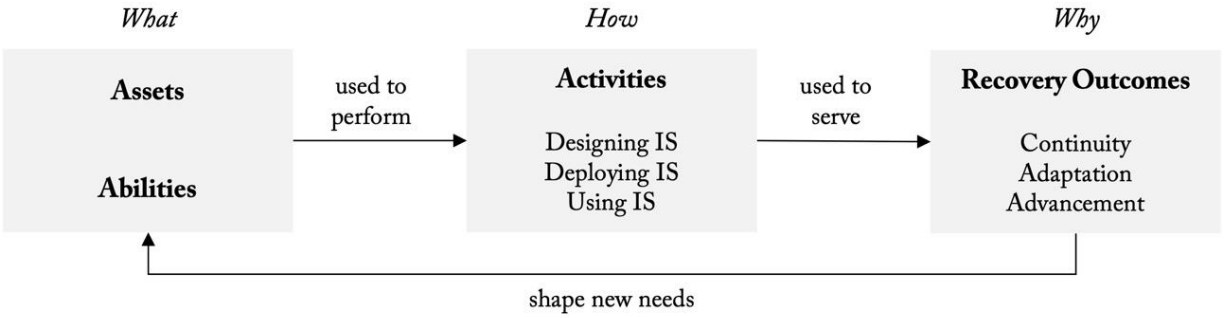

Figure 2. Digital Resilience: A Conceptual Framework

4 Advancing Digital Resilience Against Exogenous Shocks: How IS Research Can Contribute

IS research has much to contribute to developing a research agenda on digital resilience. There is a strong foundation to build upon not only in IS resilience studies but also in the accumulating research examining IS use in exogenous shocks—a stream of research that has been gaining momentum in recent years. Our review of the literature reveals untapped opportunities to develop novel IS insights beyond studying properties of resilient systems or resilience as "black box" outcomes. Correspondingly, we propose a capacity lens to support the investigation of unique digital resilience phenomena situated in the context of recovery from exogenous shocks.

Exogenous shocks and digital resilience phenomena: As outlined earlier, the exploration of digital resilience phenomena necessitates an understanding of the capacity of individuals, organizations, and communities to cope with the complex demands and challenges emerging from shocks and their ensuing crises. This capacity depends on the capabilities of individuals, organizations, and communities to effectively marshal appropriate resources, expertise, and technologies to meet specific recovery objectives within a particular crisis context. Thus, digital resilience extends beyond the mere possession of certain capabilities, encompassing the extent to which these capabilities can be actualized to achieve specific recovery objectives (i.e., continuity, adaptation, and/or advancement) in the face of exogenous shocks. From this standpoint, digital resilience serves as a new lens for IS scholars to examine novel phenomena that emerge within varied crisis contexts, broadening our current explorations of the effective design, deployment, and use of IS beyond the confines of business value creation to the multifaceted issue of resilience building at individual, organizational, and community levels.

Shocks manifest in various forms and severities, each presenting unique challenges to the resilience of individuals, organizations, and communities (Tremblay et al., 2023). Acute crises, such as those triggered by natural disasters or organizational emergencies, demand rapid, decisive actions to minimize damage and restore normalcy (Kotlarsky et al., 2020). Digital resilience in such contexts involves the capacity to realize a swift recovery. Chronic crises, such as those brought by ongoing climate change or persistent social inequalities, require a sustained and strategic approach to resilience. Being resilient in the face of chronic stressors requires the capacity to endure ongoing disruptions while simultaneously strengthening the capacity to recover from the next wave of shocks. Distinct from the largely reactive digital resilience phenomena studied in existing research pertaining to emergency contexts (Abbasi et al., 2021), building resilience in the face of chronic crises such as climate change calls for a proactive and strategic approach that is currently underexplored (Pan et al., 2022). Prolonged crisis situations tend to involve complex decision-making processes, long-term collaborations, and recurrent conflicts among a wide array of stakeholders (Turoff et al., 2004). Furthermore, persistent crises at a global scale demand intricate collaborations across levels and boundaries, extending from international leadership to the grassroots level (Abbasi et al., 2021). What is required to build the digital resilience needed to endure and recover from such chronic stressors? How can individuals, organizations, and communities maintain digital resilience amid both sudden and prolonged crises? How can we manage the trade-offs and paradoxes associated with IS design, deployment, and use emerging from different shock contexts? These questions underscore the need for further research on digital resilience, particularly studies that build on more nuanced considerations of the context of shocks.

Technological shocks, exemplified by the emergence of generative AI, represent another category of shocks, as they fundamentally alter the landscape in which digital resilience is exercised. Resilience to technological shocks involves more than simply withstanding the disruptions introduced by new technologies. It also involves the capacity to adapt and advance, turning the crises that such shocks induce into opportunities for development. Much like a vessel navigating through stormy seas that maintains its course while also venturing into unexplored waters, organizations today face the dual challenge of strengthening digital resilience while navigating their digital transformation journey. They must build the capacity to maintain their existing momentum while simultaneously being capable of strategically adjusting their course to capitalize on the shifting currents of opportunity. The interwoven role of digital resilience within the contemporary landscape of technological advancements thus opens new mesolevel IS phenomena to explore. Future research could address questions such as: How can organizations leverage technological shocks as opportunities to foster innovation? How does the constant advancement of technologies impact the digital resilience of an organization? What strategies can organizations employ to balance the dual objectives of reinforcing digital resilience and driving digital transformation?

The what, why, and how of digital resilience: In parallel with the exploration of different digital resilience phenomena, it is essential to advance the conceptual clarity of digital resilience to organize heterogeneous findings from studies situated in diverse

contexts. Existing empirical research has offered insights into how various assets and abilities, including the availability of IS resources (Leidner et al., 2009), existing routines (Tremblay et al., 2023), and IT governance structures (Park et al., 2023), shape an organization's capacity to recover from crises by leveraging IS. Nevertheless, beyond harnessing preexisting assets and abilities, digital resilience is also shaped by the capability to mobilize new assets and abilities during times of crisis, such as during the period of "forced digitalization" in a pandemic (Hacker et al., 2020). Future research could seek to theorize the building blocks of digital resilience and illuminate the interplay among them. Addressing questions such as—How can organizations effectively draw on and adapt existing assets and abilities to support recovery from exogenous shocks? What types of new assets and abilities become critical during a particular type of crisis? How can these be identified, cultivated, and effectively mobilized during crisis situations?—can extend the proposed conceptualization of digital resilience to elucidate the dynamics and mechanisms that shape such capacity. Such explorations could offer the conceptual foundation needed to align insights from past research with future endeavors.

The digital resilience of individuals, organizations, and communities is not a static attribute but a capacity that evolves over time. New IS practices introduced during a crisis, for instance, can foster innovations that become institutionalized over time, subsequently forming new assets that can be harnessed in future crises (Floetgen et al., 2021). Similarly, the strategies and mechanisms for designing, deploying, and using IS might differ from one stage of a crisis to another—for example, IS might be leveraged to reduce the probability of a disruption during the onset of a crisis but used to mitigate immediate impacts and accelerate recovery in the later stages of a crisis (Liu et al., 2023). Ultimately, to be resilient also means "being able to come away from the event with an even greater capacity to prevent and contain future errors" (Comfort et al., 2010, p. 23). Future research could investigate the evolution of digital resilience and the various factors and mechanisms that advance or challenge this capacity throughout the different stages of a crisis.

The intersections and dependencies across various recovery objectives could also be further explored. For example, as previously discussed, the capacity for adaptation often relies on robust coping mechanisms that enable continuity (Duchek, 2020). Investigating how different IS activities are strategized and implemented to realize multifaceted recovery goals across the continuum of a crisis could offer a more nuanced understanding of digital resilience. These explorations could help to explain why some individuals and organizations manage exogenous shocks more effectively than others and what specific strategies they employ at different stages. The digital resilience of individuals also inevitably shapes capacity at organizational and community levels. How does digital resilience materialize and interact at various levels, and what implications does this have? Addressing such questions will be essential in crafting effective strategies and making informed decisions to manage exogenous shocks.

Implications of digital resilience: Resilience has been associated with rigidity (Duchek, 2020) and is perceived as a temporary coping measure that holds individuals, organizations, and communities in a state of stagnation until a crisis subsides (Floetgen et al., 2021). Investments in building resilience can therefore be seen as a trade-off between efficiency, value creation, and innovation (Nauck et al., 2021). However, we advocate a different perspective: In a digitally integrated society frequently subjected to various shocks, digital resilience is an essential capacity for thriving, not just surviving. This stance resonates with the United Nation's Sustainable Development Goals and its designation of resilience as a strategic priority for all organizations (Corbett & Mellouli, 2017). Accordingly, we encourage future research to consider digital resilience not as a hindrance but as a strategic endeavor. We propose a shift from a predominant focus on how to "bounce back" from adversity to an exploration of how we can "build forward better" in the aftermath of shocks and crises through digital resilience.

Nevertheless, we do not advocate an absolute techno-optimism standpoint. The cultivation of digital resilience is not without its challenges. Within organizations, viewing digital technologies as a panacea for coping with crises could result in the implementation of "quick-fix" digital solutions and ill-considered digital strategies (Ågerfalk et al., 2020). While these measures may prove useful for immediate challenges, they can also bring about unintended consequences, such as less rational design choices (Zilber & Goodman, 2021), which, in the longer term, could incur technical debt (Woodard et al., 2013) and the implementation of high-risk systems fraught with privacy and security issues (Sakurai & Chughtai, 2020). As such, more research is needed to delve into the interplay between digital resilience and other relevant IS phenomena—from digital innovation practices to principles of responsible technology management—in order to mitigate potential issues in reactive crisis-driven designs.

Lastly, as we underscore the indispensable role of digital technologies today, it is equally crucial to acknowledge those who are currently excluded from the digital essentials. The cultivation of digital resilience among vulnerable communities, those either digitally marginalized or disproportionately affected by shocks, presents its own set of challenges. Against

this backdrop, we call for more research to explore the unique digital resilience phenomena in these contexts, such as the use of frugal innovations by underserved communities to navigate crises in resource-scarce areas. In addition to advancing new knowledge on these important phenomena, we also call upon fellow researchers to draw on our collective IS expertise to conduct intervention-based research, lending support to driving digital resilience where it is needed most.

5 Concluding Remarks

Digital resilience has become a cornerstone of society's sustainable progress. With digital technologies interwoven into the very fabric of our lives, digital resilience serves as a foundation for individuals, organizations, and communities to withstand shocks, adapt to changes, and continuously advance amid disruptions. In this editorial, we offer a new conceptual framework bridging past and emerging research streams related to digital resilience. Our framework positions digital resilience as a multifaceted capacity composed of assets, abilities, and activities that are essential for fostering the three facets of recovery—maintaining continuity during, facilitating adaptation from, and enabling advancement following exogenous shocks. We offer this framework as a compass for IS scholars and practitioners in their efforts to understand and cultivate digital resilience. We hope that this editorial will inspire more research and practical strategies, thereby advancing our collective capacity to navigate the complexities and uncertainties of our shared future.

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